

Environmental and Social Impact Assessment for the Power Supply Component of the Mombasa SEZ Development Project



Original

ESIA Study Report

Kenya Electricity Transmission Co. Ltd. (KETRACO)

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PROJECT SUMMARY

Consulting Services for:	Consultancy Services for carrying out Environmental and Social Impact Assessment (ESIA) Study for the Proposed Mariakani-Dongo Kundu 220kV Transmission Line
Project Components	<p>The project is composed of a 220 kV Transmission Line extending over a distance of approximately 53 km from Mariakani (Kilifi County) to Mombasa SEZ (Mombasa County) via Kwale County and a substation at Dongo Kundu.</p> <p>The main components of the Project are:</p> <ul style="list-style-type: none"> • Development of 220 kV transmission line from Mariakani 400/220 kV substation to Mombasa SEZ (The Mariakani 400/220 kV substation is not included in the Project scope) • Development of 220/33 kV substation inside Mombasa SEZ • Development of 33 kV distribution line inside Mombasa SEZ from 220/32 kV substation
Project Objectives	To provide adequate power supply for the proposed Special Economic Zone that will host an Industrial Park, Free Trade Zones, Residential Area, Enterprise and Port Facility among others components.
ESIA Study Objectives:	<p>To evaluate the Environmental and Social Impacts that will arise from the Construction and Operation of the proposed 220kV Transmission Line from Mariakani-Dongo Kundu and a substation in Dongo Kundu.</p> <ul style="list-style-type: none"> • To identify all significant and adverse Environmental Impacts. • To generate baseline data for monitoring and evaluation of how well the proposed mitigation measures are performing. • To evaluate and identify viable project alternatives • To recommend appropriate and cost effective mitigation measures to address project impacts during construction and operation. • To prepare an Environmental and Social Impact Assessment Study Report compliant to <ul style="list-style-type: none"> ✓ The Environmental Management and Coordination Act (1999) including the subsequent NEMA Regulations ✓ JICA Guidelines for Environmental and Social Considerations (2010) and detailing findings and recommendations
Client:	JICA Design Team (JDT)
Proponent:	Kenya Electricity Transmission Co. Ltd. (KETRACO)
Consultant:	PANAFCON Ltd (Kenya)
Report Title:	ESIA Study Report
Submission Date:	January 2019

DEFINITION OF KEY TERMS

Assets: Comprises land, structures or crops/trees, unless otherwise defined.

Census: means a field survey carried out to identify and determine the number of Project Affected Persons (PAPs) families/households/persons or Project Displaced Persons (PDPs). The meaning of the word shall also embrace the criteria for eligibility for compensation, resettlement and other measures that result from consultation with PAPs.

Chainage: Distance along a curved or straight survey line from a fixed commencing point, similar to mileage. Usually presented in “kilometers + meters” (e.g. 101+30)

Community Sensitization Meeting (equivalent to Local Stakeholder Meeting in JICA Guidelines): Meeting convened to inform the community regarding a proposed project

Compensation: Payment in-kind and/or cash for an asset to be acquired or affected by a project at replacement cost, without taking into account depreciation.

Entitlement: Range of measures comprising cash compensation, income rehabilitation assistance, transfer assistance, income substitution, and relocation which are owing to business restoration and/ or PAPs, depending on the type, degree and nature of their losses, to restore their social and economic base.

Host Community: Community/land area where people, physically displaced by a project, will be resettled.

Household: Family or collection of people, which function as a single economic unit.

Income Restoration: Measures required to ensure that PAPs have the resources to at least restore, if not improve, their livelihoods.

Indigenous Peoples: People indigenous to an area and include ethnic minorities as defined by World Bank Operational Policy on Indigenous Peoples (OP 4.10).

Key Stakeholders: Those inhabitants of an area affected by a project who have the most to lose and the most to gain from the completion of the project, and whose concerns must be addressed in an environmental assessment.

PAP Consultation Meeting: Meeting with the Project Affected Persons (PAPs) to disclose to them project impacts and proposed restoration measures.

Project Affected Person: Any person who, on account of the execution of the Project, or any of its components or subprojects would regardless of land type have their: right, title or interest in any house, titled/trust land (including residential, agricultural and grazing land) or any other fixed or movable asset acquired or possessed, in full or in part, permanently or temporarily; business, occupation, work, place of residence or habitat adversely affected; or Standard of living adversely affected.

Project Displaced Persons: All the people affected by a project who through involuntary acquisition and/ or encumbrance placed upon the land on account of the execution of the project, necessitating the moving and resettlement from the affected land; includes any person, household, firms, or public or private institutions who as a result of a project would have their: standard of living adversely affected; right, title or interest in all or any part of a house, land (including residential, commercial, agricultural, plantations, forest and grazing land) or any other moveable or fixed assets acquired or possessed, in full or in part, permanently or temporarily adversely affected; or business, occupation, place of work, residence, habitat or access to forest or community resources adversely affected, with or without displacement business, occupation, place of work, residence, habitat or access to forest or community resources adversely affected, with or without displacement.

Proponent: The agency proposing and has responsibility for implementation of a project.

Public Consultation Meeting (PCM): Meeting convened to gain public input prior to consideration of land use application for a proposed project. The forum is used to inform the public about the product and discuss the potential positive and negative impacts and proposed mitigation measures

Rehabilitation: An enhanced period of maintenance intended to restore a project to its original condition. Structural defects are repaired without major changes to alignment and width standards as would be implemented in a reconstruction.

Relocation: Physical moving of PAPs from their pre-project place or residence, place for work or business premises, to an area within the same land that is not affected by the project.

Resettlement: The settlement of people in a different place.

Resettlement Action Plan: Time-bound action plan, with budget, setting out resettlement strategy, objectives, eligibility criteria, entitlements, actions, responsibilities, monitoring and evaluation. The type of RAP can be categorized by the magnitude of the resettlement required.

Socio-economic Survey: Census of potential PAPs which is prepared through a detailed enumeration survey based on actual data collected.

Stakeholder Meeting: Meeting with Key Stakeholders to inform them about the project and seek guidance/consensus about the project activities

Squatter: A person occupying land to which they have no claim under any tenure but is eligible for compensation as he/she is present during the census and inventory of assets or in occupation of private land for over 12 years in accordance with The Limitations of Actions Act.

UTM (Universal Transverse Mercator): Conformal projection that uses a 2-dimensional Cartesian coordinate system to give locations on the surface of the Earth.

Vulnerable: Any person or groups who might suffer disproportionately or face the risk of being marginalized from the effects of resettlement i.e.

- Female-headed households with dependents;
- Children-headed households;
- Disabled household heads;
- Poor households;
- Landless;
- Elderly households with no means of support: and
- Ethnic minorities.

Wayleave: A Right of Way (RoW) over the land of another. This RoW is for carrying sewer, drain, power line or pipeline into, through, over or under any lands but in so doing may interfere with the existing buildings

CERTIFICATION

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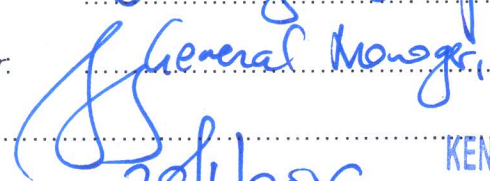


For:

On behalf of:

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Officer's Name: **Dr Eng Joseph Siny**.....
Position of Officer: **General Manager, Technical Services**.....
Signed: .....
Date/Stamp: **28/1/2019**.....

**KENYA ELECTRICITY TRANSMISSION
COMPANY LIMITED**

LIST OF ACRONYMS

ACC	Assistant County Commissioner
BDL	Below Detection Limit
CC	County Commissioner
CDE	County Director of Environment
CDP	County Development Plan
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
CWMP	Construction Work Management Plan
DCC	Deputy County Commissioner
DG	Director General
DP	Displaced Persons
DPCT	District Project Coordination Team
DSDO	District Social Development Officer
EC	Electrical Conductivity
EC	European Commission
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
EIB	European Investment Bank
EMCA	Environment Management and Coordination Act
EMF	Electro Magnetic Field
EPA	Environment Protection Agency
EPs	Entitled Persons
ERC	Energy Regulatory Commission
ERM	Environmental Resources Management
ESIA	Environmental and Social Impact Assessment
ESMaP	Environmental and Social Management Plan
ESMoP	Environmental and Social Monitoring Plan
ESS	Environmental and Social Standard
EU	European Union
GDC	Geothermal Development Company
GoK	Government of Kenya
GPS	Global Positioning System
IFI	International Financial Institution
IMA	Independent Monitoring Agency
IMU	Independent Monitoring Unit
IPP	Independent Power Producers
ISS	Integrated Safeguards System
JDT	JICA Design Team
JICA	Japan International Cooperation Agency
KCAA	Kenya Civil Aviation Authority
KenGen	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
KFS	Kenya Forest Service
KNEB	Kenya Nuclear Electricity Board
KPA	Kenya Ports Authority
KWS	Kenya Wildlife Service
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals

MOE&P	Ministry of Energy and Petroleum
NGO	Non-Governmental Organisation
NLC	National Land Commission
NMK	National Museums of Kenya
OSHA	Occupational Safety and Health Act
PAH	Polycyclic Aromatic Hydrocarbons
PAPs	Project Affected Persons
PCM	Public Consultation Meeting
PM	Particulate Matter
PMU	Project Management Unit
PRC	Provincial Resettlement Committee
REA	Rural Electrification Authority
RF	Resettlement Framework
RAP	Resettlement Action Plan
RIC	RAP Implementation Committee
ROW	Right of Way
SEZ	Special Economic Zone
SIA	Social Impact Assessment
TPH	Total Petroleum Hydrocarbon
TL	Transmission Line
TOR	Terms of Reference
UTM	Universal Transverse Mercator
WB	World Bank
WMP	Waste Management Plan
CWMP	Construction Waste Management Plan

EXECUTIVE SUMMARY

INTRODUCTION

Project Background

The Kenya Electricity Transmission Company (KETRACO) has proposed to build a 53 km 220kV transmission line (TL) from Mariakani-Dongo Kundu to supply electricity to the Mombasa Special Economic Zone (Mombasa SEZ) to be built in Dongo Kundu.

Project Objectives

The objective of developing the Mariakani-Dongo Kundu 220kV transmission line is to provide adequate power supply to the proposed Mombasa SEZ.

PROJECT DESCRIPTION

The Project will consist of the following components:

- Development of 220 kV transmission line from Mariakani 400/220 kV substation to Mombasa SEZ (note that Mariakani 400/220 kV substation is not included in the Project scope and will be constructed through another project)
- Development of 220/33 kV substation inside Mombasa SEZ
- Development of 33 kV distribution line inside Mombasa SEZ from 220/33 kV substation

POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The study has been conducted in accordance with all the relevant legislation pertaining to energy transmission, land ownership and acquisition, relocation and resettlement among others. The Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999 Revised 2018 and the subsequent regulations including Environmental (Impact Assessment and Audit) Regulations of 2003, are the legislations that govern EIA studies in Kenya.

Project Listing in the Second Schedule

Projects to undergo Environmental Impact Assessment are listed in the replaced Second Schedule of EMCA of 19th August 2016. The proposed Project falls in the category of “High Risk Projects – 10 (e) High Voltage Electrical Transmission Lines”. Therefore, it requires to undergo Environmental Impact Assessment (EIA) study.

JICA Guideline for Environmental and Social Consideration 2010 has also been used to carry out this ESIA study. The Project has been categorized as Category A under the JICA Guideline.

BASELINE INFORMATION

The Project area is largely in a rural setting and traverses an area which has the following features:

- Homesteads with residential houses
- Farms with annual and perennial crops
- Privately owned trees of various types
- Cultural sites (Trees used as Shrines at chainage 17.2km and 23.5km from Mariakani)

- Several rivers/streams including Ngoni, Mwache, Mambome (Gandini), Ndlovuni and Pemba Rivers.
- A community forest between DK6 and DK7.

Protected Sites

The table below gives a list of protected (gazetted) sites within the Project area.

Table A: Protected Sites Close to the Project Area

No	Name of Site	Type of Site	Area	Legislation	Distance from TL (km)
1	Kaya Gandini	Kaya	100Ha	Gazetted as natural monument in 1992 under the Antiquities and Monuments Act, Notice No. 200	30m from nearest TL
2	Kaya Kiteje	Kaya	10Ha	Gazetted as natural monument in 1992 under the Antiquities and Monuments Act, Notice No. 200	500m from nearest TL
3	Mwaluganje Forest Reserve	Forest Reserve	17km ²	Gazetted in 1941 under the Forest Act	Approximately 2.5 km south west of DK7
4	Shimba Hills National Reserve	Forest Reserve	300km ²	Gazetted in 1903 as National Forest under the Forest Act	Approximately 12 km south west of DK8

The ESIA study carried out measurements and lab analysis on noise, air, water and soil to obtain the baseline status of the Project area.

ANALYSIS OF PROJECT ALTERNATIVES

The “No Action” Alternative

The ‘No Action’ Alternative was considered where the development of the 220kV TL from Mariakani-Dongo Kundu would not be carried out. One option is to use the existing network in Mombasa but was found that it does not have sufficient capacity to support demand of Mombasa SEZ. An alternative option may be to construct a new power station inside or near Mombasa SEZ, but that will likely entail greater environmental and social impacts. In conclusion, the proposed Project is considered as the most appropriate option.

Alternative analysis of TL route

The following alternative analysis was conducted in the process of finalizing the TL route:

- Alternative analysis of shortest TL route between Mariakani substation and Mombasa SEZ substation
- Alternative analysis of TL outside Mombasa SEZ area including route analysis to avoid Kaya Gandini
- Alternative analysis of TL inside Mombasa SEZ area

ENVIRONMENTAL AND SOCIAL IMPACTS

Scoping of Environmental Impacts

Scoping of environmental impacts was carried out and ToR for the ESIA Study developed. Potential impacts were rated in accordance to the following criteria.

- A+/-: Significant positive/negative impact is expected.
- B+/-: Positive/negative impact is expected to some extent.
- C+/-: Extent of positive/negative impact is unknown.
- D: No impact is expected

Assessment of Environmental Impacts

Potential negative impacts identified from the scoping exercise were predicted and assessed in detail. No significant impacts were identified in regards to pollution and natural environmental aspects. The main concerns are impacts associated with resettlement as presented in **Table B**. Resettlement impacts are addressed in the separate Resettlement Action Plan (RAP) Study.

Table B: Impacts on Human Settlements and Assets

No	Description	Units	Quantity
1	Household Heads	Number	598
2	Project Affected Persons (PAPs)	Number	3,849
3	Land Parcels	Number	565
4	Land Parcels	Total Area in acres	519.71
5	Structures	Number	280
6	Business	Number	3
7	Trees	Number	11,908
8	Crops	Units	9,267
9	PAPs to be relocated	Number	403
10	PAPs for displacement	Number	89

PUBLIC CONSULTATION AND PARTICIPATION

Public Consultation and Participation was carried out at the following levels:

- Initial Key Stakeholder Meetings with leadership in Mombasa, Kilifi and Kwale Counties. The meetings took place from Tuesday July 4, 2017 – Friday 7 July, 2017.
- Sensitization Meetings with the project area community were convened from Wednesday July 12 – Tuesday July 18, 2017. A total of 6 meetings were convened and were attended by 1,194 community members.
- Consultations with KFS, KWS and HMK were carried out from July 25 – 27, 2017.
- PAP Consultation Meetings were carried out from Monday April 23 – Friday April 27, 2018.
- Public Consultation Meetings were carried out in the 9 Locations of the Project Corridor from Monday June 18 – Friday June 22, 2018.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMaP)

An ESMaP matrix table has been prepared which proposes mitigation measures for the potential negative impacts, and its implementation responsibility, supervision responsibility and cost.

ENVIRONMENTAL AND SOCIAL MONITORING PLAN (ESMoP)

An ESMoP matrix table has been prepared which provides the monitoring aim, method, frequency, implementation responsibility and the associated cost.

CONCLUSIONS & RECOMMENDATIONS

Conclusions

As per the ESIA Study, the proposed Project is unlikely to generate any irreversible or permanent negative impacts, providing that the proposed mitigation measures and monitoring are implemented appropriately. The Project should be allowed to proceed when the process of compensation and resettlement is successfully concluded as per the RAP.

Recommendations

The following aspects and commitments are to be considered in the ensuing Project stages:

- The TL tower shall be placed to the extent possible in an area with no land-based activities such as farming.
- The TL tower shall be placed to the extent possible far from sensitive environment such as rivers, school and houses.
- The TL route along the tree shrine area shall be reconsidered whether it is possible to avoid cutting the tree shrines.
- To mitigate the impacts of forest clearance, a detailed afforestation program should be developed through consultation with KFS and local community.
- Measures should be considered so that the affected local communities will gain more benefits through the Project such as providing employment opportunities.
- The proposed Environmental and Social Management Plan (ESMaP) and Environmental and Social Monitoring Plan (ESMoP) should be updated in line with any changes in plan and design of the Project.

COST OF PROPOSED PROJECT

The cost of the Project is estimated as approximately KES 5,700,000,000 (Five Point Seven Billion KES).

1 INTRODUCTION

This ESIA Study Report is for the Power Supply Component of the Mombasa SEZ Development Project. It is for the proposed construction of a 53km long, 40m wide, 220kV transmission line (TL) from Mariakani-Dongo Kundu and a substation in Dongo Kundu.

1.1 Project Background

According to the Government of Kenya long-term development plan “Vision 2030”, Kenya aims to be a middle-income country by 2030 and the development of the Mombasa Special Economic Zone (hereinafter referred to as “Mombasa SEZ”) is mentioned as a priority project to achieve this goal. The Mombasa SEZ will be developed in the Dongo Kundu area of Mombasa County (part of the SEZ is also inside Kwale County), which will cover an area of approximately 1,200 ha. The Mombasa SEZ is planned to consist of free trade zone, industrial park, residential zone, tourism zone among others and are planned to be developed through three phases. New infrastructures such as port, road, power and water supply facilities will need to be developed to serve the Mombasa SEZ. The power supply facilities for the Mombasa SEZ will be developed by Kenya Electricity Transmission Company Limited (KETRACO) and will consist of the following components:

- Development of 220 kV Transmission Line (TL) from Mariakani 400/220 kV substation to Mombasa SEZ (note that Mariakani 400/220 kV substation is not included in the Project scope and will be constructed through Mombasa-Nairobi 400kV Transmission Line project)
- Development of 220/33 kV substation inside Mombasa SEZ
- Development of 33 kV distribution line inside Mombasa SEZ from 220/33 kV substation

Projects to undergo Environmental Impact Assessment are listed in the revised Second Schedule of EMCA of 19 August 2016. The proposed Project falls in the category of “High Risk Projects – 10 (e) High Voltage Electrical Transmission Lines” hence it is required to undergo Environmental Impact Assessment (EIA). JICA Guideline for Environmental and Social Consideration 2010 has also been used to carry out this ESIA study. The Project has been categorized as Category A under the JICA Guideline.

1.2 Project Objectives

The main objective of the proposed project is to ensure provision of adequate and stable supply of electricity to the Mombasa SEZ where there will be commercial and industrial activities.

1.3 Project Justification

The SEZ is going to accommodate several industries that will be carrying out processing and manufacturing of products that will have significant power demand. The high demand for power cannot be met by the available power from Mombasa area hence the need to bring in power from elsewhere. It was therefore necessary to have a dedicated supply coming from a substation in Mariakani that receives power through the 400kV TL that comes from Nairobi. The 220kV line will run from Mariakani Substation to Dongo Kundu for distribution within the SEZ.

2 PROJECT DESCRIPTION

2.1 Project Location

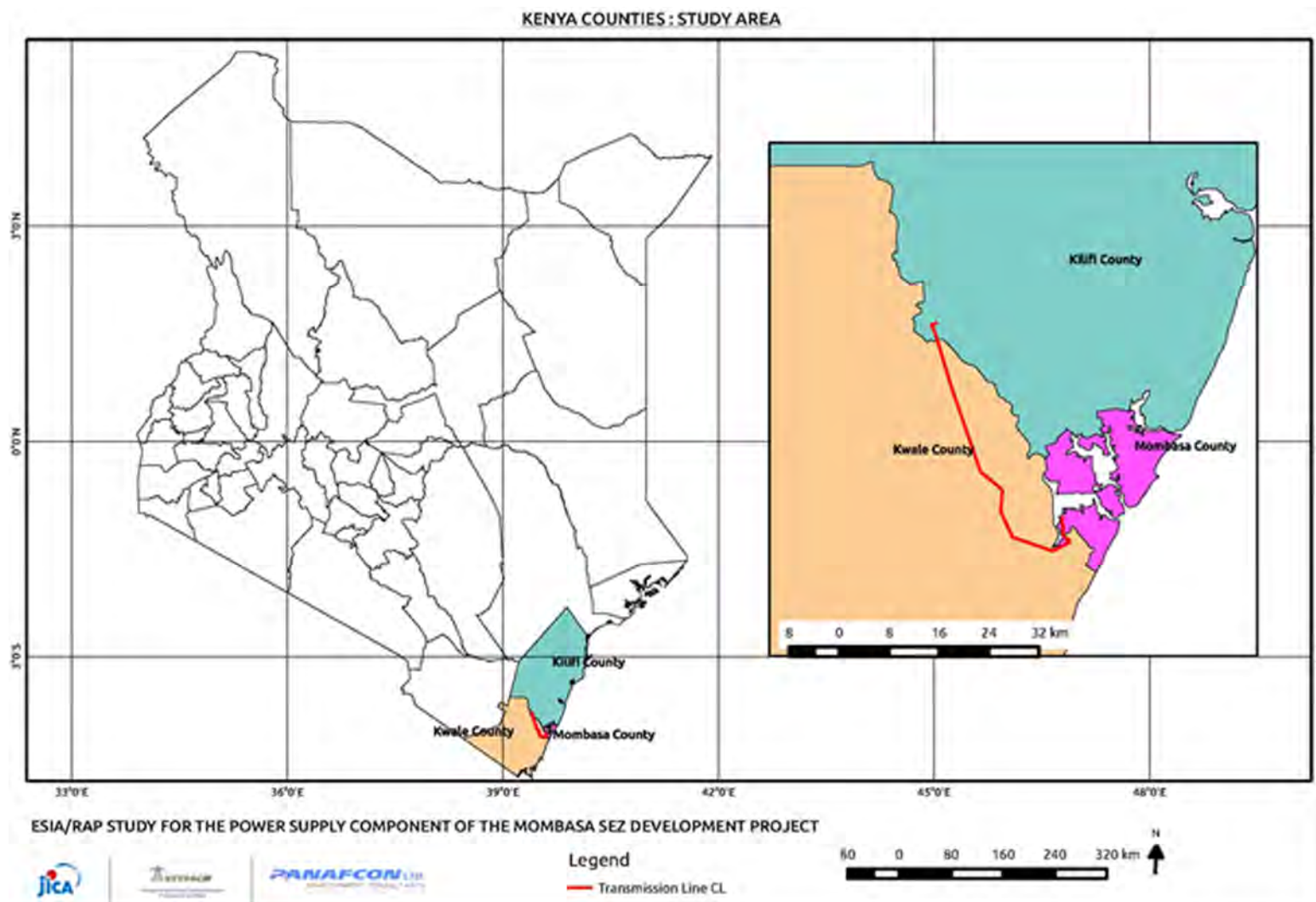
The project will be composed of a TL from Mariakani-Dongo Kundu and a substation in Dongo Kundu. The TL will traverse through three counties namely Kilifi, Kwale and Mombasa covering a distance of 53 km. It will occupy a wayleave corridor of 40m (20m on either side from the center of the TL). The substation will occupy an area of around 1.9 hectares.

Refer to **Map 1 and Map 3** for the location of the Mariakani-Dongo Kundu Transmission Line in the three counties of Kilifi, Kwale and Mombasa.

Dongo Kundu

Dongo Kundu area is in Mtongwe Location, Likoni Sub-County, Mombasa County. It is located immediately south of Port Reitz and to the east of Bombo Creek. The area has undulating topography with hills and valleys with altitude varying from Sea Level (0m) to approximately 80m above sea level.

The Mombasa SEZ 220/33 kV substation will be located in Likoni Sub-County, Mombasa County over a hilly terrain adjacent to the new Southern Bypass Road. **Map 2** shows the location of the Mombasa SEZ 220/33 kV substation while **Map 3** shows the TL route (the coordinates of the angle points are shown in **Annex 6**). The 33 kV distribution line will run from Mombasa SEZ 220/33 kV substation to the new port and industrial area to be developed inside the Mombasa SEZ. The distribution line will be installed along the right-of-way of the new Southern Bypass Road and new port access road. The total distance is approximately 11 km.



Map 1: Location Map Showing Kilifi, Kwale and Mombasa Counties



Map 2: Location of the Mombasa SEZ 220/33 kV Substation

2.2 Basic design of 220 kV transmission line

The 220 kV transmission line will be an overhead double-circuit transmission line supported by steel-lattice type transmission towers. The transmission tower will be placed at an interval of around 300-400 m, and the height will be around 45 m but may vary depending on the site topography and surrounding structures. Sufficient clearance height will be secured from the ground level as per Kenyan regulation. The four corners of the transmission tower base will be secured over a concrete foundation and will occupy an area of around 10 x 10 m. The exact location of the transmission towers will be determined in the ensuing detailed design study. **Figure 1** shows a typical design of steel-lattice type transmission tower.

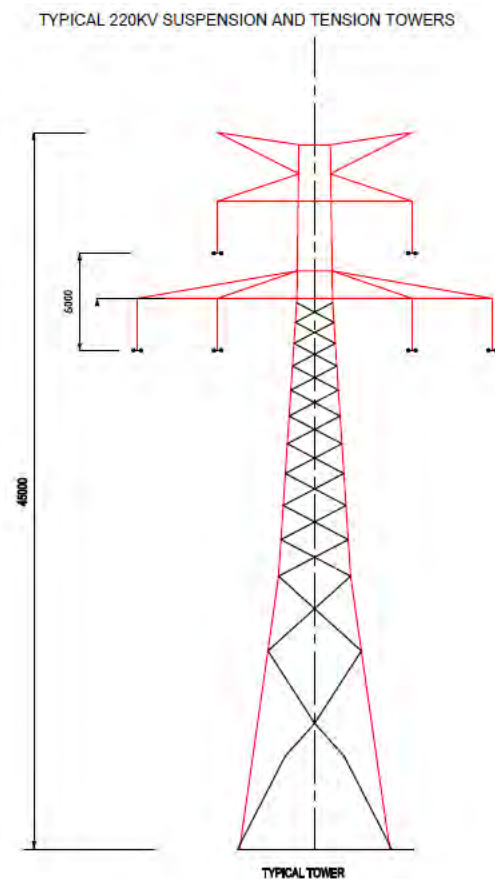
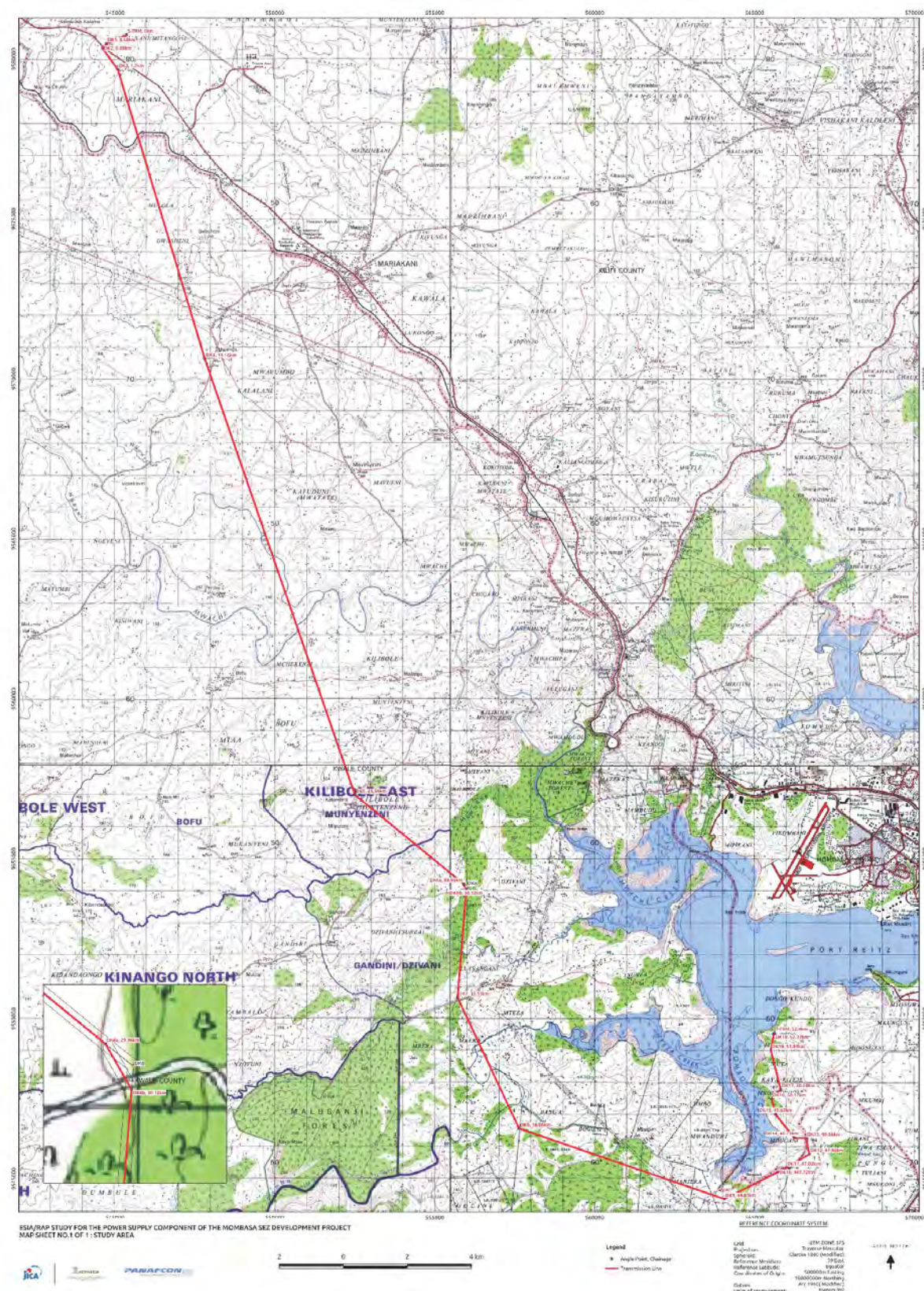


Figure 1: Typical design of steel-lattice type Transmission Tower



Map 3: Location of the Proposed Mariakani-Dongo Kundu 220kV TL

2.3 Basic design of 220/33 kV substation

The 220/33 kV substation will mainly consist of transformers (75 MVA x 2 units), switchgear (220 kV), control building and access road. Oil pit will be installed to contain any spills from the transformer. The area of the substation will be approximately 18,800 m² with some vacant space for future expansion.

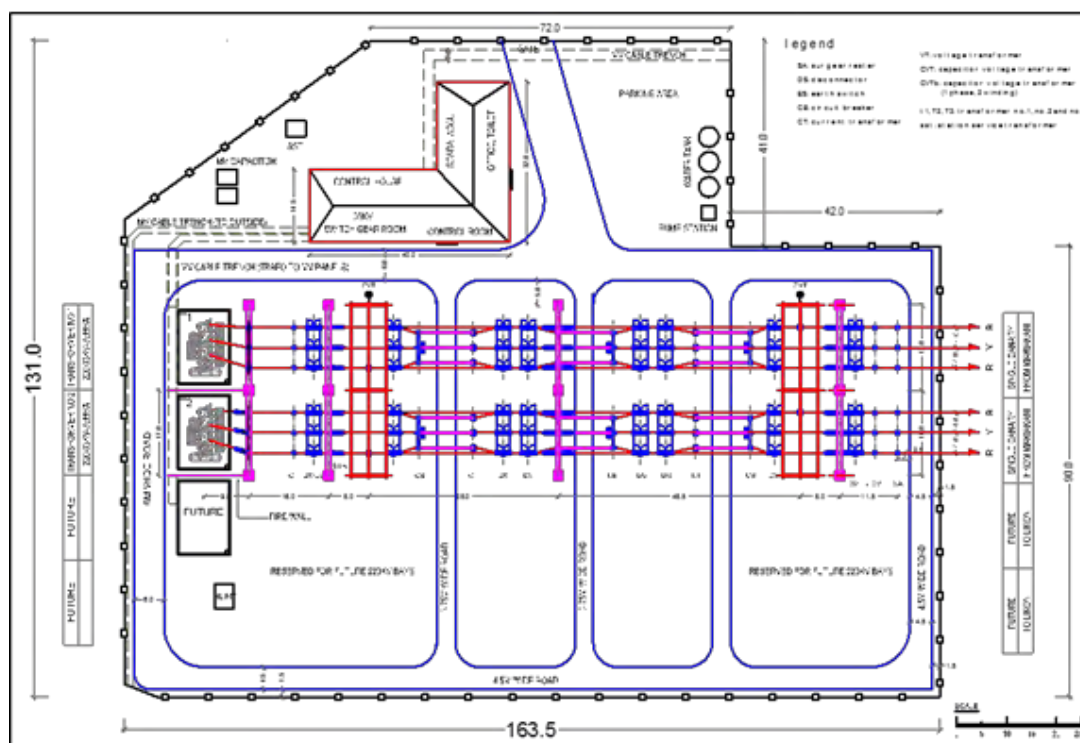


Figure 2: Layout of the 220/33Kv Substation

The access road will have a distance of approx. 800 m, which will connect the substation with the existing road. The road will be constructed through cut and fill works. Box culverts will be installed along the road where it intercepts natural drainage channels. **Figure 3** shows the layout of the substation access road.

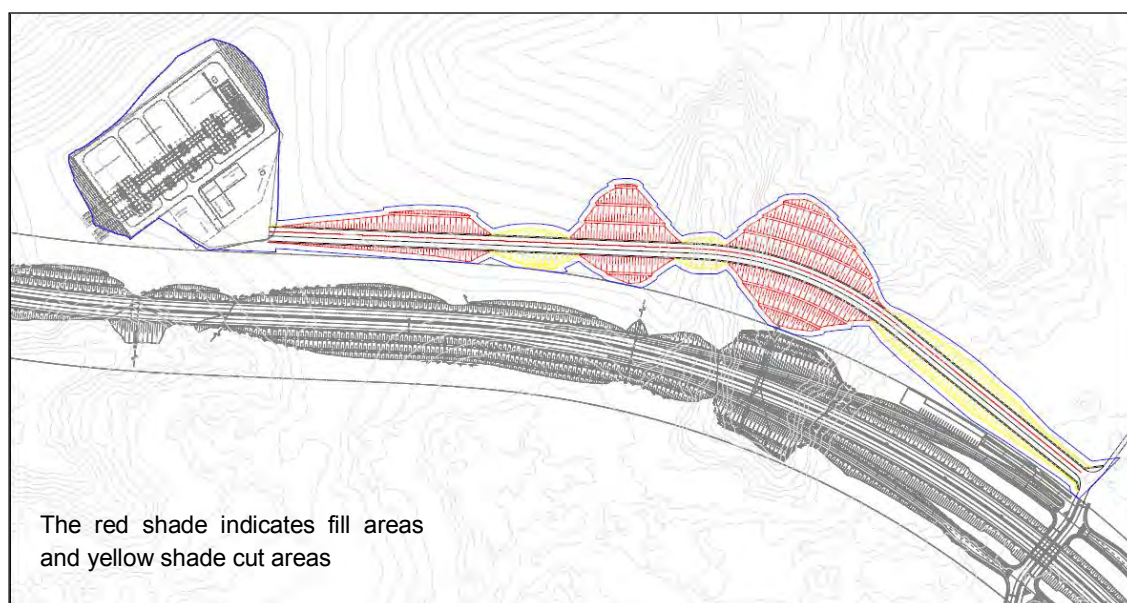


Figure 3: Layout of the substation access road

2.4 33 kV distribution line

The 33 kV distribution line will be an overhead double circuit type supported by concrete pole/foundation.

2.5 Construction plan

During construction of the transmission line tower foundations there will be site excavation works, construction of the concrete tower pad, erection of the lattices and stringing of the conductors. Excavation works will also take place at the substation that covers an area of around 1.9 hectares.

2.5.1 Construction method

(1) Transmission line and tower

Construction of transmission lines will typically involve the following works:

- a) Clearance of vegetation along the transmission line corridor and within the footprint of the transmission tower base. Low-lying vegetation along the transmission line corridor will be maintained.
- b) Establishment of temporary construction yard and access road.
- c) Construction of concrete foundation of the transmission tower. This will include excavation of tower base, concrete placement and backfilling. The concrete mix will be prepared at the site.
- d) Erection of transmission tower (assembling of prefabricated components of the lattice structure)
- e) Stringing of transmission cable. Transmission cable will be installed by installing a winch at one end of the line, and a tensioner and cable drum at the other end.

(2) Substation

Construction of substation will typically involve the following construction works:

- a) Clearance of vegetation within the substation/access road site
- b) Establishment of temporary construction yard
- c) Construction of access road (cut and fill, grading, slope protection)

- d) Site development of substation (cut and fill, grading, slope protection)
- e) Construction of substation equipment foundation (concrete placement)
- f) Construction of control house and installation of equipment and steel structures
- g) Pavement of access road

(3) Construction Machines

Table 1 shows the main construction machines required for construction of transmission line and substation.

Table 1: Main Construction Machines for construction of TL and Substation

Type	Quantity	Type	Quantity
Truck (3 ton)	1	Excavator	6
Truck with crane (2 ton)	2	4-wheel tractor	1
Mobile crane (20 ton):	1	Light truck	4
Power shovel	1	Dump truck (10 ton)	10
Hydraulic rotary drilling rig	1	Water tank truck	1
Pile driving equipment	1	Concrete mixing machine	10
Back hoe	1	Diesel engine generator	8
Stringing winch	1	Welding machine	4
Stringing tension	1	Cutting machine	6

(4) Construction Workers

Around 20 workers (e.g. mason, supervisor, unskilled laborer) are expected daily to be working at the substation construction sites. Around the same number of workers will also be working at the transmission line sites. Most workers will be procured locally, although skilled foreigners may be hired for highly technical works. The entire recruitment process for the workers will be managed by the contractors in accordance with Kenya labor laws.

Normal working hours are planned to be from around 08:00-17:00 from Monday to Saturday. Works outside of normal working hours will require permission from KETRACO and relevant local authorities.

(5) Construction Materials

Construction works will require raw materials such as fill soil, cement, aggregates, gravel and wood. Fill soil will be procured from excess soil generated from substation/access road cutting works. Other materials will be procured locally from licensed suppliers and there will be no need for the Project to develop any new quarries and borrow pits as all necessary raw materials (e.g. sand and aggregates for concrete) are readily available from existing local suppliers.

(6) Temporary Construction Facilities

Temporary construction facilities such as stockyard are planned to be established within the site boundary of the substations and corridor of the transmission lines. Other temporary construction facilities may include concrete batching plant, access road and workers camp. The requirement and locations of these facilities will be considered in more detail in the detailed design stage.

(7) Construction schedule

Construction works is expected to take around 2 years starting from around 2022. **Table 2** shows the tentative construction schedule.

Table 2: Tentative construction schedule

Item	Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Construction of S/S access road	15																								
Construction of S/S foundation	12																								
Design/manufacturing/transportation of S/S equipments	11																								
Construction/installation of S/S equipments	19																								
Site testing	2																								
Construction of transmission line	23																								

2.6 Project cost

The cost of the Project is estimated as approximately KES 5,700,000,000 (Five Point Seven Billion KES).

3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Policy Framework

3.1.1 National Environment Policy

The Kenya Government's National Environment Policy, 2013 aims at integrating environmental aspects into national development plans. The objectives of the national environmental policy include:

- Provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and natural resources.
- Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources.
- Ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods.
- Promote and support research and capacity development as well as use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, Strategic Environmental Assessments (SEAs), Environmental Impact Assessments (EIAs), Environmental Audits (EA) and Payment for Environmental Services (PES).
- Promote and enhance cooperation, collaboration, synergy, partnerships and participation in the protection, conservation, sustainable management of the environment and natural resources.
- Ensure inclusion of cross-cutting and emerging issues such as poverty reduction, gender, disability, HIV&AIDS and other diseases in the management of the environment and natural resources.
- Promote domestication, coordination and maximisation of benefit from Strategic Multilateral Environmental Agreements (MEAs).

3.1.2 KETRACO Safety, Health and Environment (SHE) Policy

KETRACO has prepared a SHE Management System with the specific aim of complying with Occupational Safety and Health Act (OSHA), 2007; Environmental Management & Coordination Act, 1999; Energy Regulatory Board's Environment, Health and Safety policy Framework for the Electric Power sub-sector, 2005; its internal SHE Policy and donor requirements.

3.1.3 KETRACO Route Selection Criteria

A. Criteria for Route Selection:

- The route of a transmission line is decided from the following main considerations.
 - (1) Shortest length, hence least capital cost.
 - (2) Ease during construction and ease in maintenance of the line (route near roads for easy approach & accessibility).
 - (3) Requirement of future loads (substations) near the proposed route so that the line can be easily connected.
 - (4) Required separation distance from parallel communication lines (Communication, Railways, etc.) for meeting the conditions of induced voltage.
 - (5) Avoiding of forest areas as well as wild life sanctuaries.
 - (6) Cost of securing and clearing right of way (ROW).
 - (7) Maintaining statutory distances from Airports, Airstrips and Helipads.

- The following areas are to be avoided as far as possible while selecting the route of the line.
 - (1) Tough inaccessible areas where approach is difficult.
 - (2) Towns and villages, leaving sufficient margin for their growth.
 - (3) Areas subject to floods, gushing streams during rainy seasons, tanks, ponds, lakes, etc. and natural hazards.
 - (4) Wooded areas with high trees or fruit bearing trees involving payment of heavy compensations for cutting of the trees.
 - (5) Swamps and shallow lands subject to flood, marshy areas, low lying lands, river beds, and earth slip zones, etc. involving risk to stability to foundations.
 - (6) High hillocks / hilly areas / sand dunes and areas involving abrupt changes in levels and requiring too many long spans.
 - (7) Series of irrigation wells.
 - (8) Rifle shooting areas and other protected areas such as army / defense installations and ammunition depots.
 - (9) Areas which involve risk to human life, damage to public & private properties, religious places, cremation grounds, quarry sites and underground mines, gardens, orchards and plantations.
 - (10) Areas which will create problems of right of way and way leaves.
 - (11) Buildings / Storage areas for explosives or inflammable materials, bulk oil storage tanks, oil or gas pipelines, etc.
- The route of the transmission line shall, as far as possible, be the shortest length between the pre - determined sub stations.
- The route of the transmission line is to be so located that, as far as possible, it is protected from high winds and falling trees & branches. In hilly tracks, the line is to be routed, as far as possible, along the side of the hills or through valleys rather than over high points. However, a route of the line very close to steep slopes of hills be avoided as far as possible as there may be difficulty in obtaining lateral (side) clearance to ground for conductors. Also, there may be overhanging / loose boulders which may roll down and damage the line.
- It is desirable to take the line as near the paths and roads as practicable without unduly increasing the length of the line so as to facilitate transportation of material during construction and the patrolling / maintenance of the line. Where the line cannot be routed near paths / roads economically, care shall be taken to see that easy access is possible at every 5 to 8 km. It shall be ensured that all angle / tension points, particularly in the case of 400 kV lines, are approachable to facilitate easy transportation of stringing equipment during construction and for maintenance / breakdowns.
- In hilly / mountainous type of terrain or in thickly populated areas, it is generally not advisable to attempt a direct route or try to locate towers in long spans. Small angles of a few degrees cost a little more and add little to the length of the line. Suspension towers (A - type) can be provided for line angles of up to 2 degrees and small angle towers (B - type) can be provided for angles up to 10 degrees.
- In general, large angles in the line are to be avoided wherever possible. The magnitude of the angle be small as far as possible and should never be more than 60 degrees.
- The line shall be aligned suitably so that it can be diverted / looped in looped out (LILO) to cater for possible future loads / sub stations along the route.

B. Telecommunication and Railway Infrastructure:

The line route shall be so selected that the voltage induced in parallel running telephone / communication/ signaling lines / circuits of the Communication/ Railways does not exceed the prescribed permissible values under fault conditions. The Stakeholders approval should be obtained before energizing the line.

C. Approval of The Aviation Authorities:

The line route shall be at a sufficient distance from the aerodromes / airports so that clearance from the aerodrome / airport authorities is not required or, otherwise, can be obtained easily.

D. Crossing of Railway Tracks:

The crossing of Railway tracks shall normally be outside the railway station limits.

E. Crossing Of Rivers / Roads:

- (1) Crossing of rivers is preferably done at points where the bed is of the smallest width and the banks on both sides of the rivers are high. The crossing is done at points of the river path where it is unlikely to cut the banks when it is flowing.
- (2) The route is selected such that multiple crossings of the same road are avoided.
- (3) Crossing of roads at very small angles is to be avoided.

F. Crossing of Power Lines:

- (1) When crossing existing higher voltage power lines, the new line shall normally be below such existing lines except in extremely limiting circumstances.
- (2) When crossing existing lower voltage power lines, the new line shall normally be above such existing lines except in circumstances where it is not possible.
- (3) When crossing existing power lines of the same voltage, the new line may be above or below such existing lines as per site conditions.

G. Approval of Forest Services:

- (1) Forest area is to be avoided as far as possible.
- (2) If forest area cannot be avoided, or if the line route is uneconomical in case forest area is avoided, then the approval of the Forest Department is required.

3.2 Legal Framework

3.2.1 Relevant Environmental Legislations

Table 3 explains the Kenyan environmental laws and regulations relevant to the Project.

Table 3: Relevant Legislation used in the ESIA Study

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
1	Environmental Management & Coordination Act (EMCA), No 8 1999 Revised 2018 and Subsidiary Regulations	<p>The legislation advocates for environmental protection during project implementation and restoration of impacted environment.</p> <p>Section 58, subsection 1 – Requires that before a project is executed, an EIA Report must be prepared and submitted to the Authority (NEMA) in a prescribed form.</p> <ul style="list-style-type: none"> – Subsection (7) EIA shall be conducted in accordance with the EIA regulations, guidelines and procedures issued under the EMCA. – EMCA Part V Section 50 - The Authority shall, in consultation with the relevant lead agencies (including Ministry of Wildlife & Tourism – KWS) prescribe measures necessary to ensure the conservation of biological diversity in Kenya • EMCA, Section 72, 74,75, and 76 deals with water pollution, water pollution prohibition and license to discharge effluent • EMCA, Section 91 and 94 deals with the classification of wastes, handling and their management • EMCA, Section 107 provides standards for the control of noxious smell • EMCA, Part XIII, Section 142 (1) says that any Person who – <ul style="list-style-type: none"> – Discharges any dangerous materials, substances, oil, oil mixtures into land, water, air or aquatic environment; – Pollutes the environment; – Discharges any pollutant into the environment <p>Commits an offence and shall on conviction, be liable to a fine not exceeding five hundred thousand shillings.</p> <p>Sector related regulations that will apply to this project includes:</p> <ul style="list-style-type: none"> – Waste Management Regulations (Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006) that governs handling, storage, transportation, treatment and disposal of wastes; – Water Quality Regulations (Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006) that governs drinking water, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife and water used for any other purposes – Wetlands, River Banks, Lake Shores and Sea Shore Management Regulations (Legal Notice No. 19 of the Kenya Gazette Supplement no. 9, February 2009) that governs management of wetlands, wetland resources, river banks, lake shores and sea shores. Specific sections 	Project has the potential to affect the physical and biological environment including soil, water, air, flora and fauna during construction.	<ul style="list-style-type: none"> • The execution of an ESIA Study in compliance with regulations has been commissioned. • The ESIA Report has provided an Environmental and Social Management Plan (ESMaP) that will be followed by the contractor to mitigate identified project impacts and implement monitoring activities.

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>have requirements that apply to wetlands in Kenya either in private or public land.</p> <ul style="list-style-type: none"> – Conservation of Biological Diversity and Resources, Access to Genetic Resources, Benefit Sharing (BD) Regulations (Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006) Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties that governs Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties – Air Quality Regulations (Legal notice No. 34 of 2014) provides for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. – Noise & Excessive Vibration Pollution Control Regulations (Legal Notice No.61 of 2009) which prohibits any person from making or causing 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 		
2	Environmental (Impact Assessment and Audit) Regulations, 2003.	<p>The legislation provides guidance on project impact categorization into low, medium and high risks and implementation of appropriate environmental and social impact assessments.</p> <p>Part 1 – Preliminary Section 4 (1) says no proponent shall implement a project that (a) is likely to have a negative environmental impact; or (b) for which an environmental impact assessment is required under the Act or these Regulations unless an environmental impact assessment has been concluded and approved in accordance with these Regulations,</p> <p>Part II The Project Report This part describes the Regulations and contents of a Project Report</p> <p>Part III – The Environmental Impact Assessment Study This part describes the ESIA Study Process, Part IV describes the contents of an ESIA Study Report and Part V elaborates on environmental audit and monitoring.</p> <p>The Regulation provides the guidelines that have been established to govern the conduct of environmental assessments and environmental audits in Kenya. The regulations provide guidelines on preparation of EIA Project Report and EIA Study Reports for EIA Licence Applications and Approvals.</p>	The proposed project has been identified to have potential significant impact. Being a high voltage transmission line, the project is envisaged to generate significant impacts	Full ESIA Study of the project assessing all impacts has been commissioned in order to prepare EIA Report for EIA License.

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		Guidelines on Environmental Audits for projects in operation are also provided in these regulations. The guidelines require that the EIA study be conducted in accordance with the issues and general guidelines spelt out in the Second and Third schedules.		
3	Land Act 2012	<p>The Land Act 2012 governs the process of land management in Kenya taking into consideration required conservation measures and restoration.</p> <ul style="list-style-type: none"> • Section 110. (1) Says that land may be acquired compulsorily under this part if the Commission certifies, in writing, that the land is required for public purposes or in the public interest as related to and necessary for fulfillment of the stated public purpose. • Section 146, Says the Commission (National Land Commission) may, create a right of way which shall be known as public right of way. • Section 19. (1) Says the Commission shall make rules and regulations for the sustainable conservation of land based natural resources. • Section 126. Says if the Commission is satisfied that any land of which the occupation or use has been secured under this Part is needed solely as a means of access to other land, then— (b) the compensation to be paid under section 120 shall be limited to the damage done to trees, plants, growing crops and permanent improvements on the land, together with a periodical sum for diminution in the profits of the land and of adjoining land by reason of that use. • Section 107 (7) Says for the purposes of sections 110 to 143, interested persons shall include any person whose interests appear in the land registry and the spouse or spouses of any such person, as well as any person actually occupying the land and the spouse or spouses of such person. • Section 148. (1) Says compensation shall be payable to any person for the use of land, of which the person is in lawful or actual occupation, as a communal right of way and, with respect to a wayleave, in addition to any compensation for the use of land for any damage suffered in respect of trees crops and buildings as shall, in cases of private land, be based on the value of the land as determined by a qualified valuer. 	<ul style="list-style-type: none"> • Restriction of use of land taken up by transmission line and acquisition of Substation land" (40m wide for a distance of 53km for transmission line) and land for the substation. • The project will reduce the use of the land occupied by the TL and take-up of the substation land. 	<ul style="list-style-type: none"> • The execution of an ESIA Study in compliance with regulations has been commissioned. • A RAP Study to facilitate valuation of affected land & Property for compensation has also been commissioned
4	Energy Act, 2006	<p>The Energy Act governs the management and sustainable use of energy resources and enhancing protection of the environment. The Act lays down the groundwork for separation of generation from transmission and distribution of power in electricity sub—sector and liberalization of procurement, distribution and pricing of oil products.</p> <p>The legislation advocates for the following:</p>	<p>The construction and maintenance activities of the project have the potential to:</p> <ul style="list-style-type: none"> • Impact the environment • Cause health and safety risks to workers and the 	<ul style="list-style-type: none"> • Project has initiated this ESIA Study in compliance with regulations • The ESIA Study Report has provided mitigations/safeguard

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>Section 27. (1) Subject to the provisions of this Act, a licence or licences as the case may be, shall be required for the—</p> <p>(a) Generation, importation or exportation, transmission or distribution of electrical energy;</p> <p>Section 30.(1) The Commission shall, in granting or rejecting an application for a licence or permit, take into consideration—</p> <p>(b) The impact of the undertaking on the social, cultural or recreational life of the community;</p> <p>(c) The need to protect the environment and to conserve the natural resources in accordance with the Environmental Management and Coordination Act of 1999;</p> <p>(d) Land use or the location of the undertaking;</p> <p>(e) Economic and financial benefits to the country or area of supply of the undertaking;</p> <p>(f) the ability of the applicant to operate in a manner designed to protect the health and safety of users of the service for which the licence or permit is required and other members of the public who would be affected by the undertaking;</p> <p>Section 53. (1) For the purpose of the conveyance, transmission, or supply of electrical energy, a licensee may erect, fix, install or lay any poles, wires, electric supply lines, power or other apparatus in, upon, under, over or across any public streets, road, railways, tramways, rivers, canals, harbours or Government property, in the manner and on the conditions as provided in this Act.</p> <p>Section 54. (1) Where a licensee requires the compulsory acquisition of land for any of the purposes of a licence, the licensee may apply to the Minister to acquire the land on his behalf.</p> <p>(2) Where the Minister in consultation with the Commission is satisfied that it is in the public interest to do so, he may acquire the land in accordance with the relevant laws.</p> <p>(3) Where land is acquired on behalf of the licensee under subsection (2), the licensee shall bear all the costs in relation thereto.</p>	community	measures to protect workers, community and environment
5	The Public Health Act (Cap 242) Revised Edition 2012	The legislation provides for the protection of public health in Kenya and lays down rules relative to, among other things, food hygiene and protection of foodstuffs, the keeping of animals, protection of public water supplies, the prevention and destruction of mosquitos and the abatement of nuisances including nuisances arising from sewerage.	(l) The construction of the Transmission Line will be done in areas where latrines are not readily available.	(n) The ESIA has proposed that workers be provided with appropriate latrines in the working area. (o) Provision of sanitation

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>Section 115 Says no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.</p> <p>Part IX - Sanitation and Housing,</p> <p>Section 118 - b, c, e, h, i, k provides what constitutes nuisance. This includes:</p> <p>(b) Any dwelling or premises or part thereof which is or are of such construction or is such a state or so situation or so dirty or so verminous as to be dangerous to health</p> <p>(c) Any street, road or any part thereof, any stream, pool, ditch, gutter, watercourse, sink, water tank, cistern, water closet, water tank urinal, sewage treatment plant waste pipe, drain, sewer, garbage receptacle, dust bin, refuse pit is in such way or so situated or constructed to be offensive or to be injurious or dangerous to health</p> <p>(e) Any noxious matter or waste water, flowing or discharged from any premises</p> <p>(h) Any accumulation or deposit of refuse</p> <p>(i) Any accumulation of stones, timber or other material</p> <p>(k) Any dwelling which or premises which is so overcrowded, among other provisions</p> <p>Section 129. Duty of local authority as to protection of water supplies</p> <p>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 (whether such supply is derived from sources within or beyond its district);</p>	(m) The workers require to use latrines while at work.	facilities for workers in the design
6	The Wildlife Conservation and Management Act No. 47 of 2013. Revised Edition 2014	<p>The Legislation governs the conservation and management of wildlife through advocating for the following actions::</p> <ul style="list-style-type: none"> • Protection of wildlife using appropriate methods • Wildlife conservation education and extension services to create public awareness. <p>The relevant sections include:</p> <ul style="list-style-type: none"> • Section 19 elaborates on the functions of the County Wildlife Conservation and Compensation Committees that includes undertake education, extension services and public awareness • Section 26 says Environment Law to Apply • The provisions of this Act with respect to conservation, protection and management of the environment shall be in conformity with the provisions of the Environmental Management and Co-ordination Act (No. 8 of 1999). 	<ul style="list-style-type: none"> • The Transmission Line transects vegetated and Forest areas visited by wildlife (Baboons, wild Pigs and Migratory Birds and Elephants visiting the dispersal areas (though rarely). • There is likelihood that protected/threatened fauna may be present in the project area • There may be fauna 	<p>ESIA Study Report to provide recommendations including:</p> <ul style="list-style-type: none"> • Education on wildlife conservation • Installation of guards on Pylons to stop animals like Baboons from climbing and reaching conductors. • Installation of Bird reflector bowls to avoid bird strikes.

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<ul style="list-style-type: none"> • Section 28 says that Water Act shall apply without exception • Section 29 emphasizes requirement for Sustainable use of land • Section 31 provides for declaration of protected areas by the Cabinet Secretary. • Section 46 provides for Protection of endangered and threatened ecosystems • Section 47 provides for listing of endangered and threatened species and amendment of the list from time to time. • Section 89 provides offences relating to pollution of designated wildlife areas. • Section 92 provides offences relating to endangered and threatened species. 	species that are protected/threatened	
7	The Occupational Safety and Health Act, 2007	<p>The Act provides governance on safe and secure working environment for workers through implementation of appropriate safety measures.</p> <ul style="list-style-type: none"> • Section 3 part 2 of the Act elaborates that the purpose of the Act is to: <ul style="list-style-type: none"> – Secure the safety, health and welfare of persons at work; – Protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work. • Section 8 of the factories and other places of work (Hazardous Substances) rules, 2007 says employers shall provide the employee with suitable respiratory protective equipment and protective clothing. • Section 101. (1) Emphasizes that every employer shall provide and maintain for the use of employees in any workplace where employees are employed in any process involving exposure to wet or to any injurious or offensive substance, adequate, effective and suitable protective clothing and appliances, including, where necessary, suitable gloves, footwear, goggles and head coverings. 	The construction and operation of the project will have activities taking place at heights and areas with steep slopes posing Occupational Safety and Health Risks.	ESIA Report provides recommendations on Health and safety to be followed by Staff carrying out ESIA Study and Construction Staff.
8	Public Roads and Roads of Access Act Cap. 399 (Revised Edition 2010)	<p>The legislation provides for appropriate governance on development and use of public roads and roads of access. The Act advocates for:</p> <ul style="list-style-type: none"> • Notification and seeking permission for construction of Roads of Access from land owners; <p>Section 10 requires that notice is served on land owners affected by the road project.</p> <p>Section 11 elaborates on granting of leave to construct road of access subject to such conditions and to payment of such compensation in respect of any growing crops or permanent improvements damaged or destroyed by the construction of such road of access</p>	<ul style="list-style-type: none"> • The Construction and Operation activities of the Transmission project will require access roads within the project area. • The access roads will pass through fallow and farm lands 	Developer to apply proposed mitigation measures provided in this ESIA Study Report to minimize impact and inconvenience to project area community

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
9	County Government Act No. 17 of 2012 Revised 2017	<p>The County Government Act is intended to provide powers, functions and responsibilities to deliver services to the Counties under the devolved government.</p> <p>Section 3. Object and purpose of the Act The object and purpose of this Act is to— (h) prescribe mechanisms to protect minorities within counties pursuant to Article 197 of the Constitution;</p> <p>Section 34. Exercise of executive authority The county executive committee shall exercise the executive authority—(e) while ensuring the protection and promotion of the interests and rights of minorities and marginalized communities;</p> <p>Section 94. Objectives of county communication - A County government shall use the media to—(c) undertake advocacy on core development issues such as agriculture, education, health, security, economics, sustainable environment among others;</p> <p>Section 104. Obligation to plan by the County (2) The county planning framework shall integrate economic, physical, social, environmental and spatial planning.</p> <p>Section 110. County Spatial Plans (2) The spatial plan, which shall be spatial development framework for the county, shall— (c) contain strategies and policies regarding the manner in which the strategies and policies shall—(vi) contain a strategic assessment of the environmental impact of the spatial development framework;</p> <p>Section 115. Public participation in county planning (1) Public participation in the county planning processes shall be mandatory and be facilitated through— (b) provision to the public of clear and unambiguous information on any matter under consideration in the planning process, including— (i) clear strategic environmental assessments; (ii) clear environmental impact assessment reports;</p>	<p>The project has the potential of</p> <ul style="list-style-type: none"> Displacing people residing within the project corridor Disturbing Flora and Fauna Creating visual intrusion by the pylons 	<ul style="list-style-type: none"> Project plans will be taken to Local Authority for approval. Project design will conform with project area environment reducing visual intrusion ESIA Study which is in progress will carry out an all-inclusive Public Participation process through consultations, sensitization meetings and Public Consultation Meetings. The ESIA Study will also assess and establish the presence of minorities marginalized communities to identify required assistance.
10	The Water Act No. 43 of 2016 revised 2017	<p>The Act provides for the protection from pollution and sustainable use of water resources.</p> <p>Section 63. Right to Clean and Safe Water 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.</p> <p>Section 110. Compulsory Acquisition of Land (1) A licensee, or an applicant for a license, who requires the compulsory</p>	<p>The Transmission Line Project and substation has the potential to:</p> <ul style="list-style-type: none"> Interfere with water catchment Cause pollution of water sources 	<ul style="list-style-type: none"> ESIA Study has already been commissioned Developer to comply with ESIA ESMaP and recommendations on environmental protection and mitigation measures.

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>acquisition of land for any of its purposes, may apply to a county governor, or where necessary to the Cabinet Secretary, who, on being satisfied that such compulsory acquisition is desirable, may take the steps necessary to secure the compulsory acquisition of the land in accordance with the applicable laws.</p> <p>(2) It shall be a condition of the licence that the licensee or an applicant for a licence shall, for the purposes of subsection (1) take any necessary action to ensure the protection —</p> <p>(a) of a source of supply which belongs to such licensee or will belong to the licensee following the acquisition;</p> <p>(b) against pollution or other degradation whether on the surface or underground of any water resource within such licensee's area of jurisdiction.</p> <p>Section 143. Obstruction or Pollution of Watercourse or Water Resource</p> <p>(1) A person shall not, without authority conferred under this Act— (a) willfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or</p> <p>(b) throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.</p> <p>144. Remedy of Defaults</p> <p>(1) Without prejudice to any other remedy or course of action, if a person contravenes any provision under this Act, then, the Authority, the Regulatory Board, the county government executive concerned or the licensee concerned may, by order served on the person concerned, require that person within a reasonable time specified in the order to remedy the contravention and in particular— (a) to clean up any pollution or make good any other harm identified in the order which was caused to any water resource by reason of the contravention;</p>		
11	Forest Conservation and Management Act No 34 of 2016 Revised 2017	<p>This Act provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio-economic development of the country.</p> <p>Section 3. Application of the Act</p> <p>This Act shall apply to all forests on public, community and private lands.</p> <p>Section 4. Guiding Principles</p> <p>The principles of this Act shall be—</p> <p>(a) good governance in accordance with Article 10 of the Constitution;</p>	<ul style="list-style-type: none"> • The proposed Transmission Line (TL) transects vegetated areas and a forested area belonging to the Community (around DK6 – DK7). • There will be need to cut 	<ul style="list-style-type: none"> • ESIA Study has already been Commissioned • Developer to comply with ESIA recommendations on environmental protection, • There are recommendations provided in the ESIA

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>(b) public participation and community involvement in the management of forests;</p> <p>(c) consultation and co-operation between the national and county governments;</p> <p>Section 21. Forestry functions of County Governments</p> <p>(1) Each County Government—</p> <p>(b) shall manage all forests on public land defined under Article 62(2) of the Constitution;</p> <p>(d) shall promote afforestation activities in the county;</p> <p>(e) shall advice and assist communities and individuals in the management of community forests or private forests;</p> <p>(f) may enter into joint management agreements with communities or individuals for the management of community forests or private forests.</p> <p>Section 42. Management of indigenous forests</p> <p>(1) All indigenous forests and woodlands shall be managed on a sustainable basis for purposes of—</p> <p>(a) conservation of water, soil and biodiversity;</p> <p>(b) riparian and shoreline protection;</p> <p>(c) cultural use and heritage;</p> <p>Section 44. Concession on Public Forests</p> <p>(1) Where the Service is satisfied that utilization of a public forest can be done through the granting of a concession, the Service shall grant the concession subject to the provisions of the Constitution, this Act and any other relevant written law.</p> <p>(2) The Service shall not recommend any such proposal unless—</p> <p>(a) the proposal has been subjected to an independent environmental impact assessment; and</p> <p>(b) public consultation in accordance with the Second Schedule has been undertaken and completed.</p> <p>Section 64 (1), except under a license or permit or a management agreement issued or entered into under this Act, no person shall, in a public or provisional forest fell, cut, take, burn, injure or remove any forest produce</p> <p>Section 75. No. 9 of 1999 to apply</p> <p>(1) Where a provision of this Act requires a person to conserve or protect the environment, the relevant provisions of the Environmental Management and Co-ordination Act, 1999, shall also apply with respect to the manner in which the conservation or protection shall proceed.</p> <p>(3) A user or other related right shall not be granted under this Act where the requirement for a strategic environmental, cultural, economic and social impact</p>	<p>down the trees along the TL corridor of 40m wide.</p> <ul style="list-style-type: none"> There may be existence of protected/threatened flora species 	<p>Study Report to protect Sacred and Cultural sites ;</p> <ul style="list-style-type: none"> There are recommendations in the ESIA Study Report to implement mitigation measures including protection of protected/threatened flora species.

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		assessment licence under the Environmental Management and Co-ordination Act, 1999, has not been complied with.		
12	The Physical Planning Act No.6 of 1996 Revised 2012	<p>The Act provides for implementation of regulated development through preparation of physical development plans while taking into account potential environmental impacts.</p> <p>Section 30. Development Permission (1) No person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33.</p> <p>Section 36. Environmental impact assessment If in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report.</p> <p>Section 37. Registration of documents (1) The Registrar shall refuse to register a document relating to the development of land unless a development permission has been granted as required under this Act in respect of such development or unless the appropriate conditions relating to such development permission have been complied with</p> <p>Section 41. Subdivision of land (1) No private land within the area of authority of a local authority may be subdivided except in accordance with the requirements of a local physical development plan approved in relation to that area under this Act and upon application made in the form prescribed in the Fourth Schedule to the local authority.</p> <p>Section 46. Right of entry (2) A person shall not have the right to enter upon any land or premises until after the expiration of forty-eight hours after a notice of entry has been served on the owner or occupier of the land or premises.</p>	<ul style="list-style-type: none"> • There are persons who will be required to relocate and resettle elsewhere within the project area • The project will require the cutting down of trees along the TL corridor. • There will be excavation works for the base of the pylons. • The project has the potential of interfering with flora and fauna in the project area 	<ul style="list-style-type: none"> • Project Design to be submitted for approval • ESIA Study has been commissioned and is in progress • ESIA Study Report contains detailed Environmental and Social Management Plan (ESMaP) that will be used by the proponent and contractor during construction/operation.
13	Employment Act No 11 of 2007 Revised 2017	<p>The Act provides for protection of workers against forced labour and exploitation, employment of underage children.</p> <p>Section 4. Prohibition against forced labour (1) No person shall use or assist any other person in recruiting, trafficking or using forced labour.</p>	The project is located within community settled areas and there is a high potential of underage children looking for manual jobs. The	<ul style="list-style-type: none"> • The ESIA Study Report provides ESMP that prohibits forced and child labour • Project proponent will be

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>Section 53. Prohibition of worst forms of child labour (1) Notwithstanding any provision of any written law, no person shall employ a child in any activity which constitutes worst form of child labour.</p> <p>Section 54. Complaint to the labour officer or police officer (1) A person may make a complaint to a labour officer or a police officer of the rank of an inspector and above if that person considers any child to be employed in any activity which constitutes worst form of child labour.</p> <p>Section 56. Prohibition of employment of children between thirteen years and sixteen years of age (1) No person shall employ a child who has not attained the age of thirteen years whether gainfully or otherwise in any undertaking. (2) A child of between thirteen years of age and sixteen years of age may be employed to perform light work which is— (a) not likely to be harmful to the child's health or development; and (b) not such as to prejudice the child's attendance at school, his participation in vocational orientation or training programmes approved by the Cabinet Secretary or his capacity to benefit from the Instructions received.</p> <p>Section 6. Sexual Harassment (1) An employee is sexually harassed if the employer of that employee or a representative of that employer or a co-worker— (a) directly or indirectly requests that employee for sexual intercourse, sexual contact or any other form of sexual activity that contains an implied or express— (i) promise of preferential treatment in employment; (ii) threat of detrimental treatment in employment; or (iii) threat about the present or future employment status of the employee; (b) uses language whether written or spoken of a sexual nature; (c) uses visual material of a sexual nature; or (d) shows physical behaviour of a sexual nature which directly or indirectly subjects the employee to behaviour that is unwelcome or offensive to that employee and that by its nature has a detrimental effect on that employee's employment, job performance, or job satisfaction.</p>	contractor will also have the opportunity of engaging community members for casual jobs. The engagement needs to observe Employment Act requirements against forced labour.	required to abide by the requirements of the Employment Act
14	Agriculture and Food Authority Act, No 13 of 2013 Revised 2015	<p>The Act provides for governance on land classification, land use and preservation.</p> <p>Section 21. Land Development Guidelines</p>	The proposed transmission, the line crosses over settlement and agricultural	Project proponent undertakes to abide by the requirements of the developed guidelines

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>(1) The Cabinet Secretary shall, on the advice of the Authority, and in consultation with the National Land Commission, provide general guidelines, in this Act referred to as land development guidelines, applicable in respect of any category of agricultural land to the owners or the occupiers thereof.</p> <p>Section 23. Land preservation guidelines</p> <p>(1) The Cabinet Secretary, on the advice of the Authority, and in consultation with the National Land Commission, for the purposes of the conservation of the soil, or the prevention of the adverse effects of soil erosion on, any land, may, prescribe national guidelines for any or all of the following matters—</p> <p>(a) prohibiting, regulating or controlling the undertaking of any agricultural activity including the firing, clearing or destruction of vegetation when such prohibiting, regulating or controlling is deemed by the Cabinet Secretary to be necessary for the protection of land against degradation, the protection of water catchment areas or otherwise, for the preservation of the soil and its fertility;</p> <p>(b) requiring, regulating or controlling—</p> <p>(i) the afforestation or re-afforestation of land;</p> <p>(ii) the drainage of land, including the construction, maintenance or repair of drains, gullies, contour banks, terraces and diversion ditches;</p> <p>(iii) salination, acidification and saltification of soil;</p> <p>(c) requiring the uprooting or destruction, without payment of any compensation therefore, of any vegetation which has been planted in contravention of a land preservation order;</p> <p>Section 32. Land preservation orders</p> <p>A county government may make a land preservation order against the owner or occupier of land, or against both the owner and occupier either at the same time or at different times.</p>	<p>land where farmers grow crops such maize, beans, cassava, peas, and commercial plants like mango trees, cashew nuts, coco nuts etc.</p>	<p>touching on type of development, prevention of adverse effects and following preservation orders issued by County Government.</p>
15	<p>National Museums and Heritage Act No. 6 of 2006 Revised 2012</p>	<p>The Act provides for the protection, preservation and maintenance of cultural and natural heritage sites and monuments.</p> <p>Section 4. Functions of National Museums</p> <p>(c) identify, protect, conserve and transmit the cultural and natural heritage of Kenya;</p> <p>(d) promote cultural resources in the context of social and economic development.</p> <p>Section 43. Duties of National Museums to Protect and Maintain Monuments</p> <p>(1) A monument which is for the time being owned by the National Museums, or under the guardianship of the National Museums, shall be properly maintained</p>	<p>2 Tree shrines are affected. One in Mwatate Location and the other in Kasemeni Locations.</p>	<ul style="list-style-type: none"> • The JICA Design Team is reviewing the Transmission Line route to avoid these cultural/protected sites. • Consultations with the Guardians of the Cultural Sites (Owners of Shrines) have been consulted with regards, to the affected items.

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>by the National Museums, except so far as its maintenance is, by such guardianship or agreement the responsibility of the owner of the monument or of any other person.</p> <p>(3) When any such monument or any part thereof is used periodically for religious observances, the National Museums shall make due provision for the protection of the monument from pollution or desecration—</p> <p>(a) by prohibiting entry therein, except in accordance with by-laws made with the concurrence of the persons in religious charge of the monument or part thereof, of any person not entitled so to enter by the religious usage of the sect or community by which the monument or part thereof is used; or (b) by taking such other action the National Museums deems necessary.</p> <p>Section 57. Heritage wardens</p> <p>(1) The Minister may by notice in the <i>Gazette</i> appoint persons recommended by the National Museums to be heritage wardens for the purpose of enforcing this Act.</p> <p>(2) A heritage warden appointed under subsection (1) may, with leave of the Attorney-General be appointed prosecutor for purposes of prosecuting offences committed under this Act.</p>		
16	Community Land Act No. 27 of 2016	<p>The Act provides for the governance of community land on use, development and benefits sharing among community members.</p> <p>Section 4. Ownership and tenure system</p> <p>(1) Community land in Kenya shall vest in the Community.</p> <p>(2) Subject to the provisions of this Act or any other written law, the State may regulate the use of community land in accordance with Article 66 of the Constitution.</p> <p>(3) Community land shall vest in the community and maybe held under any of the following tenure system—</p> <p>(a) customary;</p> <p>(b) freehold;</p> <p>(c) leasehold; and</p> <p>(d) such other tenure system recognized under this Act or other written law.</p> <p>Section 22. Conversion of community land to public land</p> <p>(1) Community land may be converted to public land by—</p> <p>(a) compulsory acquisition;</p> <p>(b) transfer; or</p> <p>(c) surrender.</p> <p>Section 6. Role of County Governments</p>	The transmission line is passing through land owned by the community	<ul style="list-style-type: none"> The ESIA and RAP Study teams have consulted with the community members. The ESIA Report has provided an ESMaP that should be implemented by the contractor

No.	Legislation/ Guideline	Relevance of the Legislation/Guideline	Trigger of Legislation/ Guideline	Project Fulfillment of the Legislation/Guideline
		<p>(2) The respective county government shall hold in trust for a community any monies payable as compensation for compulsory acquisition of any unregistered community land.</p> <p>Section 19. Land use and development planning of community land (a) consider any conservation, environmental or heritage issues relevant to the development, management or use of the land;</p>		
17	HIV And Aids Prevention and Control Act No. 14 Of 2006 Revised in 2012	<p>The Act provides for measures for the prevention, management and control of HIV and AIDS, to provide for the protection and promotion of public health and for the appropriate treatment, counselling, support and care of persons infected or at risk of HIV and AIDS infection</p> <p>Section 3. Object and purpose of Act The object and purpose of this Act is to— (a) promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS;</p> <p>Section 4. HIV and AIDS Education and Information (1) The Government shall promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS through a comprehensive nationwide educational and information campaign conducted by the Government through its various Ministries, Departments, authorities and other agencies.</p> <p>Section 7. HIV and AIDS Education in the workplace (1) The Government shall ensure the provision of basic information and instruction on HIV and AIDS prevention and control to— (a) employees of all Government Ministries, Departments, authorities and other agencies; and (b) employees of private and informal sectors.</p>	The Transmission Line passes through a settlement area. There is a high potential of the project workers getting involved in unprotected sex with community members.	<p>The Contractor shall prepare a project implementation plan that contains a comprehensive programme for:</p> <ul style="list-style-type: none"> • Regular sensitization of all workers on HIV Aids and other Sexually Transmitted Diseases • Providing workers with condoms

3.2.2 JICA Guideline for Environmental and Social Consideration

JICA Guidelines provide for Impact Categorization into Category A, B, C and FI.

- **Category A** – Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A. These impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors, projects that have characteristics that are liable to cause adverse environmental impacts, and projects located in or near sensitive areas.
- **Category B** – Proposed projects are classified as Category B if their potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily.
- **Category C** – Projects that are likely to have minimal or little adverse impact on the environment and society
- **Category FI** – Project funding is provided to a financial intermediary or executing agency; the selection and appraisal of the sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding, so that the sub-projects cannot be specified prior to JICA's approval of funding/project appraisal; and those sub-projects are expected to have a potential impact on the environment.

This Project is categorized as “Category A” mainly as it will entail significant resettlement. **Table 4** shows the gaps between Kenya's law and JICA environmental guideline and the Project's policy to fill the gaps.

Table 4: Gaps between Kenya's Law and JICA Environmental Guideline

	JICA Environmental Guideline	Kenyan law	Gaps and Project's gap filling policy
General	Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan.	Projects that require EIA is listed in Second Schedule of EMCA. High-voltage transmission line project is categorized as “High risk” hence it is necessary to conduct EIA in the planning stage. As per Article 16 of the EIA regulation, it is necessary to consider alternatives and mitigation measures.	There is no notable gap. The Project will consider alternatives and mitigation measures during the planning process.
Information disclosure	EIA reports must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them.	There is no specific regulation on EIA report language but English is the norm as it is the official language. There is no regulation on language use for when explaining projects to local residents.	The EIA report will be prepared in English. Explanation and written materials for local residents will be provided in Kiswahili, which is the locally common language.
	EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by	As per Article 21 of the EIA regulation, the public have the opportunity to submit oral or written comments on the EIA during the EIA evaluation period, which will be announced through	While there is no specific regulation on the availability period of EIA and permission for copy, the EIA report will be disclosed continuously through KETRACO website.

	JICA Environmental Guideline	Kenyan law	Gaps and Project's gap filling policy
	project stakeholders such as local residents and copying must be permitted.	gazette and newspaper with nation-wide circulation. The announcement will include the time and place where the EIA can be reviewed. There is no specific regulation on the availability period of EIA and permission for copy.	
Consultation	For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans.	As per Article 17 of the EIA regulation, it is necessary to hold at least 3 public meetings during the EIA preparation stage. However, there is no specific regulations on information disclosure and when to hold the meetings.	While there are no specific regulations on information disclosure and when to hold the meetings, the Project will start to hold meetings with relevant stakeholders from the early planning stage to explain and discuss the Project plans.
	In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared.	As per Article 17 of the EIA regulation, it is necessary to hold at least 3 public meetings during the EIA preparation stage. Minutes of the meeting is required to be submitted to NEMA.	No notable gap.
	Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared.	It is required to consult stakeholders during the EIA preparation and also hold public hearing during EIA evaluation as necessary.	While there are no specific regulations on when to hold the consultations, public meetings will be held at the scoping and draft report stages.
Assessment items	The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage,	Second Schedule of the EIA regulation describes the items to be considered such as: <ul style="list-style-type: none"> Natural environment (e.g. biodiversity, wildlife, wetland, water resource, hydrology, vulnerable ecosystem) Social environment (e.g. economy, social, health, migration/immigration, social infrastructure, culture, landscape, amenity, land use) 	There is no notable gap. The Project will nevertheless cover the JICA environmental items.

	JICA Environmental Guideline	Kenyan law	Gaps and Project's gap filling policy
	local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.		
	In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.	As per Article 18 of the EIA regulation, it is necessary to consider secondary, and cumulative impacts but does not mention impacts of projects that are indivisible from the project and to consider impacts throughout the life cycle of the project.	Impacts of Projects that are indivisible from the project will be considered as necessary. Impact will also be considered throughout the life cycle of the Project including pre-construction, construction and operation stages.
Monitoring , grievance	Project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders.	There is no regulation on disclosure of monitoring results.	Monitoring results are planned to be disclosed through KETRACO website.
	When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.	As per Article 39 of the EIA regulation, the public may, after showing reasonable cause in writing, petition the Authority to cause an audit to be carried out on any project.	KETRACO will establish Project Implementation Team, which will include environment and social officers. The team will have the role of responding against any grievances.
Ecosystem and biota	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.	As per Second Schedule of the EIA regulation, it is necessary to assess impacts on vulnerable ecosystem.	While there are no specific regulations on ecosystem and biota, the Project will confirm the presence and status of critical natural habitats and critical forests through field surveys and expert consultations. In case any are identified, the Project will consider to the extent possible to avoid any impacts.
Indigenous Peoples	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	The 2010 Kenya Constitution protects the rights of minority or marginalized communities such as land rights and political participation.	While there are no specific regulations on indigenous peoples, the Project will confirm the presence and status of indigenous peoples through field reconnaissance and interviews. In case any are identified, the Project will consider to the extent possible to avoid any impacts.

3.3 Institutional Framework

There are several institutions that have been set up to operate under the Ministry of Energy and Petroleum (MOE&P) to provide services in the energy sector particularly generation, transmission and distribution of electricity. They include Energy Regulatory Commission (ERC), Kenya Electricity Generating Company (KenGen), The Kenya Power and Lighting Company (KPLC), The Rural Electrification Authority (REA), Kenya Electricity Transmission Company (KETRACO), Geothermal Development Company (GDC), Energy Tribunal, Kenya Nuclear Electricity Board (KNEB), and Independent Power Producers (IPPs).

The roles and functions of these institutions have been categorized into generation, transmission, distribution, oversight, policy and regulation. The functions are elaborated in **Table 5**. The Chart showing the arrangement of the institutions is provide in **Figure 3**. KETRACO plays the role of electricity transmission.

Table 5: Roles of Organizations involved in Electricity Generation & Distribution

No.	Category	Institution	Role/Function
1	Policy	Ministry of Energy and Petroleum (MOE&P)	MOE&P is in charge of making and articulating energy policies to create an enabling environment for efficient operation and growth of the sector
2	Policy	Kenya Nuclear Energy Board - KNEB	KNEB is tasked with defining, coordinating and implementing Kenya's nuclear power programme which includes the development of a comprehensive legal and regulatory framework for nuclear energy use, evaluation of technical requirements for the programme and advocacy for nuclear use in Kenya
3	Arbitration	Energy Tribunal	Energy Tribunal is an independent legal entity which was set up to arbitrate disputes in the sector.
4	Regulation	Energy Regulatory Commission (ERC)	Energy Tribunal ERC is responsible for regulation of the energy sector. Functions include tariff setting and oversight, coordination of the development of Indicative Energy Plans, monitoring and enforcement of sector regulations
5	Generation	Kenya Electricity Generating Company (KenGen)	KenGen carries out generation of electricity from hydropower, thermal, geothermal and wind
		Geothermal Development Company (GDC)	GDC undertakes surface exploration of geothermal fields, undertake exploratory appraisal and production drilling and management of steam fields as well as entering into steam sales agreements with investors
		Independent Power Producers (IPPs)	IPPs are private investors that are involved in generation either on a large scale or for the development of renewable energy under the Feed-in-tariff Policy. Some of the IPPs include IberAfrica Power, Rabai Power, Tsavo Power, or Power, Mumias Sugar Company etc
6	Transmission	Kenya Electricity Transmission Company (KETRACO)	KETRACO Plans, designs, constructs, owns, operates and maintains new high voltage (132kV and above) electricity transmission infrastructure
7	Distribution	Kenya Power and Lighting Company commonly known as Kenya Power	KPLC is the off-taker in the power market buying power from all power generators on the basis of negotiated Power Purchase Agreements (PPAs) for onward transmission, distribution and supply to consumers

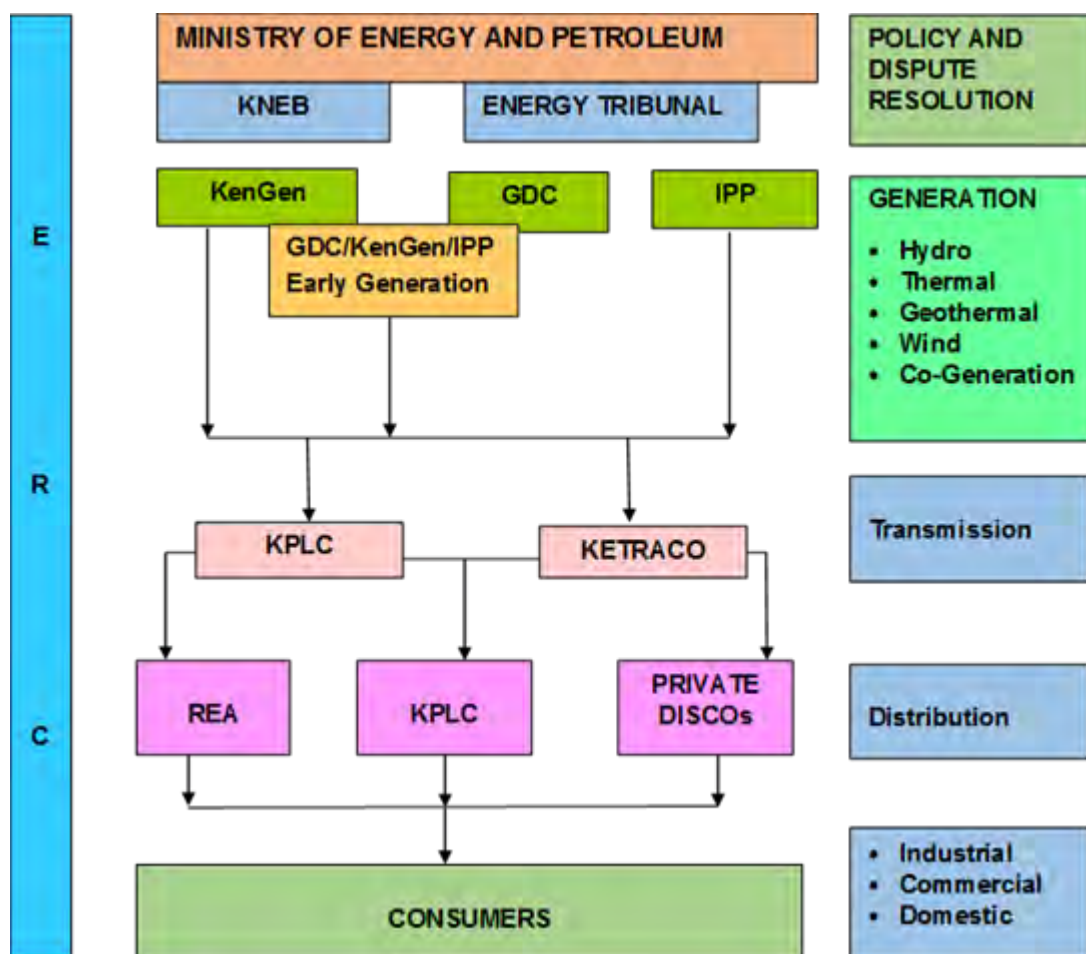


Figure 4: Institutional Arrangements in the Electricity Sector

Abbreviations

- KNEB – Kenya Nuclear Electricity Board
- KenGen - Kenya Electricity Generating Company
- GDC – Geothermal Development Company
- IPP – Independent Power Producers
- REA – Rural Electrification Authority
- KETRACO – Kenya Electricity Transmission Company
- NLC – National Land Commission
- ERC – Energy Regulatory Commission
- KPLC – Kenya Power and Lighting Company known commonly as Kenya Power

3.4 Environment-related permits

Table 6 lists the environment-related permits required in the Project.

Table 6: Environment-related permits required in the Project

No.	Relevant activity	Statute	Requirement	Competent Authority	Responsible Agency for Obtaining Clearance	Date of Acquisition	Duration
Pre-Construction Stage							
1	Construction and operation of TL and substation	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit ESIA report to obtain EIA license	NEMA	KETRACO	Upon approval of ESIA report	Max 90 Days from date of submission of ESIA Report
2	Cutting of forest trees between DK6-7	Forest Management and Conservation Act, 2016	Need to obtain permission to cut forest trees between DK6-7	Kenya Forest Service (KFS)	KETRACO	Before forest clearance works	Indefinite
3	Construction of overhead TL tower (approx. 45 m height)	Civil Aviation Act, 2013	Need to obtain permission to install overhead TL tower	Kenya Civil Aviation Authority (KCAA)	KETRACO	After D/D study	Indefinite
4	Construction activities	Occupational Safety and Health Act (OSHA), 2007	Need to apply registration of premises	Directorate of Occupational Safety and Health Services (DOSHS)	Contractor	Before commencement of construction	1 – 4 weeks
5	Construction and operation of TL and substation in 3 different counties	County Governments Act No. 17 of 2012 revised in 2017	Need to obtain clearance of ESIA report	County Governments of Kilifi, Kwale and Mombasa Counties	KETRACO	Upon approval of ESIA report	Indefinite
6	Setting up of construction camp sites	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit Project report to obtain EIA license	NEMA	Contractor	Before commencement of construction	1 – 1.5 months
7	Water abstraction from water resource (if required)	Water Act, 2012	Need to obtain permission to abstract water	Water Resources Authority (WRA)	Contractor	Before commencement of construction	1 – 1.5 months

No.	Relevant activity	Statute	Requirement	Competent Authority	Responsible Agency for Obtaining Clearance	Date of Acquisition	Duration
8	Drilling of boreholes (if required)	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit Project report to obtain EIA license	NEMA	Contractor	Before commencement of construction	1 – 1.5 months
9	Storage, transport and disposal of waste including hazardous waste	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to obtain waste license through submission of Waste Management Plan	NEMA	Contractor	Before commencement of construction	1 – 1.5 months
Construction Stage							
1	Blasting of construction site bedrocks (if required)	Explosives Act, 2016	Need to obtain to blasting permit	Mines and Geology Department in Ministry of Environment and Forestry	Contractor	Before blasting works	Max 1 month
2	Emission of excessive noise/vibration (if required)	Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	Need to obtain permit to emit excess noise/vibration	NEMA	Contractor	Before excessive noise/vibration works	2 days

3.5 Environmental standards

Table 7 shows the environmental standards that were referred in the EIA study.

Table 7: Environmental standards referred in the EIA study

Category	Referred standards
Air quality	<ul style="list-style-type: none"> • Environmental Management & Co-ordination Act (Air Quality) Regulations 2014 • WHO Ambient Air Quality Guidelines (2005)
Noise/vibration	<ul style="list-style-type: none"> • Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009 • WHO Guidelines for Community Noise (1999)
Surface/ground water	<ul style="list-style-type: none"> • Environmental Management and Coordination (Water Quality) Regulations 2006 • Dutch Soil Remediation Circular 2013
Soil	<ul style="list-style-type: none"> • Dutch Soil Remediation Circular 2013

4 PROJECT BASELINE INFORMATION

The proposed project involves the construction of a 220kV Transmission Line from Mariakani-Dongo Kundu (53km long) and a substation in Dongo Kundu. The transmission line will occupy a corridor of 40m width.

4.1 Physical Environment

4.1.1 Climate

Rainfall

In general, the annual precipitation varies with the distance away from the coast. Along the Coastline Area, rainfall changes from 900-1100 mm per year (Dongo Kundu Area). About 40 to 50 km inland (Mariakani Area), the rainfall is about 700 mm. The coastal region receives an average annual convectional and bimodal rainfall of about 900mm with a marked decrease in intensity into the hinterland. The project area experiences two rain seasons, short rains occur between October and December while the long rains are usually experienced between March and July. The rainfall pattern is influenced by proximity to the Indian Ocean, relatively low altitudes, temperature and trade winds (East Africa Monsoon Winds).

Temperature

The annual minimum temperatures in the area ranges between 22°C and 26°C while the maximum temperatures vary between 31°C and 36°C along the coastal belt. The average annual relative humidity is 77.6% and average monthly relative humidity ranges from 73% in January to 84% in May along the coastal belt due to the high evaporation rate and availability of surface water.

4.1.2 Topography

The project corridor covers a distance of 53km from Mariakani-Dongo Kundu area in Mombasa County. Dongo Kundu lies in the coastal lowland to the south of Port Reitz Creek. It rises gently from flat zone of elevation 0 – 40m above sea level within the SEZ area where the Dongo Kundu substation is located. The landscape of the project corridor as one moves north-westwards undulates forming rolling hills. The topography rises from 40m at Dongo Kundu to about 160m above sea level at the Gandini Forest area located between Mwache and Mwaluganje Forest Reserves (DK6) and 195m at Mwanda Centre further on. The topography further rises to around 220m at Mariakani area where the project starts.

4.1.3 Soils and Geology

Soils

The soil profile changes from the coastline to Mariakani. The soil around Dongo Kundu area up to the hills at Gandini is composed of well drained to imperfectly drained, shallow to moderately deep, yellowish brown to very dark grey, firm to very firm clay on dissected parts (Cambisols). The forested area (DK6 area) is composed of well drained, shallow to moderately deep, dark brown to yellowish brown, firm, moderately calcareous clay. The area from Mariakani to DK6 is composed of well drained, deep, dark brown to yellowish brown, friable to firm, fairly stony, fairly rocky, fine sandy clay loam to clay. The Baseline Soil analysis results for TPH and PAH are presented in **Table 12** and the Analysis Report is in **Annex 9**.

Geology

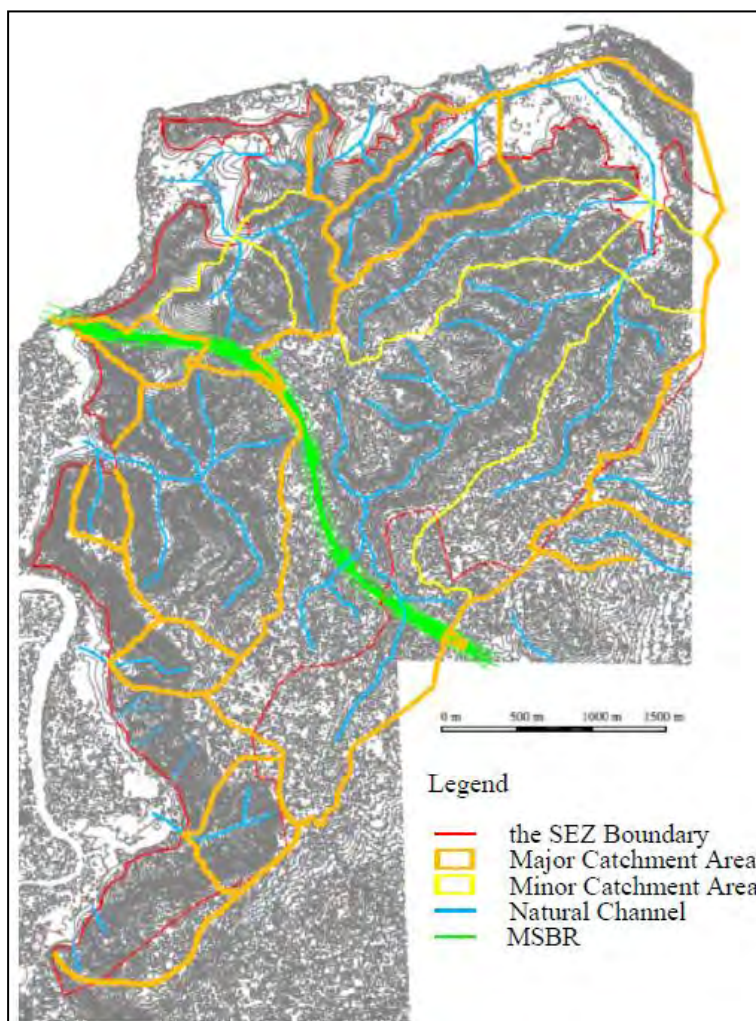
The coastal zone is composed of Jurassic Sediments consisting of Shales and Sandstones with lesser intercalations of limestones. Further inland from Mazeras area to Mariakani, the geology is composed of Mariakani Sandstones overlain by Mazeras Sandstones and Shimba Grits. These can be seen exposed along the Mwache River and its tributary (Ngoni River).

4.1.4 Hydrology

The main river that drains the transmission line project area is Mwache River. The Mwache River and all the tributaries feeding into it are seasonal by nature and flows are dependent on the rainfall in the middle and high watersheds discharging into Indian Ocean via Mwache Creek and Port Reitz. These rivers flow southwards and south-eastwards as tributaries of Mwache River. Mwang'ombe River passing on the eastern side of the Mariakani Substation area flows southwards changing its name to Ngoni and joins Mwache River to the north east of Bofu. The other rivers that drain the project area include Ngeyeni and Matumbi Rivers that flow eastwards to join Mwache River to the north-east of Matumbi Centre. Mambome and Ndzovuni Rivers also drain the project area eastwards passing through Lutsangani to the Mwache Creek.

Mwache River and the smaller seasonal streams have peak flows that coincide with the rainy seasons occurring between March and June and during November/December short rains. The river beds remain dry for the rest of the dry season. Cumulatively the rivers drain thousands of tons of sediment during the flows. The local population relies on these rivers for their domestic water supply and watering livestock. Shallow groundwater in the area is exploited through wells and boreholes to augment water supply to the community since the rivers have seasonal flows. Refer to **Annex 7** for the Map showing main Rivers of the Project Area.

While there are no perennial rivers/streams in the Mombasa SEZ area, during heavy rain, rainwater will flow along existing valleys or natural channels downstream. **Figure 5** shows the catchment area and drainage pattern within the Mombasa SEZ area.



Source: JICA Design Team

Figure 5: Catchment area and drainage pattern within the Mombasa SEZ area

4.1.5 Physical Infrastructure and Telecommunication

The Mombasa-Nairobi A109 Highway that passes through Mazeras and Mariakani Towns is located on the eastern side of the 220kV Transmission Line (TL) project. The highway enjoys modern infrastructure including paved roads, good public transport connection, land line and mobile network system. The powerline runs in the north-west to south-east direction and passes through privately owned land parcels. Whereas the mobile networks cover the area, the powerline corridor passes through land parcels that do not have proper road network. Some murram roads transect the powerline corridor at various places. The roads can be accessed in places like:

- near the Mariakani Toll Station,
- through Gwasheni and well maintained roads starting at Mariakani Town, Kokotoni area, Uwanja Wa Ndege, Mazeras Town, Bonje and Miritini areas.

4.2 Pollution

The proposed project has the potential to generate pollution during construction and operation phases. The proposed transmission corridor is located within a settlement area with dwelling homesteads and more than 3km away from the Mombasa-Nairobi A109 Highway where there are commercial and industrial developments.

The pollution aspects of concern include: Air, Noise, Soil, Surface/Groundwater and Radiation. During the ESIA Study Phase, Air, Noise, Soil, Surface/Groundwater and Radiation samples were collected for baseline lab analysis of various parameters.

Baseline measurements and sample collection for analysis was done during the ESIA Study Phase by SGS and Radiotech Solutions as elaborated in **Table 8**

Table 8: Measurements and Sample Collection for Lab Analysis

Nr	Medium	Agency	Location	Analysis/Measurements	No of Samples
1	Water	SGS	Streams/Rivers	TPH and PAH	5
			Shallow Groundwater/Wells		
2	Soil	SGS	Contractor's Camp, Pylon Base and Substation	TPH and PAH	5
3	Noise	SGS	Selected Project Area Sites	Baseline Noise Level Measurements	5
4	Air	SGS	Selected Project Area Sites	Particulate Matter (PM ₁₀), Oxides of Sulphur (SO _x), Oxides of Nitrogen (NO _x)	5
5	Radiation	Radiotech	Transmission Line Corridor	Radiation Levels	10

The Map showing the locations where measurements were done and samples collected for analysis is provided in **Annex 17**.

4.2.1 Insitu-Measurements of Surface and Groundwater

During the ESIA Study field assessment, surface and groundwater samples were collected for *insitu* measurements using Electrical Conductivity (EC) and pH meters. This was done to establish the status of the water sources being used by the community in the project area

Insitu Measurements Methodology

The Electrical Conductivity (EC) and pH measurements were carried out using the EC and pH Meters from Eijkelpamp the Netherlands. The water from the rivers/streams, open wells or pans were collected and used to rinse the EC and pH meter probes. The water from the developed well was purged for a few minutes before collection of the samples for measurements and lab analysis. The measurement readings were given a few minutes to stabilize before readings were recorded.

Insitu Measurement Results

The results of the insitu measurements carried out on the surface and ground water samples are presented in **Table 9**. The results indicate that the water sources assessed are within the recommended limits.

Table 9: Insitu Measurements on Surface and Groundwater Samples

No	Location	Location Coordinates	EC ($\mu\text{S/cm}$)	pH	Temperature ($^{\circ}\text{C}$)
1.	Well at Boundary of Kaya Mtongwe and Mwangala Sub-locations	0565614, 9548578	764	7.4	27.8
2.	Developed Community Well with Pump	0562179, 9544810	498	7.10	28
3.	Stream Water at the Railway Bridge	0545893, 9577726	33	8.47	28.3
4.	Mwache River near Bofu Centre – 055087, 9562395	0550870, 9562395	212	7.99	31.8
5.	Water Pan in Mariakani/Mitangoni -	0545096, 9580880	42	7.95	29.5
Kenya - Water Quality Regulations (pH)			-	6.5 – 8.5	-

Source: Panafcon - ESIA Study 2017 - 2018

Electrical Conductivity (EC) Levels and Uses

0 – 800 ($\mu\text{S/cm}$)

- Good for drinking (provided there is no organic pollution suspended material)
- Generally good for irrigation, though care to be taken for values above 300 $\mu\text{S/cm}$, particularly with overhead sprinklers, which may cause leaf, scorch on some salt sensitive plants.
- Suitable for all livestock

800-2500 ($\mu\text{S/cm}$)

- Can be consumed by humans, although most would prefer water in the lower half of this range if available
- When used for irrigation, requires special management including suitable soils, good drainage and consideration of salt tolerance of plants
- Suitable for all livestock

The Electrical Conductivity Measurement results for the surface and shallow groundwater in the project area are well within acceptable limits (<800 $\mu\text{S/cm}$).

4.2.2 Air Pollution

Air samples were collected for PM₁₀, NO_x and SO_x analysis to assess the baseline status of the project area.

Air Quality Measurement Methodology

Particulate Matter (PM₁₀)

Exposure to dust contaminants was determined by use of static sampling where a battery powered sampling pump (Minivol) connected by tubing to a substance specific sample holder, was clamped and positioned in selected areas of concern. Air was drawn through the particle size separator and then through a filter medium. Particle size separation was achieved by impaction at a flow rate of 5 l/min. The sampled filter papers were taken to our accredited laboratories for gravimetric weighing after around 24 hours of exposure time.

Sulphur Dioxide (SO₂) & Nitrogen Dioxide (NO₂)

Sampling of SO₂ and NO₂ was done as per ISO 16200-2:2000 for the sampling and analysis of volatile compounds where the pollutants are passively sampled into diffusion tubes packed with adsorbents. The adsorption cartridges for the gases were mounted at about 1.5 - 2 meters above the ground surface. The duration of the measurements was between 21 and 23 hours. The tubes were consequently dispatched to affiliate laboratories in Spain for analysis.

Air Baseline Analysis Results

Baseline air samples were collected by SGS during the ESIA Study field assessment for analysis of Sulphur Oxides (SO_x), Nitrogen Oxides (NO_x) and Particulate Matter (PM₁₀). The analysis results are presented in **Table 10**. Measurement and Analysis Reports are in **Annex 9**

Table 10: Baseline Air Quality Analysis Results

No	Location/sampling date	Location Coordinates	PM ₁₀ (µg/m ³)	SO _x (µg/m ³)	NO _x (µg/m ³)
NA 01.	Substation Site – Home of Pastor Benson Savai near Mwangala Primary School 2018/4/16-17	0565996, 9549494	15	BDL	BDL
NA 02.	Near Kiteje Secondary School 2018/4/17-18	0565855, 9545251	15	BDL	BDL
NA 03.	Near Mwanda Dispensary 2018/4/18-19	0548000, 9570150	31	BDL	BDL
NA 04.	At Katundani Shopping Centre 2018/4/18-19	0552400, 9556600	19	BDL	BDL
NA 05.	Near Shangia Primary School 2018/4/19-20	0545149, 9579529	11	BDL	BDL
Detection Limit				1.7µg/sample	0.17µg/sample
WHO guideline values (µg/m³)			50	20	40
EMC Limits for residential, rural & other area (µg/m³)			100	80	80

Source: Panafcon/SGS - ESIA Study 2017 – 2018

- All the 5 Air Sampling sites had PM₁₀ results that are below the EMC Air Quality Regulations, 2014 and WHO Air Quality Guidelines Global Update, 2005
- All the 5 Air Sampling sites had SO₂ and NO₂ results that are Below Detection Limits (BDL) of the respective analytical methods used in each case.



Plate 1: Particulate Matter Measurements (Minivol) and SO_x/NO_x - May 2018

4.2.3 Noise Pollution

Baseline noise level measurements were carried out during the ESIA Study.

Baseline Noise Measurement Methodology

The Noise measurements were carried as per the ISO 1996 Parts 1, 2 and 3 standards, entailing the following:

- Inspection of the vicinity and the implicated activities
- Verification/Calibration of the sound level meter before and after the measurements.
- Meteorological conditions during the measurement - Measurements of temperature, wind speed and relative humidity were taken before the noise level measurements.
- The ISO 1996 does not define the length of measuring period and only advises on the measuring time that covers the changes in operation of the noise source. Measurements were taken at an interval of 10minutes.
- Noise levels are expressed in decibels, A-weighted sound pressure level (dBA).

The measurement results are expressed as follows:

- Leq, Value of A-weighted sound pressure level of a continuous steady sound that is within a specified interval, has the same mean square sound pressure as a sound under consideration whose level varies with time.

Instrumentation

The following instruments were used during the measurement:

- Larson and Davis Noise Meter: A Type 1, Data logging, precision impulse, Integrating sound level meter, with a microphone (and windshield) mounted on a tripod at 1.5m above the ground level and >3m from any façade.
- GPS, Garmin eTrex 12-Channel

Calibration certificates for the noise meter are included in **Annex 9** of this report.

Baseline noise level measurement results are presented in **Table 11**. Measurements and Analysis Reports are in **Annex 9**

Table 11: Baseline Noise Analysis Results

No	New No.	Location/sampling date	Location Coordinates	Monitoring Duration	
				Diurnal (LAeq)	Nocturnal (LAeq)
NA 1.	A1	At Substation Site – at the home of Pastor Benson Savai near Mwangala Primary School 2018/4/16-17	0565996, 9549494	79	71
NA 2.	A2	Near Kiteje Secondary School 2018/4/17-18	0565855, 9545251	66	52
NA 3.	A3	Near Mwanda Dispensary 2018/4/18-19	0548000, 9570150	76	48
NA 4.	A4	At Katundani Shopping Centre 2018/4/18-19	0552400, 9556600	69	45
NA 5.	A5	Near Shangia Primary School 2018/4/19-20	0545149, 9579529	66	42
Noise and Excessive Vibrations Pollution Regulations 2009 (Residential outdoor) dB(A)				50	35
Guidelines for Community Noise, World Health Organization (WHO), 1999. (Residential outdoor) dB(A)				55	45

Source: Panafcon/SGS - ESIA Study 2017 - 2018

The diurnal and nocturnal noise levels at all the monitoring points surpassed the Noise and Excessive Vibrations Pollution Regulations 2009 of 50 dB and 35 dB respectively. The high noise levels may partly be as a result of activities within the nearby school, shopping centre, household and so on.

4.2.4 Soil Pollution

Baseline soil samples were collected during the ESIA Study for TPH and PAH lab analysis.

Soil Sampling Methodology

Soil monitoring at the aforementioned areas was done in accordance to the USEPA SOP on Field Sediment Sampling; document #1215. The SGS K COP-ENV005 method on soil sampling and preservation was incorporated. The samples were collected from beneath the ground at a depth of 0.0-1.5 meters directly using a manual soil sampling augur. The samples were placed in containers (bottles) constructed of inert material and cooled by ice packs at a temperature of <4°C and transported to the laboratory for analysis. The soil analysis results are presented in **Table 12** and Reports are in **Annex 9**.

Table 12: Baseline Soil Analysis Results (samples collected in April 2018)

No	Location	Location Coordinates	PAHs (Total) (mg/kg)	TPH (C6-C44) mg/kg
S1.	At Substation Site 1	0565650, 9549577	0.34	0.65
S2.	At Substation site 2	0566451, 9549356	0.29	0.72
S3.	Near Lutsangani	0555700, 9550650	0.63	0.61
S4.	At the Start of Transmission Line in Mariakani	0545200, 9580800	0.44	0.83
S5.	In Mbunguni at homestead of Suwari Kiguru	0563450, 9544549	0.70	0.74
Dutch Intervention Level (DIV) set under Soil Remediation Circular 2013 (mg/kg)*			40	5,000

*: Dutch standard is referred due to absence of national standard. The standard stringent and recognized by NEMA Kenya.

Source: Panafcon/SGS - ESIA Study 2017 – 2018

Traces of TPH and PAH have been detected in the soil samples. However, the traces are insignificant when compared against the Dutch Intervention Values of 5000mg/kg and 40 mg/kg respectively.

4.2.5 Surface/Groundwater Pollution

Baseline water samples were collected from streams/rivers and shallow groundwater sources during the ESIA Study for TPH and PAH analysis.



Plate 2: Insitu Water Measurement at Mwache River – Bofu – March 2018

Sampling Methodology

ISO 5667 Part 1, 2 & 3 and EPA Publication 669 provides guidelines on the principles to be applied to the design of sampling programmes, sampling techniques and the handling and preservation of samples from pits/ and boreholes. SGS Kenya applied these guidelines during the sampling process to obtain a representative and sterile samples for analysis. The samples were stored at controlled temperatures (approximately 40 C) in a cooler box with ice packs. Samples were submitted to SGS laboratory for analysis. The chemicals of concern analyzed in the soil samples were TPH & PAH.

Analysis Results

The analysis results of the water samples collected from project area streams/rivers and shallow wells are presented in **Table 13** and the Analysis Reports in **Annex 9**. Samples were collected in April 2018.

Table 13: Baseline Surface and Groundwater Analysis Results

No	Location	Location Coordinates	PAHs (Total) (µg/l)	TPH (C6-C44) µg/l
W1.	Well at Boundary of Kaya Mtongwe and Mwangala Sub-locations	0565614, 9548578	<50	290
W2.	Developed Community Well with Pump	0562179, 9544810	<50	410
W3.	Stream Water at the Railway Bridge	0545893, 9577726	<50	230
W4.	Mwache River near Bofu Centre –	0550870, 9562395	<50	200
W5.	Water Pan in Mariakani/Mitangoni -	0545096, 9580880	<50	280
Dutch Target Values set under Soil Remediation Circular 2013 (µg/l)			-	50
Dutch Intervention Values set under Soil Remediation Circular 2013 (µg/l)*			-	600

*: Dutch standard is referred due to absence of national standard. The standard stringent and recognized by NEMA Kenya.

Source: Panafcon/SGS - ESIA Study 2017 – 2018

- TPH concentrations for the five sampled points were above the Dutch target limit of 50µg/l but below the Dutch Intervention values of 600µg/l.
- PAH levels were below their respective analytical detection limits.

4.2.6 Baseline Radiation Measurements

There is evidence that exposure to strong electromagnetic field from transmission lines leads to occurrence of not only some form of cancer, especially leukemia in children, brain and breast cancer, but also the less deadly diseases such as insomnia, blood disorders, weak immune system and reproductive problems. A number of studies suggest that living close to high-voltage power lines can increase the incidence of several kinds of cancer. It is suggested that 0.5 – 1 milliGauss (mG) is the maximum safe amount one should be exposed to where we live/reside. A wayleave corridor of 40m (20m on either side from the centre line has been set for this 220kV Transmission Line (TL). Any dwellings or human activities outside this corridor should be safe.

Baseline Radiation Measurements were done along the TL corridor and substation site by **Radiotech Solutions Limited** based in Mombasa.

The Baseline Radiation measurement results are given in **Table 14** and the report is presented in **Annex 10**.

Table 14: Baseline Radiation Analysis Results

No	Location	Location Coordinates	Results in dose rate avg µSv/hr
RM1	The homestead of Nyota Kitale Mnyaka next to Mariakani Substation	0544918 9580574	0.11
RM2	Near Shangia Primary School at the homestead of Ndzuwa Tsuma Kenga	0545149 9579529	0.114
RM3	Near Mwanda Dispensary at the homestead Mvunya Mwando Katembe Stream Water at the Railway Bridge	0548038 9569993	0.09
RM4	Homestead of Madziko Rai in Bofu Sub-location, Mtaa Location	0550911 9561684	0.08
RM5	At Katundani Shopping Centre	0552400 9556600	0.13
RM6	Near Lutsangani Shopping Center and DK 7 New	0555700 9550650	0.15
RM7	Near Mbuguni Market at the homestead of Chizi Mazera Mari	0560843 9545458	0.11
RM8	Near Kiteje Secondary School also near DK 10	0565855 9545251	0.10
RM9	At the Substation Site 1 – at the homestead of Joseph Kitutsa Timona near Mwangala Primary School	0565688 9549607	0.12
RM10	At Substation site 2 – at the homestead of Laurence Sammy Kavutsu Dena near Mwangala Primary School	0566451 9549356	0.11
Average dose rate along the line			0.1114-

Source: Panafcon/SGS - ESIA Study 2017 – 2018

Radiation Dose Calculations

From the above results, the public exposure to natural radiation along the proposed transmission line corridor shows an average of 0.1114 µSv/hr which is a unit of measuring the radiation dose rate, therefore one receives doses as follows:-

1. One day - $0.1114 \times 24 = 2.6736$ µSv
2. One month – 2.6736 times avg. 30days = 0.080208 mSv
3. One year – 0.080208 times 12 months = 0.962496 mSv

This concludes that the limits are within acceptable International Atomic Energy Agency (IAEA) standards of 1mSv/yr, however, annual survey is recommended due to soil erosion, weathering of rocks and deforestation.

Given that the whole site location has indicated elevated levels of radiation emanating from soils and rocks due to the presence of Naturally Occurring Radioactive Materials (NORM), the project can be implemented. This is because there is no established relation between NORM and construction of the high voltage transmission line.

4.3 Natural Environment

Baseline information of the project area flora and fauna was carried out by using the following approach:

- Desktop review of existing data and literature/reports on the project area flora and fauna
- Field assessment of the project corridor to identify and record flora and fauna
- Consultation with project area community, County/National Government Agencies and other experts.

4.3.1 Desktop Review of Existing Literature/Reports

The following reports were reviewed to obtain the project area baseline information regarding flora and fauna and other physical features:

- Strategic Environmental Assessment for Master Plan for Development of Mombasa Special Economic Zone by Repcon Associates
- ESIA Study of the Proposed Dongo Kundu – Mariakani 400kV Power Transmission Line by E-Cue Associates
- ESIA Study Report for the Proposed Mombasa-Mariakani Road by Aquaclean Services Limited
- Revised RAP Report for Mombasa-Mariakani Road by Panafcon Ltd

4.3.2 Assessment of the Project Area Corridor

The ESIA study ecologist followed the transmission line corridor from Mariakani-Dongo Kundu documenting the flora and fauna encountered and consulting local authorities and community members to obtain the following information:

- The local name of the plant/trees species encountered.
- The main uses of trees and other plants encountered along the corridor
- Presence of any threatened wildlife or plant species within the corridor

Flora - The section from Mariakani – Munyenzeni (DK1 – DK5) is composed of shrubs and a few scattered mature trees. The area also has scattered settlements with subsistence farms. Some of the trees/plants encountered include Indian Ashok (*Polyantha langifolia*), *Eucalyptus camaldulensis*, *Grevillea robusta*, Mango Trees, Coconuts, Cashew Nuts, Baobab and *Terminalia mentalis* among others. The area around Gandini (DK6 – DK7) is forested with various species of indigenous trees. The remaining area from DK8 to Dongo Kundu has scattered trees including Cashew Nuts, Palm and Coconut Trees. Observations of the ecology are provided in **Table 15** and **Annex 8**.

Table 15: List of Flora identified along the TL corridor

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
DK1-DK2	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Kikwata (Swahili) - Acacia	<i>Acacia mellifera</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
DK2 – DK3	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Kikwata (Swahili) - Acacia	<i>Acacia mellifera</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
DK3 – DK4	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Chachane (Boran) - Acacia	<i>Acacia paoli</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK4 – DK5	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica</i> .	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera</i> .	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
	Mtimbao (Swahili) - Eucalyptus	<i>Eucalyptus camaldulensis</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
	Kikwata (Swahili) - Acacia	<i>Acacia mellifera</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
DK5 – DK6	Mwembe (Swahili) - Mango	<i>Mangifera indica</i> .	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera</i> .	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwarubaini (Swahili/Digo) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern ver 3.1 Population trend: decreasing	<i>Not listed</i>
	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Kikwata (Swahili) - Acacia	<i>Acacia mellifera</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
DK6 – DK7	Mwembe (Swahili) - Mango	<i>Mangifera indica</i> .	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera</i> .	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwarubaini (Swahili/Digo) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern ver 3.1 Population trend: decreasing	<i>Not listed</i>
	Kikwata (Swahili) - Acacia	<i>Acacia mellifera</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Kimwea (Kamba) - acacia	<i>Acacia kirkii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mnafisi (Swahili)	<i>Bosnia coriacea</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Ubani (Swahili) - Frankincense	<i>Boswellia neglecta</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Myombo (Swahili) - Brachystegia	<i>Brachystegia spiciformis</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
	Mkarakara (Swahili)	<i>Bridelia micrantha</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mkangu (Swahili) - Long-pod cassia	<i>Cassia abbreviata</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
	Msufi (Swahili) - Kapok tree, Silk-cotton tree	<i>Ceiba pentandra</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: unknown.	<i>Not listed</i>
	Mpeketo (Swahili)	<i>Garcinia livingstonei</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mnyumbu (Swahili)	<i>Lannea schweinfurthii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mkoma (Swahili) – Doum Palm	<i>Hypheane compressa</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: unknown.	<i>Not listed</i>
	Mvule (Swahili)	<i>Milicia excelsa</i>	Status: Lower Risk/near threatened <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
DK7 – DK8	Mwembe (Swahili) - Mango	<i>Mangifera indica</i> .	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera</i> .	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mtimbao (Swahili) -	<i>Eucalyptus saligna</i>	This taxon has not yet been assessed for the IUCN Red List,	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
	Sydney blue gum		but is in the Catalogue of Life	
	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
	Mtugo (Taita)	<i>Acacia gerrardii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mkamasi (Swahili)	<i>Cordia sinensis</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
DK8 – DK9	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mnyakwaa (Swahili)	<i>Commiphora eminii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
	Mbambangoma (Swahili) Abyssinian coral tree	<i>Erythrina abyssinica</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life:	<i>Not listed</i>
DK9 – DK10	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mnguvi (Swahili)	<i>Mimusops obtusifolia</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mnyakwaa (Swahili)	<i>Commiphora eminii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mswaki (Swahili) - Toothbrush tree	<i>Dobera glabta</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
DK10- DK11	Mjunju (Swahili) - Desert Date	<i>Balanites aegyptiaca</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mdaa mwitu (Swahili) - Abyssinian diospyros	<i>Diospyros abyssinica</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mpepeta (Swahili)	<i>Dialium orientate</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the <u>Catalogue of Life</u>	<i>Not listed</i>
	Mnyakwaa (Swahili)	<i>Commiphora eminii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
DK11- DK12	Mkanju, mkoroshu (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mnyakwaa (Swahili)	<i>Commiphora eminii</i>	This taxon has not yet been assessed for the IUCN Red List,	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
			but is in the Catalogue of Life.	
	Mdaa mwitu (Swahili) - Abyssinian diospyros	<i>Diospyros abyssinica</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
DK12- DK13	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica</i> .	<u>Mangifera indica</u> (Mango) Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera</i> .	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mjunju (Swahili) - Desert Date	<i>Balanites aegyptiaca</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
DK13- DK14	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mjunju (Swahili) - Desert Date	<i>Balanites aegyptiaca</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica</i> .	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mvumo (Swahili) - African fan palm	<i>Borassus aethiopum</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: unknown	<i>Not listed</i>
	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mukuyu (Kikuyu) – Sycamore Fig	<i>Ficus sycomorus</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwangati (Swahili) - Siny	<i>Terminalia spinosa</i>	This taxon has not yet been assessed for the IUCN Red List,	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
	terminalia		but is in the Catalogue of Life	
	Kilului(Kambai) - Drooping- Branched Balanites	<i>Balanites glabra</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Lusina (Swahili) - Leucaena, Lead tree	<i>Leucaena leucocephala</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Ol-okii (Masai)	<i>Lycium europaeum</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mhomba (Swahili) - Cassia spectabilis	<i>Senna spectabilis</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
DK14 DK15	Mvumo (Swahili) - African fan palm	<i>Borassus aethiopum</i>	Status: Least Concern ver 3.1 Pop. trend: unknown	<i>Not listed</i>
	Mbambara (Swahili)	<i>Commiphora africana</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mhomba (Swahili) - Cassia spectabilis	<i>Senna spectabilis</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Lusina (Swahili) - Leucaena, Lead tree	<i>Leucaena leucocephala</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient ver 2.3 (needs updating)	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mkanju, mkorosh (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
DK15- DK16	Mkanju, mkorosh (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient ver 2.3 (needs updating)	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mbalibali (Swahili) - Whistling thorn, Ant-galled acacia	<i>Acacia drepanolobium</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
DK16- DK17	Mkwaju (Swahili) - Tamarind	<i>Tamarindus indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mkwaju (Swahili) - Tamarind	<i>Tamarindus indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
DK17- DK18	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mkwaju (Swahili) - Tamarind	<i>Tamarindus indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera.</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
DK18-DK19	Mwarubaini (Swahili) – Neem Tree	<i>Azadirachta indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	tatus: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>
	Mkwaju (Swahili) - Tamarind	<i>Tamarindus indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mnazi (Swahili) – Coconut palm	<i>Cocos nucifera</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life.	<i>Not listed</i>
	Mkanju, mkorosho (Swahili) - Cashewnut	<i>Anacardium occidentale</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
Substation Site	Mkwaju (Swahili) - Tamarind	<i>Tamarindus indica</i>	Status: Least Concern <u>ver 3.1</u> Pop. trend: stable	<i>Not listed</i>
	Mkone (Swahili)	<i>Grewia plagiophylla</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mkunazi (Swahili) - Jujube	<i>Ziziphus mauritiana</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mwembe (Swahili) - Mango	<i>Mangifera indica.</i>	Status: Data Deficient <u>ver 2.3</u> (needs updating)	<i>Not listed</i>

TL corridor	Common/local name	Scientific name	Status as per IUCN Red List	Status as per Wildlife Conservation and Management Act (Sixth Schedule)
	Mng'ongo (Swahili)	<i>Sclerocarya birrea</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mukuyu (Kikuyu) – Sycamore Fig	<i>Ficus sycomorus</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mnyumbu (Swahili)	<i>Lannea schweinfurthii</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mtomoko mwitu (Swahili)	<i>Annona senegalensis</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Myombo (Swahili) - Brachystegia	<i>Brachystegia spiciformis</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Lusina (Swahili) - Leucaena, Lead tree	<i>Leucaena leucocephala</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mbambara (Swahili)	<i>Commiphora africana</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>
	Mbuyu (Swahili) - Baobab	<i>Adansonia digitata</i>	This taxon has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life	<i>Not listed</i>



Plate 3: Mariakani Area showing scattered Shrubs and Trees – July 2017

Fauna - The project area has less wildlife due to expansion of settlements and agriculture. However, according to Kenya Wildlife Service (KWS), the forest cover at DK6-DK7 occasionally hosts migratory birds and wildlife from Mwaluganje Forest Reserve. Animals including elephants use this forested area as a dispersal area only when they escape from Mwaluganje Forest Reserve which happens rarely and KWS always return the animals back to the reserve. It was indicated that the area around DK6-DK7 also experiences disturbances from wild pigs and baboons. Due to the easy access of the community forest by community members, it is less used by wildlife and birds as a habitat. When consulted, **World Wildlife Fund (WWF)** confirmed that from global assessment, there isn't real threat of the project/corridor to critical corridors or habitats however it traverses river systems and wetlands.

Birds

According to **Nature Kenya** the two endangered birds in the project area are Sokoke Pipit (*Athus Sokokensis*) and Spotted Ground-Thrush (*Zoothera Guttata*). They are both classified as “endangered” under the Wildlife Conservation and Management Act and ICUN Red List. Presence of these birds are confirmed in Kaya Gandini and Shimba Hills National Reserve through literature and expert interview. Following are information on Sokoke Pipit (*Athus Sokokensis*) and Spotted Ground-Thrush (*Zoothera Guttata*):

• **Spotted Ground Thrush (*Zoothera Guttata*)**

Presence -In Kenya Spotted Ground Thrush (*Zoothera Guttata*) is present at very low densities throughout the Arabuko-Sokoke Forest, but has in the past been known to occur at higher densities in the few tiny patches of thick coastal forest such as Diani, Shimoni and Gede. A few records have been made in **Kaya Gandini**, Kaya Waa, Mrima Hill Forest, Mkongani and Shimba Hills.

Migration - It breeds in the forests of southern Tanzania, and then visits coastal Kenya between March and November every year. During this visit it does not breed, but spends most of its time feeding.

Habitat - It inhabits low altitude moist evergreen forest with nearly complete canopy cover, deep shade, extensive moist, thick leaf litter and sparse undergrowth. It likes areas of low coral vegetation with dead wood and vine tangles for cover when threatened. The thrush is predominantly a litter forager and since feeding is an important survival tool, the litter layer is an important habitat component for it. It avoids disturbance prone areas. Solitary or in pairs, sometimes in small parties on migration

Threat - The main danger facing the bird's survival is destruction and degradation of its forest habitat through various human activities, mainly agriculture, extraction of timber and uncontrolled development into forests.

• **Sokoke Pipit (*Anthus Sokokensis*)**

Presence - Sokoke Pipit (*Anthus sokokensis*) has been recorded from several sites along the East African coast in Kenya. It is restricted in its range, mainly to non-closed canopy woodland habitat dominated by *Brachystegia* tree species where it feeds on arthropods on the ground or in the under-storey.

Although the species has been reported to occasionally venture into the forest edge including observations while it fed on termites and sparse grass in open areas, it is essentially restricted to the interior of the *Brachystegia* forest. A few records have been made in Kaya Gandini, Kaya Waa, Mrima Hill Forest, Mkongani and Shimba Hills.

Migration - Sokoke Pipit (*Anthus Sokokensis*) is not a migrant.

Habitat - It lives mainly on the forest floor, preferring areas with bare ground, high litter-cover, and high densities of ants and termite mounds, feeding among sparse grass on insects, including termites and beetles. The species in general is highly sensitive to disturbance

Threat - Population is suspected to be in decline owing to the clearance and degradation of the species's forest habitat, mainly through charcoal burning, agricultural encroachment, logging and pole cutting.

According to National Museums of Kenya document (Bird Migration and Bird Strike Situation in Kenya), approximately 21% of all Kenya's bird species are migratory and about 46% of the migratory species are water birds. The migrants include 171 Palearctic, 55 Afrotropical and 4 Malagasy migrant species. The bulk of migratory birds visiting or passing through Kenya use the Rift Valley, coast, eastern bushlands, central and western grasslands as their flyway. The flyway along the coast, includes the beaches, reefs and mangrove creeks. According to Birdlife International website, large flocks of Common cuckoo (*Cuculus canorus*) and Golden orioles (*Oriolus oriolus*) visit the Shimba Hills National Reserve during March and April. Other migratory birds that visit the Project area mentioned by Nature Kenya are European Honey-buzzard, European Bee-eater and White-throated Bee-eater. None of the birds mentioned above are threatened species. Information on migratory birds around the Project area is summarized in **Table 16**.

Table 16: Information on migratory birds around the Project area

Species	Migratory passage	Migratory season to Kenya	Threatened status	Source
European Honey-buzzard	Afro-Palearctic	Northern hemisphere winter season	IUCN: LC Kenya: Not listed	Nature Kenya BirdLife International
European Bee-eater	Afro-Palearctic	Northern hemisphere winter season	IUCN: LC Kenya: Not listed	Nature Kenya BirdLife International
White-throated Bee-eater	Afro-Tropical	Uncertain	IUCN: LC Kenya: Not listed	Nature Kenya BirdLife International
Common cuckoo	Afro-Palearctic	March-April	IUCN: LC Kenya: Not listed	BirdLife International
Golden oriole	Afro-Palearctic	March-April	IUCN: LC Kenya: Not listed	BirdLife International
Spotted Ground Thrush	Tanzania-Kenya	March-November	IUCN: EN Kenya: EN	Nature Kenya

List of fauna identified along the TL corridor from field survey are presented in **Table 17** and **Annex 8**. List of fauna identified in the DK6-7 area through literature and expert interviews are presented in **Table 18**.

Table 17: List of Fauna identified along the TL corridor

TL corridor	Common/ local name	Scientific name	Status under IUCN Red List	Status under Wildlife Conservation and Management Act (Sixth Schedule)
Substation- DK11	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
DK2 – DK3	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
DK3 – DK4	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Rock Dove	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK4 – DK5	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
DK5 – DK6	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
DK6 – DK7	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	Willow Warbler	<i>Phylloscopus neglectus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
DK7 – DK8	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	Willow Warbler	<i>Phylloscopus neglectus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
DK8 – DK9	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK9– DK10	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
DK10-DK11	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1	<i>Not listed</i>

TL corridor	Common/ local name	Scientific name	Status under IUCN Red List	Status under Wildlife Conservation and Management Act (Sixth Schedule)
			Pop. trend: stable.	
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK11-DK12	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK12-DK13	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK13-DK14	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK14-DK15	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK15-DK16	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>

TL corridor	Common/ local name	Scientific name	Status under IUCN Red List	Status under Wildlife Conservation and Management Act (Sixth Schedule)
	claw		the Catalogue of Life.	
DK16-DK17	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK17-DK18	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Rock Dove-	<i>Columbia Livia</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life	<i>Not listed</i>
	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Yellow Throated Long claw	<i>Macronyx croceus</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>
DK18-DK19	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Speckled Mousebird-	<i>Colius striatus</i>	Status: Least Concern ver 3.1 Pop. trend: increasing	<i>Listed as invasive species</i>
	Red-billed Hornbill-	<i>Tockus erythrorhynchus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Black-eyed (common) Bulbul-	<i>Pycnonotus barbatus</i>	Status: Least Concern ver 3.1 Pop. trend: increasing	<i>Not listed</i>
	Black headed weaver-	<i>Ploceus Cucullatus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
Substation	African Grey Hornbill	<i>Tockus nasutus</i>	Status: Least Concern ver 3.1 Pop. trend: stable	<i>Not listed</i>
	Pied crow	<i>Corvus albus</i>	Status: Least Concern ver 3.1 Pop. trend: stable.	<i>Not listed</i>
	Malachite sun bird	<i>Nectarina famosa</i>	This taxon has not yet been assessed for the IUCN Red List, and also is not in the Catalogue of Life.	<i>Not listed</i>

Table 18: List of fauna obtained from existing report and interview with KWS

TL corridor	Common/ local name	Scientific name	Status under IUCN Red List	Status under Wildlife Conservation and Management Act (Sixth Schedule)	Source of Information/ Remarks
DK6 – DK7	Spotted ground thrush	<i>Zoothera guttata</i>	Status: Endangered C2a (i) ver 3.1 Pop. trend: decreasing Not spotted during field work but reported in the Important Bird Areas report to have existed in Kaya Gandini Forest.	Listed as endangered	Important Bird Areas in Kenya by Leon Bennun and Peter Njoroge, 1999
	Plain backed sunbird	<i>Antheptes reichenowi</i>	Status: Near Threatened ver 3.1 Pop. trend: decreasing. Not spotted during field work but reported in the Important Bird Areas report to have existed in Kaya Gandini Forest.	Listed as near threatened	Important Bird Areas in Kenya by Leon Bennun and Peter Njoroge, 1999
	Fischer's Turaco	<i>Tauraco fischeri</i>	Status: Near Threatened ver 3.1 Pop. trend: decreasing	Listed as near threatened	Important Bird Areas in Kenya by Leon Bennun and Peter Njoroge, 1999
	Sokoke Pipit	<i>Anthus sokokensis</i>	Status: Endangered Pop. trend: decreasing	Listed as endangered	Important Bird Areas in Kenya by Leon Bennun and Peter Njoroge, 1999
	Ndovu (Swahili) – African Elephant	<i>Loxodonta africana</i>	Status: Vulnerable A2a ver 3.1 Pop. trend: increasing. Not observed during field work session but reported to use Gandini forest as dispersal area only when they escape from Mwaluganje Forest Reserve. This happens rarely and KWS returns them back immediately.	Listed as endangered	KWS Kwale – Interview with KWS Officer
	Yellow Baboons	<i>Papio cynocephalus</i>	Status: Least Concern ver 3.1 Pop. trend: stable. Not observed during fieldwork but reported to visit Gandini Forest	Not listed	KWS Kwale – Interview with KWS Officer
	Wild Pig	-	Not observed during field work session but reported to visit the Gandini forest area	Not listed	KWS Kwale – Interview with KWS Officer



Plate 4: Forest Vegetation at DK6 – July 2017

Based on the findings obtained from expert interviews, literature review and field surveys, as per definition of World Bank OP 4.04 it is concluded that there are no critical habitats along the Project corridor for mainly the following reasons:

- There are no legally protected areas nor sites recognized by local and international authorities as ecologically important within the TL corridor.
- The natural environment along the TL corridor including DK6-7 forest area has been disturbed by human activities such as agriculture and forest exploitation.
- No threatened flora/fauna species were identified along the TL corridor during field survey.

However, there are some protected areas in the surrounding areas which are considered as critical habitats. Refer to 4.3.3 for details of the protected areas.

4.3.3 Protected Areas/Sacred Sites (Kaya)

Kaya Gandini

Kaya Gandini is located east of DK6 having a total area of 100 ha (see **Annex 7** for the location). The edge Kaya Gandini is around 30 m from the nearest TL. It was gazetted as natural monument in 1992 under the Antiquities and Monuments Act, Notice No. 200. A Kaya is a sacred forest of the Mijikenda people in the former Coast Province of Kenya. The kaya forest is considered to be an intrinsic source of ritual power and the origin of cultural identity. Kaya Gandini is also designated as an Important Bird Area (IBA). Presence of endangered bird species such as Spotted Ground Thrush and Sokoke Pipit are reported by Leon Bennun and Peter Njoroge (1999). According to KWS expert, the area is occasionally visited by mammals such as elephants, baboon and wild pig.

Mwaluganje Forest Reserve

Mwaluganje Forest Reserve is an area designated for forest conservation and management. The reserve starts approximately 2.5 km south west of DK7. It was gazetted in 1941 under the Forest Act and covers an area of approximately 17 km². According to KWS expert, the forest reserve is a habitat for mammals such as elephants (large families of about 150 residing here), monkeys, warthog, baboon, impala and waterbuck.

Notable birds are Crested Guinea fowl, Brown-hooded Kingfisher, Black-collared Barbet, African fish eagle and Golden palm weaver, which none are IUCN threatened species. Refer to **Annex 7** for the map showing the location of Mwaluganje Forest Reserve.

Shimba Hills National Reserve

Shimba Hills National Reserve is a protected area designated in 1968 under the Wildlife Conservation and Management Act. It has an area of approx. 300 km² and is located around 12 km south west of DK8. This reserve hosts the highest density of African elephant in Kenya. Other animal species found in the area are Sable antelope, elephant shrew, bushy tailed mongoose and fruit bats. The forest is also designated as an Important Bird Area (IBA), where endangered species such Spotted Ground Thrush and Sokoke Pipit are present. Migratory birds such as Common cuckoo, Sand martin, Golden orioles and Ringed plover flyover the area mainly in November-April season.

Mwaluganje Elephant Sanctuary

Mwaluganje Elephant Sanctuary is a community-owned elephant park for elephant conservation. It has an area of approx. 36 km² and located around 10 km west of DK8. Although the sanctuary has no legal designation, it was formed in the early 1990s to create a wildlife corridor for the movement of elephants between Mwaluganje Forest Reserve to the north and Shimba Hills National Reserve to the south. Elephants use this migratory passageway to access important foliage areas within their natural domain at different times of the year.

Kaya Kiteje

Kaya Kiteje was gazetted as natural monument in 1992 under the Antiquities and Monuments Act, Notice No. 200. It is located at the west coast of Mombasa SEZ with an area of around 10 ha. It is around 500 m from the TL. Figure 6 shows the location of Kaya Kiteje.

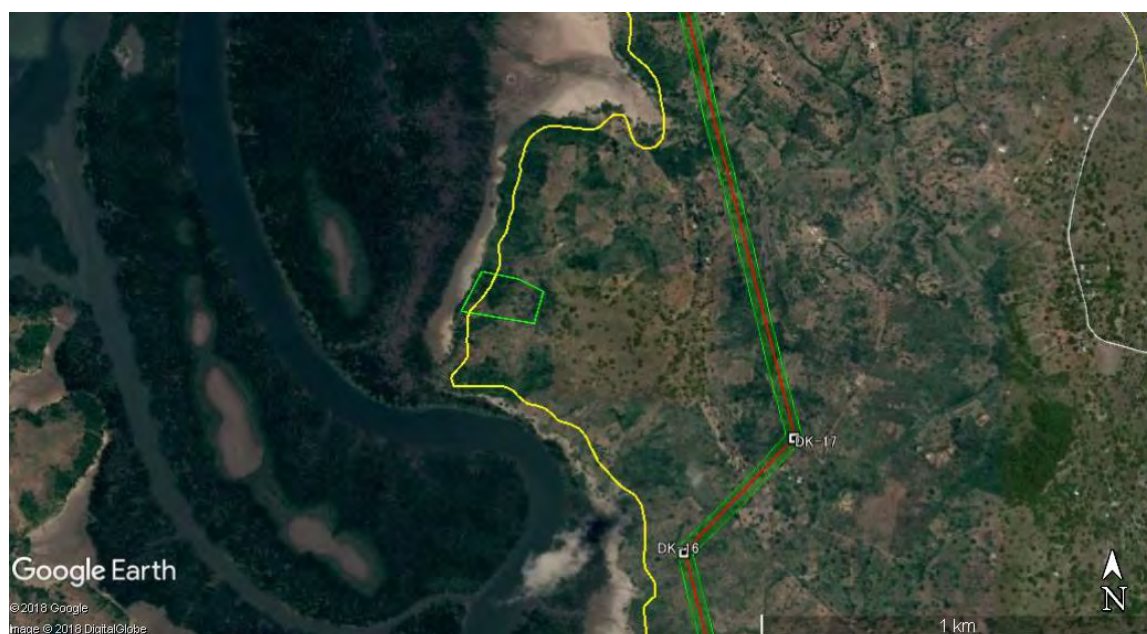


Figure 6: Location of Kaya Kiteje (green area)

4.3.4 Tree Shrine

The ESIA study assessment has confirmed presence of two tree shrines along the TL corridor (6.1 km from DK4 and 2.1 km from DK5). While these trees do not have any legal status it is a cultural site that was dedicated by the ancestors of the clan that own the site. It is a place of worship and regarded as a holy place used to seek healing and answers to various challenges. The two shrine owners (Mzee Kombo Mangale Nyuni – Kasemeni Location and Mzee Mangale Zuma Mdoe of Mwatate Location) were interviewed. They mentioned that if the TL route is difficult to alter, a shrine transfer ceremony can be conducted to transfer the holy powers of the shrine from one tree to another designated tree/object if the existing one is going to be cut down. They accepted that the trees can be cut down after shrine transfer ceremony has been conducted and their trees compensated. **Table 19** provides what is required and the related cost for each Shrine Ceremony. The total comes to KShs 340,770.00.

Table 19: Cost of Shrine Transfer Ceremony

No	Item	Unit Cost (KShs)	No of Units	Total Cost (KShs)
1. Shrine Tree at Chainage 23.5km – Kasemeni Location				
1	Sheep (Black in Colour)	5,000.00	1	5,000.00
2	Chicken (Black in Colour)	1,000.00	1	1,000.00
3	Dressing for 2 Women & 2 Men (Red & Black Dresses)	500.00	4	2,000.00
	Cultural Elders Gracing Ceremony	12,000.00	1	12,000.00
	Total for Kaya 1			20,000.00
2. Shrine Tree at Chainage 17.2 – Mwatate Location				
1	Bulls (Black, Red, White)	60,000.00	3	180,000.00
2	Goats (Black, Red, White)	8,000.00	3	24,000.00
3	Sheep	8,000.00	1	8,000.00
4	Chicken (Roosters) - Black =, Red, White	1,000.00	3	3,000.00
5	Clothes (Black, Red, White)	1,000.00	3	3,000.00
6	Rice	150.00	10	1,500.00
7	Coconuts	50.00	50	2,500.00
8	Potatoes (1 Bag)	4,500.00	1	4,500.00
9	Uto (10 Litres)	1,300.00	2	2,600.00
10	Sugar (10 Kg)	150.00	10	1,500.00
11	Tomatoes (1 Crate)	8,000.00	1	8,000.00
12	Onions (1 Net)	1,200.00	1	1,200.00
13	Drums and Kayamba	15,000.00	1	15,000.00
14	Traditional Elders (4 Experts)	6,000.00	4	24,000.00
15	Mobilizations Fee	41,970.00	1	41,970.00
	Total for Kaya 2			320,770.00
	Grand Total for Kaya 1 and 2			340,770.00



Plate 5: A Baobab Tree Shrine near approx. 6km to DK4 from DK3 – July 2017

4.4 Social Environment

4.4.1 General description

Project Area Community

The proposed project traverses Kilifi, Kwale and Mombasa Counties. The socio-economic characteristics of the affected population is homogeneous because the project is predominantly located in rural social settings. The project area is inhabited by the Miji Kenda community with each administrative location dominantly habited by a particular Miji Kenda sub-tribe as shown in **Table 20** below. They are engaged mainly in subsistence crop farming and limited animal husbandry. The majority of the population speak Swahili according to the local administration. **Figure 7** shows the administrative boundary of the Project area.

Table 20: Communities living in the Project area

County	Sub-County	Location	Community
Kilifi	Kaloleni	Mariakani	Girama, Duruma and Kamba
Kwale	Matuga	Mbunguni	Duruma
Kwale	Matuga	Ng'ombeni	Duruma
Kwale	Kinango	Kasemeni	Duruma
Kwale	Kinango	Gandini	Duruma
Kwale	Kinango	Mwavumbo & Mwatate	Digo & Duruma
Mombasa	Likoni	Mtongwe	Digo, Duruma, Swahilis, Kamba, Luhya, Luo, Somali, Taita, Kikuyu, Kisii, Pokomo, Meru

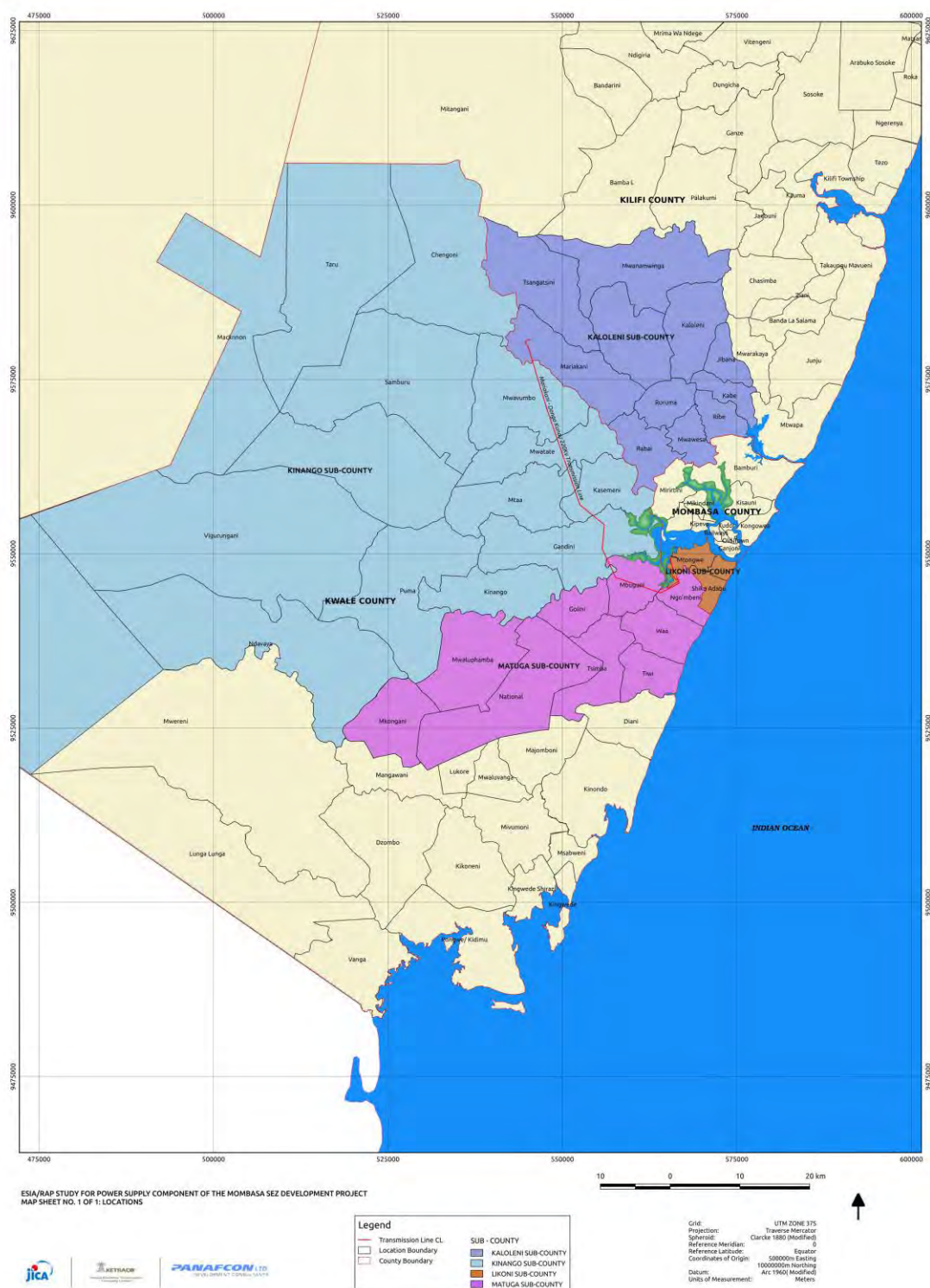


Figure 7: Administrative boundary of the Project area

Settlement and Population

The project is located in a rural setting with sparsely distributed settlements/homesteads. The transmission line corridor is going to affect a few homesteads. Population is low and scattered across the project area. The population density in the area between DK1 and DK5 in Kinango Constituency is currently about 67 persons per km² while the rest of the area covering Matuga Constituency has a population density of about 189 persons per km² as per the first County Integrated Development Plan (2013-2017).

There is a mixture of permanent houses, semi-permanent houses (iron sheet and timber houses) and mud houses.

Infrastructure

The social and public infrastructures that were encountered along the project corridor are elaborated in **Table 21**.

Table 21: Social and Public Infrastructure encountered along Project Corridor

No	Social Infrastructure	Affected Item	Location
1	Kiteje Secondary School	Land and Trees	In Ng'ombeni location between DK10 and DK11 (at chainage 47km)
2	Kenya Railways (Railway Line)	Land	In Mwavumbo location between DK3 and DK4 (at chainage 5.9km)
3	Water Pipeline	Land	In Mwavumbo location between DK3 and DK4 (at chainage 8.9km)
4	Kenya Pipeline Company Limited (Oil Pipeline)	Land	In Mwavumbo location between DK3 and DK4 (at chainage 10km)
5	Trading Centre	Land	In Mwatate location between DK4 and DK5 (at chainage 15.6km)
6	Matuga Water Supply (Water Valve Manhole)	Structure	In Mbunguni location between DK8 and DK9 (at chainage 42.4km)
7	Kenya Power and Lighting Company (Distribution Lines)	Wayleave Land	In Mbunguni location between DK8 and DK9 (at chainage 42.9km)



Plate 6: Housing Structures Affected by the TL Corridor – July 2017

Land Use

Land use in the higher area between Mariakani and DK5 is largely scanty subsistence farming where maize is grown and also the keeping of domestic animals. There are instances of a few people engaged in quarrying activities. More intense agricultural activities occur in the low-lying areas where majority of the farms have coconut-cassava and cashew nut-cassava combinations. A few farms have maize and beans. Most of the project area fall under the coconut-cassava zone.



Plate 7: Livestock Pen in one of the homesteads in the project area – July 2017

Livelihood

Majority of the project area community members are involved in mixed farming where they grow maize, sorghum, millet, green grams, beans, peas and cassava. Livestock rearing is also practiced in Kinango. Other commercial activities taking place in Kinango include quarrying for building stones and mining.

Fisheries livelihood is mainly carried out along the coastal line (Dongo Kundu area). Formal employment, casual labour, small business/petty trade, and tourism are carried out in urban centers. The semi commercial crops like coconuts and mangos are largely grown in Matuga Constituency. The cash crops grown in this area are cashew nuts, sugarcane, cotton, simsim, bixa and tobacco. The main livestock species kept for both food and income generation include Zebu cattle, goats and sheep.

4.4.2 Socio-economic survey

Survey Methodology

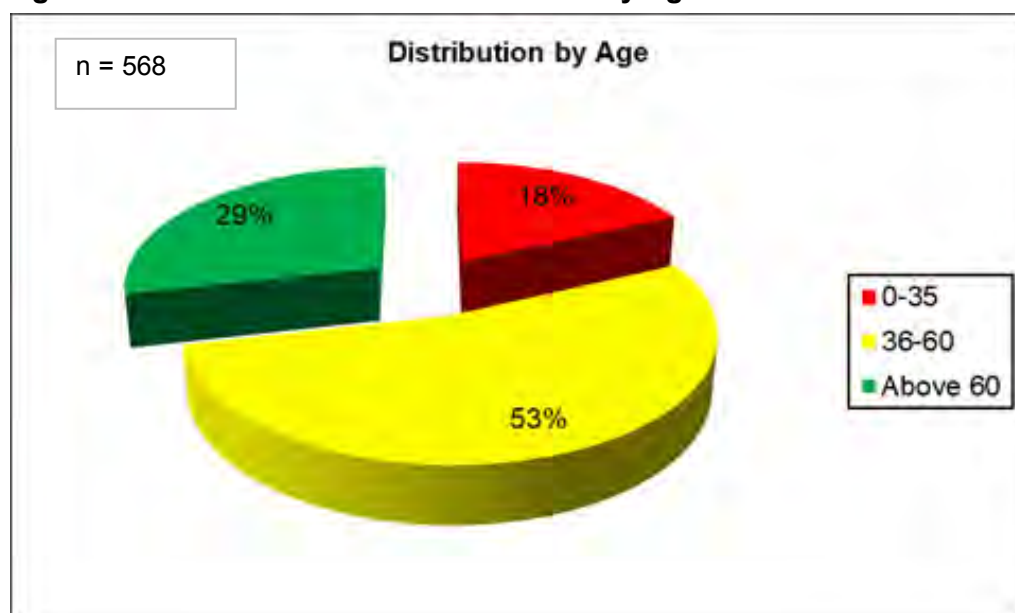
The Consultant developed comprehensive household questionnaires for data collection.

The household questionnaires captured the following information: Level of education of family heads, their source of income, number of children, male and female adults per affected household, type of land tenure, affected land size, number and type of structures per affected household, type of affected crops and trees of economic/medicinal significance. PAP, Stakeholder and Public Sensitization was done as part of participatory approach through household and stakeholder questionnaire administration. Sensitization meetings were organized by the Consultant in collaboration with the local administration. The Consultant made use of maps and GPS Coordinates to identify the ground location of the 40m wide wayleave of the transmission line from Mariakani to Dongo Kundu and the substation site. The questionnaires were administered to the household heads along the transmission line to obtain the socio-economic data. The collected socio-economic data was subjected to statistical analysis that generated the results presented in the pie-charts.

4.4.2.1 *Distribution of Household Heads (HH) by Age*

Age is a major demographic characteristic. A total of 568 HH were interviewed regarding their ages which were distributed into 3 categories as given in **Figure 8**. 53% of the respondents were in the age group of between 36 and 60 years. 29% were above 60 years while 18% were 35 years and below. In rural Kenya, up to 60 year old people are usually in charge of their livelihood affairs, managing their mainly land-based resources and actively making a living. However, those above 60 years of age are generally aging people who are not able to effectively do manual work that is required to support livelihood activities in rural Kenya. 71% of the HH were aged below 60 years. This category of HH are generally considered physically, economically and socially active to command over any compensatory resources and re-organize their livelihoods accordingly in line with project requirements.

Figure 8: Distribution of Household Heads by Age

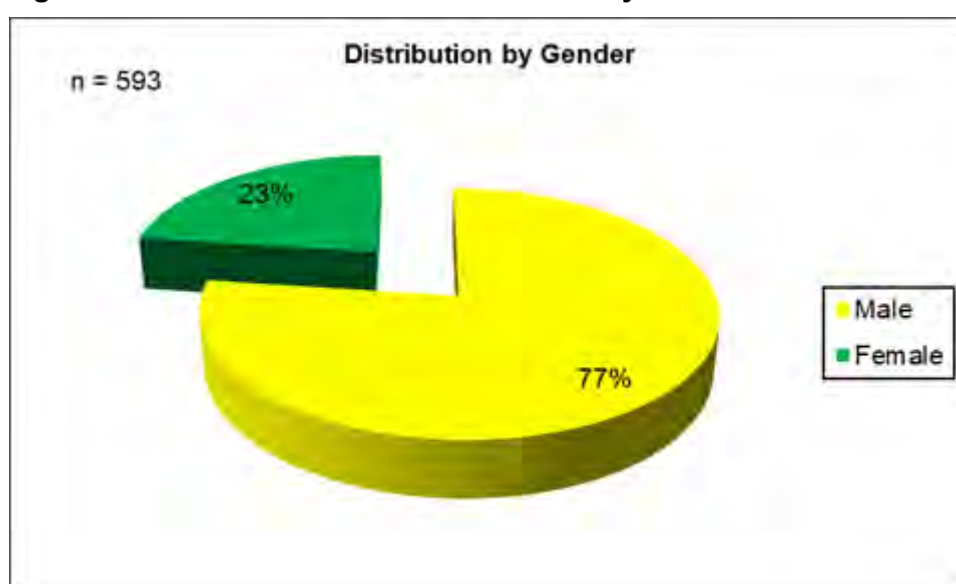


Source: Panafcon – RAP Survey, 2017-2018

4.4.2.2 Distribution of Household Heads by Gender

A gender analysis was carried out on 593 household heads. There were 136 female and 457 male household heads. This translates to 77% of the Household Heads being male while the remainder 23% are female as shown in **Figure 9**. In terms of gender, the Household Heads surveyed defy the normal population pyramid where the number of males nearly equals that of females in the various age groups of any population. Part of the reason for this kind of outlook relates to the fact that the one major population group in the Kilifi, Kwale and Mombasa Counties that host the project are the Miji Kenda who are patriarchal. Hence property in land and structures are socially defined to belong to male adults and thus considered the legal owners and not the women even if the resources/ affected assets have been sourced and secured by the women.

Figure 9: Distribution of Household Heads by Gender



Source: Panafcon – RAP Survey, 2017 – 2018

4.4.2.3 Distribution of Household Heads according to Marital Status

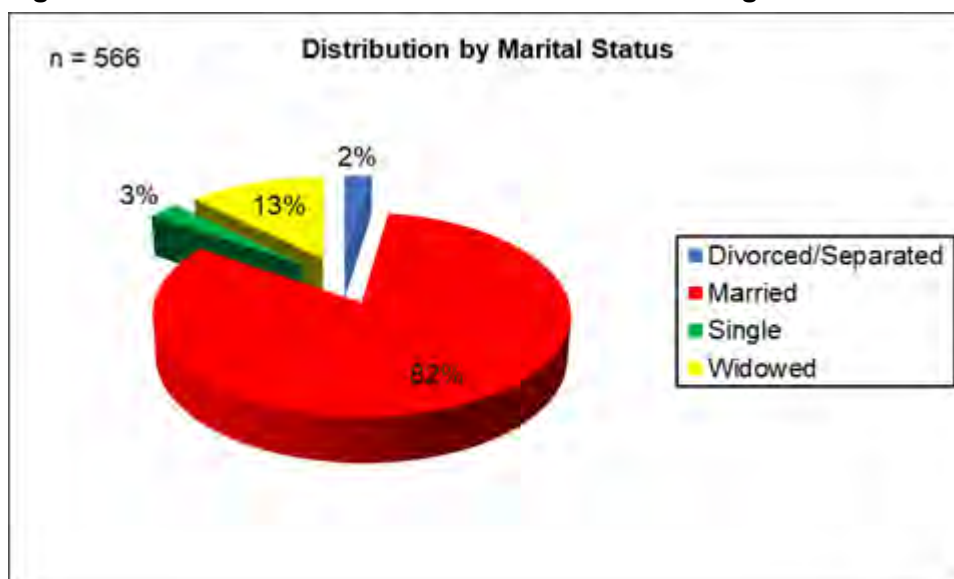
The study also looked into the marital status of the HH. A total of 566 household heads were evaluated under five classes as listed below:

- Married = 465
- Divorced = 11
- Separated = 3
- Single = 16
- Widowed = 71

The above distribution showed that 82% of them were married while 13% were widowed and 3% were single. A combined total of 2 % of the interviewed HH were either divorced or separated. Refer to **Figure 10**.

The implication of the marital status outlook is that most of them are in family set-ups and therefore project mitigations should maintain family unity. There should be minimal disruption to family units.

Figure 10: Distribution of Household Heads according to Marital Status



Source: Panafcon – RAP Survey, 2017 – 2018

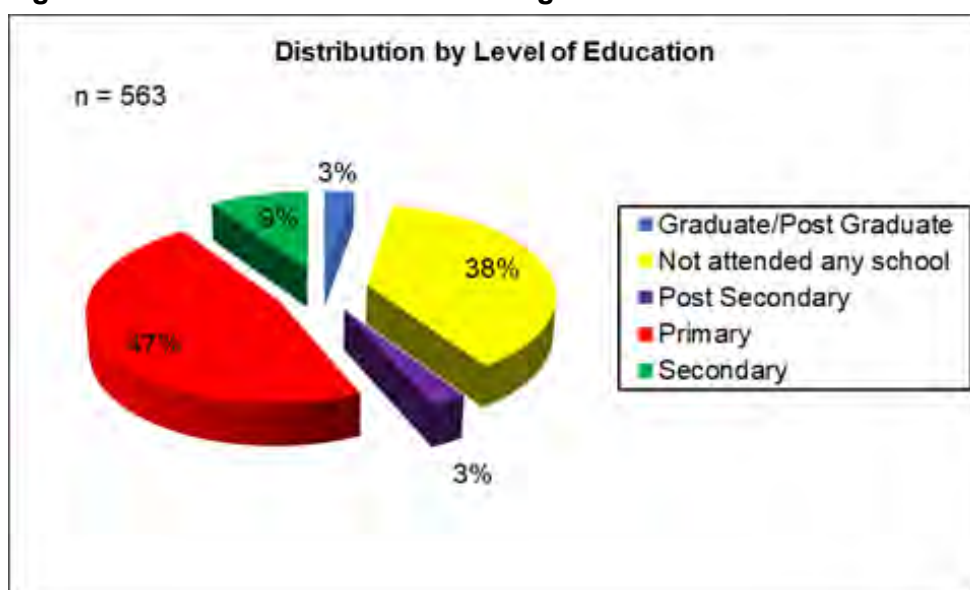
4.4.2.4 Distribution of Household Heads according to Level of Education

An assessment on level of education was done for 563 household heads and the findings are presented below:

- Post Graduate = 1
- Graduate = 15
- Post-Secondary = 15
- Secondary = 54
- Primary = 265
- Not Attended School = 213

The above findings translate to the percentages given in **Figure 11** below.

Figure 11: Household Heads According to Level of Education Attained



Source: Panafcon – RAP Survey, 2017 - 2018

38% of the household heads had not attended any school at all, 47% had achieved primary level while 9% had achieved secondary school level. 3% had achieved post-secondary and also another 3% had achieved graduate/post graduate education. Post-secondary education refers to skill-based training after secondary school level education. The fact that 62% of the household heads had formal education implies that just above half of the project affected persons are able to participate in meetings and resettlement and mitigation activities of the project.

4.4.2.5 Socio-economic Characteristics of Household Heads (HH)

In this section, the study delved into the actual socio-economic characteristics of the HH.

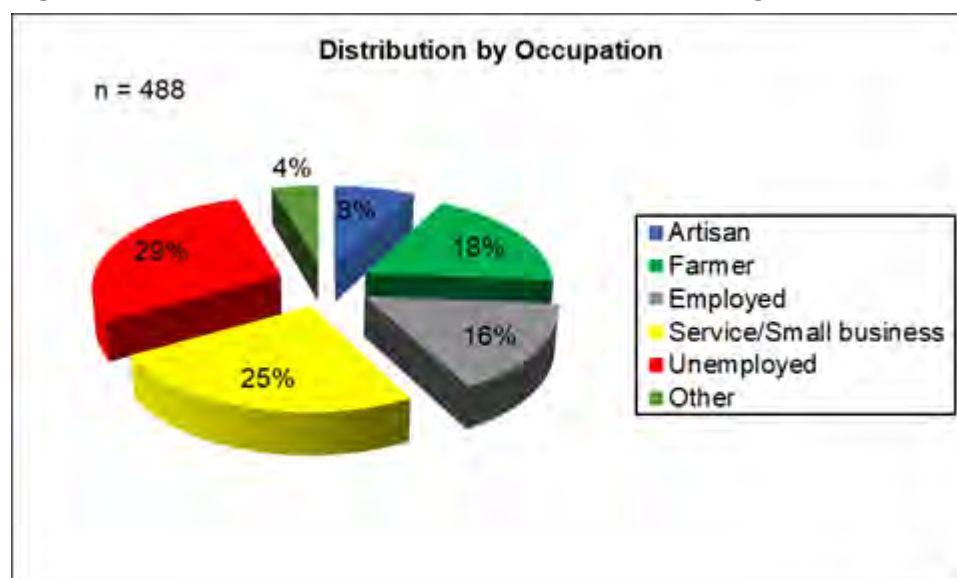
Occupation of the HH

The main occupation of 488 household heads are as follows:

- Artisan = 38
- Farmer = 90
- Employed = 78
- Administration = 3
- Service/small business = 120
- Unemployed = 140
- Others = 19

The above figures translate into the percentages presented in **Figure 10**. 25% are running small businesses, 8% are artisans in the informal sector and 18% are involved in farming activities for their livelihood. 16% of the respondents are employed in the formal sector. 29% of the HH considered themselves unemployed since they were not involved in any income generating activities. These were mainly people who had no or limited formal education.

Figure 12: Distribution of Household Heads According to Main Occupation



Source: Panafcon – RAP Survey, 2017 – 2018

The HH appreciate the gaps in their social and economic progress that the proposed project would fill in improving their lives and hence offered great support for it on this basis.

Overall, the various occupations and lifestyles of the HH already mentioned imply that most of them were in the natural resource-based livelihoods and any displacement from their current locations would most likely throw their livelihoods off balance. This calls for careful design of resettlement so that PAPs are not relocated to areas that will not suit their farming livelihood styles.

The various occupations described above include the following:

- **Artisan** – Those privately involved in artisanry jobs like Carpentry, mechanics, masonry, painting, weaving and electrical works.
- **Farmer** – Those involved in Farming activities that contributes to their livelihood
- **Employed** – Those having regular jobs like Civil servants, teachers, guards, cooks and account clerks
- **Un-employed** – Those not gainfully employed or engaged in regular income activities
- **Service/Small Business** – Those operating motorbike transport (boda boda), kiosk operators, charcoal vendors, drivers of public transport vehicles and wine tappers.
- **Others** – Those offering Administration Services like Chiefs, Village Elders and Retired persons

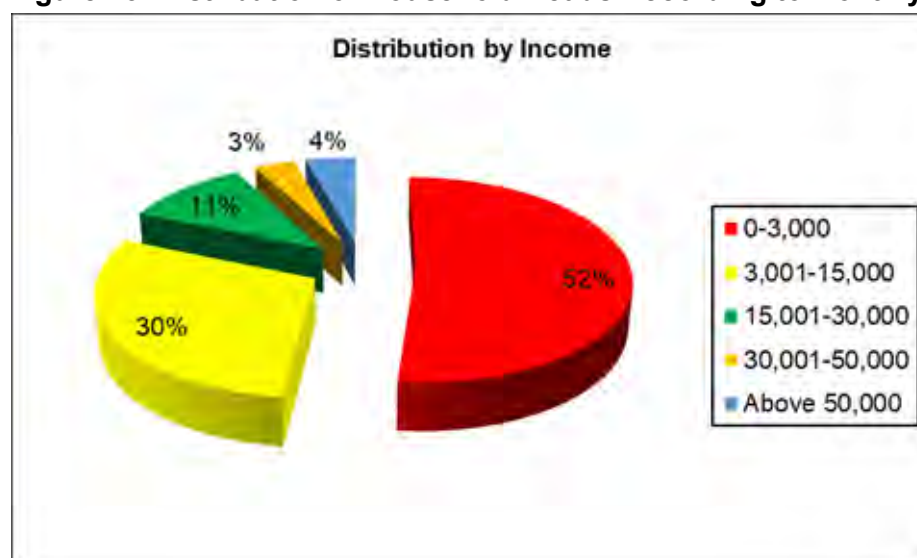
Income of the HH

The incomes of 598 household heads were distributed into the following 5 categories.

- 0 – 3,000 = 309
- 3,001 – 15,000 = 177
- 15,001 – 30,000 = 65
- 30,001 – 50,000 = 21
- Above 50,000 = 26

The above numbers were translated into percentages presented in **Figure 13**. The results show that 52% either have an income of KShs 3,000 or less or no regular income at all. This suggests that majority of the HH are poor. Those earning between KShs 3,000 and KShs 15,000 form 30% of the population. 11% of the HH earn between KShs 15,000 and KShs 30,000 while only 3% earn between KShs 30,000 and KShs 50,000. The remaining 4% earn above KShs 50,000. See **Figure 13** for Distribution of income among the Household Heads..

Figure 13: Distribution of Household Heads According to Monthly Income



Source: Panafcon – RAP Survey, 2017 - 2018

4.4.2.6 Distribution of Household Heads by Source of Energy for Cooking

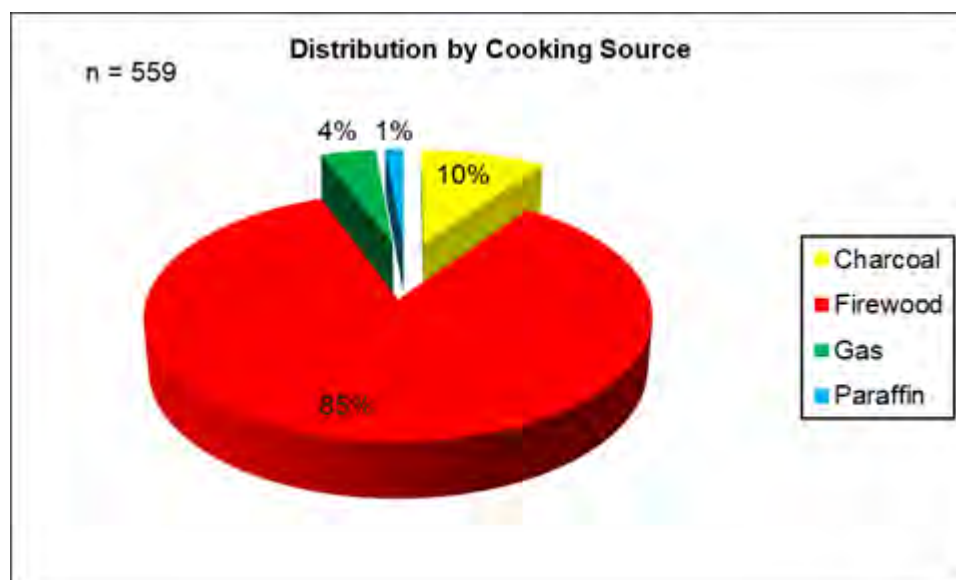
A total of 559 household heads were interviewed regarding their energy sources for cooking and the following results were obtained:

- Firewood = 473
- Charcoal = 54
- Gas = 24
- Paraffin = 8

The above numbers translated to percentages shown in **Figure 14**. 85% use firewood, 10% use charcoal, 4% use gas. While 8% use Paraffin. Users of other sources form 1%. This is a worrying trend when considering conservation of forest resources.

A total of 95% of energy sources are forest resources based (Firewood and Charcoal). Firewood does not only deplete forest resources, it significantly contributes to air pollution resulting in Upper Respiratory Tract Infection (URTI). Sensitisation of the project area community should be carried out to educate them on the impacts of absolute reliance on natural vegetation for cooking energy (destruction of forest resources and health effects) Use of clean energy sources like gas and charcoal briquettes) should be promoted.

Figure 14: Household Heads by Source of Energy for Cooking



Source: Panafcon – RAP Survey, 2017 – 2018

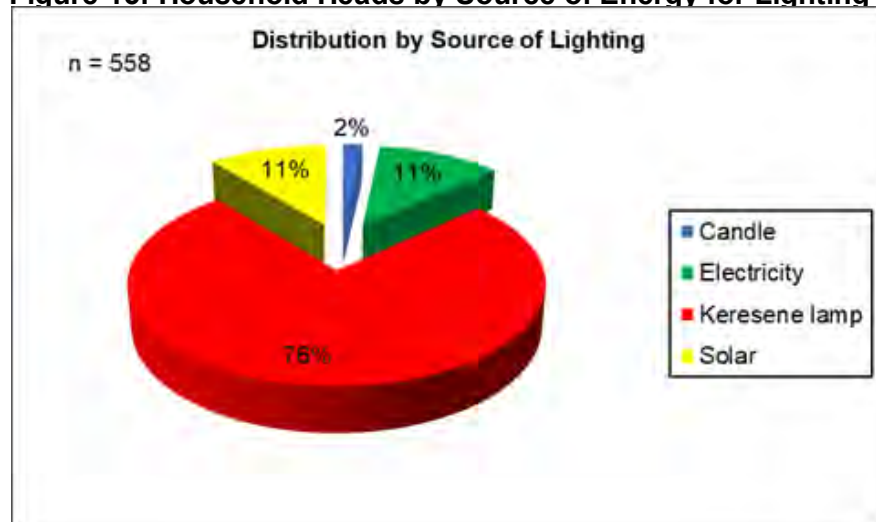
4.4.2.7 Distribution of Household Heads by Source of Energy for Lighting

Out of 558 household heads interviewed regarding sources of energy for lighting, the following results were obtained:

- Electricity = 64
- Candle = 10
- Kerosene Lamp = 423
- Solar = 61

The above numbers translated to the percentages presented in Figure 13. Majority of the project area respondents use Kerosene Lamp (76%). Electricity and Solar Power follow with 11% each. Use of candles and other sources form only 2%.. Use of kerosene lamps is unsafe health-wise and may contribute to respiratory and eye related diseases due to smoke emission.. Project area population should be sensitized on affordable and environmentally friendly sources like solar lanterns.

Figure 15: Household Heads by Source of Energy for Lighting



Source: Panafcon – RAP Survey, 2017 - 2018

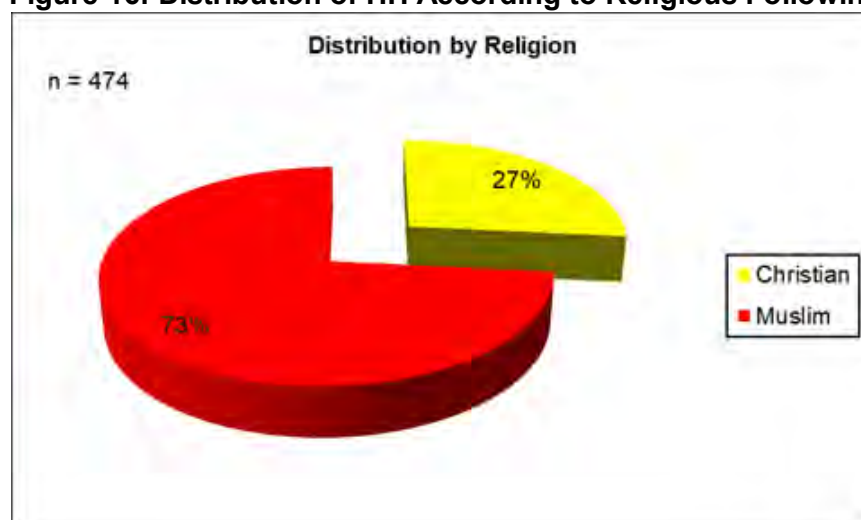
4.4.2.8 Distribution of Household Heads by Religious Following

The 474 household heads who indicated their religious following exhibited 2 dominant religious groups as given below:

- Muslim = 348
- Christian = 126

The above data translated to 73% being Muslim followers while 27% being Christian followers as shown in **Figure 16**. It will be important to this into consideration when aspects of resettlement are being discussed with the PAPs.

Figure 16: Distribution of HH According to Religious Following



Source: Panafcon – RAP Survey, 2017 – 2018

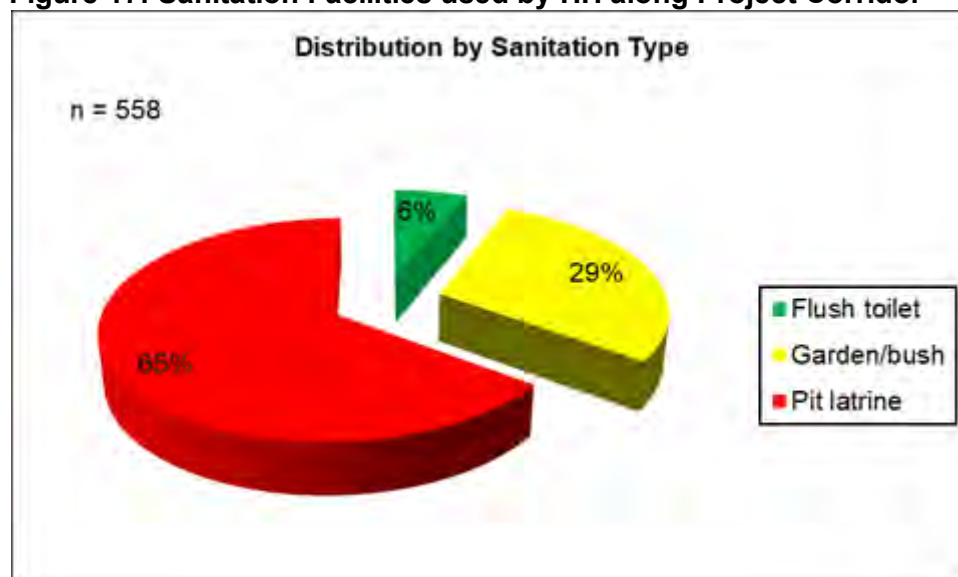
4.4.2.9 Distribution of HH by Sanitation Type

The 558 household heads who indicated the type of sanitation facility they use were distributed as follows:

- Flush toilet = 34
- Pit latrine = 362
- Garden/bush = 162

This translates to 65% use pit latrines, 29% use Garden/bush while 6% use flush toilets as shown in **Figure 17**. The 29% do not have any developed sanitary facility (use the bush) to answer the call of nature. A small percentage (6%) use flush toilet facilities. Considering that a significant population (30%, refer to **Figure 18**) use water from boreholes/wells for drinking and given that groundwater is not very deep, there is cause for concern on health and sanitation of the community since the wells are located where the community is settled.

Figure 17: Sanitation Facilities used by HH along Project Corridor



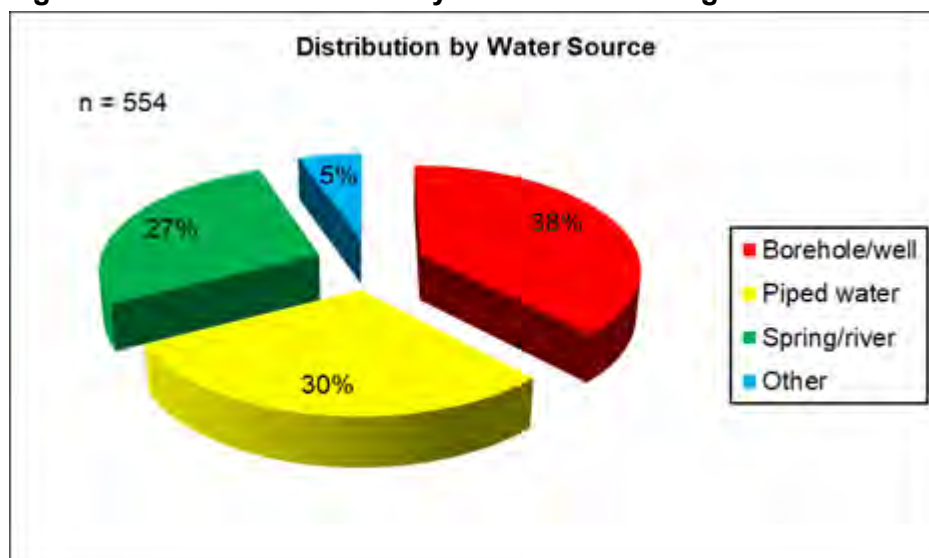
Source: Panafcon – RAP Survey, 2017 – 2018

4.4.2.10 Distribution of HH by Source of Drinking Water

The 556 household heads who indicated the source of their drinking water along the project corridor are distributed as follows:

- Borehole/well = 210
- Piped water = 163
- Spring/river water = 151
- Others = 30

The above numbers translate to the percentages provided in **Figure 18**. Majority rely on boreholes/wells as a source of drinking water (38%). Piped and spring water sources are also used almost in equal measure (30% and 27% respectively). The significant quantity of piped water use reflects the urban nature of the project area. The 5% who use other sources largely rely on water purchased from water vendors.

Figure 18: Distribution of HH by Source of Drinking Water

Source: Panafcon – RAP Survey, 2017 – 2018

4.4.2.11 Vulnerable HH

There were 198 HH classified as vulnerable due to being ill, paralysed, poor, women and so on. Among the 198 HH, 136 were headed by women, majority of whom are widows and have not attended school. Vulnerable households will require extra assistance during resettlement.

5 ANALYSIS OF PROJECT ALTERNATIVES

During the course of formulating the proposed project, several project alternatives were considered to ensure that the best option of project development is adopted. The consideration of alternatives is one of the more proactive approaches of environmental assessment. This process serves to enhance the project design through an examination of other feasible options instead of only focusing on the more defensive task of reducing adverse impacts of a single design.

5.1 The “No Action” Alternative

The ‘No Action’ alternative has been considered where the development of the 220kV transmission line from Mariakani-Dongo Kundu would not be carried out. One possible option will be to use the existing 132 kV TL network in Mombasa, but considering future demand of the Mombasa area, this network does not have sufficient capacity to support demand of Mombasa SEZ. Besides, the Mombasa SEZ will require more reliable 220 kV power supply rather than 132 kV. An alternative option may be to construct a new power station inside or near Mombasa SEZ, but that will likely entail greater environmental and social impacts due to the following reasons:

- A new power station will generate additional pollution risks such as through wastewater discharge, stack emission and hazardous wastes.
- A new power station may further stress the sensitive natural environment in the Dongo Kundu area (e.g. mangroves, mud flats and creeks) through accumulative impacts with the Mombasa SEZ.
- A new power station will require larger resettlement and hence greater social impacts.

In conclusion, the proposed Project is considered as the most appropriate option.

5.2 Alternative analysis of TL route

The following alternative analysis was conducted in the process of finalizing the TL route:

- Alternative analysis of shortest TL route between Mariakani substation and Mombasa SEZ substation
- Alternative analysis of TL outside Mombasa SEZ area including route analysis to avoid Kaya Gandini
- Alternative analysis inside Mombasa SEZ area

Results of each analysis are explained below:

(1) Alternative analysis of shortest TL route between Mariakani substation and Mombasa SEZ substation

The TL route was planned by referring to KETRACO’s route selection criteria. One of its priority criteria is to select as far as possible the shortest route between the pre-determined substations. Therefore, as an initial step, the following two routes between Mariakani substation and Mombasa SEZ substation was considered.

- Option A: TL with the shortest distance from Mariakani substation and Mombasa SEZ substation
- Option B: TL with the shortest distance from Mariakani substation and Mombasa SEZ substation that avoids mangrove area

Figure 19 shows the alignment of the two routes (Option A and B).



Figure 19: Alignment of Option A (blue line) and Option B (red line)

Table 22 compares the two TL options based on natural and social impacts and technical difficulties.

Table 22: Alternative analysis of Options A and B

No	Project Aspect	Option A	Option B
1	Route	Mariakani substation – Mombasa SEZ substation	Mariakani substation – south Mombasa SEZ -Mombasa SEZ S/S. Note that the route inside Mombasa SEZ followed the route set through Mombasa SEA Master Plan.
2	Distance	Approx. 38 km	Approx. 50 km
3	Land use	Agriculture	Agriculture
4	Impact on natural environment	Approx. 24 ha of forest clearance necessary including mangrove	Approx. 4 ha of forest clearance necessary
5	Impact on social environment	Resettlement of around 70 HH is estimated.	Resettlement of around 70 HH is estimated.
6	Technical difficulties and other issues	Need to cross over a mangrove/creek area	No notable difficulties
7	Recommended option	Not recommended for the following reasons: <ul style="list-style-type: none"> - It will require large area of forest clearance including mangroves - Some technical issues as TL will need to cross over a mangrove/creek area 	Recommended for the following reasons: <ul style="list-style-type: none"> - Area of forest clearance is less the Option A - No need to cut mangrove - No technical difficulties

Based on the alternative analysis, Option B was selected as the suitable TL route mainly as it requires less forest clearance and no crossing of mangrove/creek area.

(2) Alternative analysis of TL outside Mombasa SEZ area

After selecting Option B, the route was studied in more detail to identify any issues. One major issue was encountered at around 25 km from the Mariakani substation, in which a primary school (Migunemi Primary School) was found inside the TL corridor.

Since KETRACO route selection criteria recommends to avoid such public properties, the following two alternative routes were considered that avoids Migunemi Primary School (see Figure 2 for the alignment of the two routes):

- Option A: The route avoids Migunemi Primary School by diverting to the east direction. The angle of diversion was set in a manner to avoid another school (Chizini Primary School) located in the vicinity. In addition, the route was planned to minimize TL distance and angle point.
- Option B: The route avoids Migunemi Primary School by diverting to the west direction. The angle of diversion was set in a manner to avoid another school (Gandini Central Primary School) located in the vicinity. In addition, the route was planned to minimize TL distance and angle point.

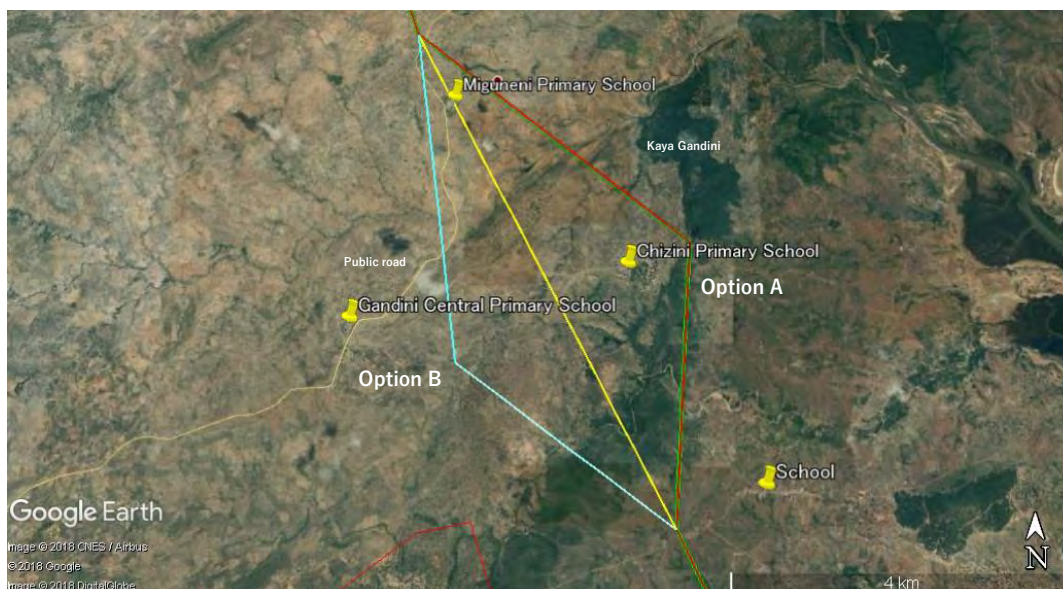


Figure 20: Two alternative route options to avoid Migunemi Primary School

Table 23 compares the two route options based on natural and social impacts and technical difficulties.

Table 23: Alternative analysis of route options to avoid Migunemi Primary School

No	Project Aspect	Option A	Option B
1	Distance	Approx. 8 km	Approx. 8 km
2	Impact on natural environment	Approx. 10 ha of forest clearance is necessary	Approx. 3 ha of forest clearance is necessary
3	Impact on social environment	Less than 10 structures identified along the route	More than 10 structures identified along the route
4	Technical difficulties and other issues	No notable difficulties.	The route crosses the same public road multiple times and also at small angles which needs to be avoided as per KETRACO criteria.
5	Recommended option	Recommended for the following reasons: - Displacement/relocation of homestead/structures will be less than Option B. - No issues on road crossing as in Option B.	Not recommended for the following reasons: - Displacement/relocation of homestead/structures will be greater than Option A. - It requires multiple crossing of the same public road and also crossing at small angles which needs to be avoided as per KETRACO route selection criteria.

The critical difference between Options A and B is that Option B requires multiple crossing of the same public road which needs to be avoided as per KETRACO route selection criteria.

While multiple crossing can be avoided by bending the route at a steeper angle, this will either significantly extend the length of the TL or create more angle points. Therefore, Option A was selected as the suitable option.

After Option A was selected, it was established through field survey that DK6 was touching the edge of Kaya Gandini, which is a gazetted natural monument site. An alternative route to avoid Kaya Gandini was therefore considered. **Figure 21** shows the alignment of the two options. **Table 24** compares the two route options based on natural and social impacts and technical difficulties.

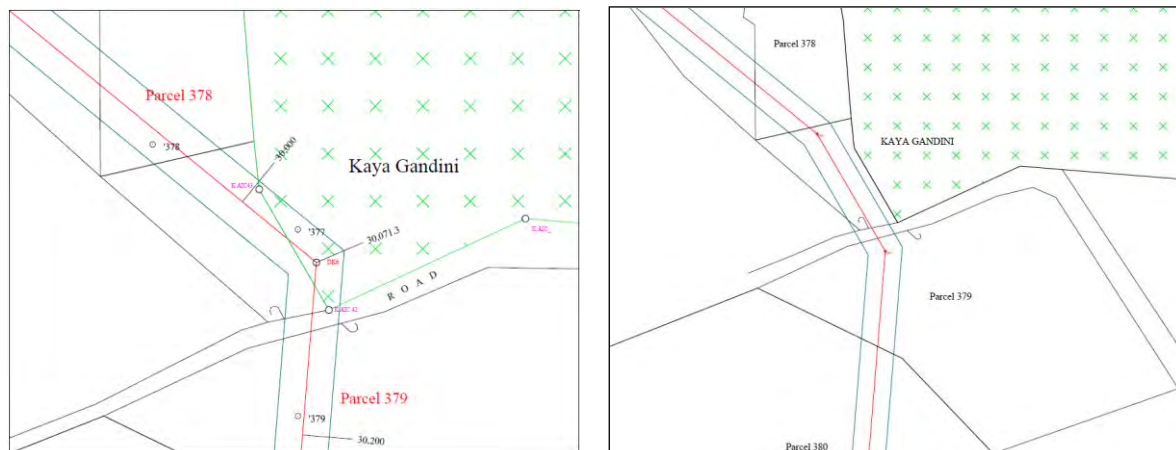


Figure 21: Alternative route options along Kaya Gandini
(Left: kaya affecting route, right: kaya avoiding route)

Table 24: Alternative analysis of route option to avoid Kaya Gandini

No	Project Aspect	Option A (kaya affecting route)	Option B (kaya avoiding route)
1	Overlapping area with Kaya Gandini	Approx. 0.2 ha	No overlap
2	Impact on natural environment	Some trees inside Kaya Gandini will need to be cut.	Some trees will need to be cut but it will be outside Kaya Gandini.
3	Impact on social environment	<ul style="list-style-type: none"> It will result in partial loss of cultural site used by community. It will occupy more land area than Option B. 	<ul style="list-style-type: none"> It will result in no loss of cultural site used by community. It will occupy less land area than Option A.
4	Technical difficulties and other issues	No notable difficulties.	Need to install one extra tower but technically not an issue but the cost will increase.
5	Recommended option	Not recommended for the following reasons: <ul style="list-style-type: none"> It will overlap with Kaya Gandini, resulting in loss of trees and cultural site inside Kaya Gandini. 	Recommended for the following reasons: <ul style="list-style-type: none"> Although it will be more costly by installing an extra tower, natural and social impacts are less than Option A and as there will be no technical issues.

In conclusion, the route to avoid Kaya Gandini (Option B) was selected as natural and social impacts are less than Option A and due to no technical issues.

(3) Alternative analysis of TL inside Mombasa SEZ area

The TL route inside SEZ basically follows the route proposed in the Mombasa SEZ Master Plan. However, the route was identified to pass over a kaya (Kaya Kiteje), which socially is not recommended.

Therefore, a new alternative route was considered as shown in **Figure 22**. The alternative route was set in a manner so that it will not affect the planned land use under the Mombasa SEZ Master Plan. **Table 3** shows the results of the alternative analysis. In conclusion, the newly proposed route was analyzed to be the better option, firstly as it avoids the kaya and also due to less number of households in the wayleave, and less number of angle points.

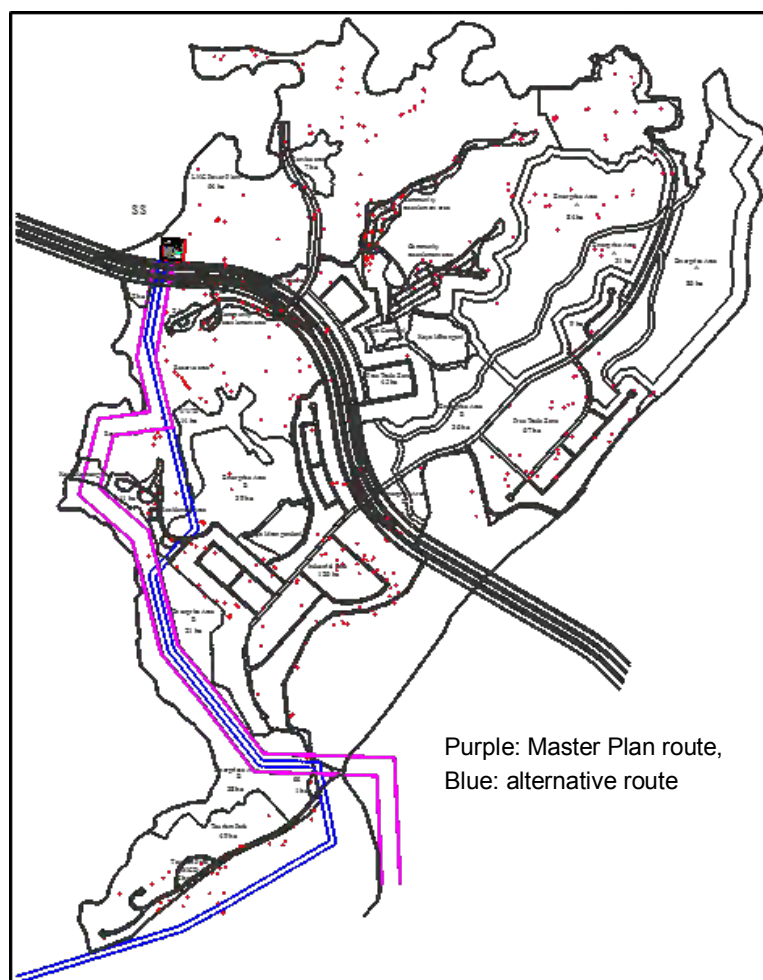


Figure 22: TL Route alternative

Table 25: Alternative Analysis of Route Options inside Mombasa SEZ

No	Project Aspect	Master Plan route	Alternative route
1	Distance	Approx. 4.3 km	Approx. 4 km
2	Impact on natural environment	TL will pass over Kaya area (Kaya Kiteje) and tall trees inside the Kaya will need to be cut.	Does not pass over Kaya area (Kaya Kiteje avoided) and tall vegetation is limited along the route.
3	Impact on social environment	Four structures identified inside the TL.	One structure identified inside the TL.
4	Technical difficulties and other issues	<ul style="list-style-type: none"> • More angle points than alternative route. • Steeper angle points than alternative route which needs to be avoided as much as possible as per KETRACO criteria. 	Less angle points than Master Plan route.
5	Recommended option	<p>Not recommended for the following reasons:</p> <ul style="list-style-type: none"> - Will pass over Kaya and require cutting of Kaya trees - Displacement/relocation of homestead/structures will be more than alternative route. - More angle points and steeper angle points than alternative route. 	<p>Recommended for the following reasons:</p> <ul style="list-style-type: none"> - Does not pass over Kaya - Displacement/relocation of homestead/structures less than Master Plan route. - Less angle points than Master Plan route.

6 ENVIRONMENTAL AND SOCIAL IMPACTS

6.1 ESIA Scoping Exercise

The matrix providing the classification and occurrence of the potential environmental impacts and the actions required during the ESIA Study are outlined in **Table 26** below:

Table 26: Scoping of Environmental Impacts

No	Item	Phase	Rating	Rationale	TOR of EIA study
1	Air pollution	C	B-	Construction works may cause air pollution such as through exhaust and fugitive dust emissions from construction vehicles / machines and heavy construction works.	<ul style="list-style-type: none"> Review applicable laws/regulations. Implement baseline air quality survey. Identify construction air pollution sources. Identify sensitive receptors.
		PC, O	D	There are no notable air pollution sources.	—
2	Water pollution	C	B-	Construction works may pollute surface/ground water through rainwater runoff and discharge of concrete wash water.	<ul style="list-style-type: none"> Review applicable laws/regulations. Implement baseline water quality survey. Collect hydrological information around project area. Identify construction water pollution sources. Identify sensitive receptors.
		PC, O	D	There are no notable water pollution sources.	—
3	Soil pollution	C	B-	Oil spills and leaks from construction vehicles and machines may cause soil pollution.	<ul style="list-style-type: none"> Review applicable laws/regulations. Implement baseline soil quality survey. Identify construction soil pollution sources.
		PC, O	D	There are no notable soil pollution sources.	—
4	Waste	PC	B-	Vegetation waste will be generated from forest clearance.	<ul style="list-style-type: none"> Review applicable laws/regulations. Review waste management practices of vegetation wastes.
		C	B-	Various construction wastes will be generated including excavated soil.	<ul style="list-style-type: none"> Review applicable laws/regulations. Identify type and volume of construction wastes Review waste management facilities.
		O	B-	Waste will be generated from operation and maintenance activities.	<ul style="list-style-type: none"> Identify type of operation and maintenance wastes Review waste management facilities.
5	Noise and vibration	C	B-	Heavy construction works and movement of construction vehicles may cause noise and vibration nuisance.	<ul style="list-style-type: none"> Review applicable laws/regulations. Implement baseline noise survey. Identify construction noise/vibration sources. Identify sensitive receptors.
		PC, O	D	There are no notable noise/vibration sources.	—
6	Ground subsidence	PC, C, O	D	There are no activities that may cause ground subsidence.	—

No	Item	Phase	Rating	Rationale	TOR of EIA study
7	Offensive odor	PC, C, O	D	There are no notable odor sources.	—
8	Bottom sediment	PC, C, O	D	There are no notable sediment pollution sources.	—
9	Conservation area	PC	D	There are no activities that may have adverse impact on conservation areas.	—
		C	B-	Construction works may affect Kaya Gandini and Mwaluganje Forest Reserve.	<ul style="list-style-type: none"> Review applicable laws/regulations. Collect information on Kaya Gandini and Mwaluganje Forest Reserve and consult with kaya elders
		O	D	There are no activities that may have adverse impact on conservation areas.	—
10	Ecosystem, flora/fauna	PC	B-	Forest along the DK6-DK7 TL corridor will need to be cut.	<ul style="list-style-type: none"> Review applicable laws/regulations. Review existing information and conduct expert interview. Implement flora/fauna survey. Identify presence of threatened species. Estimate area of forest clearance
		C	B-	Construction works may disturb wildlife along the DK6-DK7 forest area.	<ul style="list-style-type: none"> Review applicable laws/regulations. Review existing information conduct expert interview. Implement flora/fauna survey. Identify type of construction works that may affect wildlife.
		O	B-	TL generally have risk of bird collision and wildlife electrocution.	<ul style="list-style-type: none"> Review existing information conduct expert interview. Identify wildlife susceptible to collision and electrocution.
11	Hydrology	PC, C, O	D	While some sections of the TL will cross rivers, adverse impacts on river hydrology are not expected as no structures will be built inside the river.	—
12	Topography	C	D	While the topography at the substation site will change due to cut and fill works, such change is unlikely to entail any impacts.	—

No	Item	Phase	Rating	Rationale	TOR of EIA study
		PC, O	D	There are no activities that may cause alteration of existing topography.	—
13	Involuntary resettlement	PC	B-	Some resettlement will be required but is not expected to be large scale.	<ul style="list-style-type: none"> Review applicable laws/regulations. Review compensation and assistance measures proposed in the RAP.
		C, O	D	Resettlement will not be required.	—
14	Vulnerable social groups	PC	B-	Vulnerable groups are susceptible to resettlement related impacts.	<ul style="list-style-type: none"> Implement socioeconomic survey and identify vulnerable groups. Review assistance measures proposed in the RAP.
		C, O	D	There are no activities that may affect vulnerable groups.	—
15	Indigenous/minority people	PC, C, O	C-	Uncertain whether there are any indigenous/minority people	<ul style="list-style-type: none"> Literature review Implement field reconnaissance and interviews
16	Livelihood, living environment	PC	B-	PAPs may lose income if not appropriately compensated and assisted.	<ul style="list-style-type: none"> Implement socioeconomic survey Identify factors that may result in income reduction. Review assistance measures proposed in the RAP.
		C	B-	Construction works may restrict some livelihood activities.	<ul style="list-style-type: none"> Implement socioeconomic survey Identify factors that may result in income reduction. Review assistance measures proposed in the RAP.
		O	D	There are no activities that may affect livelihood activities.	—
17	Land use	PC	B-	Land use at the substation site will change due to land acquisition for substation. There will be some restriction of land use along the TL corridor.	<ul style="list-style-type: none"> Implement socioeconomic survey and identify current land use.
		C	B-	There will be temporary restriction in land use at the construction site.	<ul style="list-style-type: none"> Implement socioeconomic survey and identify current land use.
		O	D	There are no activities that will require land use change.	—
18	Local resource	PC, C, O	D	There are no activities that may have adverse impacts on local resources.	—

No	Item	Phase	Rating	Rationale	TOR of EIA study
19	Water use	C	D	No impacts are expected as TL construction (i.e. stringing works) will disturb only a small section of the rivers crossing the TL and will be short-term.	—
		PC, O	D	There are no activities that may affect water use.	—
20	Social infrastructures and services	PC	B-	Social infrastructures along the TL corridor may require relocation.	Implement socioeconomic survey and identify social infrastructures along the TL corridor.
		C	B-	Construction works may temporary affect social infrastructures.	Implement socioeconomic survey and identify social infrastructures along the TL corridor.
		O	D	There are no activities that may have adverse impacts on social infrastructures and services.	—
21	Social institutions	PC, C, O	D	There are no activities that may affect social institution.	—
22	Misdistribution of benefit and losses	PC, C, O	D	There are no activities that may cause misdistribution of benefit and losses.	—
23	Local conflicts of interest	PC, C, O	D	There are no activities that may trigger local conflicts of interests.	—
24	Cultural heritage	PC	B-	Two tree shrines are located inside the TL corridor and may have to be cut.	<ul style="list-style-type: none"> Identify the height of the tree shrine. Consult tree shrine owners.
		C, O	D	There are no activities that may affect cultural heritage.	—
25	Landscape	PC, C, O	D	The Project will somewhat change the surrounding landscape but such change will not be of any significance because the area of interference of the TL will be minimal and the substation area will become an industrial area under the SEZ.	—
26	Gender	PC	B-	The Project may trigger gender issues due to the patriarchal nature of the society.	Implement socioeconomic survey and identify women HH that may be affected.
		C, O	D	There are no activities that may trigger gender issues.	—
27	Children's rights	C	B-	Construction contractor may exploit children for cheap labor.	<ul style="list-style-type: none"> Review applicable laws/regulations. Review child labour status in Kenya.

No	Item	Phase	Rating	Rationale	TOR of EIA study
		PC, O	D	There are no activities that may trigger children's rights issues.	—
28	Infectious diseases (HIV/AIDS etc.)	C	B-	There is a certain risk of infectious diseases spreading through influx of construction workers.	<ul style="list-style-type: none"> Review applicable laws/regulations. Assess risk of infectious diseases.
		PC, O	D	The risk of spreading infectious diseases is low.	—
29	Occupational safety	C, O	B-	There is a certain risk of occupational accidents.	<ul style="list-style-type: none"> Review applicable laws/regulations. Identify high risk works related to TL construction and operation.
30	Accidents	C	B-	There is a certain risk of accidents (e.g. traffic accidents).	Identify type of works that may cause accidents.
		PC, O	D	The risk of accidents is low.	—
31	Climate change	PC, C, O	B-	Forest clearance along the TL may to some extent enhance global warming through loss of CO ₂ storage sources.	Asses impact on climate change by estimating area of forest clearance and consequent loss in carbon storage capacity.

NB:

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown.

D: No impact is expected

Abbreviations

PC - Pre-construction stage,

C - Construction stage.

O - Operation stage

6.2 Potential Positive Impacts

The proposed Mariakani-Dongo Kundu 220kV Transmission Line and substation at Dongo Kundu have notable positive effects that have been identified during this ESIA study. They are included in **Table 27**.

Table 27: Potential Positive Impacts

No	Potential Positive Impact	Justification
1.	Supply of adequate power to Special Economic Zone (SEZ)	Make the proposed SEZ realize its objective of attracting investment and developing an industrial and commercial hub in Dongo Kundu area
2.	Availability of affordable power	Facilitate SEZ produce goods and other services at competitive prices for both domestic and export markets
3.	Improvement of income and enhancement of livelihood of project area community	The TL will facilitate SEZ generate job opportunities at Dongo Kundu that will enhance livelihood and economic growth.
4	Enhancement of property value in Dongo Kundu and the surrounding areas	The Transmission Line (TL) will contribute to the appreciation of land and other property within Dongo Kundu and the surrounding areas

6.3 Assessment of Potential Negative Impacts and Mitigation Measures

The study has noted that besides the positive effects, there are negative environmental and social implications that are associated with its implementation as highlighted below:

6.3.1 Sources of Negative Impacts

The potential sources of negative impacts of the transmission line project include the following:

- **Clearance of Tall Vegetation and Forest** - Clearance of existing vegetation to create the 40m wide Right Of Way (ROW) along the 53km transmission line corridor and to a less extent, the construction of access roads for construction and maintenance;
- **Excavation Activities** - Excavation and disturbance of top soils and geological formation at the proposed substation site and the sites where the pylon bases will be located will cause loosening of the top soil that can easily be blown away or transported by water.
- **Construction Activities** - Construction activities of the proposed transmission line structures and other activities associated with civil works
 - a) Vegetation clearance
 - b) Excavation activities
 - c) Water demand for construction personnel & activities
 - d) Site construction waste generation
 - e) Fugitive dust emission
 - f) Exhaust gas emission from vehicles and machinery
 - g) Noise from construction machinery
- **Displacement of Structures** - Effects of construction activities to human settlement resulting to relocation and resettlement of affected persons
- **Presence of Transmission Lines in Forests:** Presence of Transmission Line in vegetated/forested areas where there are migratory birds and animals that climb structures;
- **Religious and Sacred Sites** – Presence of religious, sacred or cultural sites along the TL corridor (shrines)

- **Steep Slopes within the TL Corridor** – Presence of relatively steep slopes within the TL corridor where construction of pylon bases will take place;
- **Contractor's Construction Camps** – The contractor's camp will accommodate various activities like residential units for caretakers and storage of construction materials that will include fuels, oils and chemicals.
- **Development of Structures in a Natural Environment** – Development of structures that do not conform to the host natural environment.
- **Disruption of socio economic activities** – The project area has some socio-economic activities like growing of commercial plants like cashew nuts, coconuts, mangos, quarrying of building stones etc. which will be disrupted.
- **Disruption of wildlife and migratory bird transitory habitats** – The community forested area of the TL corridor (DK6-DK7) is accessed by elephants when they escape from Mwaluganje Forest Reserve. This rarely happens and if they break the fence, KWS returns them back immediately. Since the area is a community forest, fewer animals and migratory birds use this area.
- **Alteration of Land Use** – The TL will alter land use patterns in the project corridor
- **Working at Heights** – Some of the workers will be working at heights when installing and stringing of conductors and when carrying out maintenance.
- **Greenhouse Effect** – Loss of some forest cover along the TL corridor over a distance of 2.5km
- **Riparian Distance** – There is a requirement that riparian distance from the river water is observed when putting up a development or structure next to a river basin to avoid impacting the river/stream.
- **Increased Water Demand for Construction** – Construction of the Transmission Line infrastructure will require extra supply of water.

6.3.2 Assessment of Negative Impacts

The potential negative impacts identified through the scoping exercise (Section 6.1) are predicted and assessed in the ensuing sections. The results of the assessment are rated and summarized in **Table 29**.

(1) Air pollution

Construction impacts:

The main source of air pollution will be exhaust gas and fugitive dust emission especially from heavy construction works (e.g. cut and fill works) at the substation/access road. However, significant impacts are not anticipated as construction activities are temporary and intermittent in character. There may however be certain impacts on the few residential houses located in the vicinity of the construction site especially during dry weather where dust is more readily suspended. Strict air pollution control measure will therefore be required when working near residential houses.

(2) Water pollution

Construction impacts:

Water pollution may occur when large volume of soil from exposed construction areas are eroded and discharged to downstream surface water body via rainwater runoff. Such risk is highest at the substation/access road where soils will be exposed through cut and fill works. According to the catchment map of Mombasa SEZ area, there are no perennial streams in the downstream area. Rainwater runoff will flow through valleys and natural channels and eventually drain towards the extensive mud flat area in Port Reitz as shown in Figure 23.



Figure 23: Expected passage of rainwater runoff from substation/access road

Impacts on water quality will likely not be significant for the following reasons:

- Sediment load from rainwater runoff will not increase significantly from present as area of exposed soil is relatively high even as of now.
- The catchment area of the substation/access road is around 100 ha, whereas the area that will be developed for the substation/access road is around 5 ha. The sediment load from the substation/access road is therefore limited compared to the entire catchment area.
- Most of the rainwater from the substation/access road will eventually end-up in the downstream mud flat area. It is likely that most of the sediment will in the process settle before or after discharging to the mud flat area as runoff velocity reduces.

Other sources of water pollution will be concrete wash water which in general has high pH levels. Hence if untreated concrete wash water is discharged it will raise the pH of the receiving water body, but significant impacts are unlikely as it will gradually be neutralized naturally.

(3) Soil pollution

Construction impacts:

Oil spill/leaks from construction vehicles/machines and fuel tanks may cause soil pollution. Risk of pollution will be high in case of using old and poorly-maintained vehicles/machines, using maintenance facilities with inadequate pollution control and on-site fueling activities. However, considering that the source of potential oil pollution is limited to construction vehicles/machines and fuel tanks, the extent of soil pollution will be limited to a relatively small area in case of oil spill/leaks events. Therefore, significant impacts are not expected.

(4) Waste

Wastes will be generated throughout the Project period. As per Environmental Management and Coordination (Waste Management) Regulations 2006, wastes are required to be transported and treated/disposed through NEMA authorized firms.

Non-hazardous wastes are generally disposed at the county's waste disposal facility. Mombasa has two waste disposal sites namely: Kibarani and Mwakirunge. While Kibarani was closed recently, Mwakirunge is still under operation.

Pre-construction impacts:

The main waste during pre-construction will be vegetation remains from forest clearance. However, disposal will not be required as they will be reused locally such as for fuel wood, furniture and building material. Therefore, no impacts are expected.

Construction impacts:

During construction, wastes such as excavated soil, packaging material, metal scrap and waste oil will be generated. In terms of volume, excavated soil will be most significant (around 11,600 m³), which is the top soil that will be removed during cutting works at the substation/access road. However, since top soil can be reused for other purposes (e.g. agriculture soil), disposal will not be required. Non-hazardous wastes that cannot be reused/recycled will be disposed at the county's waste disposal sites. In Mombasa there are two waste disposal sites namely Kibarani and Mwakirunge. However, since Kibarani is now closed, wastes from the substation/access site can be disposed only at the Mwakirunge waste disposal site. Due to the limited waste volume, this is not expected to be an issue. Hazardous wastes such as waste oil can be recycled through local NEMA authorized recycling firms. In conclusion, while significant waste impacts are not expected, it will be necessary to consult the county government waste authority when developing the Construction Waste Management Plan (CWMP).

Operation impacts:

Wastes during operation stage will be mainly from the substation such as domestic waste from control office and recovered waste oil from oil pits. No significant impacts are expected as the volume of these wastes are limited and can be readily accommodated by the county's waste disposal site. Hazardous wastes such as waste oil can be recycled through NEMA authorized recycling firms. Therefore, significant waste impacts are not expected.

(5) Noise

Construction impacts:

The main noise sources will be from construction vehicles/machines especially from pile driving works at the substation and TL towers. Noise impacts of pile driving works was predicted by assuming the use of hydraulic pile-driver, which has a source noise level of 108 dB (Sarsby R.W, 2000). Noise attenuation was calculated using the following standard noise attenuation formula:

$$LA_{eq} = LA_w - 8 - 20 \times \log_{10} r$$

LA_{eq} : Equivalent continuous A-weighted sound pressure Level

LA_w : Source power level

Distance from source

Table 28 shows the prediction results.

Table 28: Predicted noise attenuation of hydraulic pile-driver

	Distance from noise source (m)								
	10	20	50	100	150	200	250	300	350
Noise level (dB)	80	74	66	60	57	54	52	51	49

According to the prediction, noise from pile driving works will attenuate to around the same level as the Kenyan noise standard of 50 dB (residential daytime) at a distance of around 300 m. If compared with WHO guideline value (55 dB), noise level will attenuate below the guideline value at a distance of around 200 m.

In the case of substation, there will be some impacts within the 300 m to 200 m zone as there are several residential houses and a school located in the area as shown in Figure 24 (few residential houses that exist in the 0-200 m zone will not be present in the construction stage due to resettlement). While this may cause some nuisance to the residents and school, impacts are not significant considering that the level of exceedance is relatively minor and the fact that the duration of pile-driving works will be limited to few months. The noise level however could be slightly elevated than the prediction if vehicle noise from the Southern Bypass Road are high.

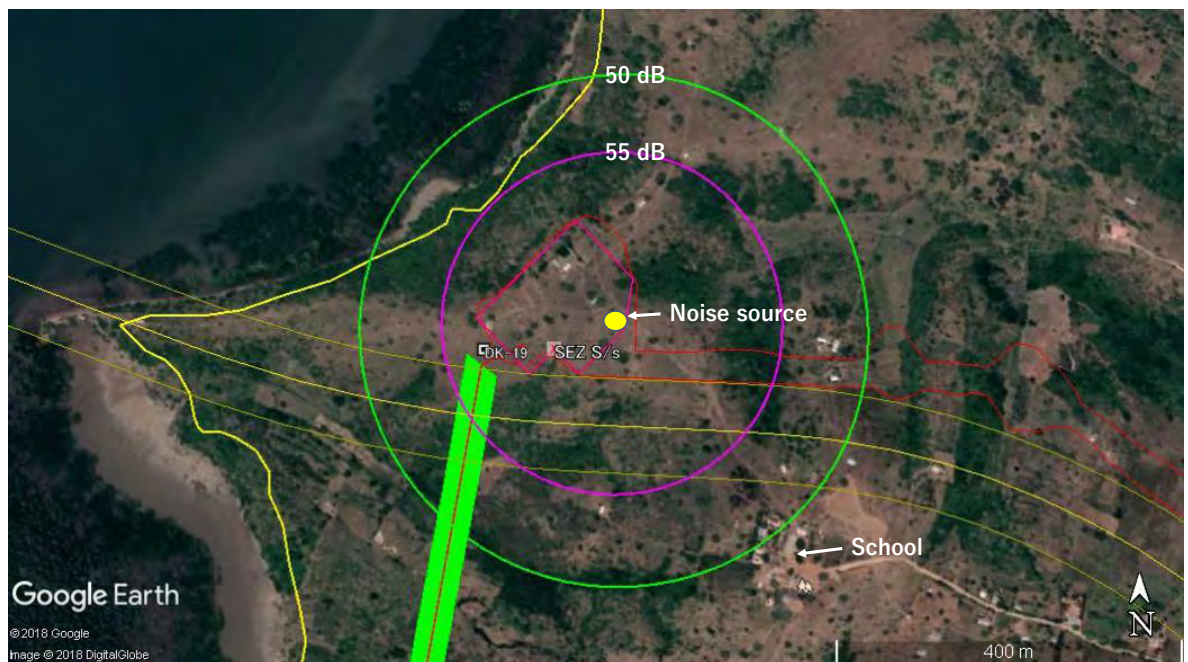


Figure 24: Predicted noise attenuation from pile-driving works

Similar noise levels will be experienced during the construction of the TL towers but impacts will be less, as pile-driving works will be of much shorter duration (i.e. 1-2 weeks).

(6) Vibration

Construction impacts:

The main source of vibration will be from pile driving works at the substation and TL towers. According to the manual of “Japanese Technical Association for Steel Pipe Piles and Sheet Piles”, vibration levels of hydraulic pile-driver will in general attenuate to below 75 dB (construction site-boundary vibration standard of Japan) after 25 m. No impacts are expected for the substation site as there are no structure within such distance. There may be certain impacts at the TL tower sites in case there are any structures within the 25 m radius. It is therefore recommended to place the TL towers in an area that can maintain a distance of least over 25 m from the nearest structure.

(7) Protected area

Construction impacts:

There are four protected areas around the TL route namely: Kaya Gandini, Mwaluganje Forest Reserve, Shimba Hills National Reserve and Kaya Kiteje. Apart from Kaya Gandini, TL construction works will not affect the protected areas as it does involve any activities where impacts can reach over long distances (only tower erection and stringing works). On the other hand, Kaya Gandini may be susceptible to impacts of TL construction works (e.g. noise) due to its proximity to the TL (distance between the edge of Kaya and centre of TL is around 30 m). However, impacts will not be significant as construction will only last for around 1 month in the area.

(8) Ecosystem

Pre-construction impacts:

The TL passes through a community forest between the DK6-7 area over a distance of around 2,500 m (see **Figure 25**). Consequently, as per KETRACO policy, the forest trees inside the TL corridor that are or may grow to heights above 12 feet¹ will need to be cut down, which will lead to some degradation and fragmentation of forest habitat. The affected forest area will be around 5 ha (2,500 m x 20 m)², resulting in cutting of around 500 trees.

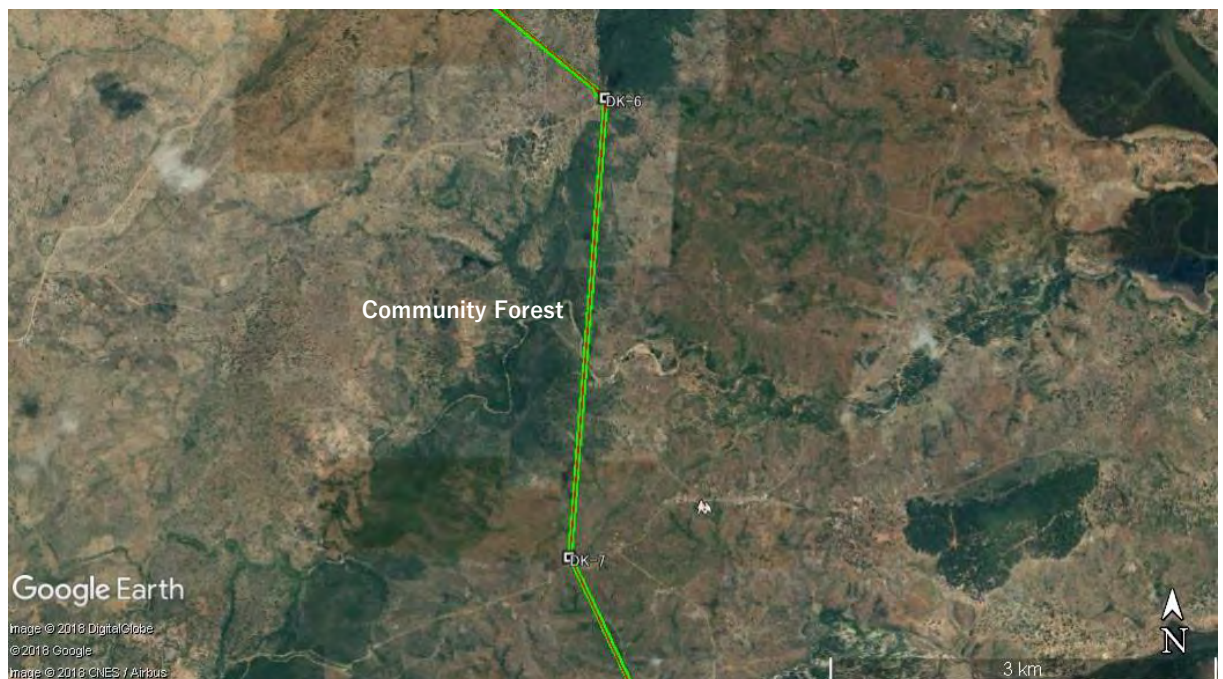


Figure 25: Community forest area between DK6-7 TL corridor

The forest area along the DK6-7 were studied through field surveys and interviews. The main findings are summarized as follows:

¹ According to KETRACO policy, trees inside the TL corridor that may grow beyond 12 ft in height at maturity must be cleared.

² To minimize tree cutting, KETRACO will only cut the trees within the 20 m width of the TL corridor instead of the entire 40 m wayleave. Hence the extent of forest tree clearance will be 2,500 m x 20 m = 5 ha.

- A total of 15 tree species were identified consisting of cash crops (e.g. mango and coconut trees) and common indigenous trees (e.g. *Brachystegia spiciformis*, *Bridelia micrantha*, *Cassia abbreviate*). None of the identified trees are classified as nationally or IUCN threatened species.
- As the area lies along the forest edge, tree cover was relatively low and often fragmented compared to the denser inner forest area. Therefore, it can be considered that the TL will have limited fragmentation impacts.
- Apart from some common bird species such as Pied crow, Rock Dove and Willow Warbler, no notable fauna were identified in the area. Threatened bird species such as Spotted Ground-trush and Sokole Pipet that inhabit the nearby Kaya Gandini were also non-existent. This may be because forest birds tend to avoid forest edge where they are more prone to predation.
- According to KWS, the forest area was occasionally visited by elephants, baboons and wild pigs from the surrounding protected areas. However, presence of these animals are now very rare due to fencing of the protected areas and frequent usage by the local community resulting in forest degradation. It was however mentioned that there is risk of electrocution by climbing baboons and hence need for some prevention measures.

Based on the above findings, it can be considered that the affected forest area is not a critical habitat and therefore it is unlikely that forest clearance will have any significant ecological impacts. Nevertheless to mitigate the impacts, KETRACO plans to conduct tree planting in cooperation with KFS and local community.

Construction impacts:

Construction of the TL along the DK6-DK7 area may disturb wildlife in the forest area mainly through noise and presence of labor force. However, impact will not be significant as TL construction will be short-term (i.e. 1-2 months) and will not involve large labor force (around 20 workers).

Operation impacts:

There are certain risks that migratory birds will be killed or injured through collision with TL. Information on migratory birds were therefore collected through expert interview and literature review. The main findings are summarized as follows:

- According to National Museums of Kenya publication, around 21% of birds (229 species) in Kenya are migratory, in which around half are waterbirds. These migratory birds use the Rift Valley, coast, eastern bushlands, central and western grasslands as their flyway. In the coast, beaches, reefs and mangrove creeks are used by the migratory birds.
- According to BirdLife International website, vast numbers of Common cuckoo (*Cuculus canorus*) and Golden orioles (*Oriolus oriolus*) visit Shimba Hills National Reserve.
- According to Nature Kenya expert, the threatened Spotted Ground-trush found in Kaya Gandini and Shimba Hills breed in the forest in south of Tanzania, then migrate to south coast of Kenya from March to November. Other notable migratory species in the area are European Honey-buzzard, European Bee-eater and White-throated Bee-eater, which none are threatened species.

Based on the above findings, it can be considered that there is some risk of bird collision as the TL is relatively close to migratory bird flyway (e.g. coastal and mangrove areas) and also the forest habitat for Spotted Ground-trush.

Residential forest birds may also be at risk as they fly between forest areas. In conclusion, the risk of bird collision is considered highest between DK5-DK19 area.

(9) Resettlement

Pre-construction impacts:

As per RAP study, the Project will result in displacement of 16 households (89 PAPs) and relocation of 60 households (403 PAPs). Impact is considered significant as more than 200 PAPs will require resettlement.

(10) Vulnerable social groups

Pre-construction impacts:

Within the PAPs, there are 198 household heads (HH) classified as vulnerable due to being ill, paralyzed, poor, women and so on. Within the 198 HH, 136 HH are classified as poor either not having any regular income or having monthly income of less than 3,000 KES. These PAPs will be vulnerable to resettlement related impacts especially as they often have limited financial resources to cope during the transition period.

(11) Indigenous/minority people

The majority of people living around the Project area belong to the Mijikenda tribe, which is not considered as indigenous/minority people. No indigenous/minority people were identified along the Project corridor, hence impact on indigenous/minority people are not expected.

(12) Livelihood, living environment

Pre-construction impacts:

Land acquisition/easement will mainly have the following impacts on livelihood:

- Loss of income from agriculture activities at the substation/access road site
- Loss of income from cash crops (e.g. mango trees) that requires cutting
- Loss of income from small-scale business (kiosk, quarry, Posho mill) operating in the TL corridor

Impacts should not be significant as for the following reasons:

- Agriculture activities at the substation/access road site is limited
- Felled trees are left for the owner to use, which can be sold.
- Affected small-scale business can be readily relocated and operated at another nearby area

Construction impacts:

Livelihood activities such as farming will be temporary restricted at the TL construction sites (e.g. tower construction site, temporary construction yard). However, impacts will not be significant as construction works will be spatially limited and short-term (around 1-2 months), and activities can be resumed after construction is completed.

(13) Land use

Pre-construction impacts:

The substation/access road site is currently a rural residential area with some farming and livestock rearing activities. Such land use will no longer be possible in this area, but impacts are not significant as the extent of land use alteration is not large scale. There will be no major change in land use along the TL corridor except for certain restrictions such as prohibition of building structures. Impact on land use is overall considered not significant.

Construction impacts:

There will be temporary restriction in land use at the construction site (e.g. tower construction site, temporary construction yard). However, impact is not significant as such restriction will be spatially limited and short-term.

(14) Social infrastructure and services

Pre-construction impacts:

The TL corridor will pass through part of Kiteje Secondary School land parcel which is currently vacant with only few trees, but the area was earmarked for future expansion of school infrastructure. Hence the TL will affect to a certain extent future school operation.

Construction impacts:

The TL will cross several roads including Mombasa Road (A109), Southern Bypass Road and other rural roads. Although the use of these roads will be restricted during the stringing process, such restrictions will only be for few hours. The TL also crosses the Mombasa-Nairobi Standard Gauge Railway, but it will not have any impacts as necessary stringing works can be completed within the non-operating hours. Part of Kiteje Secondary School land parcel will be restricted for use during TL construction works but will not hinder school activities as the area is vacant and will only be of short duration.

(15) Cultural heritage

Pre-construction impacts:

There are two tree shrines located inside the TL corridor. As per KETRACO policy, these trees need to be cut as they are higher than 12 ft. This will deprive the community a place of worship, but it will only be temporary as a tree shrine transfer ceremony can be conducted to transfer the holy powers of the shrine from one tree to another designated tree/object. The trees owners have been consulted and agreed and have provided the requirements for carrying out the shrine tree transfer ceremony. Impacts are therefore not significant.

Note: The TL route will be reconsidered in the detailed design stage for possible options to avoid the shrine trees. If not possible, KETRACO will assist the shrine tree transfer ceremony.

(16) Gender

Pre-construction impacts:

Within the PAPs, 136 household heads are women. Due to the patriarchal nature of the society, and the fact that most are widows who have limited educational background they will be more vulnerable to resettlement related impacts.

(17) Children's right

Construction impacts:

Since child labour is relatively common in Kenya, there is a possibility that underage children can be exploited for construction works. Also the majority of the households in the project area have low income levels hence there will be tendency for underage children to look for jobs to help their families.

Kenya is a signatory of ILO Minimum Age Convention 1973 and regulates child labour under the Employment Act as follows:

- Definition of child is a person who has not attained the age of eighteen years (Article 2)
- No person shall employ children under 13 years of age (Article 56).
- Light work is permitted for children between 13 to 16 years of age under certain conditions (Article 56)
- Children between 13 to 16 years of age are restricted to attend machinery (Article 58)
- No person shall employ a child in any opencast workings or sub-surface workings (Article 58)

The Act is consistent with the Minimum Age Convention for light work but does not set any age limits for potentially hazardous works (except machinery and mining), which is set as above 18 years under the Minimum Age Convention. Therefore, there is a certain possibility that children under 18 years can be employed for hazardous construction works. Furthermore, underage children may also be unintentionally employed as children may not have official documents to prove their age. It is therefore important to confirm the candidate's age through local government offices or other means.

(18) Infectious diseases

Construction impacts:

According to Mombasa County AIDS Strategic Plan 2016-2020, the HIV prevalence rate in Mombasa County is 7.4% (year 2014), which is higher than the national average of 5.6%. HIV prevalence rate is higher with women (10.5%) than men (4.5%). According to Kwale County AIDS Strategic Plan 2016-2019, the HIV prevalence rate in Kwale County is 5.7% (year 2014). Kilifi County AIDS Strategic Plan 2016-2020, the HIV prevalence rate in Kilifi County is 4.4% (NASCOP 2014). HIV patients are relatively high with sex workers, drug users and so on. Considering such situation, there are certain risks that incoming construction workers can become infected by HIV as well as spreading HIV.

(19) Occupational safety

Construction impacts:

There is a moderate risk of occupational accidents such as falling from height during tower construction, falling into excavation pits and machine operation.

Operation impacts:

There is a moderate risk of occupational accidents such as electrocution during maintenance work.

(20) Accidents

Construction impacts:

There is a moderate risk of accidents such as by movement of construction vehicles along public access roads. Risks will be high along commuting roads used by children and intersection with busy roads.

(21) Climate change

TL construction will result in loss of around 5 ha of forest cover. Carbon stock in Kenya forest is estimated at 137 ton per hectare (FAO 2010). Therefore, loss of 5 ha of forest can be roughly estimated to result in reduction of 685 tonnes of carbon stock. This is equivalent to only around 0.00014% of the total forest carbon stock of Kenya, which is 476 million tonnes (FAO 2010). Kenya's NDC under the Paris Agreement aims to increase tree cover to at least 10% of the total land area.

While forest loss from this Project will somewhat hinder in achieving this goal, it will only be a minor negative contribution as the current forest area is 3.467 million ha (FAO 2010). To mitigate the impacts, KETRACO plans to conduct tree planting in cooperation with KFS and local community.

Table 29: Assessment of Potential Negative Impacts

No	Item	Rating of scoping			Rating after impact assessment			Rationale
		PC	C	O	PC	C	O	
1	Air pollution	D	B-	D	D	B-	D	<p>[Construction] The main source of air pollution will be exhaust gas and fugitive dust emission from heavy construction works at the substation/access road. However, significant impacts are not anticipated as construction activities are temporary and intermittent in character. There may however be certain impacts on the few residential houses located in the vicinity of the construction site especially during dry weather where dust is more readily suspended.</p>
2	Water pollution	D	B-	D	D	B-	D	<p>[Construction] Sediment-laden rainwater runoff from substation/access road may pollute downstream surface waters. Significant impacts are not expected mainly due to the limited area of the substation/access road in comparison to the catchment area and the fact that most of the sediment will likely settle before or after discharging to the receiving area (mud flat area in Port Reitz) as runoff velocity reduces.</p> <p>Uncontrolled discharge of concrete wash water may temporarily pollute the receiving water body as concrete wash water often has elevated pH levels. Impacts however will not be significant as pH will be gradually neutralized.</p>
3	Soil pollution	D	B-	D	D	B-	D	<p>[Construction] Oil spill/leaks from construction vehicles/machines and fuel tanks may cause soil pollution. Significant impacts are not expected as the magnitude of oil spill/leaks if it occurs will be limited to a relatively small area.</p>
4	Waste	B-	B-	B-	D	B-	B-	<p>[Pre-construction] Felled trees will be generated from forest clearance. However, impacts are not expected as these can be reused for other beneficial purposes by the local community (e.g. fuel, building material, furniture).</p> <p>[Construction] Significant impacts are not expected as construction wastes can be readily accommodated by the county's municipal waste disposal site or recycled through NEMA authorized recycling firms such as for waste oil.</p> <p>[Operation] Significant impacts are not expected as operation wastes can be readily accommodated by the county's municipal waste disposal site or recycled through NEMA authorized recycling firms such as for waste oil.</p>

No	Item	Rating of scoping			Rating after impact assessment			Rationale
		PC	C	O	PC	C	O	
5	Noise/ vibration	D	B-	D	D	B-	D	<p>[Construction]</p> <p>Noise: The main source of noise will be from pile driving works at substation and TL tower. According to the noise impact prediction, noise from pile driving works will attenuate to around the same level as the Kenyan noise standard of 50 dB (residential day-time) at a distance of 300 m. Since there are several houses and a school within this 300m zone, pile driving works may cause some nuisance to the residents and school. However, impacts are not significant considering that the level of exceedance is relatively minor and the fact that the duration of pile-driving works will be limited to few months. Similar noise levels will be experienced during the construction of the TL towers but impacts will be less, as pile-driving works will be of much shorter duration (i.e. 1-2 weeks).</p> <p>Vibration: The main source of vibration will be from pile driving works at the substation and TL tower. According to existing literature, in case of hydraulic pile-driver, vibration levels will in general attenuate to below 75 dB (construction site-boundary vibration standard of Japan) after 25 m. No impacts are expected for the substation site as there are no structure within such distance. There may be certain impacts at the TL tower sites in case there any structures nearby.</p>
6	Conservation areas	D	B-	D	D	B-	D	<p>[Construction] Kaya Gandini may be susceptible to impacts of TL construction works (e.g. noise) due to its proximity to the TL. However, impacts will not be significant as construction will only last for around 1 month in the area.</p>
7	Ecosystem, flora/fauna	B-	B-	B-	B-	B-	B-	<p>[Pre-construction] Around 5 ha of forest area (around 500 trees) will be cleared specifically the community forest area between DK6-DK7, inevitably resulting in some degradation and fragmentation of forest habitat. However, impact of forest clearance is considered not significant as trees are either common cash crops or common indigenous trees with no conservation status and no endangered fauna was identified. Also forest clearance will mainly be along the forest edge where tree cover was relatively low, hence fragmentation will be limited.</p> <p>[Construction] Construction of the TL along the DK6-DK7 area may disturb wildlife in the forest area mainly through noise and presence of labor force. However, impact will not be significant as TL construction will be short-term (i.e. 1-2 months) and will not involve large labor force.</p> <p>[Operation] Birds can be killed or injured through collision with TL. The risk of bird collision is considered highest between DK5-DK19 area where the TL passes near forest and mangrove areas.</p>

No	Item	Rating of scoping			Rating after impact assessment			Rationale
		PC	C	O	PC	C	O	
8	Involuntary resettlement	B-	D	D	A-	D	D	[Pre-construction] The Project will result in displacement of 16 households (89 PAPs) and relocation of 60 households (403 PAPs). Impact is considered significant as more than 200 PAPs will require resettlement.
9	Vulnerable social groups	B-	D	D	B-	D	D	[Pre-construction] There are 198 household heads (HH) classified as vulnerable and 136 HH are classified as poor since they do not have regular income or have a monthly income of less than 3,000 KES. These HH will be vulnerable to resettlement related impacts especially as they often have limited financial resources to cope during the transition period.
10	Indigenous/minority people	C-	C-	C-	D	D	D	No indigenous/minority people were identified along the Project corridor, hence impact on indigenous/minority people are not expected.
11	Livelihood, living environment	B-	B-	D	B-	B-	D	[Pre-construction] Land acquisition/easement will mainly have the following impacts on livelihood: <ul style="list-style-type: none"> • Loss of income from agriculture activities at the substation/access road site • Loss of income from cash crops (e.g. mango trees) that requires cutting • Loss of income from small-scale business (kiosk, quarry, Posho mill) operating in the TL corridor Impacts should not be significant as for the following reasons: <ul style="list-style-type: none"> • Agriculture activities at the substation/access road site is limited • Felled trees are left for the owner to use, which can be sold. • Affected small-scale business can be readily relocated and operated at another nearby area [Construction] Livelihood activities such as farming will be temporarily restricted at the TL construction sites. However, impacts will not be significant as construction works will be spatially limited and short-term, and activities can be resumed after construction is completed.

No	Item	Rating of scoping			Rating after impact assessment			Rationale
		PC	C	O	PC	C	O	
12	Land use	B-	B-	D	B-	B-	D	<p>[Pre-construction] The substation/access road site is currently a rural residential area with some farming and livestock rearing activities. Such land use will no longer be possible in this area, but impacts are not significant as the extent of land use alteration is not significant. There will be no major change in land use along the TL corridor except for certain restrictions such as prohibition of building structures. Impact on land use is overall considered not significant.</p> <p>[Construction] There will be temporary restriction in land use at the construction site. However, impact is not significant as such restriction will be spatially limited and short-term.</p>
13	Social infrastructure and services	B-	B-	D	B-	B-	D	<p>[Pre-construction] The TL corridor will pass through part of Kiteje Secondary School land parcel which is currently vacant with only few trees, but the area was earmarked for future expansion of school infrastructure. Hence the TL will affect to a certain extent future school operation.</p> <p>[Construction] The TL will cross several roads. Although the use of these roads will be restricted during the stringing process, such restrictions will only be for few hours. The TL also crosses the Mombasa-Nairobi Standard Gauge Railway, but it will not have any impacts as necessary stringing works can be completed within the non-operating hours. Part of Kiteje Secondary School land parcel will be restricted for use during TL construction works but will not hinder school activities as the area is vacant and will only be of short duration. Impact is overall considered not significant.</p>
14	Cultural heritage	B-	D	D	B-	D	D	<p>[Pre-construction] Two tree shrines are located inside the TL corridor, which need to be cut as they are higher than 12ft. This will deprive the community a place of worship, but it will only be temporary as a tree shrine transfer ceremony can be conducted to transfer the holy powers of the shrine from one tree to another designated tree/object. Impacts are therefore not significant.</p>
15	Gender	B-	D	D	B-	D	D	<p>[Pre-construction] Within the PAPs, 136 household heads are women. Due to the patriarchal nature of the society, and the fact that most are widows who have limited educational background they will be more vulnerable to resettlement related impacts.</p>

No	Item	Rating of scoping			Rating after impact assessment			Rationale
		PC	C	O	PC	C	O	
16	Children's right	D	B-	D	D	B-	D	[Construction] Since child labour is relatively common in Kenya, there is a certain possibility that underage children can be exploited for construction works. Majority of the households in the project area have low income levels hence there will be tendency for children to look for jobs to help their families. Impact is not significant providing the Construction Contractor complies with the Kenyan regulations and as necessary the Minimum Age Convention.
17	Infectious diseases (HIV/AIDS etc.)	D	B-	D	D	B-	D	[Construction] Around 20-40 construction workers will be present during construction. Since the Project area has relatively high rate of HIV prevalence, there are certain risks of spreading infectious diseases.
18	Occupational safety	D	B-	B-	D	B-	B-	[Construction] There is a moderate risk of occupational accidents such as falling from height during tower construction, falling into excavation pits and machine operation. [Operation] There is a moderate risk of occupational accidents such as electrocution during maintenance work.
19	Accidents	D	B-	D	D	B-	D	[Construction] There is a moderate risk of accidents such as by movement of construction vehicles along public access roads.
20	Climate change	B-	B-	B-	D	D	D	TL construction will result in loss of around 5 ha of forest cover. Impact on climate change is negligible as such loss of forest cover will have minimal impacts on carbon stock and forest area.

6.4 Resettlement Issues

The proposed Mariakani – Dongo Kundu 220kV Transmission Line will occupy a corridor of 40m wide from Mariakani to Dongo Kundu covering 53km. The area that will be occupied by the Transmission line will be 502.19 acres. This will be under easement. The substation/access road will occupy around 17.52 acres. The substation/access road land will be fully acquired by KETRACO. All persons occupying the identified transmission line corridor and substation will be relocated elsewhere to give way for the project. There will be need to carry out resettlement as a result of the project.

6.4.1 Transmission Line Easement and Substation Land Acquisition

Transmission Line (Easement)

An easement conveys limited rights to KETRACO for a specified use (installation and maintenance of Power Transmission Lines) while the property owner retains the land for other uses within the 40-metre wide wayleave corridor along the entire 53 km. The acquired wayleave corridor for the TL will be under easement by KETRACO where:

- The wayleave corridor may be used for all other purposes except construction of structures and planting of trees which can grow to a height exceeding 12 feet high;
- KETRACO shall pay compensation for loss of use of the wayleave area at 30% upwards of the current cost of the land depending on the magnitude of the impact;
- The encumbered part of the land for the wayleave will still remain the property of the land owner.

Substation/access road (Acquisition)

The land that will be used to develop the substation/access road in Dongo-Kundu will be permanently acquired and compensated.

6.4.2 Affected Persons and Property

A RAP Study was commissioned to carry out detailed census survey to determine affected persons/homesteads. All affected assets including land structures, Trees, Crops and businesses have been determined and valued for compensation and resettlement.

Table 30 provides a summary of affected persons and assets.

Table 30: Impacts on Human Settlements and Assets

No	Description	Units	Quantity
1	Household Heads	Number	598
2	Project Affected Persons (PAPs)	Number	3,849
3	Land Parcels	Number	565
4	Land Parcels	Total Area in acres	519.71
5	Structures	Number	280
6	Business	Number	3
7	Trees	Number	11,908
8	Crops	Units	9,267
9	PAPs to be relocated	Number	403
10	PAPs for displacement	Number	89

6.4.3 Structure and Role of the PAP Committee

PAP Committees have been setup in each of the 9 locations touched by the project. These are Mariakani, Mwavumbo, Mwatate, Mtaa, Kasemeni, Gandini, Mbunguni, Ng'ombeni and Mtongwe Locations.

Structure of PAP Committee

PAP Committees have been initiated to ensure a timely execution of the whole resettlement process. The committee consists of the following representatives:

1. Youth
2. Men
3. Women
4. Vulnerable Persons
5. County Government (Important Departments)
6. National Government.

Role of the PAP Committee

The committee's role will include:

- Receiving of any complaints/grievances from PAPs and registering them.
- Resolving of resettlement and compensation issues,
- Ensuring promotion of avenues to address grievances
- Ensuring continuous communication between the PAPs, project proponent (KETRACO) and other stakeholders.

Members of the PAP Committees were elected during the PAP Consultation Meetings held between Monday 23 April – Friday 27 April, 2018. The committee will operate at the location level but base their offices at Kaloleni, Kinango, Matuga and Likoni which are the subcounty headquarters that have several Government Offices.

6.4.4 Summary Cost of the Land and Other Assets

Table 31 gives the estimate of the amount that will be used to compensate affected persons for loss of land and assets and also facilitate relocation and resettlement.

Table 31: Cost of Affected Land Assets

No.	Property	Total Amount (KShs)
1	Land	173,137,125
2	Structures	50,181,343
3	Business	229,500
4	Trees	26,513,305
5	Crops	2,220,975
Total (KShs)		252,282,248
Provision for Assistance to Vulnerable Persons		64,649,350
Monitoring and Evaluation		55,330,000
Gross Total (KShs)		372,261,598
Contingency (10% of Gross Total)		37,226,160
Grand Total (KShs)		409,487,758

Details of the affected persons and resettlement plan is provided in a separate RAP Report (**Resettlement Action Plan Study for the Power Supply Component of the Mombasa SEZ Development Project**)

7 PUBLIC CONSULTATION AND PARTICIPATION

Public Consultation and Participation was carried out at different levels and with different stakeholders at the following levels:

1. Initial Key Stakeholder Meetings
2. Sensitization Meetings
3. Consultations with KFS, KWS , NMK and NGOs
4. Consultation with the Project Corridor Community
5. PAP Consultation Meetings
6. Key Stakeholder Questionnaires
7. Public Consultation Meetings

7.1 Initial Key Stakeholder Meetings

Initial Key Stakeholder Meetings were convened where the Study team met the leadership in Mombasa, Kilifi and Kwale Counties. The meetings took place from Tuesday July 4, 2017 – Friday July 7, 2017. The main aim of conducting these initial meetings are as follows:

- To inform the project area leadership about the project (transmission line and associated substation in Dongo Kundu).
- Seek the support of the leadership during the implementation of the ESIA and RAP Studies
- Get their views and guidance as the team plans to carry out Sensitization meetings

A list of dates and venues of the Initial Stakeholder Meetings are given in **Table 32** while minutes and attendance registers are provided in **Annex 4**. Summary of the results of the Key Stakeholder Meetings are given below:

County Commissioner of Mombasa:

- Office will support the project
- Officers within the project area will be mobilized to offer any required support

Governor's Office – Mombasa County

- There has been an increase in squatters in the area earmarked for the SEZ. This is speculative in nature. This is the main problem anticipated in the project area
- The Dongo Kundu area also has fragile marine ecosystem that needs to be protected
- Majority of the population derive their livelihood from fishing.
- There are fishermen that were previously displaced by KPA. The fishermen PAPs and the County Government however felt that the compensation that was paid was not satisfactory
- KPA is a key stakeholder and therefore there is need to actively engage them
- Sensitization and consultation will be continuous
- There is a tag of war between KPA & PAPs who jointly claim ownership of SEZ land
- JICA and GOK need to protect the buffer zone around SEZ
- Land Policy in Kenya has a specific chapter on the Coastal Province. Land ownership in the 7 former provinces is by Title deed but not in the Coast province
- The Governor's Office will offer support to the project.

Governor's Office – Kilifi County

- One of the officers indicated that in a previous KETRACO project, money meant for certain PAPs was paid to the wrong people in Shangilia area in Mariakani. The procedure for compensation was clarified by a KETRACO Officer.
- The Governor's Office offered to support the project

Matuga Sub-County Kwale County

- There could be possible incitement of the PAPs from other quarters.
- Members of the public & PAPs are anticipated to co-operative with the survey team
- Compensation packages especially the amount payable per acre may upset the locals if not involved and hence not satisfied
- Land issues will depend on the approach by the survey/ RAP team
- There is lack of Title deeds in some areas which can be difficult
- Where the land is adjudicated and Title Deeds issued; it will be straight forward
- Contacts of many chiefs and locational boundary along the corridor of the transmission line were provided to the study team.
- An officer mentioned that in some areas, chiefs aren't trusted enough by locals so the team should work with both County Government and National Government Officers on the ground
- The main means of livelihood in Kinango is subsistence farming and pastoralism since the area is semi-arid.
- Officers from the sub-County Office offered to support the project activities

Kaloleni Sub-County – Kilifi County

- There is approx. 7,500 acres of land at the Mariakini substation where there is a legal tussle between the registered land owner and others who have settled on it
- The DCC requested that there should be transparency and involvement of the local leaders in the entire RAP process
- Local people are generally friendly and like to be listened to
- There are no sacred sites in Mariakani
- Duruma are the majority in population followed by Giriama
- Commonly used radio stations are Bahari and Kaya FM
- Officers from the sub-County Office offered to support the project activities

Likoni Sub-County - Mombasa County

- At least 10 days' notice is required to organize for a public meeting in Dongo Kundu
- KPA has at least 3 Title Deeds and the community occupying this land knows this
- At least 2 RAPs have been done; One by KeNHA for the Dongo Kundu bypass and the SEZ RAP. Therefore, this will be the 3rd RAP and the RAP team will need to make the affected community understand that this is not a new RAP
- The Team needs to be careful with words during the meetings and the field survey
- The team should avoid answering questions on land
- Officers from the sub-County Office offered to support the project activities

Table 32: Initial Key Stakeholder Meetings

No	Date	Project Implementers & Consultants	County	Key Stakeholders	Meeting Venue	Time
1	Tuesday July 4, 2017	Representatives of KETRACO, JICA and Panafcon	Mombasa	Mombasa County Commissioner	Mombasa County Commissioner's Office on Mama Ngina Drive	8.30am–9.30am
2	Tuesday July 4, 2017	Representatives of KETRACO, JICA and Panafcon	Mombasa	Mombasa County Secretary	County Secretary's Office located at the Mombasa County Government Offices Near Mombasa Hospital	10.00am–12.00 Noon
3	Tuesday July 4, 2017	Representatives of KETRACO, JICA and Panafcon	Kilifi	Kilifi County Governor	Governor's Office at the Kilifi County Government's Offices Near Huduma Centre in Kilifi Town	02.00pm–03.00 pm
4	Wednesday July 5, 2017	Representatives of KETRACO, JICA and Panafcon	Kwale	Matuga Sub-County Commissioner/ Governor	Cultural Centre Board Room in Kwale Town	10.00am-11.30am
5	Thursday July 6, 2017	Representatives of KETRACO, JICA and Panafcon	Kilifi	Deputy County Commissioner, Kaloleni	Deputy County Commissioner's Office, Kaloleni Sub County Office in Kizurini; Kaloleni	09/00am-11.00am
6	Thursday July 6, 2017	Representatives of KETRACO, JICA and Panafcon	Mombasa	Likoni Sub County Deputy Commissioner/ Governor	Deputy County Commissioner's Office,	02.00pm-03.00pm
7	Friday July 7, 2017	Representatives of KETRACO, JICA and Panafcon	Mombasa	Chief Mtongwe Location	Chief's Office Mtongwe	02.00pm-03.00pm

7.2 Sensitization Meetings

7.2.1 Sensitization Meetings Preparation

A total of 7 sensitization meetings were organized and convened in the project area. The purpose of the sensitization meetings was to inform the project area community on:

- Details of the proposed 220kV Transmission Line project from Mariakani-Dongo Kundu and a Substation in Dongo Kundu;
- What will be expected of the community when the assessment team visits them on the ground along the project corridor;
- The activities that will take place during field Environmental Assessment and Census Survey of the persons affected by the project;

Sensitisation Meetings were organised through two steps:

- **Consultations** - Consultation with County Government Offices and the Ministry of Interior and Coordination of National Government. The Meeting Venues were identified with reference to the venues used in earlier ESIA study carried out in 2014. Appropriate dates were selected ensuring a minimum of 1 week notice before any meeting takes place.
- **Announcements** – Meeting notices were announced in English and Kiswahili (main language used by the community) using the following media:
 - Local Radio FM Station
 - Through the Chief's Office, Local Schools and Churches
 - Pinning of Notices at various accessible locations within the project area
 - Use of mobile vehicles with loud speakers circulating in the project area

The Sensitization Meetings outside Dongo Kundu took place as planned from Wednesday July 12, 2017 to Tuesday July 18, 2017. The Sensitization at Dongo Kundu was held on Tuesday March 20, 2018.

Table 33 provides dates and venue details of the Sensitization Meetings. A total of 1,560 persons attended the meetings.

Table 33: Details of the Sensitization Meetings

No	Date	County	Location	Meeting Venue	Time	No. of Participants
Area Outside Dongo Kundu						
1	Wednesday July 12, 2017	Kilifi	Mariakani Location	Baraza Meeting Area near EMACO Hotel along the Mombasa-Nairobi Highway	10.00am–12.00 Noon	Total=85 <i>Men=64</i> <i>Women=21</i>
2	Thursday July 13, 2017	Kwale	Mbunguni Location	Mbunguni Chief's Camp Grounds	10.00am–12.00 Noon	Total=307 <i>Men=200</i> <i>Women=107</i>
3	Thursday July 13, 2017	Kwale	Ng'ombeni Location	Kiteje Assistant Chief's Office Ground	02.00pm–04.30 pm	Total=236 <i>Men=77</i> <i>Women=159</i>
4	Friday July 14, 2017	Kwale	Kasemeni Location	Mnyenzi Assistant Chief's Office Grounds	10.00am -12.30am	Total=125 <i>Men=99</i> <i>Women=26</i>
5	Friday July, 2017	Kwale	Gandini Location	Lutsangani AP Camp Grounds	02.00pm-04.00pm	Total=257 <i>Men=192</i> <i>Women=65</i>
6	Tuesday July 18, 2017	Kwale	Mwavumbo and Mwatate Locations	Mwanda Dispensary Grounds	02.00pm-04.00pm	Total=183 <i>Men=131</i> <i>Women=52</i>
Dongo Kundu						
7	Tuesday March 20, 2018	Mombasa	Mtongwe Location	Dongo Kundu AP Camp	10.00am – 01.15pm	Total=367 <i>Men=258</i> <i>Women=109</i>
Total Number of Participants						1,560

The participants were given a chance to ask questions, give comments and suggestions under item 6 of the Agenda. The minutes and Attendance Register for the Sensitization Meetings are provided in **Annex 5**.

7.2.2 Summary of the Main Results of the Sensitization Meetings

Table 34 presents a summary of the main results of the sensitization meetings that took place in July 2017 and March 2018 for Dongo Kundu

Table 34: Participant's Questions and Responses during Sensitization Meeting

No	Questions by Participants	Response
Mariakani Location Sensitization Meeting		
1	Previous KETRACO project in the neighbouring area had challenges related to release of compensation payment of disputed land which have not been resolved to-date. The community leaders wished to know how KETRACO will ensure this current project doesn't face similar challenges. (Samuel Rimba)	<i>All KETRACO projects are subject to Kenyan law governing power transmission and land acquisition and where the ownership of the affected asset is disputed, KETRACO waits for the dispute(s) to be resolved by the relevant bodies including the courts who determine ownership before KETRACO can disburse compensation money for the affected asset(s).</i>
2	Some PAPS recorded in the previous census may not be the genuine owners of affected assets. How will this be corrected to ensure only genuinely affected people are enumerated and recorded? (Nelson Mundalo)	<i>All the eligible PAPS will be enumerated during the current census survey with the confirmation of ownership of land by a title deed where available or using the established local mechanism to confirm ownership of affected land. The ownership of developments on the land such as structures, trees and crops will be established by the members of the affected household in the presence of the village elders</i>
3	The acquired corridor may divide the parcel of land belonging to one individual PAP into two halves. What will happen to such two portions of land on each side of the corridor; will the PAP be allowed to own both halves though divided by the corridor? (Paul Kitula)	<i>Depending on the portion of land on each side of the corridor, the project may take up the entire parcel of land and physically resettle the PAP on another equal parcel if the remaining portion outside the wayleave corridor is too small for any continued use/ settlement by the PAP. The wholly eased out parcel of land below the transmission line will still belong to the PAP as KETRACO does not own land. If the remaining portions are significantly big for use by the PAPs, the project will only acquire the corridor and leave the rest of the portions to the PAP. Each on above cases will be evaluated by KETRACO RAP implementation teams before drawing a conclusion on how to handle the remaining portions of land</i>
	Will KETRACO therefore withhold compensation money for all disputed land until the dispute is resolved and will still build their line on such land still or the project will be put on hold to await the resolution of disputes so as to construct the line? (Francis Wambua)	<i>The compensation money for the disputed land will be put aside by KETRACO but will not be disbursed to any of the disputing parties until the dispute is resolved and ownership determined. In the meantime, KETRACO will construct the line across such land since government projects cannot be jeopardized by disputes which can sometimes take a long time to resolve.</i>
4	What will happen if there are trees or crops on the land whose ownership is disputed? (Anthony Safari)	<i>The trees, crops or even structures on such land whose ownership is disputed but the ownership of such developments isn't disputed, the developments will be promptly compensated disbursing payments to the established owners KETRACO however pays for trees after felling them. This process however may take time between felling and release of compensation payment</i>

No	Questions by Participants	Response
Mbunguni Location Sensitization Meeting		
5	Many people do not have title deeds for the land they occupy. Who will be compensated for such land; the title holder or the current land occupier (Musa Said)	<i>Land ownership is known whether the land has title deed or not. However, without a title deed it will be difficult to ascertain ownership which cannot be confirmed until one produces a title deed or until it is issued by the relevant government entity. PAPs without title deeds to the land they occupy are encouraged to get them since with a title deed, compensation for affected land will be straightforward and prompt</i>
6	Will he get power in his home or will this power line just pass over him as happened in Ukunda? (Juma Mwakoko)	<i>The transmitted power is high voltage that cannot be connected directly to homesteads. Distribution of power to homesteads is the responsibility of Kenya Power. KETRACO only does power transmissions which is among the first steps that can enable people to access power in their homes. People get power in their homes after distribution is done by Kenya Power from the KETRACO Substations.</i>
7	Will the proposed transmission line affect the whole Mbuguni Location or a section of it only (Hamadi Dafujo)	<i>Only a section of the location will be affected as per the already selected route that has been established through surveying</i>
8	What will happen if the line passed through a place where there are trees and crops? (Juma Shauri Lamwenga)	<i>Trees will be compensated for after they are felled and according to the rates provided by Kenya Forest Service while crops will be compensated as per the guidelines provided by the ministry of Agriculture if/ if they are destroyed during the line construction.</i>
9	What will happen if the construction vehicles were to pass through and possibly destroy crops on the land outside the wayleave area? (Mwelo)	<i>Any damage of private property outside eased out wayleave by the transmission line contractors will be compensated.</i>
Ng'ombeni Location Sensitization Meeting		
10	About 50% of land in the whole location has no title deed; what will happen in this case? (Suleiman Magomba) .	<i>The PAPs without title deeds for the land they occupy will be individually consulted and the land authorities including NLC will provide the way forward. However this process can and has been slow from KETRACO's similar experience elsewhere</i>
11	Most of the trees in the project area are indigenous trees which are have medicinal value yet the project/ KFS may be paying for planted exotic trees. How will KETRACO establish/ know the value of these indigenous trees? (Ramadhan Mwalimu)	<i>Project team get the value of all trees (both indigenous and exotic) from the Kenya Forest Service. There is no tree which grows on Kenyan soil that is not known and valued by KFS. Similarly, all crops grown in Kenya have values established by Ministry of Agriculture. Grass is not compensated for</i>
12	Could the project employ local youths in each location/ sub-location and village where the line passes? (Suleiman Saitoti)	<i>The project is expected to create employment opportunities for members of the local communities during construction specifically in areas where the transmission line is expected to pass. Besides the direct employment by the project, other forms of employment are likely to result from the spill-over effects including establishment of local markets for providing goods and services during construction. KETRACO policy requires the contractor to employ youths from the particular location where they are working for the unskilled works. The chiefs and their assistants will need to bear this in mind and ensure it is enforced during the construction phase of the project.</i>

No	Questions by Participants	Response
Kasemeni Location Sensitization Meeting		
13	How will the courts confirm the true heirs of a deceased person's land in the succession process? (Mohamed Hamisi).	<i>The succession process starts at the local chief's office who know the members of the concerned family and village elders. If unresolved the matter is escalated further up to the courts who make a determination. All interested family members are involved in every step in the succession process</i>
14	During the previous census and asset inventory survey in 2014, he was advised not to continue with the construction of his family house whose construction was active at that time. He stopped construction but this has affected him negatively since the stonework which was incomplete has deteriorated/depreciated due to continued exposure to the weather elements. How will this his case handled whether he is affected by the current line corridor or not (Tungwa Mdoe Njira)	<i>Such cases will be evaluated and determined in a manner not to disadvantage the PAP. He was advised not to remove the house at all until such evaluation are completed and compensation paid out to him</i>
15	Will the PAPs be paid compensation promptly or will they wait till they die waiting as happens in many government projects? (Abdalla Mwaile)	<i>The government (KETRACO) pays promptly upon verification of true owners of affected property more so if the ownership of land or other affected assets is not in dispute.</i>
16	What will happen if the line corridor affects Kaya shrine(s) which are common in the project area (Ndoro Simba Ndoro)	<i>KETRACO route selection criteria aims to avoid public institutions such as shopping centres, schools, health centres and places of worship such as the shrines, churches and mosques. If such facilities were to be found during ground surveys, KETRACO will further aim to avoid them by changing the position of the line corridor in a particular locality</i>
Gandini Location Sensitization Meeting		
17	PAPs should not be oppressed nor disadvantaged in the valuation and compensation process (Hamisi Menza).	<i>Compensation for the losses will be done at prevailing market value and at the replacement cost for land and structures respectively. Trees will be compensated after they are felled according to the rates of various tree types, sizes, age and value as provided by Kenya Forest Service while crops will be compensated as per the guidelines provided by the Ministry of Agriculture if they are destroyed during the line construction. This way, nobody will be disadvantaged as the compensation will be just and commensurate with the impact on affected asset</i>
18	Will compensation cash be disbursed directly to the PAPs accounts or it will be paid through another government office e.g. through the chief's office. (Hamisi Menza).	<i>The disclosure of individual compensation packages will be made to the individual persons or households and not to 3rd parties such as the chiefs who are not entitled to know how much individual PAPs gets unless the PAPs choose to disclose their compensation packages to 3rd parties. Compensation cash will be wired directly to the particular PAPs bank accounts.</i>
Mwavumbo Location Sensitization Meeting		
19	Will the PAPs be allowed to salvage any building materials from their affected structures after compensation? (Daniel Dalo)	<i>PAPs will be allowed to salvage any building materials they may consider useful to them within the notice period. Any structures not removed from the corridor by the expiry of the notice period without a good and valid reason will be pulled down by the Contractor and the PAPs will not be</i>

No	Questions by Participants	Response
		<i>able to salvage any materials after that. The felled trees belongs to the PAPs to sell or use them in any manner they deem appropriate.</i>
20	Will the community members be able to get power in their homes from the line or will this power line just pass over them? (Jackson Mambo)	<i>Distribution of power to people's homes is the responsibility of Kenya Power. KETRACO only does power transmissions which is among the first steps for people to access power in their homes after which distribution is done by Kenya Power from the KETRACO substations.</i>
21	Will the compensation rate paid for the land where the pylon/ tower is constructed be the same amount as where the line only passes over the land? (Bagala Dalu)	<i>Yes, the same land compensation rate applies regardless of whether the land will have a tower or towers erected on it or the power line will only pass over it.</i>
22	Will there be a special/ additional payment for the vulnerable group of people such as the physically challenged persons? (Katana Ziro– who looked like he is mildly mentally/ physically challenged but could communicate)	<i>Yes, KETRACO and JICA Resettlement Policies is keen to ensure that the vulnerable groups are identified, considered and provision made for their resettlement assistance during the resettlement implementation phase</i>
Mtongwe Location Sensitization Meeting		
23	People residing in Mwangala area in Dongo Kundu do not have Title Deeds. Will they benefit from the project (Suleiman Said Magomba)	<i>Land will be compensated to the rightful owner. For those without titles the land agencies including NLC will provide a way forward but payment will only be done against a land document that the government can accept.</i>
24	All residents should be involved in the whole process-in meetings, compensation-timely flow of information? (Suleiman Salim Manundu)	<i>Panafcon will ensure all affected persons are duly informed and involved in the process of surveys, compensation and resettlement.</i>
25	Dongo Kundu Community Needs Title Deeds. Where will residents of Dongo Kundu go if they are not compensated for land? There is concern that residents of Dongo Kundu are being called invaders (Abdallah Mwalimu Ali)	<i>The issue of land ownership and land documents is in progress at very high level. NLC office in Mombasa is very ready to assist.</i>
26	How will children, mothers benefit since almost all property is owned by men (Elizabeth Msindi)	<i>The Land Act 2012 protects children, spouses from being denied access to compensation funds³.</i>

³ Section 107 (7) of the Land Act protects the rights of spouses to compensation. Section 27 of the Land Act protects child's right to land.



Plate 8: Sensitization Meeting in Progress in Ngombeni Location – July 2017



Plate 9: Sensitisation Meeting at Mbunguni Location – July 2017

7.3 Consultation Meetings with KFS, KWS, NMK and NGOs

Meetings with Kenya Forest Service (KFS), Kenya Wildlife Service (KWS) and National Museums of Kenya (NMK) and NGOs were convened to achieve the following:

- Inform the departments about the proposed 220kV TL project;
- Provide details of the project including a map showing the route of the TL;
- Seek views, comments and suggestions regarding the proposed project as far as its impact on forest resources, wildlife & avifauna and protected /threatened resources or species;
- Seek support of the departments with regards to access to data and information on forest, wildlife & avifauna resources and information regarding presence and location of sacred or religious sites and protected/threatened flora and fauna;
- Confirm existence of forest along the TL corridor and their significance;
- Establish the status of the affected section of the forest and presence of Kayas;
- Establish the existence of wildlife and their migratory tendencies;

Refer to **Table 35** for details of the meetings.

7.4 Consultation with Community along the proposed corridor

During the detailed site assessment and census survey, the Consultant carried out further consultations with individual members of the community. This took place when the Consultant team was collecting detailed data along the project corridor from Mariakani-Dongo Kundu. The following activities were carried out:

- Persons affected by the project were identified
- The PAPs were provided with project details including the potential project impact
- Full biodata information was collected during the detailed census survey;
- The affected land, structures, trees and crops were identified and details recorded;
- A questionnaire was administered.
- The PAPs were given a chance to ask questions or seek clarification regarding the project.

Table 35: Consultation Meetings with KFS, KWS, NMK and NGOs

No	Date	Department Visited	Officer (s) in Attendance	Issues Discussed	Status of Forested Area	Recommendations
1	Tuesday July 25, 2017	Kenya Wildlife Service (KWS) - Kwale Office	Mr. Nathan Gatundu	Status of the forest where TL passes	<ul style="list-style-type: none"> The forested area around DK6 is Community Land. Area traversed by TL is just a dispersal area for wildlife from Mwaluganje Forest (though rarely) It is not a Gazetted Game Reserve Area Animals that may be present in the vegetation where TL passes include elephants, baboons and wild pigs Lutsangani Area (DK7) is human/wildlife conflict area due to movement of wildlife from Mwaluganje Forest (Vandalised Fence) Birds found here are migratory 	<ul style="list-style-type: none"> Minimise traverse through forest Conductors should be high enough to avoid risk to elephants Pylons should be fitted with guards that can deter baboons from climbing them Fit pylons with reflector bowls to repel migratory birds.
2	Wednesday July 26, 2017	Kenya Forest Service (KFS) – Kwale Office	Mr. George Waka – Ecosystem Conservator and Mr Vitalis C. Osodo – Forest Manager Kwale Station	Status of the forest cover where TL passes and conservation efforts	<ul style="list-style-type: none"> The forest around DK6 is a Community Forest and requires their participation if anything is to happen around there. Kaya Gandini - The area located immediately north of DK6 is gazetted. National Museums of Kenya (NMK) has mapped out the Kayas. For any survey activities to take place in the forest areas – permission needs to be sought from the Chief Conservator of Forest in Nairobi 	<ul style="list-style-type: none"> The Kwale County Survey Officer and Kaya Elders accompanied the Panafcon Survey Team to the Kaya Gandini forest area
3	Wednesday July 26, 2017	County Government Office – County Foresters Office	Mr. Joseph Indo – County Forester, Kwale County	Brief on proposed TL project provided to the County Government Team	Input from the County Government Office will only be provided after they receive the Official Letter introducing Panafcon) – No information obtained	County Government office in Kwale will provide required input after receiving official communication requesting for such input.
4	Wednesday July 26, 2017	National Museums of Kenya (NMK) – Ukunda	Mr. Abdulrahman Matano – NMK, Ukunda Office	Gazetted Kayas	<ul style="list-style-type: none"> The Forest area where DK6 lies is community land All Kayas are Gazetted The only Gazetted Kaya close to the line is 	<ul style="list-style-type: none"> Panafcon contacted the Chairman of Kaya Elders (Mwanamwenga Chigaya – to be shown the exact

No	Date	Department Visited	Officer (s) in Attendance	Issues Discussed	Status of Forested Area	Recommendations
		And World Wildlife Fund (WWF) - Ukunda	and Mr. Elias Kimaru – WWF, Ukunda Office		Kaya Gandini located immediately north of DK6.	boundary on the ground. The Community was consulted regarding the area that the TL will take up
5	Wednesday July 26, 2017	Kenya Wildlife Service (KWS) Kwale	Mr. Benard Ochieng – Research Officer KWS, Shimba Hills National Reserve and Tsavo West National Park	Wildlife and birds in the forest areas	<ul style="list-style-type: none"> The area around DK6 and DK7 is community land. The forest found here is used by wildlife as dispersal area. The animals found in the dispersal area include elephants, baboons and wild pigs. Elephants and wildpigs come here only when they break the Mwaluganje Forest Reserve. The birds found here are migratory. 	<ul style="list-style-type: none"> The Community was consulted regarding the area that the TL will take up and the elders provided guidance Measures to be undertaken have been provided in the report
6	Thursday July 27, 2017	Kenya Forest Service – Kaloleni District – Mariakani – Kilifi County	Mrs Virginia P. Kingori – Forest Officer – Kaloleni District – Mariakani – Kilifi County	Status of the forest cover where TL passes and conservation efforts	<ul style="list-style-type: none"> There is no forest cover in the Mariakani section of the TL. Trees found within the TL corridor belong to community members Some of the trees require permits from Forest Office before they can be cut down. The Officer provided a list of the common trees grown by community members in the project area 	<ul style="list-style-type: none"> Affected trees have been valued using guidance from KFS
7	Thursday July 27, 2017	Kenya Forest Service (KFS) – Mombasa	Mr. Albert Nyabuti – Ecosystem Conservator – Mombasa County and Madam Mdamu Jackline – Forester	Status of the forest cover where TL passes and conservation efforts	<ul style="list-style-type: none"> The Dongo Kundu area has mangroves which are considered as Protected/Threatened Species Kaya Kiteje lies within the project area and should be protected 	No trees should be cut down without involvement of the KFS.

No	Date	Department Visited	Officer (s) in Attendance	Issues Discussed	Status of Forested Area	Recommendations
			covering Dongo Kundu Area			
8	Thursday July 27, 2017	Kenya Wildlife Service (KWS) - Mombasa	Fridah Dermmillah Obare – Community Education and Extension Warden - Mombasa	Fish and mangrove in the Dongo Kundu area	The research department at KWS is willing to provide any information related to fish and mangrove in the project area.	KWS Office will provide the required information when required.
9	Friday November 23, 2018	Nature Kenya (Nairobi Office)	Paul Gaceru Species and Sites Manager, Nature Kenya, EANHS.	Birds in the project area	Nature Kenya continues to carry out monitoring birds in the project area. They are willing to provide the information.	There are 2 bird species in the project area that endangered.
10	Thursday November 29, 2018	World Wildlife Fund (WWF) Nairobi Office	Peter Muigai	Wildlife in the project area	Provided an evaluation of the TL route.	From global assessment, there isn't real threat of the project/corridor to critical corridors or habitats however it traverses river systems and wetlands

7.5 PAP Consultation Meeting

PAP Consultation Meetings were conducted from Monday April 23 – Friday April 27, 2018, to explain and discuss about RAP related topics. One meeting was done in each of the 9 locations traversed by the TL and substation in Dongo Kundu. Only the Household Heads of the community members affected by the project were invited to attend the PAP Consultation Meetings.

7.6 Key Stakeholder Questionnaires

Consultations have been carried out throughout the ESIA Study phase where other stakeholders have been consulted and appropriate questionnaires administered. Key Stakeholder Questionnaires were administered and 9 received back. All the stakeholders supported the project. Some of the positive aspects, concerns and suggestions on the project raised by stakeholders are elaborated below:

Positive Aspects

- The affected persons will be paid compensation and resettled;
- There will be increased power supply in the region that will support commercial activities and industries;
- The SEZ area will have access to power for development;
- The project will facilitate creation of job opportunities;
- The standard of living of the project area residents/communities will be improved.

Fears and Concerns

- There will be cutting down of trees along the TL corridor and the substation;
- Similarly, many raised concerns that they may lose land due to lack of appropriate documents or delayed payments resulting from court cases due to disputes.
- Compensation will be delayed leaving many PAPs to spend in the cold and have no livelihoods and thereby leaving them poorer.
- There were also fears that the promise of compensation cannot be fully trusted. They have noted that there are other projects in the area whose compensation payments have not been completed yet the project construction activities are in progress with PAPs still waiting to be settled.
- Will the contractor honour the promise of giving the local community members jobs especially the youth?
- The project area environment will be affected by the project construction and operation activities;
- There may be corruption issues when it comes to compensation of those affected by the project.
- There are cultural and sacred sites that may be interfered with by the project. These include the following:
 - Shrines (2 Shrines encountered)
 - Graves and Graveyards

Suggestions

- The Local Administration (National Government and County Government) and the clan leadership should be incorporated in the process of identifying who rightfully owns the land where land ownership documents have not been processed or there are succession issues to be resolved.
- Compensation should be carried out before relocation is done.
- Locals should be given priority to do casual jobs such as clearing the transmission line corridor and carrying out other manual jobs.

- Contractor should maintain construction activities along the marked area of the project;
- Contractor should engage local community members to provide local labour for casual jobs during the construction;
- Environmental and Social Management Plan (ESMaP) should be implemented;
- Where there are fragile ecosystems like wetlands and water sources, proper mitigation measures should be applied;
- Replanting of trees that will be cut down should be done in identified areas;
- There should be proper intervention measures to minimize soil erosion;
- Populated and forested area should be avoided;
- There should be involvement of the community /public participation at all stages of the project;
- Community members should be assisted with tree seedlings to plant to replace the cut trees;
- Approvals for powerline towers should be sought from KCAA before construction commences.

Annex 18 provides a summary of feedback received from Key Stakeholders.

7.7 Public Consultation Meeting (PCM)

Public Consultation Meetings (PCMs) were held from Monday June 18 to Friday June 22, 2018. The meetings were announced through the following avenues:

- Chiefs Barazas
- Posters
- Phone calls by Chiefs and the Village Elders
- Vehicles with speakers driving through the project area

Refer to **Table 36** for Public Consultation Meetings (PCMs) Schedule and the number of persons who participated in the meetings at the 9 different locations covering the project area. A total of 1,384 person (men=1,066, women=318) attended the PCMs. A Map showing the locations where PCMs were held is provided in **Annex 16**.

PCM Agenda

1. Opening Prayers
2. Introduction of Participants
3. Purpose of Conducting the PCM
4. The ESIA Study Activities that were Carried Out
5. Findings of the Study/Project Impacts
6. Proposed Mitigation Measures
7. Questions & Answer Session
8. Closing Remarks
9. Closing Prayers

The PowerPoint Presentation used during the Public Consultation Meetings is presented in **Annex 11**. During the PCM, participants were given an opportunity to give comments, suggestions and also ask questions. Minutes, attendance registers and questions and responses recorded during the PCMs is provided in **Annex 12**. In addition, simplified forms/questionnaires in both English and Kiswahili were distributed to participants to facilitate gathering of feedback information. An evaluation of the feedback forms is presented in **Table 37**. The main points are summarized as follows:

All the respondents indicated support for the project. The issues and comments recorded by the respondents include the following:

- The environment of the project area needs to be protected during construction and operation.
- Project Affected Persons should be paid in good time and adequate amounts that can enable them to relocate and restore their livelihoods.
- KETRACO should facilitate planting of trees in the project area to replace the ones that will be cut down.
- KETRACO should ensure that the Contractor implements the Environmental and Social Management Plan (ESMaP) so as to minimize impacts to the community and also protect the environment.
- Regular consultations with the community should continue and they should be involved in every aspect of the project implementation.
- KETRACO should facilitate support to the community in the areas of water for domestic use, sanitation, energy for cooking and lighting.
- Project area community members requested that they should be given priority for job opportunities on the project.
- The Contractor should enhance Health and Safety during construction and operation.
- Noise and dust/smoke should be suppressed during construction and operation since the project is located in a settlement area.

The feedback forms filled by respondents at the PCMs are provided in **Annex 14**.

Table 36: Public Consultation Meeting Schedule

#	Venue	Date	Time	County	Sub-County	Location	No. of Participants
1	Baraza Field near Tiba Petrol Station	Monday June 18, 2018	9:00 AM	Kilifi	Kaloleni	Mariakani	116 Men=87 Women =29
2	Mwanda Dispensary	Monday June 18, 2018	2:00 PM	Kwale	Kinango	Mwavumbo	211 Men=180 Women=31
3	Mazirizirini Police Station	Tuesday June 19, 2018	9:00 AM	Kwale	Kinango	Mwatate	175 Men=116 Women=59
4	Bofu Chief's Camp	Tuesday June 19, 2018	2:00 PM	Kwale	Kinango	Mtaa	86 Men=56 Women=30
5	Mnyenzi Health Centre	Wednesday June 20, 2018	9:00 AM	Kwale	Kinango	Kasemeni	124 Men=97 Women=27
6	AP Camp Lutsangani	Wednesday June 20, 2018	2:00 PM	Kwale	Kinango	Gandini	187 Men=151 Women=36
7	Mbunguni Chief's Camp Ground	Thursday June 21, 2018	9:00 AM	Kwale	Matuga	Mbunguni	164 Men=118 Women=46
8	Kiteje Assistant Chief's Camp	Thursday June 21, 2018	2:00 PM	Kwale	Matuga	Ng'ombeni	103 Men=88 Women=15
9	Dongo Kundu AP Camp	Friday June 22, 2018	9:00 AM	Mombasa	Likoni	Mtongwe	218 Men=173 Women=45
Total							1,384 Men-1,066 Women=318



Plate 10: PCM in Progress at Dongo Kundu AP Camp – June 22, 2018



Plate 11: PCM in Progress at Mwanda Dispensary – June 18, 2018

Table 37: Analysis of Participant Feedback Forms

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
Mariakani Location						
1.	John Nalo	Sagar Holdings	Land Owner in the Project area - PAP	<ul style="list-style-type: none"> Aware of the project Had plans for the land parcel Project will bring development Impacts have been identified and mitigations proposed There will be economic growth 	<ul style="list-style-type: none"> Implement project to foster development Guard against pollution Minimize noise Put up projects that will benefit community 	Yes
2.	Damaris Kimondo	Ministry of Interior and Coordination of National Government – ACC Mariakani	Local Leader - Administration	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit community Cutting down of trees will impact environment Disruption of settlements 	<ul style="list-style-type: none"> Implement proposed mitigation measures Compensate affected persons Excavate only necessary areas Maintain project area environment 	Yes
3.	Francis Maoto	Department of Agriculture	Agricultural Officer	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit community Cutting down of trees will impact environment Disruption of settlements 	<ul style="list-style-type: none"> Implement mitigation measures Compensate affected persons adequately Provide community with tree seedlings Maintain project area environment 	Yes
4.	Joyce Kombe	Ministry of Interior and Coordination of National Government – Chief Mariakani Location	Local Leader	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit community There will be radiation during operation of the transmission line 	<ul style="list-style-type: none"> Compensate affected persons adequately Give priority to community on employment opportunities 	Yes
5.	Peter Kirigha	Resident	Community Member	<ul style="list-style-type: none"> Not aware of the project Project is good There will be radiation during operation of the transmission line 	<ul style="list-style-type: none"> Project should proceed Destruction of houses and other structures The cutting down of trees 	Yes
6.	Harrison Katana Konde	Ministry of Interior and Coordination of National Government – Assistant Chief Mariakani	Local Leader	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit to community There will be cutting down of trees Disruption of settlements Powerline passes without community getting connected 	<ul style="list-style-type: none"> Compensate affected persons adequately Give priority to community on employment opportunities 	Yes
Mwavumbo Location						
7.	Mwanjole N. Ndoro	County Government of Kwale	Ward Administrator	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit community Community is well consulted Cutting down of trees will impact environment Disruption of settlements There is comprehensive consultations with community 	<ul style="list-style-type: none"> Sensitize community on prudent use of compensation money Compensate affected persons Form environment committees Maintain project area environment Involve community members in activities of the project Encourage community participation 	Yes

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
8.	Stephen K. Nzomo	County Government of Kwale	Village Administrator	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit community Community is well consulted Disruption of settlements 	<ul style="list-style-type: none"> Sensitize community on environmental aspects Compensate affected persons Provide community with tree seedlings to plant Involve community in activities of the project 	Yes
9.	Pascal Mumo	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and benefit community 	<ul style="list-style-type: none"> The TL should be well maintained Implement ESMP Sensitize community on environmental issues 	Yes
10.	Wilson Jackson Mwangale	Resident	PAP	<ul style="list-style-type: none"> Aware about the project Project will bring development and benefit community Economy of the community will be elevated 	<ul style="list-style-type: none"> Dust should be controlled during construction Involve community in ESIA to identify mitigation measures 	Yes
11.	Ruth Mbala Mtuacha	Resident	Community Member	<ul style="list-style-type: none"> Aware about project Disruption of settlements Project will bring development and benefit community Concern over health of children from radiation 	<ul style="list-style-type: none"> Compensate affected persons well Sprinkle water to reduce dust Enhance security during construction 	Yes
12.	Daniel Wanini Dalu	Resident	PAP	<ul style="list-style-type: none"> Aware about project My land is affected There will be employment for youth If care is not taken during construction, there may be impacts Disruption of settlements 	<ul style="list-style-type: none"> Enhance security Put up signage during construction There should be no construction before compensation payment 	Yes
13.	Amos Mbovu Katembe	Resident	PAP	<ul style="list-style-type: none"> Aware about the project Project will bring development and benefit community through jobs Disruption of settlements There will be restricted use of land 	<ul style="list-style-type: none"> Project should proceed 	Yes
14.	Rama Karani Mers	Resident	PAP	<ul style="list-style-type: none"> Aware about project There will be restricted use of land Project will bring development and benefit community through jobs 	<ul style="list-style-type: none"> Pay PAPs directly Protect environment Reduce dust during construction Let justice prevail during compensation and resettlement 	Yes
15.	Gwama Mgalla Mbovu	Resident	PAP	<ul style="list-style-type: none"> Aware about the project Project will bring development and jobs for the community The project will separate families 	<ul style="list-style-type: none"> Sensitize community on prudent use of compensation money Project implementers should protect environment 	Yes
16.	Solomon Kuphenya Dallu	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and benefit community through jobs 	<ul style="list-style-type: none"> Project area community should be given priority on jobs 	Yes
17.	Josephine Chai	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Community elaborately sensitized 	<ul style="list-style-type: none"> Community should be given priority on jobs Control cutting down of trees 	Yes
Mwatate Location						

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
18.	Alex Rai	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project 	<ul style="list-style-type: none"> Compensate affected persons Control cutting down of trees 	Yes
19.	Hassani Mboga Wanini	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be restricted use of affected land There may be pollution of water sources There may be excess noise and dust/smoke Project will provide power to the project area 	<ul style="list-style-type: none"> Provide jobs to project area community 	Yes
20.	Onesmus Chiboko Mgandi	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will provide power to the project area There will be disruption of settlements There will be interference with cultural sites 	<ul style="list-style-type: none"> My Family is affected by the project PAPs to be adequately compensated 	Yes
21.	Amos Nyawa	Resident	Community Member	<ul style="list-style-type: none"> Aware of the project There will be restricted use of affected land There will be jobs for the community There will be noise and dust/smoke during construction. 	<ul style="list-style-type: none"> Project should proceed 	Yes
22.	Samson Chale Joho	Resident	Community Member	<ul style="list-style-type: none"> Aware of the project Project will bring development and benefit community through jobs There will be disruption of settlements 	<ul style="list-style-type: none"> Compensation should be paid Project should avoid public institutions KETRACO should provide tree seedlings for planting KETRACO should facilitate construction of Chief's Office 	Yes
23.	Warsib Chirima Mwingo	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and benefit community through jobs Power cannot be supplied to community directly from the TL 	<ul style="list-style-type: none"> Provide power to the community Project area community should be given priority on jobs 	Yes
24.	Mohamed Luvi Mwero	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will cause air pollution from dust/smoke causing diseases Project will cause displacement of persons Project will generate jobs 	<ul style="list-style-type: none"> KETRACO should consider facilitating community projects Adequate compensation should be paid KETRACO should consider facilitating community projects 	Yes
Mtaa Location						
25.	Tunu K. Beuchi	Resident	Community Member	<ul style="list-style-type: none"> Not aware about the project There will be restricted use of affected land Project will bring development and jobs for the community There will be demolition of houses 	<ul style="list-style-type: none"> Adequate compensation should be paid Residents should be alerted during construction KETRACO should consider facilitating community projects 	Yes
26.	Mwamwero Baya Katana	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring industrial development and enhancement of the project area economy The high voltage poses safety risk There will be disruption of settlements 	<ul style="list-style-type: none"> Sensitize community on project benefits Pay Adequate compensation Minimise disruption of human settlements Promote justice fairness during project implementation 	Yes

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
27.	Joseph N. Nyae	Ministry of Interior and Coordination of National Government – Chief Mtaa Location	Local Leader	<ul style="list-style-type: none"> Aware about the project Project will cause displacement of persons Project will bring development and enhance economy Project will bring development and jobs for the community 	<ul style="list-style-type: none"> Sensitize community on project impacts and benefits 	Yes
28.	Baya Shokoa Gwidi	Resident	Community Member	<ul style="list-style-type: none"> Aware about project Project will bring development and enhance economy There will be displacement of persons Potential occurrence of accidents 	<ul style="list-style-type: none"> Involve community in all aspects of project development and implementation Adequate compensation should be paid to PAPs Compensation Payment to PAPs should be done directly 	Yes
29.	James Mwamongo Dena	Resident	community Member	<ul style="list-style-type: none"> Aware about the project Project will bring industrial development and enhancement of the project area economy Cutting down of trees within the TL corridor will impact environment Bushes should not be cleared 	<ul style="list-style-type: none"> Adequate compensation should be paid to PAPs Project area community should be given priority on jobs KETRACO should consider supporting a community project Facilitate tree planting 	Yes
30.	Rodgers Nyawa Ngumuta	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring industrial development and enhancement of the project area economy There will be displacement of persons There will be new job opportunities 	<ul style="list-style-type: none"> Adequate compensation should be paid to PAPs Project area community should be given priority on job opportunities Put in adequate safety measures during construction 	Yes
31.	Ibrahim Nzira Charo	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be restricted use of affected land 	<ul style="list-style-type: none"> Adequate compensation should be paid to PAPs Minimize land disputes Community should be given priority on jobs 	Yes
32.	Musena Beja Ngoa	Ministry of Interior and Coordination of National Government – Assist Chief Bofu Sub- Location	Local Leader	<ul style="list-style-type: none"> Aware about the project There will be displacement of persons Project will bring industrial development and enhancement of the project area economy Concerned about radiation during operation. 	<ul style="list-style-type: none"> Compensate and resettle affected persons Inform community on project impacts minimize displacement of persons minimize environmental impacts of the project 	Yes
33.	Juma Mwamdzomba	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be restricted use of affected land Project will create job opportunities 	<ul style="list-style-type: none"> Compensate and resettle affected persons Project area community should be given priority on jobs 	Yes
34.	Sammy Bidu Shadrack	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be displacement of persons/ Project will enhance project area economy 	<ul style="list-style-type: none"> Compensate and resettle affected persons Enhance transparency during payment Environmental protection should be enhanced 	Yes
Kasemeni Location						
35.	Tunuwa Mwamula	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance economy Jobs will be created 	<ul style="list-style-type: none"> Protect environment Project area community should be given priority on jobs Continue creating awareness among the community Facilitate tree planting 	Yes

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
36.	Joseph Shumba Tsochizi	Resident	PAP	<ul style="list-style-type: none"> Aware about the project There will be restricted use of affected land Project will bring development and enhance the economy Job opportunities will be created Trees in the corridor will be cut 	<ul style="list-style-type: none"> Compensate and resettle affected persons Sensitize PAPs on prudent and appropriate land use 	Yes
37.	Makanzu Rashid Makanzu	County Government of Kwale – Village Administrator	Local Leader	<ul style="list-style-type: none"> Aware about the project There will be enhancement of economy It will affect people and, loss of trees/other assets Shrines will be affected 	<ul style="list-style-type: none"> Maintain TL Protect shrines and other cultural sites 	Yes
38.	Benson Kalimbo Kokoi	Ministry of Interior and Coordination of National Government – Chief Kasemeni Location	Local Leader	<ul style="list-style-type: none"> Aware about the project It will affect people and, loss of trees/other assets Job opportunities will be created There will be excess dust/noise Project will bring industrial development and enhancement of the project area economy 	<ul style="list-style-type: none"> Compensate affected persons Adequately and resettle them Suppress dust and noise during construction 	Yes
39.	Sarah Waweru	Resident	Community Member	<ul style="list-style-type: none"> No aware about the project Project will open up the area 	<ul style="list-style-type: none"> Exercise fairness Start project soon Keep community informed 	Yes
Gandini Location						
40.	Said Mwetemo Ngao	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy There will be loss of trees /crops 	<ul style="list-style-type: none"> Compensate affected persons Adequately and resettle them Sensitize PAPs on prudent use of compensation money Avoid cutting down trees/crops 	Yes
41.	Juma Chindoro Kulala	Resident	PAP	<ul style="list-style-type: none"> Aware about the project There will be controlled use of land There will be job opportunities Persons will be displaced and biodiversity/assets affected 	<ul style="list-style-type: none"> Compensate affected persons Adequately and resettle them Sensitize PAPs on prudent use of compensation payments Avoid cutting down trees/crops 	Yes
42.	Mbaruku Juma Baushi	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Compensate PAPs adequately Pay PAPs directly Sensitize PAPs on prudent use of compensation money Avoid cutting down trees/crops 	Yes
43.	Lubando Kajimbi Dheri	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project It will affect people and, loss of trees/other assets Project will bring development and enhance project area economy 	<ul style="list-style-type: none"> Compensate PAPs Adequately and resettle them Prioritize job opportunities for community members 	Yes

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
44.	Umazi Mwangolo	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be restricted use of land There will be job opportunities It will affect people and, loss of trees/other assets There will be interference with cultural sites (Shrines) 	<ul style="list-style-type: none"> Control the cutting of trees Suppress dust by sprinkling water on excavated areas Protect environment during construction and operation of the TL 	Yes
45.	Munga Ndegwa	Ministry of Interior and Coordination of National Government – Assistant Chief	Local Leader	<ul style="list-style-type: none"> Aware about the project There will be restricted use of land There will be job opportunities It will affect people and, loss of trees/other assets There will be interference with cultural sites (Shrines) There will be enhancement of the economy 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Facilitate planting of trees 	Yes
46.	Andersen Beja Baraza	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy It will affect people and, loss of trees/other assets 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Facilitate planting of trees Improve environment by appropriate waste disposal Control cutting of trees 	Yes
47.	Mwanamweng a Chigamba Nyanje	Resident	PAP	<ul style="list-style-type: none"> Aware about the project Potential negative impacts Cutting down of trees 	<ul style="list-style-type: none"> Environment should be protected during construction Control cutting of trees 	Yes
48.	Dwamwanga Karimbo Mazera	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy Potential occurrence of accidents 	<ul style="list-style-type: none"> Environment should be protected during construction KETRACO should facilitate project area community to get connected to electric power. 	Yes
Mbunguni Location						
49.	Josphat M. Murisa	Resident	PAP	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Suppress dust by sprinkling water on excavated areas Protect environment during construction and operation Assist project area community get appropriate sanitation facilities 	Yes
50.	Robert Shunet	Ministry of Interior and Coordination of National Government – Assistant County Commissioner	Local Leader	<ul style="list-style-type: none"> Aware about the project There will be displacement of persons, loss of trees/other assets Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Assist the community as a way of appreciating their support to the project Protect the environment and conserve biodiversity 	Yes
51.	Suari Mohammed Viro	Resident	PAP	<ul style="list-style-type: none"> Aware about the project There will be job opportunities There will be enhancement of the economy Persons are affected and loss of trees/other assets 	<ul style="list-style-type: none"> Protect the environment and conserve biodiversity Facilitate planting of trees 	Yes

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
52.	Juma Matano	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Persons are affected and loss of trees/other assets There will be excess noise & dust There will be development and enhancement of the economy There will be job creation 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Suppress dust and noise Protect environment 	Yes
53.	Evans M. Mutisa	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be restricted use of land There will be development and enhancement of the economy There will be safety risks 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Facilitate planting of trees Reduce dust and noise during construction and protect environment Project area community should get priority on jobs Construct a learning facility in the project area 	Yes
Ng'ombeni Location						
54.	Athumani Jiti Mwatsengo	County Government of Kwale – Ward Administrator	Local Leader	<ul style="list-style-type: none"> Aware about the project Persons are affected and loss of trees/other assets 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Facilitate planting of trees Control cutting of trees Facilitate provision of water to the project area community by drilling boreholes 	Yes
55.	Salama Musa Suleiman	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Persons are affected and loss of trees/other assets Project will bring development and enhance the economy There may be misuse of compensation funds 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Sensitize PAPs on prudent use of compensation funds Facilitate planting of trees prioritize job opportunities for the community 	Yes
56.	Mohamed Ali Sibabu	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy Project will enhance land value 	<ul style="list-style-type: none"> KETRACO to ensure environmental protection Suppress dust and noise 	Yes
57.	Kishumbo Shee Hamisi	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project Project will bring development and enhance the economy Persons are affected and loss of trees/other assets 	<ul style="list-style-type: none"> Continue with elaborate sensitization of community members. Facilitate tree planting Enhance Health and safety aspects during construction and operation. Facilitate support for schools and health centres in the project area 	Yes
58.	Mohamed Saidi Nyota	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project There will be excess noise and dust during construction Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Minimize environmental impacts by implementing ESMP 	Yes
59.	Athman Hamisi Macheso	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project People will be affected and, loss of trees/other assets There will be excess dust/smoke and noise There will be job creation 	<ul style="list-style-type: none"> Control cutting down of trees and facilitate planting others Implement ESMP Continue sensitizing project area community on environmental issues 	Yes

#	Stakeholder Name	Department or Organization	Involvement or Role in Project	Stakeholder benefits, Interest, Goals, and Concerns	Follow-up Actions and Communication	Support for the Project
60.	Khalid Ali Awadh Said Badel	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project People will be affected and, loss of trees/other assets Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Minimize environmental impacts by implementing ESMP 	Yes
Mtongwe Location						
61.	Jane. F Machara	Ministry of Interior and Coordination of National Government – Assistant County Commissioner	Local Leader	<ul style="list-style-type: none"> Not aware about the project (New in the area) There will be development and enhancement of the economy 	<ul style="list-style-type: none"> Enhance safety procedures during construction Respect local cultural practices as project is implemented Involve community and consider their suggestions 	Yes
62.	Rasheed Abdalla	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project People will be affected and, loss of trees/other assets Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Enhance environment protection 	Yes
63.	Shake Livason Shake	Resident	PAP	<ul style="list-style-type: none"> Aware about the project People will be affected and, loss of trees/other assets Project will bring development and enhance the economy There will be job opportunities 	<ul style="list-style-type: none"> Compensate PAPs adequately and resettle them Consider views of the community members Prioritize provision of jobs to our youth Regular communication between KETRACO and Community members to continue 	Yes
64.	Walter Kirts	Peace Cohesion - Chairman	Leader	<ul style="list-style-type: none"> Aware about the project There will be enhancement of the economy People will be affected and, loss of trees/other assets 	<ul style="list-style-type: none"> Continue consulting community to enhance project ownership Implement ESMP Respond to any questions in good time. 	Yes
65.	Pastor Eliathu Mate Nthiga	Resident	Community Member – Church Leader	<ul style="list-style-type: none"> Aware about the project People will be affected and, loss of trees/other assets Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Inform community how much they will be paid Respect agreement between community and KETRACO KETRACO to fulfill compensation payment obligations 	Yes
66.	Ali Sasab Athman	Resident	Community Member	<ul style="list-style-type: none"> Aware about the project People will be affected and, loss of trees/other assets Project will bring development and enhance the economy 	<ul style="list-style-type: none"> Continue consulting community in every aspect of project Compensate PAPs adequately and on time. 	•

8 ENVIRONMENTAL MITIGATION MEASURES AND MANAGEMENT PLANS

8.1 Environmental and Social Management Plan (ESMaP)

The Environment Management Plan is important for ensuring project sustainability and environmental and social protection. Whereas efforts are usually made to develop/predict mitigation measures for projects before implementation, it is during the operation lifespan of the project that actual impacts are noted or experienced.

An environment monitoring and management plan that includes the monitoring of the progress of mitigation measures being implemented will be carried out while also monitoring the project for any new negative impacts that were not earlier considered or anticipated.

The proponent shall ensure that the Contractor understands and implements all specified mitigation measures during the pre-construction and construction period. The proponent's Supervising Engineer will be responsible for assessing the Contractor's Environmental and Social Management Plan and internally implement the Management Plan to ensure that the environmental and social impacts are monitored and managed in an acceptable manner.

Monitoring systems shall be set up by the Proponent during the operational phase, so that potential environmental problem areas can be detected well in advance and the appropriate remedial action taken. The Proponent shall have a checklist of items that need to be monitored as a matter of routine or periodically over agreed intervals, depending on the nature of the aspect to be monitored. The types of parameters that will be monitored include proposed mitigation measures, design features or actual impacts. Depending on the nature or aspect of impact to be monitored, monitoring will be done as part of routine or periodic maintenance. However, socio-economic and ecological parameters shall be effectively assessed over a longer time span.

Table 38 provides the Environmental and Social Management Plan (ESMaP) developed after carrying out the ESIA Study of the project corridor. The ESMaP shows the planned mitigation measures for items that were assessed to have negative impacts in the impact assessment process.

Table 38: Environmental & Social Management Plan (ESMaP)

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
Pre-construction phase					
Ecosystem	Loss of forest trees and habitat due to forest clearance along the TL corridor	<ul style="list-style-type: none"> The width of forest clearance along the wayleave will be reduced to 20 m to minimize forest clearance. Forest clearance to be conducted as far as possible outside of migratory season (March-November) of Spotted Ground-thrush. In case bird nests are found, they will be relocated to a nearby area/tree. KETRACO will support local/regional afforestation programs through consultation with KFS and local communities. 	KETRACO	KFS	Approx. 1,200,000
Resettlement	Displacement/ relocation of persons, structures, trees due to land easement/acquisition	<ul style="list-style-type: none"> Carry out fair and adequate compensation as per RAP and provide livelihood restoration assistance to PAPs until that their livelihoods are restored to pre-project levels or better. Implement internal and external monitoring to ensure the RAP is implemented appropriately. A grievance redress mechanism (e.g. establishment of PAP Committee) will be put in place to address all emerging complaints and grievances from the PAPs and project area community. 	KETRACO NLC	-	409,487,758 (as per RAP report)
Vulnerable social groups	Vulnerable people are susceptible to resettlement related impacts	<ul style="list-style-type: none"> Vulnerable HH to be provided with extra assistance as per RAP (e.g. sourcing host land, support with dismantling of structures, moving and building new structures). 	KETRACO NLC	-	64,649,350 (as per RAP Report)
Livelihood	Loss of income due to land acquisition or easement	<ul style="list-style-type: none"> TL tower shall be located as far as possible outside of farming areas. Provision of compensation and assistance as per RAP until income are restored to pre-project levels or better. 	KETRACO NLC	-	Included in RAP budget
Land use	Alteration of land use due to land acquisition	<ul style="list-style-type: none"> Provision of compensation and assistance as per RAP until incomes are restored to pre-project levels or better. 	KETRACO NLC	-	Included in RAP budget

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
Social infrastructure and services	Disturbance to Kiteje Secondary school operations	<ul style="list-style-type: none"> Provision of compensation as per RAP so that the school can obtain replacement land adjacent to the school to allow future expansion. KETRACO to ensure the school obtain replacement land. 	KETRACO NLC	-	Included in RAP budget
Cultural heritage	Cutting of tree shrine due to TL corridor	<ul style="list-style-type: none"> Support implementation of tree shrine transfer ceremony (in case the tree shrine cannot be avoided). 	KETRACO	NMK	Approx. 350,000 (Shrine transfer ceremony)
Gender	Women are susceptible to resettlement related impacts	<ul style="list-style-type: none"> Women household heads to be provided with extra assistance as per RAP. Hold women focused group meetings as necessary. Allocate women representative in the PAP committee. 	KETRACO NLC	-	Included in RAP budget
Construction phase					
Air pollution	Fugitive dust and exhaust emissions from construction vehicles	<ul style="list-style-type: none"> Implement regular maintenance and vehicles emitting visible pollutants (e.g. black soot) to be removed from operation until repaired as per Environmental Management and Co-ordination (Air Quality) Regulations 2014. Construction vehicles without inspection certificate will not be allowed to operate. Slow driving on dusty roads within the community area. Regular water spraying of access road. Cover truck loading bed when transporting loose materials such as rock, sand and mud. Avoid to the extent possible passing through sensitive areas (e.g. residential area, schools). 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost
	Fugitive dust emission from heavy civil works	<ul style="list-style-type: none"> Regular water spraying of exposed surfaces. Cover exposed cut and fill surfaces and unused stockpiles. 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost
Water pollution	Sediment-laden rainwater runoff from construction site	<ul style="list-style-type: none"> Exposed cut and fill slopes at the substation/access road to be protected (e.g. by shotcrete) as soon cut and fill works are completed. Install temporary erosion control measures (e.g. sheet cover, sedimentation pond) as necessary. Stockpiles (e.g. topsoil) to be covered by sheet. 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
		<ul style="list-style-type: none"> Temporary construction yard to be located as far as possible from surface water bodies and wetlands. 			
	Uncontrolled discharge of concrete wash water	<ul style="list-style-type: none"> Discharge of untreated concrete wash water to the environment to be strictly prohibited. Concrete wash water to be treated at designated facilities (e.g. facilities with wash water treatment system). Acquire effluent discharge license from NEMA in case of discharge to environment. Effluent quality (e.g. pH) to comply with discharge standard set under Environmental Management and Coordination, (Water Quality) Regulations 2006. 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost
Soil pollution	Accidental spillage of oil to the ground	<ul style="list-style-type: none"> Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired. Maintenance activities to be conducted at designated facilities with appropriate pollution control. Spill response kit (e.g. absorbents) to be readily available at the construction site. Fuel tanks to be installed on an impermeable base with bunds. 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost
Waste	Generation of construction waste	<ul style="list-style-type: none"> Minimize waste generation through reuse and recycling. Wastes to be stored in designated areas and with containers specialized for each waste type. Wastes to be collected and disposed only by NEMA-authorized firms. Construction contractor to prepare a Construction Waste Management Plan (CWMP) through consultation with the county government, which identifies the different wastes that will be generated and their proposed storage and disposal procedure. 	Construction contractor	Supervising consultant KETRACO NEMA	Included in construction base cost
Noise	Noise from construction vehicles/machine and	<ul style="list-style-type: none"> Equip vehicles and machines with exhaust mufflers and carry out regular maintenance/inspection. Prohibit using vehicles that exceed 84 dBA when 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
	pile driving works	<p>accelerating as per Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009.</p> <ul style="list-style-type: none"> • Avoid to the extent possible using roads that pass through sensitive areas. If unavoidable, drive slowly when passing through sensitive areas and avoid raving of engines and unnecessary idling. • Use to the extent possible low-noise pile driver. Conduct pile-driving works in a manner so that noise levels do not exceed the construction site noise standard set under Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009. • In principal, pile-driving at nighttime shall not be allowed. 			
Vibration	Vibration from pile driving works	<ul style="list-style-type: none"> • Locate towers at least over distance of 25 m from the nearest structure. • Conduct pile-driving works in manner so that vibration levels do not exceed the construction site vibration standard set under Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009. 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost
Conservation area	Indirect disturbance to Kaya Gandini	<ul style="list-style-type: none"> • Before commencement of construction, hold meetings with Kaya elders to inform about the construction schedule and works, and consult for necessary mitigation measures. • Prohibit entrance of construction workers inside the Kaya. • Establish temporary construction yard as far as possible from the Kaya. • Use as far as practical low-noise construction machines. 	KETRACO Construction contractor	Supervising consultant KETRACO NMK	Included in construction base cost
Ecosystem	Disturbance to forest fauna along DK6-DK7	<ul style="list-style-type: none"> • Implement induction programs for the construction workers regarding prohibition of activities such as hunting, poaching, plant collecting, littering and fire burning. • Construction to be conducted as far as possible outside of migratory season (March-November) of Spotted Ground-thrush. • Use as far as practical low-noise construction machines. • Surround noisy non-mobile equipment (e.g. generator) with 	Construction contractor	Supervising consultant KETRACO KWS	Included in construction base cost

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
		noise barrier.			
Livelihood	Temporary loss of income due to construction-related disturbances	<ul style="list-style-type: none"> Establish temporary construction yard/road as far as possible outside of farmland. Compensation to be provided to affected persons depending on the degree of impact. Inform well in advance the affected persons about the construction plan so that they can harvest their crops and their request can be incorporated into the plan. All casual labor to be resourced from the local community. 	Construction contractor KETRACO	Supervising consultant KETRACO	Included in construction base cost
Land use	Temporary restriction in land use due to construction	<ul style="list-style-type: none"> Establish temporary construction yard/road as far as possible where land use is non-existent or limited. 	Construction contractor	Supervising consultant KETRACO	-
Social infrastructure	Temporary restrictions on road use	<ul style="list-style-type: none"> Prepare Road Use Restriction Plan and obtain permission from the road authority (KeNHA, KeRRA). Inform in advance the local community regarding road use restrictions. 	KETRACO Construction contractor	<ul style="list-style-type: none"> Supervising consultant KETRACO KeHNA, KeRRA 	Included in construction base cost
	Temporary restrictions at Kiteje Secondary School	<ul style="list-style-type: none"> Inform in advance the construction schedule and necessary safety restrictions. 	KETRACO Construction contractor	Supervising consultant KETRACO	Included in construction base cost
Children's right	Employment of underage children	<ul style="list-style-type: none"> As per Employment Act 2007, children under 13 years of age will not be employed. As per Employment Act 2007, children between 13 and 16 years of age will not be employed for works that are potentially harmful and prejudice the child's attendance at school. Prohibit employment of children under 18 years of age for potentially harmful works. 	Construction contractor	Supervising consultant KETRACO	-
Infectious diseases	Proliferation of infectious diseases due to influx of construction workers	<ul style="list-style-type: none"> Construction contractor to prepare HIV/AIDS Prevention/Awareness Plan in accordance to Kenyan laws and regulations. The plan shall among others include the following: <ul style="list-style-type: none"> ✓ Planned awareness programs for construction workers ✓ Code of Conduct to be complied by the construction 	Construction contractor	Supervising consultant KETRACO County government	Included in construction base cost

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
		workers ✓ Other measures (e.g. counselling and testing)			
Occupational safety	Risk of occupational accidents (e.g. falling from height, falling into pits, machine operation)	<ul style="list-style-type: none"> • Use of safety harness during working at height. • Install barriers around excavated pits. • Engage only qualified operators. • Use of PPE. • Construction contractor to prepare an Occupational Health and Safety Plan in accordance to Kenyan laws and regulations. The plan shall among others include the following: <ul style="list-style-type: none"> ✓ Risk assessment and planned safety measures ✓ Training plan for construction workers ✓ Organizational structure ✓ Emergency response plan 	Construction contractor	Supervising consultant KETRACO DOSHS	Included in construction base cost
Accidents	Risk of traffic accidents	<ul style="list-style-type: none"> • Strict compliance to speed limits. • Avoid to the extent possible using roads with high risk of accidents. • Vehicle motion alarm to be installed on all construction vehicles • Placement of warning signs and traffic control officers at high risk areas. 	Construction contractor	Supervising consultant KETRACO	Included in construction base cost
Operation phase					
Waste	Generation of operation waste (e.g. leaked transformer oil, domestic waste)	<ul style="list-style-type: none"> • Use transformer oil free of PCBs. • Wastes to be handled and disposed only by NEMA-authorized firms. • Waste disposal containers to be provided onsite for each waste category. • Oil pit to be regularly emptied and kept in containers for disposal by NEMA approved firms. • Preparation of Waste Management Plan (WMP) that identifies the different wastes that will be generated and their proposed disposal procedure. 	KETRACO	NEMA	Included in operation base cost

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
Ecosystem	Bird collision with TL	<ul style="list-style-type: none"> Installation of avian flight diverters (during construction) along the TL passing through forest area. 	Construction contractor (for installation)	KWS	Included in construction base cost
	Electrocution from live TL	<ul style="list-style-type: none"> Installation of guards (during construction) on the TL tower in the forested area to deter climbing animals like baboons. 	Construction contractor (for installation)	KWS	Included in construction base cost
Occupational safety	Risk of occupational accidents for maintenance activities	<ul style="list-style-type: none"> Maintenance contractor to prepare an Occupational Health and Safety Plan in accordance to Kenyan laws. 	Maintenance contractor	KETRACO	Included in operation base cost
Decommission Phase					
Decommissioning activities	Risk of causing disturbance to project area community during decommissioning activities	<ul style="list-style-type: none"> Preparation of a Decommissioning Plan 3 months in advance. Informing NEMA and County Government about the intended decommissioning Informing project area community regarding the intended decommissioning activities and sharing the activities plan Engaging NEMA and County Government Approved Decommissioning and Waste Disposal Firm 	<ul style="list-style-type: none"> KETRACO Decommissioning contractor 	Supervising consultant	To be estimated in D/D stage
Noise	Noise from decommissioning vehicles and activities	<ul style="list-style-type: none"> Equipping vehicles and machinery with exhaust mufflers and carry out proper maintenance. Instructing truck and machinery operators to avoid raving of engines. Avoiding as much as possible use of roads that pass through sensitive areas. Avoiding as much as possible the conducting of noisy works during nighttime. 	<ul style="list-style-type: none"> KETRACO Decommissioning contractor 	Supervising consultant	To be estimated in D/D stage

Item	Potential impact	Mitigation measures	Implementation responsibility	Supervision responsibility	Approx. cost (KSh)
Waste	Generation of decommissioning waste	<ul style="list-style-type: none"> Wastes to be stored in designated areas and with containers specialized for each waste type. Wastes to be collected and disposed only by NEMA-authorized firms. Decommissioning contractor to prepare a Waste Management Plan (WMP) that identifies the different wastes that will be generated and their proposed storage and disposal procedure. 	<ul style="list-style-type: none"> KETRACO Decommissioning contractor 	Supervising consultant	To be estimated in D/D stage
Soil pollution	Accidental spillage of oils and other hazardous chemicals to the ground	<ul style="list-style-type: none"> There should be careful handling of transformers during decommissioning to avoid oil spillage. Regular inspection of vehicles and machines for oil and fuel leaks. Leaking vehicles and machines to be removed until repaired. Spill response kit (e.g. absorbents) to be readily available at the decommissioning site especially where transformers are located. Hazardous substances to be stored only in designated storage facility with impermeable base and away from sensitive areas (e.g. groundwater wells, surface water) and secured from the public. Hazardous materials are only to be handled by trained staff. 	<ul style="list-style-type: none"> KETRACO Decommissioning contractor 	Supervising consultant	To be estimated in D/D stage

8.2 Environmental and Social Monitoring Plan (ESMoP)

Most of the environment where the proposed transmission line is designed to cross is largely virgin and requires that environmental protection is enhanced to ensure that there are no adverse effects occurring from its construction and operation phases. Environmental monitoring is an integral part of the environmental management process. It rationally completes the process that begins with, establishing the environmental baseline condition followed by Carrying out the Environmental and Social Impact Assessment then Implementation of mitigation measures and Monitoring the success of those measures.

Environmental and Social monitoring is envisioned as an important process in project management. The monitoring programme will reveal changes and trends brought about by the presence and operations of the project. Such information will be useful in the formulation of sustainable project management and operation strategies. The basic activities for a sound-monitoring programme for the transmission line once it starts operating should at least include the following parameters:

- Collection and analysis of relevant environmental and social data of the site including:
 - Evaluation of the type and quantity of solid waste generated at the construction site
 - Inspection of the materials being used
 - Evaluation of the construction practices
 - Monitoring of the ROW maintenance activities to ensure proper vegetation control methods, prevent invasion by exotic species and support decisions which take advantage of possible benefits to wildlife
 - Evaluation of noise and other effects emanating from the construction sites to wild animal behaviour within vicinity of the route
 - The amount of water consumed during the construction of the tower pads and other structures and how the runoff water is directed
 - Seasonal variation of the presence of disease vectors (mosquitoes)
 - Effects of Vehicle and Human Traffic to wildlife
 - Quality of life of the resettled persons
 - Change in health trends of persons in the project area
- Identification of unexpected environmental impacts
- Formulation of counter-measures to mitigate against the unexpected negative impacts and comparing them with actual impacts as identified during the audit

8.2.1 Monitoring plan

The ESIA study has revealed that the proposed 220kV Transmission Line from Mariakani – Dongo Kundu and the substation at Dongo Kundu will generate project impacts that require mitigation during construction period. These impacts will also require close monitoring during construction and post construction period.

Monitoring will involve measurements, observations, evaluations, assessment and reporting on various variables during construction and operation. It shall therefore be important that KETRACO to institute monitoring of the success of the mitigation measures and also the level of as this will assist in improving operations of the Transmission Line and environmental protection.

Arising from the study, the aspects to be monitored are given in **Table 39**.

Table 39: Environmental and Social Monitoring Plan (ESMoP)

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost (KHz)
Preconstruction phase					
Ecosystem	To check the progress and effectiveness of tree afforestation program	Confirm the growth status (e.g. height, survival, health) of planted trees.	• 2/year until 5 years after plantation	KFS KETRACO	To be estimated in D/D stage
Involuntary resettlement	To check the progress and effectiveness of RAP implementation	[Internal monitoring] <ul style="list-style-type: none"> Assess whether compensation and other entitlements are being delivered in line with the RAP. Assess whether agreed measures to restore or enhance livelihood and sources of income are being implemented. Identifying any conflicts or problems, issues, or cases of hardship resulting from the resettlement process. 	<ul style="list-style-type: none"> 1/month during RAP implementation Quarterly after RAP implementation for 1 year 	KETRACO PAP Committee	Approx. 2,300,000
		[External monitoring] <ul style="list-style-type: none"> Assessment of compliance with RAP actions Assessment of pre- and post-resettlement socio-economic situation of the affected households Reviewing records of grievances and following up whether or not appropriate corrective actions have been undertaken and outcomes are satisfactory. 	<ul style="list-style-type: none"> Every 6 months during RAP implementation Once a year after resettlement for 2 years 	Independent agency	Approx. 4,300,000
Vulnerable social groups	To check the effectiveness of assistance measures for vulnerable PAPs	Implement as part of RAP monitoring.	<ul style="list-style-type: none"> 1/month during RAP implementation Quarterly after RAP implementation for 1 year 	KETRACO PAP Committee	Included in RAP monitoring budget
Livelihood, living environment	To check the effectiveness of livelihood recovery measures	Implement as part of RAP monitoring.	<ul style="list-style-type: none"> 1/month during RAP implementation Quarterly after RAP implementation for 1 year 	KETRACO PAP Committee	Included in RAP monitoring budget

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost (KSh)
Land use	To check the effectiveness of livelihood recovery measures	Implement as part of RAP monitoring.	<ul style="list-style-type: none"> 1/month during RAP implementation Quarterly after RAP implementation for 1 year 	KETRACO PAP Committee	Included in RAP monitoring budget
Social infrastructure and services	To check the land acquirement and usage status of Kiteje Secondary School	Implement as part of RAP monitoring.	<ul style="list-style-type: none"> 1/month during RAP implementation Quarterly after RAP implementation for 1 year 	KETRACO PAP Committee	Included in RAP monitoring budget
Cultural heritage	To check the usage status of the transferred tree shrine	Confirm usage status of the transferred tree shrine through interviews and field reconnaissance.	<ul style="list-style-type: none"> Once a year after transfer for 3 years 	KETRACO	Approx. 300,000
Gender	To check the effectiveness of assistance measures for women HH	Implement as part of RAP monitoring.	<ul style="list-style-type: none"> 1/month during RAP implementation Quarterly after RAP implementation for 1 year 	KETRACO PAP Committee	Included in RAP monitoring budget
Construction phase					
Air pollution	To check whether excessive dust and exhaust gas are not emitted from the construction sites	Visual inspection of: <ul style="list-style-type: none"> Fugitive dust emissions from construction sites Exhaust gas emissions from construction vehicles and machines 	Daily	Construction contractor	Part of construction base cost
		Field measurement of air quality (PM ₁₀) at sensitive receptors near the substation/access road sites (3 sites). Results to be compared with national ambient air quality standard.	Once before construction 1/week during heavy construction works	Construction contractor	Approx. 3,000,000
Water pollution	To check whether rainwater runoff from construction sites are not causing water	<ul style="list-style-type: none"> Visual inspection of rainwater runoff flow pattern (e.g. check whether there is any inflow of sediment-laden runoff from construction site). In case there is significant inflow of sediment-laden 	Before and after mitigation	Construction contractor	Approx. 500,000

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost (KHs)
	pollution	rainwater runoff, measure water quality (turbidity and TPH) of the receiving water body before and after mitigation.			
	To check the water quality of treated concrete wash water	Measurement of pH of treated concrete wash water. Results to be compared with national effluent standard.	Prior to discharge.	Construction contractor	Approx. 500,000
Soil pollution	To check of any oil leaks from construction vehicles/machines and fuel tank.	Visual inspection of oil leaks from construction vehicle/machines and fuel tanks.	Daily	Construction contractor	Part of construction base cost
	To check the soil quality of top soil at substation/access road	<ul style="list-style-type: none"> • Sampling and analysis at 3 sites • Parameter: PAHs and heavy metals (As, Cd, Cr+6, Hg, Pb, Ni, Zn) • Results to be compared with Dutch Soil Remediation Circular 2013 	Once before construction	Construction contractor	Approx. 500,000
Noise	To check whether excessive noise is not emitted from the construction sites	<ul style="list-style-type: none"> • Field measurement of noise level (LAeq) at construction site boundary. Results to be compared with national construction site noise standard. • Field measurement of noise level (LAeq) at sensitive receptors (e.g. homestead, school, hospital). Results to be compared with national ambient noise standard. 	Once before construction 1/week during heavy construction works	Construction contractor	Approx. 00,000
Vibration	To check whether excessive vibration is not emitted from the construction sites	<ul style="list-style-type: none"> • Field measurement of vibration level at construction site boundary. Results to be compared with national construction site vibration standard. 	Once before construction 1/week during heavy construction works	Construction contractor	Part of construction base cost
Waste	To check whether wastes are stored and handled in accordance to the contractor's CWMP	<ul style="list-style-type: none"> • Visual inspection of waste storage sites and construction sites. • Confirm records of waste treatment/disposal 	Daily 4/year	Construction contractor Construction supervisor	Part of construction/supervision base cost
Conservation area	To check whether there are any impacts on Kaya Gandini	Hold meetings with Kaya Elders and check of any adverse impacts.	1/month	Construction contractor KETRACO	Part of construction base cost

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost (KSh)
Ecosystem	To check impacts on forest flora/fauna	<ul style="list-style-type: none"> Conduct surprise inspection of construction workers to check of any possession of forest flora/fauna. Visual inspection of any dead wildlife. 	1/week	Construction contractor	Part of construction base cost
Livelihood, living environment	To check impacts on livelihood due to acquisition of land for construction works	Implement as part of RAP monitoring.	1/month	KETRACO PAP Committee	Included in RAP monitoring budget
Land use	To check impacts on land use due to acquisition of land for construction works	Confirm construction land use plan prior to commencement of construction.	Once before construction	KETRACO	Included in RAP monitoring budget
Social infrastructure and services	To check impacts on operation of Kiteje Secondary School	Interview manager of Kiteje Secondary School	Once during stringing works TL	Construction supervisor KETRACO	Part of supervision base cost
Children's right	To check whether there are any child labour	<ul style="list-style-type: none"> Checking of employment registration of the Contractor. Confirmation of accuracy of employment registration with local administration office. 	Monthly	Construction supervisor KETRACO	Part of supervision base cost
Infectious diseases	To check implementation status of HIV/AIDS Prevention/Awareness Plan	Confirmation of implementation records of awareness programs, counselling and so on.	2 times/year	Construction supervisor KETRACO	Part of supervision base cost
Occupational safety	To check whether safety procedures are implemented in accordance to OHSP (All sites)	Visual inspection of work safety procedures and equipment.	Daily	Construction contractor Construction supervisor	Part of construction base cost
Accident	To check status of accidents	Confirm status of accidents through weekly meetings	Weekly	Construction supervisor	Part of supervision base cost

Category	Aim	Method	Frequency	Implementation responsibility	Estimated cost (KSh)
Operation phase					
Waste	To check operation wastes are stored and handled in accordance to the Waste Management Plan	Inspection of oil leakages and waste management practices at the substation.	4 times/year (Quarterly)	KETRACO	Included in KETRACO's operation and maintenance budget
Ecosystem	To check whether any bird collision incidences have occurred along the TL corridor especially along the forest area	Field reconnaissance and community interview along the TL corridor.	2 times/year for 2 years	KETRACO	Included in KETRACO's operation and maintenance budget
	To check whether any animals have been electrocuted along the forest area	Field reconnaissance and community interview along the TL corridor.	2 times/year for 2 years	KETRACO	Included in KETRACO's operation and maintenance budget
Occupational safety	To check whether safety procedures are implemented in accordance to OHSP	Visual inspection of work safety procedures and equipment.	During maintenance work	KETRACO	Included in KETRACO's operation and maintenance budget

8.3 Implementation structure

KETRACO will establish Project Implementation Team (PIT) consisting of two environmental specialists and two social safeguards specialists. They will supervise and coordinate implementation of the ESMaP, conduct additional studies where necessary and addressing any grievances. PIT will also be responsible for taking procedures for obtaining necessary licenses (e.g. ESIA License) and reporting monitoring results to NEMA during construction and operation phases.

During the construction stage, the construction contractor will be mainly responsible for implementing the ESMaP/ESMoP under the supervision of the supervising consultant. The construction contractor shall allocate at least one Health, Safety and Environment (HSE) officer for the substation and one for the transmission line. The HSE officer will be responsible among others for preparing construction specific environmental related plans (e.g. environmental management plan, waste management plan, health and safety plan), obtaining necessary permits, education of workers, supervision, review of monitoring results, reporting and so on. The supervising consultant will also need to allocate Health, Safety and Environment (HSE) officers for the substation and transmission line, who will be responsible for inspection and supervision of the construction contractor's environmental performances, review/feedback of monitoring results and assist KETRACO as necessary. **Figure 26** shows the implementation and reporting/feedback structure of the EMoP for the construction stage.

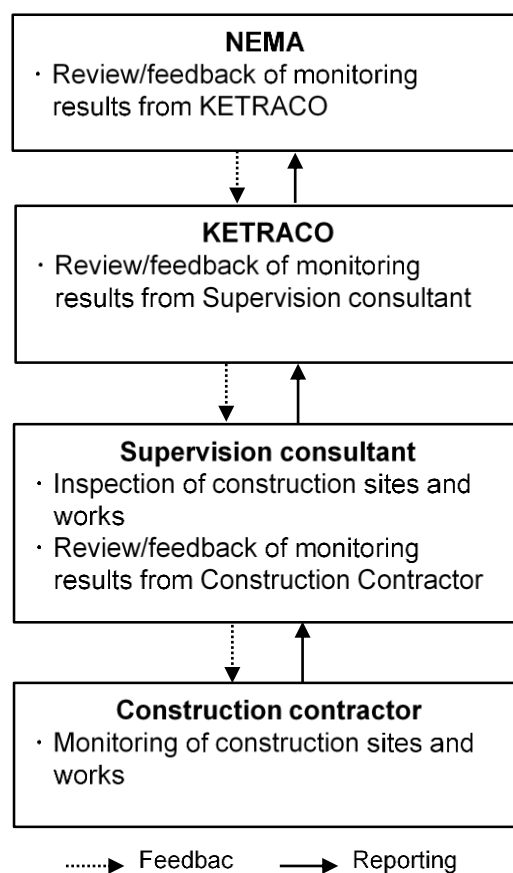


Figure 26: Implementation and reporting/feedback structure of EMoP

During the operation stage, KETRACO will be responsible for implementing ESMaP and ESMoP and reporting to NEMA.

8.4 Project's Decommissioning Phase

In the event of decommissioning & demolition of the transmission line infrastructure, the Proponent shall be required to restore the host environment close to its original state.

The demolition exercise shall involve the following:

- Inform NEMA and the Local Authority through a 3-month notice;
- Provide NEMA and the Local Authority with a detailed Decommissioning Plan;
- Demolish and remove all the concrete works, transmission line and associate structures;
- Demolish and remove the tower structures, electrical fittings and associated cables;
- Demolish and carefully handle components that contain chemicals like the transformers;
- Ensure proper handling of the demolished materials and have an authorized and guided transportation and disposal away from human settlement, water bodies and riparian areas;

KETRACO shall submit a decommissioning plan to NEMA in good time prior to decommissioning. The decommissioning plan shall include a restoration plan.

The host environment shall be rehabilitated and restored to its former state through:

- Approved and appropriate landscaping methodology.
- Planting of indigenous vegetation.

Removal of any soils that may have been impacted by oils or fuels for offsite (away from the project area) remediation.

Impact Significance of Decommissioning Activities is provided in **Table 40**.

Table 40: Impact Significance of Decommissioning Activities

No	Aspect	Environment, Health And Safety Impact	Significance Level
1.	Noise	Reduced hearing due to high noise from decommissioning activities	Low
2	Air Pollutants (Exhaust Emissions)	Respiratory disease caused by CO ₂ , CO, NO _x , and VOCs released by combustion engines and machines during demolition and transportation of recovered materials at the project site	Low
3	Air Pollutants (Fugitive Dust)	Respiratory disease caused by pollutants (cement, dust), caused by demolition of transmission line tower pad and structure	Low
4	Water Pollutants	Public health problems as a result of consuming heavy metal and other chemicals like oils, grease and other petroleum products released to the ground contaminating rivers and drinking water wells.	Low
5	Traffic Accidents	Traffic related mortality and morbidity from transportation activities	Low
6	Physical Hazards	Injuries resulting from demolition activities	Low
7	Ergonomic Hazards	Injuries due to poor ergonomic considerations such as pains caused by prolonged or over-exertion while moving or otherwise handling bulky and heavy loads/equipment; visual discomfort and eye problems caused by inadequate illumination and eyestrain; development of lumbago due to poor vehicle suspension/ uncomfortable seat, etc.	Low
8	Wild animals	Injuries resulting from attacks by wild animals (elephants, baboons, wild pigs) as a result of decommissioning activities within the habitat of such animals	Low

9 CONCLUSIONS AND RECOMMENDATIONS

During the ESIA study phase project components have been evaluated through review of the following aspects: project literature, preliminary field assessment, and collection of baseline information sample collection and lab analysis, identification of project impacts, identification possible mitigation measures and monitoring plan. The information obtained provides adequate information regarding the salient ecological and socio-economic features of the study area and the potential impacts of the proposed transmission line project.

9.1 Conclusions

As per the ESIA Study, the proposed Project is unlikely to generate any irreversible or permanent negative impacts, providing that the proposed mitigation measures and monitoring are implemented appropriately. The Project should be allowed to proceed when the process of compensation and resettlement is successfully concluded as per the RAP.

9.2 Recommendations

The following aspects and commitments are to be considered in the ensuing Project stages:

- The TL tower shall be placed to the extent possible in an area with no land-based activities such farming.
- The TL tower shall be placed to the extent possible far from sensitive environment such as rivers, school and houses.
- To mitigate the impacts of forest clearance, a detailed afforestation program should be developed through consultation with KFS and local community. Candidate afforestation area will be the periphery of the DK6-7 forest area. KETRACO will facilitate the afforestation program and actual planting will be implemented by KFS and local community.
- The TL route along the tree shrine area shall be reconsidered whether it is possible to avoid cutting the tree shrines.
- Measures should be considered so that the affected local communities will gain more benefits through the Project such as providing employment opportunities.
- The proposed Environmental and Social Management Plan (ESMaP) and Environmental and Social Monitoring Plan (ESMoP) should be updated in line with any changes in plan and design of the Project.

10 ESIA STUDY TEAM

No	Name/Position	Task Assignment
1.	Mr. Joshua Patrick Oyieko	Team Leader /Environmental Lead Expert
2.	Irene Muchoki	Socio Economist
3.	Fredrick Maseno	Safety and Occupational Health Professional
4.	Charles Ataya	Ecologist

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12 COLOPHON

JICA/ESIA Study for the Power Supply Component of the Mombasa SEZ Development Project
Pan-17-038

Client	: JICA Design Team (JDT) / KETRACO
Project	: ESIA Study for Power Supply Component of the Mombasa SEZ) Development Project
File	: Water & Environment'
Length of report	: 157 pages
Author	: PANAFCON Ltd.
Project Manager	: Joshua Oyieko
Project Director	: OKELLO, Richard O.
Date	: January 2019
Name/Initials	: oro/im/jp

ANNEXES

Annex 1: NEMA EIA License for Panafcon and Lead Expert



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/7210

Application Reference No: NEMA/EIA/EL/9941

M/S Panafcon Ltd

(individual or firm) of address

P.O. Box 53147-00200, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **0184**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **2/13/2018**

Expiry Date: **12/31/2018**

Signature.....

(Seal)

Director General
The National Environment Management
Authority

P.T.O.



ISO 9001: 2008 Certified

FORM 7

(r.15(2))



**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/6998

Application Reference No: NEMA/EIA/EL/9937

M/S **Joshua P. Oyieko**

(individual or firm) of address

P.O Box 53147-00200, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **091**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **2/6/2018**

Expiry Date: **12/31/2018**

Signature.....

(Seal)

Director General

**The National Environment Management
Authority**

P.T.O.



ISO 9001: 2008 Certified



P.O. Box 5087 - 00506 Nairobi Kenya Tel: 0774 239 594
Email: eikenya2013@gmail.com Web: www.eik.co.ke

No. **9690**

Date: 09/01/19

Received from..... Palmagcon Ltd

The sum of Shillings Five Thousand Only

Being payment of EIK Subscription - Firm - 184

Kshs. 5000/- Received by Selina

Cash/Cheque No.



P.O. Box 5087 - 00506 Nairobi Kenya Tel: 0774 239 594
Email: eikenya2013@gmail.com Web: www.eik.co.ke

No. **9689**

Date: 09/01/19

Received from..... Joshua P. Oyieko

The sum of Shillings Two Thousand Only

Being payment of EIK Subscription - Ind - 009

Kshs. 2000/- Received by Selina

Cash/Cheque No.



Annex 2: NEMA Approved ToR

ESIA Study ToR

**ESIA Study for the Proposed
Mariakani-Dongo Kundu 220kV
Transmission Line and Sub-
Station at Dongo Kundu**

Terms of Reference (ToR) for the ESIA Study



ESIA Project Report RE: NEMA/PR/5/2/18,828

Kenya Electricity Transmission Company (KETRACO),
Kawi Complex, Block B, Popo Lane, Off Red Cross Road,
South C,
P. O. Box 34942 – 00100, NAIROBI, KENYA.
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Final February 2018

ORIGINAL



ESIA Study ToR

ESIA Study for the Proposed Mariakani-Dongo Kundu 220kV Transmission Line and Sub- Station at Dongo Kundu

Terms of Reference (ToR) for the ESIA Study

Kenya Electricity Transmission Company
(KETRACO)

file Environment

registration number Pan-17-038

version 1

Final February 2018

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1 INTRODUCTION

Proposed Terms of Reference (ToR) for the Environmental and Social Impact Assessment (ESIA) Study of the Proposed Mariakani-Dongo Kundu 220kV Transmission Line and Sub-Station at Dongo Kundu

According to the Government of Kenya long-term development plan “Vision 2030”, Kenya aims to be a middle-income country by 2030 and the development of the Mombasa Special Economic Zone (hereinafter referred to as “Mombasa SEZ”) is mentioned as a priority project to achieve this goal. The Mombasa SEZ will be developed in the Dongo Kundu area of Mombasa County (part of the SEZ is also inside Kwale County), which will cover an area of approximately 1,200 ha. The Mombasa SEZ is planned to consist from free trade zone, industrial park, residential zone, tourism zone among others and are planned to be developed through three phases.

There are no 132 kV or 220 kV lines in the SEZ area. The existing 11 kV distribution lines are used for local consumer only and not for industrial load. Since the load of the SEZ will be increased considerably, the existing 11 kV distribution lines will not be able to meet the load demands. The transformer capacity of existing substations will also become insufficient.

New power supply facilities will need to be developed to serve the Mombasa SEZ hence the proposed construction of the Mariakani-Dongo Kund 220kV Transmission Line that will tap power from the Nairobi-Mombasa 400kV line at Mariakani.

1.1 Project Components

The proposed power supply facilities for the Mombasa SEZ will be developed by Kenya Electricity Transmission Company Limited (KETRACO). They will consist of the following components:

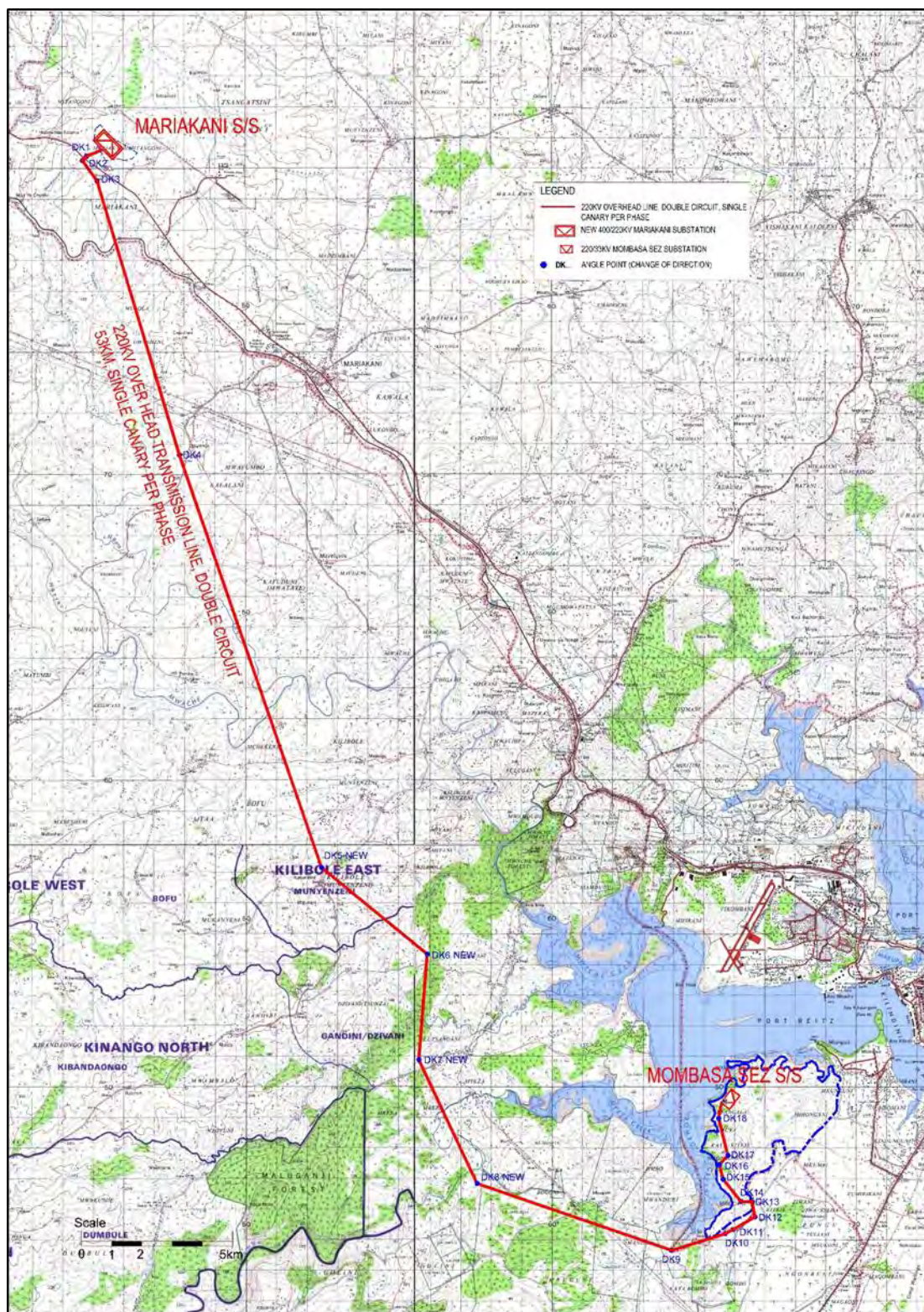
- Development of 220 kV Transmission Line (TL) from Mariakani 400/220 kV substation to Mombasa SEZ (note that Mariakani 400/220 kV substation is not included in the Project scope and will be constructed through another project)
- Development of 220/33 kV substation inside Mombasa SEZ
- Development of 33 kV distribution line inside Mombasa SEZ from 220/33 kV substation

1.2 Location of the Proposed Mariakani-Dongo Kundu 220kV Transmission Line

The 220 kV transmission line from Mariakani 400/220 kV substation to Mombasa SEZ 220/33 kV substation is approximately 53 km in distance, which will traverse through three counties namely Kilifi, Kwale and Mombasa. A 40 m wayleave will be secured along the transmission line route (20m on either side from the center of 220kV transmission line).

The Mombasa SEZ 220/33 kV substation will be located in Likoni Sub-County, Mombasa County over a hilly terrain adjacent to the new Southern Bypass Road. **Map 1** shows the route of the 220 kV transmission line. **Map 2** shows the location of the Mombasa SEZ 220/33 kV substation.

The 33 kV distribution line will run from Mombasa SEZ 220/33 kV substation to the new port to be developed inside the Mombasa SEZ. The distance is approximately 6.5 km. The distribution line will be installed along the right-of-way of the new Southern Bypass Road and new port access road.



Map 1: Location of the Proposed Mariakani-Dongo Kundu 220kV TL



Map 2: Location of the Mombasa SEZ 220/33 kV Substation

1.3 Scope of the Proposed Project Activities

The proposed 220kV Transmission Line and Sub-Station will consist of overhead double-circuit transmission line supported by a steel-lattice type transmission towers. The 220/33 kV substation will mainly consist of transformers (75 MVA x 2 units), switchgear (220 kV), control building and access road. The area of the substation will be approximately 18,800 m², which includes some vacant space for future expansion.

1.3.1 Transmission line and tower

Construction of transmission lines will typically involve the following works:

- a) Clearance of vegetation along the transmission line corridor and within the footprint of the transmission tower base. Low-lying vegetation along the transmission line corridor will be maintained.
- b) Construction of concrete foundation of the transmission tower. This will include excavation of tower base, concrete placement and backfilling. The concrete mix will be prepared at the site.
- c) Erection of transmission tower (assembling of prefabricated components of the lattice structure)
- d) Stringing of transmission cable. Transmission cable will be installed by installing a winch at one end of the line section, and a tensioner and cable drum at the other end.

1.3.2 Substation

Construction of substation will typically involve the following construction works:

- a) Clearance of vegetation within the substation site
- b) Grading works (cutting and filling) to level the site
- c) Construction of concrete foundation
- d) Construction of control house and installation of equipment and steel structures

1.3.3 Workers and Construction Facilities

(1) Construction Workers

Around 20 workers (e.g. mason, supervisor, unskilled laborer) are expected daily to be working at the substation construction sites. Around the same number of workers will also be working at the transmission line sites. Most workers will be procured locally, although skilled foreigners may be hired for highly technical works. The entire recruitment process for the workers will be managed by the contractors in accordance with Kenya labor laws.

Normal working hours are planned to be from around 08:00-17:00 from Monday to Saturday. Works outside of normal working hours will require permission from KETRACO and relevant local authorities.

(2) Construction Machines

Table 1 shows the main construction machines that will be required for construction of the transmission line and substation.

Table 1: Main Machines for Construction of TL and Substation

Type	Quantity	Type	Quantity
Truck (3 ton)	1	Excavator	6
Truck with crane (2 ton)	2	4-wheel tractor	1
Mobile crane (20 ton):	1	Light truck	4
Power shovel	1	Dump truck (10 ton)	10
Hydraulic rotary drilling rig	1	Water tank truck	1
Pile driving equipment	1	Concrete mixing machine	10
Back hoe	1	Diesel engine generator	8
Stringing winch	1	Welding machine	4
Stringing tension	1	Cutting machine	6

(3) Construction Materials

Construction works will require raw materials such as cement, aggregates, gravel, wood, bricks and reinforcing steel bar. Most will be procured from Kenya from licensed suppliers, and there will be no need for the Project to develop any new quarries.

(4) Temporary Construction Facilities

Temporary construction facilities such as stockyard are planned to be established within the site boundary of the substations and corridor of the transmission lines. Other temporary construction facilities may include concrete batching plant, access road and workers camp. The requirement and locations of these facilities will be considered in more detail in the detailed design stage.

(5) Construction schedule

Construction works is expected to take around 2 years.

1.4 Project ESIA Study Components

1.4.1 Further Review of Project Background

- Purpose/Objective of the Project
- Project Route Selection
- Project Execution

1.4.2 ESIA Study of the Proposed Transmission Line and Sub-Station

- Further Field Data Collection;
- Consultation and Interviews with Key Stakeholders and Project Area Community;
- Administration of Questionnaires and Collection of Project Area Baseline Environmental and Socio-Economic Data;
- Detailed Assessment of the Project Area Environment especially the Marine Environment, focussing on Identification of Existing Marine Life, the Potential Impacts that the Project may generate during Construction, Operation and Decommissioning Activities.
- Convening of Public Consultation Meeting within the Project Area during the ESIA Study;
- Review of any other relevant project in progress that has environmental effect on the current project;
- Review of Project Alternatives that may be adopted to eliminate or reduce impacts;
- Identification of Project Impacts, Cost Effective and Appropriate Mitigation Measures;
- Preparation of Project Environmental and Social Management Plan (ESMaP);
- Preparation of Project Environmental and Social Monitoring Plan (ESMoP);
- Preparation of ESIA Study Report.

1.5 Resettlement Action Plan (RAP) Study

A Resettlement Action Plan (RA) Study was commissioned in July 2017 and is currently at an advanced stage. 90% of the study is complete. The RAP study is being carried out to identify persons and property affected by the project for Compensation of affected land and property and resettlement of those found within the 40m wide transmission line corridor and the sub-station site.

The RAP Study is intended to achieve the following:

- Identify the land parcels affected by the 40m wide Transmission Line corridor from Mariakani-Dongo Kundu and Substation in Dongo Kundu
- Identify the households affected by the project
- Identify the structures, trees and crops affected by the project
- Carry out valuation of land for easement and acquisition compensation
- Carry out valuation of structures, trees and crops for compensation

The RAP Study is being carried out through the following steps:

- Convening of Public Sensitisation Meeting with project area community to inform them about the project and its potential impacts.
- Carrying out detailed Census Survey to identify:
 - The affected households,
 - The affected parcels of land,
 - The structures
 - The affected trees and Crops
- Valuation of affected land and property
- Convening of a Project Affected Persons (PAPs) Meeting to disclose project impacts to the PAPs
- Preparation of a RAP Report that contains compensation amounts for each PAP

2 TASKS TO BE ACCOMPLISHED DURING ESIA STUDY

2.1 Task 1: Provide Description of Proposed Project and Associated Activities

This task will endeavour to provide a full description of the project and its existing setting, using maps at appropriate scales including the following information:

- Location of the 220kV Transmission Line and Sub-Station;
- Elaborate on the Project Components and their location of installation;
- Elaborate on the salient features of the project.

2.2 Task 2: Description and Baseline Measurements and Lab Analysis of Samples

2.2.1 Description of the Baseline Environment

Under this task, there will be collection and Evaluation of Site Baseline Data including the anticipated changes before project commencement. The study will cover the following:

Physical Environment:

- Project Area Site Topography
- Climate and Meteorology
- Ambient Air and Noise Quality
- Geology
- Soils
- Surface Water Resources closest to site and within the project area (Rivers and Streams etc)
- Groundwater Resources (Boreholes, Wells etc)
- Sources of Existing Air and Noise Emissions
- Existing Infrastructure (Road Network, Railways, Electricity, Water and Sewerage Facilities)
- Any Existing Water Pollution Discharges
- Landscapes (Visual Impacts, Compatibility with surrounding area)

Biological Environment:

- Flora (Existing vegetation that shall be affected by the project activities)
- Fauna (Any potential wildlife in the project area that shall be affected by the project.
- Bird Species in the project area and impact of the project on their livelihoods;
- Any rare or endangered species in the project area;
- Sensitive Habitats (Wetlands etc)
- Any significant Natural Sites
- Species of Commercial Importance
- Species that become a nuisance, vectors or dangerous.

Socio-Economic and Cultural Environment:

- Projected Expansion and Population Growth of the project area;
- Socio-economic activities of the project area;
- Current Land Use and Planned Infrastructure Development ;
- Employment Opportunities and Influence of the project;
- Historical, Cultural or Sensitive Sites within the project area including Kayas and Shrines

2.2.2 Baseline Environment Measurements and Sample Analysis

Under this task, there will be Evaluation of Baseline Environment including Collection and Lab Analysis of samples to establish the current status of the project site. The study will cover the following:

a) Insitu Measurements

Potable Conductivity and pH Meters will be used to collect insitu measurements of the waters in the project area. The parameters that will be measured include:

- Electrical Conductivity (EC) in μ siemens or millisiemens/per cm of the water
- pH of the water
- Temperature

b) Sampling and Lab Analysis of Water

Both surface and shallow groundwater samples will be collected at various places of the project site at the following locations:

- Sub-station site
- Near settlements;
- Near School or other Public Institutions;

The water samples will undergo analysis of Total Petroleum Hydrocarbons (TPH), and Polycyclic Aromatic Hydrocarbons (PAHs).

c) Sampling and Lab Analysis of Soil

Soil samples will be collected at various locations of the project area at the following locations:

- At the sub-station site
- At the proposed location of the pylon base
- At the proposed contractor camp site

The soil samples will undergo analysis of Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAHs)

d) Noise Level Measurements

The noise levels will be measured in the project area to establish the baseline noise levels. Baseline noise level measurements will be carried out at the following locations:

- At the sub-station site
- Near Settlements
- Near School or any other Public Institution located close to the Transmission Line Route or Sub-station site.

e) Air Quality Measurements

Air quality of the project area will be evaluated by carrying out baseline air measurements where the following parameters will be analysed:

Particulate Matter (PM), oxides of Sulphur (SO_x), oxides of Nitrogen (NO_x) and Hydrocarbons (HC).. Air quality measurements will be carried at the following locations:

- At the sub-station site
- Near Settlements
- Near School or any other Public Institution located close to the Transmission Line Route or Sub-station site.

Table 2: Samples for Lab Analysis

Nr	Medium	Source	Location and No of Samples	Analysis/ Measurements	Total No of Samples
1	Water	Streams/Rivers	a) Near Sub-Station -1	TPH and PAH	5
			b) Near Settlements - 2		
			c) Near School - 1		
		Shallow Groundwater/Wells	d) Near Settlement - 1		
2	Soil	Contractor's Camp, Pylon Base and Substation	a) At Sub-Station Site - 2	TPH and PAH	5
			b) Along TL Corridor at Pylon base located near wet land/River – 2r		
			c) Contractor Camp Site - 1		
3	Noise	Selected Project Area Sites	a) At Sub-Station Site - 1	Baseline Noise Level Measurements	5
			b) Near School - 1		
			c) Near Settlements - 3		
4	Air	Selected Project Area Sites	a) At Sub-Station Site - 1	Particulate Matter (PM ₁₀), Oxides of Sulphur (SO _x) Oxides of Nitrogen (NO _x)	5
			b) Near School - 1		
			c) Near Settlements - 3		

2.3 Task 3: Legislative and Regulatory Framework

There are project site activities that will trigger Legislative Requirements:

- Project corridor clearing of vegetation
- Project Site Construction and Operation Activities;
- Health and Safety of Project Development Persons (workers) and project area operators during the project cycle (During Construction and Operation Phases);
- Presence of sensitive features like Wetlands, Shallow Groundwater and Natural Vegetation;
- Presence of gazetted cultural sites like Kayas and Shrines.
- Current Land Use and Future Land Use Planning and Control;
- Rights of Local People, any relevant Authorities at Local and Regional level and project area business operators.

Particular attention shall be paid to the following legislation:

- Constitution of Kenya 2010;
- Environmental Management and Coordination Act (EMCA) 1999 and Subsequent NEMA Regulations
 - The Environmental (Impact Assessment And Audit) Regulations, 2003;
 - Environmental Management and Coordination (Water Quality) Regulations, 2006;
 - Environmental Management and Coordination (Waste Management) Regulations, 2006;
 - Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009;
 - Environmental Management and Coordination, (Conservation of Biological Diversity and Resources, Access to Genetic Resources, Benefit Sharing (BD) Regulations, 2006;
 - Environmental Management and Coordination Draft Air Quality Regulations, 2008;
 - Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009;

Other Kenyan Legislation

- Other Acts that will be reviewed in relation to the proposed project include;
 - The Land Act, 2012 – Land Acquisition and Public Rights of Way
 - Forests Act, 2005
 - Energy Act, 2006
 - Electrical Power Act 1997
 - The Land Registration Act, 2012 (No. 3 of 2012)
 - Land Adjudication Act, Cap. 284
 - Public Roads and Roads of Access Act (Cap. 399)
 - The Standards Act Cap 496
 - The Wildlife Conservation and Management Act, 2013
 - The Occupational Safety and Health Act, 2007
 - The Public Health Act, Cap 242
 - The Water Act, 2002
 - Physical Planning Act Cap 286
 - Employment Act No 11 of 2007
 - Labour Institutions Act No. 12 of 2007
 - Building Code 1997
 - Use of Poisonous Substances Act Cap 247
 - Traffic Act Cap 403
 - The National Museums and Heritage Act, Cap6;

World Bank Guidelines (Safeguard Policies) especially

- OP 4.01 Environmental Assessment and
- OP 4.12 Involuntary Resettlement
- OP 4.36 Forests
- OP 4.04 Natural Habitats
- OP 4.11 Physical Cultural Resources

JICA Guideline for Environmental and Social Consideration

2.4 Task 4: Potential Impacts of Proposed Project

The Study shall evaluate the following potential Environmental and Social Impacts:

Impacts on Natural Environment

- Impacts on Flora & Fauna;
 - Potential impacts of project on natural vegetation including mature trees and forest cover;
 - Potential impacts of project on habitats for migratory birds
 - Potential impact of project on dispersal area for wildlife from Mwaluganje Forest
 - Potential impact of project on birds within the project area;
- Landscape Visual Impacts (alteration of land use)
- Potential interference with cultural sites like Kayas and Shrines
- Potential impacts on Water Resources;
- Generation of Solid and Liquid Waste Impacts;
- Impacts of Site Decommissioning Activities and Residues.

Impacts on Social Environment

- Potential displacement of persons within the project corridor
- Potential loss of shelter (Involuntary resettlement)
- Potential loss of livelihood
- Potential pollution of air affecting settlements

- Potential generation of excess noise affecting settlements
- Potential pollution of water sources
- Potential generation of electromagnetic fields that could cause health risks after long time exposures
- Potential impact on vulnerable groups/persons
- Potential Impact on Social Infrastructure like schools, hospitals etc.
- Potential disruption of social institutions due to influx of workers into the project area
- Potential triggering of Gender issues
- Potential increase in spread of communicable diseases like HIV etc
- There is some degree of occupational risks associated with working at heights during construction and operation
- There is potential risk of accidents occurring during construction and from machinery/vehicles.

The study shall distinguish between the following impacts:

- Significant Positive and Negative Impacts;
- Direct and Indirect Impacts;
- Short Term, Medium Term and Long Term Impacts;
- Cumulative Impacts.

The evaluation of the above impacts shall look into:

- Safety and Security of project personnel and project area operators (Construction & Operation Phases);
- Effect of Project on bird and wildlife
- Effect of Project on Soil and Land;
- Effect of Project on Water Resources (Surface, Groundwater and Wetlands);
- Effect of Project on Vegetation (Trees and Natural Vegetation);
- Effect of Project on Project Area Population, their sensitivity to project activities during construction and operation;
- Effect of Project on Local Population and Commercial Operators(Socio-Economic Impact);
- Effect of Project Solid and Liquid Waste (Sewerage and Oil Wastes from Machinery and Vehicles) generated during construction and operation phases;
- Effect of project on Local Weather Patterns;
- Effect of project and its products on Health and safety of Local Community and Operators;
- Types of potential impacts (Temporary or Permanent, Short Term or Long Term, Cumulative and Residual Impacts);
- Effects of decommissioning activities.

Identification of unavoidable or irreversible impacts and any information gaps shall be done. As much as possible, impacts shall be described quantitatively in terms of environmental costs and benefits and the assignment of economic values where feasible.

2.5 Task 5: Analysis of Alternatives to the Proposed Project

Description of alternatives identified during the course of developing the proposed project shall be elaborated and identification of other alternatives that would achieve the same objective provided.

Project Alternatives evaluation shall cover the following:

- Transmission Line route alternatives;

- Design Technology for Different Components;
- Construction Techniques for Different Components;
- Operation and Maintenance Procedures;
- Evaluation of a “No Project Scenario”.

Alternative to Location of Transmission Line and Sub-station

The Design Consultant has already evaluated some alternative routes to minimise impact on settlements and some cultural sites (Kaya Kiteje). Further alternative on Transmission Line route is going to be done to avoid cultural sites like Shrines and Kayas.

Alternative to Project Designs

Similarly, alternatives to component designs have been considered by Design Consultant. Since there are migratory birds and baboons within the forested section of the transmission line design alternatives will need to be considered to minimise impacts. These will be elaborated in the ESIA Study Report.

Project Alternatives shall be compared in terms of:

- Potential Environmental Impacts
- Capital & Operating Costs
- Suitability under local conditions
- Institutional, Training and Monitoring Requirements.
- The alternative of not implementing the project shall also be reviewed and highlighted in order to demonstrate environmental conditions without the Project.

2.6 Task 6: Mitigation Measures for Potential Impacts (Task 4)

The impacts identified under Task 4 will be provided with appropriate and cost effective Mitigation Measures. The Mitigation Measures will cover all phases of the project namely:

- Pre-construction activities (Design and Site Preparation)
- Construction activities
- Operation activities
- Decommissioning activities

Further elaboration will be done on the mitigation measures already identified and listed in Chapter 7 of the Project Report under **NEMA/PR/5/2/18, 828**.

2.7 Task 7: Development of Environmental and Social Management Plan (ESMaP)

Recommendation of Feasible and Cost-Effective Mitigation Measures to prevent or reduce significant negative impacts to acceptable levels shall be provided.

The study shall estimate the impacts and costs related to the mitigation measures required and the institutional and training requirements to implement them. The Consultant shall prepare a management plan that shall include proposed work programs, budget estimates, schedules, staffing, training requirements and other necessary support services to implement the ESMaP.

The ESMaP shall be elaborated through further elaboration of the ESMaP Matrix Table provided in Table 14 of the Project Report and layout shown in **Table 3**. The components include project activities, impacts, mitigation measures, implementing institutions and the associated cost of implementing the measures.

Table 3: Environmental and Social Management Plan

#	Project Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indicators	Cost (KES)

The ESMap Matrix Table will cover all the 4 Phases of the project namely:

- Pre-Construction
- Construction
- Operation and
- Decommissioning

Activities to be evaluated and ESMap prepared include the following:

- Clearing of Existing Vegetation of project area;
- Soil Erosion associated with Soil Excavation to facilitate construction of the pylon bases and the substation;
- Protection of the cultural sites including Kayas and Shrines;
- Activities related to construction of the pylons, stringing of conductors and construction of the substation
- Solid and Liquid Waste Management during Construction and Operation;
- Pollution of Soil, Sea Water by generated Solid & Liquid Wastes, , Fuels and Oils from machines and equipment;
- Health Issues and Safety of Workers, Community Members and Commercial Operators in the project area. This includes use of machinery and equipment during construction;
- Handling, Storage and Disposal of Used Fuels, Oils, Waste Water and Solid Waste;
- Storage, Transportation and Disposal of Sanitary Waste;
- Excessive Noise and Air Pollution from Construction and Operation Activities;
- Site Cleaning and Restoration after Construction Activities;
- Demolition of site facilities during Decommissioning;
- Site Cleaning and Restoration after Decommissioning Activities;
- Identification and Mitigation of Residual Impacts from Decommissioning Activities.

2.8 Task 8: Institutional Needs to Implement ESMap Recommendations

The Study will review the KETRACO institutional requirements to effectively implement the proposed ESMap. Involvement of other Institutions and Lead Agencies (Water, Energy, Health, Lands, and Environment), Administration at the Local, County and National Levels in the implementation of ESIA recommendations will also be evaluated and recommendations provided. The ESMap findings and recommendations of the ESIA Study will be included in the ESMap Matrix Table.

2.9 Task 9: Development of Environmental and Social Monitoring Plan (ESMoP)

The study shall prepare a detailed Environmental and Social Monitoring Plan (ESMoP) to monitor project impacts and the effectiveness of the proposed mitigation measures in all phases of the project (preconstruction, construction, operation and decommissioning phases). The monitoring Plan shall also include monitoring the success of the mitigation measures and identification of any other or new impacts not anticipated during the ESIA Study but has emerged during project implementation.

In the monitoring plan, the aspect, parameter, frequency, responsible persons/entities and cost needed for implementation will be included. **See Table 4.**

Table 4: Environmental and Social Monitoring Plan

#	Project Activity	Monitoring Aspect	Monitoring Parameter	Frequency	Responsibility	Cost (KES)

2.10 Task 10: Stakeholder Consultation

As much as possible the views of all Key Stakeholders and Project Area Community will be collected through the following forum:

- Oral interviews;
- Administration of Questionnaires;
- Key Informant Interviews with key stakeholders;
- Public Consultation Meetings: A total of 6 Public Sensitization Meetings have been convened in the project area. After completion of the ESIA Study data collection, Public Consultation Meetings (PCMs) will be convened within the project area. The intention of the Public Consultation Meetings will be to;
 - Inform the project area community and key stakeholders on the project findings. The PCM will facilitate providing information on the potential impacts and proposed mitigation measures to eliminate or reduce these impacts;
 - Collect additional 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;
- The venue of the meetings will be identified close to the project area;

The stakeholders to be contacted for their views during consultations and also during the Public Consultation Meeting will include among others the following:

- 1) Project Area Community;
- 2) Business Community in the Project Area;
- 3) Relevant Government Departments (Lands, Forest, Water, Public Health, Physical Planning and Works);
- 5) Local Security Agents (Regular and Administration Police)
- 6) CBOs and NGOs;
- 7) Local Administration (Deputy County Commissioner - DCC, Assistant County Commissioner - ACC, Chief and Assistant Chief);
- 9) Local Authority Department;
- 10) Local NEMA representative;
- 11) Clients' Representative;
- 12) Local Business Community.
- 13) Kenya Civil Aviation Authority (KCAA)
- 14) Oil marketing companies;
- 15) Kenya Petroleum Refineries Ltd (KPRL);
- 16) Kenya Pipeline Company (KPC);
- 17) Kenya Power (KPLC)
- 18) Kenya Maritime Authority;
- 19) Kenya Wildlife Services (KWS);
- 20) Coast Development Authority;
- 21) County Governments of Mombasa, Kilifi and Kwale;

- 22) National Environment Management Agency (NEMA);
- 23) Ministry of Transport and Infrastructure;
- 24) Petroleum Institute of East Africa (PIEA)

3 ESIA STUDY REPORT PREPARATION

The ESIA Study Report shall be concise and limited to significant environmental issues established. The main text shall focus on findings (desk top study, site evaluation and measurements taken). The Report shall contain site baseline data, project impacts, proposed mitigation measures, conclusions and recommendations supported by collected data, field measurements and citations of any references.

3.1 Structure of the ESIA Study Report

This ESIA Study Report will be prepared containing the following chapters:

Executive summary: This chapter will present a summary of the project activities and alternatives, significant findings, potential impacts, mitigation measures and recommended actions.

Chapter 1: Project Introduction and Background: This chapter will provide description of the project scope, background, location, objectives of the ESIA Study,

Chapter 2: Policy, legal and institutional framework: This chapter will outline the overview of the legislative and regulatory framework and how the legislation has been triggered by the project activities.

Chapter 3: Description of Proposed Project Activities: This chapter will outline Project Design and Lay-out, Project Objectives, Scope, Project Justification, Project Planning, Site Alteration during Construction, Project Decommissioning Activities and Cost of Proposed Project.

Chapter 4: Project Baseline Information: This chapter will describe the Project Setting; Project Area Physical Environment including analysis results and the Socio-Economic Baseline.

Chapter 5: ESIA Study Approach and Methodology: This chapter provide details of the Desk Top Study and Reconnaissance, ESIA Study Field Assessment Survey, Public Consultation Meetings and Questionnaire Administration and ESIA Study Report Preparation.

Chapter 6: Public Consultation and Participation: This chapter will elaborate Public/Stakeholder Consultation Methods used including Oral Interviews and Questionnaires Administered. It will also elaborate on the Public Sensitization and Consultation Meetings convened and the outcomes.

Chapter 7: Analysis of Project Alternatives: This chapter will provide the various project alternatives that have been considered to make it cost effective and the contribution of the alternative actions in reducing impacts. The “No Action” Alternative, Alternative to location, Alternative to design and Alternative to Operation Processes will be evaluated.

Chapter 8: Potential Positive and Negative Impacts: This chapter will provide Potential Positive and Negative Impacts of the proposed 220kV Transmission Line from Mariakani-Dongo Kundu..

Chapter 9: Mitigation Measures: This chapter will provide proposed appropriate and cost effective mitigation measures to minimise or eliminate the identified project impacts

Chapter 10: Environmental and Social Management Plan (ESMaP): This chapter will present the Environmental and Social Management Plan, Internal and External Audits. The ESMaP Matrix Table will include project activities, impacts, mitigation measures, implementing institutions and the associated cost of implementing the measures.

Chapter 11: Conclusions and Recommendations: This chapter will provide Conclusions and Recommendations of the ESIA Study.

Chapter 12: ESIA Study Team Members: This section will provide a table containing ESIA Study Team member names and involvement.

**List of Maps, Tables, Figures & Plates;
Bibliography;**

Annexes

1. Copy of NEMA Ratified ToR
2. Panafcon NEMA EIA Certificates and Licences
3. List of Persons Contacted During the ESIA Study
4. Sample Invitation to Stakeholders to attend Key Stakeholder Meetings
5. Public Sensitization and Consultation Meeting Agenda and Presentations
6. Minutes and Attendance Registers of Public Sensitization and Consultation Meetings
7. Water Analysis Results
8. Soil Analysis Results
9. Noise Measurement Results
10. Air Quality Measurement Results
11. Completed Stakeholder Questionnaire Forms
12. Bill of Quantity for Proposed Project
13. Photographic Plates

4 COLOPHON

Client	: JICA Design Team (JDT)
Proponent	: Kenya Electricity Transmission Company (KETRACO)
Project	: ESIA Study for the Proposed Mariakani-Dongo Kundu 220kV Transmission Line and Sub-Station at Dongo Kundu
File	: Environment
Length of report	: 15 pages
Author	: PANAFCON Ltd.
Managing Director	: OKELLO, Richard O.
Project Manager	: Joshua Oyieko
Date	: February 14, 2018
Name/Initials	: Im/jp

ANNEXES

Annex 1: Tasks of Study Team Members

Tasks of ESIA Study Team Members

No	Name/Position	Position	Task Assignment
1.	Mr. Joshua Patrick Oyieko	Team Leader /Environmental Lead Expert	<ul style="list-style-type: none"> • Team Leader • Coordination of ESIA Study Activities • Review of Environmental Policy & Past Project Reports • Project Baseline Studies • Identification of Project Environmental Impacts • Evaluation of Project Alternatives • Project Mitigation Measures • Participation in Public Sensitisation Meeting • Public Consultations and Public Consultation Meeting (PCM) • Environmental and Social Management Plan (ESMaP) • Environmental and Social Management Plan (ESMoP) • Reports Preparation (Inception, Project Report, Draft ESIA and Final ESIA Study Reports)
2.	Irene Muchoki	Socio-economist	<ul style="list-style-type: none"> • Deputy Team Leader • Socio-economic Baseline Information • Social Impact of Project on the Local Population • Evaluation of Project Area Land use • Assessment of important Cultural and Archaeological Sites • Participation in Consultations and Public Consultation Meetings • Identification of Project Alternatives • Identification of Mitigation Measures • Reports Preparation (Inception, Interim (Scoping) Report, Draft ESIA and Final ESIA Reports)
3.	Charles Ataya	Ecologist	<ul style="list-style-type: none"> • Evaluation and Identification of Terrestrial flora and fauna Species • Identification and listing of classified flora and fauna as protected/threatened species • Description of location of the protected/threatened species and provision of photographic evidence • Evaluation of Positive & Negative impacts on terrestrial environment • Evaluation of Project Alternatives & Mitigation Measures • Participation in Public Consultation Meetings • Development of Environmental Management & Monitoring Pla • Preparation of ESIA Reports

No	Name/Position	Position	Task Assignment
4.	Fredrick Maseno	Safety and Occupational Health Professional	<ul style="list-style-type: none"> • Occupational Health and Safety of Construction and Operation • Emergency Preparedness Plan • Potential Public Health Risks and Risk Reduction • Project Baseline Studies • Public Consultations and Public Consultation Meetings (PCM) • Project Mitigation Measures • Environmental and Social Management Plan (ESMaP) • Environmental and Social Management Plan (ESMoP) • ESIA Report Preparation

Annex 2: CVs of Key Study Team Members

1. Joshua P. Oyieko – Team Leader - ESIA Specialist

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Proposed Position	Team Leader/ Environmental Lead Expert	
Name of Firm:	Panafcon Ltd	
Name of Staff:	Joshua Patrick Oyieko	
Profession:	Geologist/Resettlement and Environmental Specialist	
Date of Birth:	28 November 1959	
Years with Firm:	17	Nationality: Kenyan

MEMBERSHIP OF PROFESSIONAL SOCIETIES:

- Member, **Geological Society of Kenya**;
- Member, Registered Geologist – **Geologists Registration Board, Kenya – Reg. No. 60**;
- Licensed **Water Resources Engineer (Hydrogeologist) – License No WD/DB 30/366**
- Registered with **NEMA Kenya** as an EIA/Audit Lead Expert with the National Environment Management Authority (NEMA) under the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental Impact Assessment and Audit Regulations 2003 – Registration No. 0091;
- Registered with **NEMA Uganda** in accordance with Sub-regulation (2) of Regulation 22 of The National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003 as an Environmental Impact Assessor/Environmental Auditor – Certificate No. CC/0060/04

KEY QUALIFICATIONS:

Mr. Oyieko is an EIA and RAP Specialist with over 20 years experience in Environmental Impact Assessment and Resettlement Action Plans studies for various projects in Sub-Sahara Africa. He is actively involved in Environmental Impact Assessment, Resettlement Action Plan, Environmental Audit, Environmental Risk Management and Remediation studies for various infrastructure, water projects, Service and production industry.

He has participated in Environmental Impact Assessments and Resettlement Action Plan Studies for Water Supply, Irrigation, Road Projects, Power Transmission Lines, Hydropower Projects, Borehole Projects for Water Supply. The projects are widely distributed in over 31 countries in Africa and beyond. Some of the countries include Kenya, Uganda, Tanzania, Rwanda, Ethiopia, Sudan, Zambia, Zimbabwe, Malawi, Eritrea, Madagascar and Mauritius. He has also carried out projects on Risk Assessment and Remediation of impacted Soil and Groundwater.

Mr. Oyieko also prepared the Environmental and Social Management Framework (ESMF) for the Judiciary to be used to carry out Environmental and Social Impact Assessment for the proposed Court Infrastructure Development (Rehabilitation and Construction of New Court Facilities in Kenya) under the Judicial Performance Improvement Project (JPIP). This falls under the Judicial Transformation Framework (JTF) - Pillar 3.

Mr. Oyieko prepared the Resettlement Policy Framework (RPF) for the Judiciary to be used to carry out Resettlement Action Plans for the affected persons during implementation of the Court Infrastructure Development (Rehabilitation and Construction of New Court Facilities in Kenya) under the Judicial Performance Improvement Project (JPIP). This falls under the Judicial Transformation Framework (JTF) - Pillar 3.

He was Team Leader of the **Environmental and Social Impact Assessment** of the following Projects among others:

- Proposed Relocation of Kipevu Oil Terminal (KOT)
- Lower Nzoia Irrigation Development Project – Phase II.
- Review and Update for the Proposed Rehabilitation of the Lodwar-Lokichogio-Nakodok 240Km (A1) Road
- Proposed Athi river- Mariakani Axle Load Control Station.
- Proposed Isinya – Nairobi East 400kV Transmission Line.
- Proposed Gathigiriri Resettlement Site in Mwea for the Mwea Irrigation Development Project.
- Proposed AHITI Ndomba Resettlement Site in Mwea for the Mwea Irrigation Development Project.
- Proposed Machakos – Konza – Kajiado – Namanga (155Km) 132kV Transmission Line project.
- Proposed Sondu-Homabay-Awendo-Migori-Isebania High Voltage Transmission Line.
- Environmental and Social Management Framework (ESMF) for the Judiciary of Kenya

Mr. Oyieko is a Hydrogeologist with long-standing hydrogeological experience in providing groundwater assessment and conducting hydrological investigations. He holds a Masters degree in Water Resources Survey in addition attended several relevant short courses in hydrogeological assessment including Surface and Groundwater Resources Computer Modelling and is experienced in supervising the installation of wells and providing field and office hydrogeological report preparation. He is Licensed to operate as a qualified Water Resources Engineer (Hydrogeologist) under the provisions of the Water Act (License No WD/DP 30/366) by the Water Apportionment Board of the Ministry of Water Resources Management and Development.

Mr. Oyieko is registered as an EIA/EA Lead Expert with the National Environment Management Authority (NEMA) under the Environmental Management and Coordination Act (EMCA 1999) and the Environmental Impact Assessment and Audit Regulations 2003. He is also registered as an Environmental Practitioner with NEMA Uganda to conduct Environmental Impact Assessment and Audits as an EIA Team Leader.

EDUCATION:

- 1994-96** Masters Degree (MSc) in Water Resources Survey - International Institute for Aerospace Surveys and Earth Sciences, ITC, The Netherlands, covering the following:
- Geographical Information Systems (**GIS**) including **Remote Sensing**.
 - Geophysical Exploration Methods for Applied Geology.
 - Groundwater Computer Modelling
 - Evaluation of Data and Methods (Borehole Investigation, Surface Hydrology, Irrigation).
- 1981-85** Bachelors Degree (BSc) in Geology - University of Nairobi.

PROFESSIONAL TRAINING COURSES:

- 2002** Attended an Environmental Course on Underground Tank and Product Line Integrity Testing System for the Petroleum Industry, at the **Estabrook Institute, Essexville Michigan, USA** (Systems and Training for the Petroleum Industry).
- 2004** Attended a course on “**Sustainable Environmental Management**” at the Kenya Institute of Administration, Nairobi Kenya. The course covered among others:
- The EIA Process
 - Integrated Environmental Management and the Principle of Sustainable Development
 - Community Capacity Building for Environmental Management
 - Social Impact Assessment
 - Environmental Risk Assessment
 - EIA Results and Decision Making
 - Environmental Auditing and Monitoring
 - Policy, Legal and Institutional Frameworks for EIA
 - Conflict Resolution and Management in the EIA Process
 - Stakeholder Participation in Environmental Management
- 2008** **Participated in the World Bank Environment and Social Safeguards Mobile Clinic Workshop in Nakuru Kenya organized and Facilitated by The World Bank & Ministry of Roads** – The workshop evaluated the Environmental and Social Framework Tools for a cross section of Projects where various issues related to environmental and social assessments were deliberated upon and field visits conducted to identify impacts and provide mitigation measures.

Employment Record/Experience:

- 1999 - To-date:** **Panafcon Ltd, Nairobi – Kenya**
Position: Technical Director (EIA and RAP Specialist/Hydro-geologist/GIS Specialist)
 In-charge of Projects Management and Coordination. (**Water Resources Survey, Environmental Impact (EIA), Resettlement Action Plan (RAP) and Risk Assessments**)
- 1992 – 1998:** **Ministry of Water Resources, Nairobi – Groundwater Survey Unit (which undertakes Geophysical Groundwater Exploration).**
Position : Head of Groundwater Survey Unit - Projects Coordination and Supervision
 In-charge of Geophysical Survey and Groundwater Investigations in the WRAP Project.

1985: Ministry of Water Resources, Nairobi: Geology Section of Resources Division.

Position: On The Job -Trainee Geologist

Undertook on-the-job training on Groundwater Investigation (using Geophysical Exploration Techniques) and Hydrogeology.

Relevant Professional Experience:

- 2016 Kenya – Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) of the Proposed Relocation of Kipevu Oil Terminal (KOT) (ongoing)**
 Client: Kenya Ports Authority (KPA)
 Participating in the Project as: **Team Leader**
 The objective of the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) Studies is to identify the environmental impacts of the proposed relocation on people and the environment. To determine project alternatives and cost effective mitigation measures plus a monitoring plan. Questionnaires will be used to collect data. The ESIA Study is going to identify and evaluate environmental impacts of the relocation on natural resources and operations in the project area and propose appropriate mitigation measures to minimize/eliminate impacts including safety measures. The RAP Study is going to evaluate any loss of structures and operations within the project area. Baseline socio-economic survey to generate data for monitoring and evaluation will be collected during the project cycle.
 An ESIA Study Report containing EMP and a Monitoring Plan will be prepared for submission to NEMA.
 A RAP Study Report will also be prepared. The ESIA Study will be carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies.
- 2016 Kenya: Environmental and Social-Economic Impact Assessment of the Thange River Basin.**
 Client: Kenya Pipeline Company Limited
 Participating in the Project as: **Team Leader**
 The main objective of the study was to determine the environmental and social impact of the spilled oil on the soil, water (surface and ground water), crops & other plants, livestock, the local community and propose appropriate site area remediation and restoration.
 An ESEIA Study Report containing EMP and a Monitoring Plan was prepared. The study will be done with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESEIA Study Report has been submitted to NEMA.
- 2014 Kenya: Review and Update the Environmental and Social Impact Assessment (ESIA) for the Proposed Rehabilitation of the Lodwar-Lokichogio-Nakodok 240Km (A1) Road**
 Client: Kenya National Highways Authority (KeNHA)
 Participating in the Project as: **Team Leader**
 Objective of Reviewing and Updating of Lodwar-Nakodok Road ESIA Study were:
 Reviewing and updating the ESIA Study Report compiled in 2013;
 Ensuring all environmental consequences of construction and operation of the road are evaluated and addressed as part of the mitigation measures in the final road design; Review and update the Draft ESIA Report to conform with World Bank Operational Policies and Kenya National Highways Authority (KeNHA) requirements;
 To identify gaps in the Draft ESIA Report and address them in the revised version;
 To conduct second Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the project
- 2014 Kenya – Environmental and Social Impact assessment (ESIA) Study for the propose Isinya – Nairobi East 400kV Transmission Line**
 Client: Kenya Electricity Transmission Company Ltd (KETRACO)
 Participated in the Project as **Deputy Team Leader**
 The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Isinya- Nairobi East (75km) 400kV Double Circuit Line and Sub stations project.

Questionnaires were used to collect data.

The ESIA Study was to identify and evaluate the impacts of the project on natural resources, animals and persons living in the project area and propose appropriate mitigation measures to minimize or eliminate impacts.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA report was submitted to NEMA and the EIA licence issued to the client

2014

Kenya: Environmental and Social Impact Assessment (ESIA) for the Proposed Athi river- Mariakani Axle Load Control Station.

Client: Kenya National Highways Authority (KeNHA)

Participating in the Project as: Team Leader

The objective of the Proposed Reconstruction and Modernisation of Athi River Axle Load Control Station was to improve the infrastructure of the weigh bridge station and achieve the following:

- Enhance road safety and improve working conditions at the station;
- Preserve road infrastructure.
- Optimise road transportation through reduction of time spent at the axle load station;
- Eliminate interruption of traffic flow by trucks that cross from one side of the highway to another to have their axle loads checked.
- Eliminate/reduce health and safety risks posed by roadside packed trucks containing explosive or dangerous cargo
- To conduct Public Consultation Meetings to sensitize all the stakeholders about the project, seek their inputs into the project and disclose the positive and negative impacts of the project

To conduct a Public Consultation Meetings to sensitize all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the project.

2013

Kenya - Environmental & Social Impact Assessment Study for the Proposed Lower Nzoia Irrigation Development Project – Phase II

Client: National Irrigation Board (NIB)

Participating in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impact of implementing the proposed project in Lower Nzoia. Identify and evaluate impacts of the proposed project on the natural resources, animals and persons living in the project area and recommended appropriate mitigation measures to eliminate or minimize impacts and provided a monitoring plan.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. The study is to determine loss of income (livelihood), cost of land and other property using the current market value. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The study was done with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and EIA License issued to the client.

2013

Kenya - Environmental & Social Impact Assessment for the Study for Proposed Gathigiriri Resettlement Site in Mwea for the Mwea Irrigation Development Project

Client: **Nippon Koei/JICA/ National Irrigation Board (NIB)**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Gathigiriri Resettlement Site at Mwea GK Prison land in Mwea for the Mwea Irrigation Development Project (MIDP). Used questionnaires to collect data. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures that should be put in place to minimize or eliminate the impacts. Baseline socio-economic survey was done to generate data for mitigating resettlement effects, monitoring and evaluation during project implementation. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.

The study was prepared with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies and JBIC and JICA Guidelines. The ESIA Report has been submitted to NEMA for issuance of an EIA License.

2013

Kenya - Environmental & Social Impact Assessment for the Study for Proposed AHITI Ndomba Resettlement Site in Mwea for the Mwea Irrigation Development Project.

Client: **Nippon Koei/JICA/ National Irrigation Board (NIB)**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed AHITI Ndomba Resettlement Site at AHITI Ndomba Institute in AHITI Ndomba for the Mwea Irrigation Development Project (MIDP).

Used questionnaires to collect data.

The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures that should be put in place to minimize or eliminate the impacts. Baseline socio-economic survey was done to generate data for mitigating resettlement effects, monitoring and evaluation. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The report was prepared with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies and JBIC and JICA Guidelines. The ESIA Report was submitted to NEMA and an EIA License issued.

2013

Kenya – Environmental and Social Impact assessment (ESIA) Study for Nyahururu-Maralal High Voltage Transmission Line.

Client: **Kenya Electricity Transmission Company Ltd KETRACO**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Nyahururu - Maralal (129km) High Voltage Transmission Line project.

Used questionnaires to collect data. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.

The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report has been submitted to NEMA for issuance of EIA License.

2013

Kenya – Environmental and Social Impact assessment (ESIA) Study for the proposed Sondu-Homabay-Awendo-Migori-Isebania High Voltage Transmission Line.

Client: **Kenya Electricity Transmission Company Ltd (KETRACO)**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Sondu-Homabay-Awendo-Migori-Isebania (136km) High Voltage Transmission Line project. Used questionnaires to collect data.

The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report has been submitted to NEMA for issuance of EIA License.

2013

Kenya – Environmental and Social Impact assessment (ESIA) for the proposed upgrading of Court facilities including the Court Building at Kitui Law Court.

Client: **The Judiciary**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed rehabilitation of facilities (court building, sinking and installing borehole, incinerator, toilet facilities and water storage facilities) at Kitui Law Courts in Kitui Town.

Used questionnaires to collect data.

The ESIA Study identified and evaluated impacts of the project on natural resources, and persons operating at the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.

The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies.

The ESIA Study Report has been submitted to NEMA and an EIA License was issued.

2013 Kenya – Environmental and Social Impact assessment (ESIA) for the proposed upgrading of Court facilities including the Court Building at Kangema Law Court.

Client: **The Judiciary**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed rehabilitation of facilities (court building, incinerator and toilet facilities) at Kangema Law Courts, Kangema Town. Used questionnaires to collect data. The Study identified and evaluated impacts of the project on natural resources and persons operating at the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report has been submitted to NEMA and an EIA License was issued.

2012 Kenya – Environmental Impact Assessment of the Proposed LPG Filling Plant in Kisumu

Client: **KenolKobil Ltd**

Participating in the Project as **Team Leader**

The objective of the Environmental and Social Impact Assessment (ESIA) Study was to identify the effects of the LPG plant on the environment in order to identify project impacts, appropriate project alternatives and develop cost effective mitigation measures and a monitoring plan. Used questionnaires to collect data.

The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts including safety measures to be put in place. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.

The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.

2010 Kenya – Environmental and Social Impact Assessment (ESIA) for the Proposed Voi-Taveta (110) 132 kV Single Circuit Transmission Line

Client: **Kenya Power and Lighting Company - KPLC**

Participated in the Project as **Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Voi - Taveta (110km) High Voltage Transmission Line project. Used questionnaires to collect data. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.

The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.

- 2010 - 2011** **Kenya and Ethiopia - Consultancy Services for Carrying out Environmental and Social Impact Assessment of Proposed Gibe III Hydroelectric Power Project: Downstream of Gibe III: Kenyan Perspective**
 Client: **Kenya Electricity Transmission Company Ltd (KETRACO)**
 Participated in the Project as **Deputy Team Leader**
 GIBE III which is located within the Gibe – Omo River Basin in Ethiopia has a 675 km trajectory from its terminus at Lake Turkana, Kenya – Ethiopia border. The objective of the project is to evaluate the effect of the Gibe III Hydroelectric Power Dam on the 675km downstream along River Omo and the Lake Turkana environment where the river feeds into. The potential effects downstream include hydrological (particularly on the River Omo and Lake Turkana), socio-economic for the inhabitants, ecological for plants & animals, archeological & cultural areas including the wetlands.
- 2008-2010** **Kenya– Environmental Management during upgrading of Kisumu Airport –including Resettlement of Affected Persons and Institutions.**
 Client: **Kenya Airports Authority/World Bank**
 Participated in the Project as **Team Leader**
 In-charge of the Environmental Management of the Kisumu Airport upgrading activities including overseeing resettlement of affected persons (residents on KAA land) and institutions (Usoma Primary School), the construction of the extension to the existing runway by 1 km, construction of a New Terminal Building and construction of a new access road to the Airport from the Kisumu-Maseno Road. The Environmental Management focussed on ensuring that the upgrading activities and waste generated (solid & liquid waste) is properly managed without impacting the environment including appropriate resettlement of persons and a school near the airport.
- 2007 – 2008:** **Uganda – Environmental Impact Assessment (during Detailed Engineering Design for about 300 km of District Roads Reclassified to the National Standard (Lot B)**
 Client: **World Bank/ Road Agency Formation Unit**
 Participated in the following EIA activities
- Review of Feasibility Report pertaining to EIA and Resettlement Action Plan,
 - Preliminary social and environmental impact screening and assessment,
 - Collation and Analysis of Baseline Social and Environmental Conditions,
 - Public and stakeholder consultations and Environmental & social impact assessment,
 - Preliminary environmental designs and Baseline socio-economic studies,
 - Preparation of Mitigation Measures & Resettlement Action Plan (RAP) for client approval,
- Participated in the Preparation of EIA Report.
- 2016** **Kenya: Reviewing & Updating of Draft Resettlement Action Plan (RAP) for the Proposed Dualling of Mombasa - Mariakani A109 Road Project**
 Client: **Kenya National Highways Authority (KeNHA)**
 Participating in the Project as: **Team Leader**
 The objective of the project is to review the RAP carried out in 2014 and identify any gaps. Carrying out an asset inventory (Census Survey) of the road corridor to identify all Project Affected Persons (PAPs) and the impacts of the proposed project on the livelihoods of affected persons and recommended measures to minimize resettlement effects and safeguard livelihoods. The census survey is being carried out on land affected by the project, affected structures, affected trees/crops and affected sources of income (livelihoods). Carrying out a socio-economic survey to generate baseline data for monitoring and evaluation during project implementation period. Verifying compliance with the Relocation and Resettlement Regulations that govern the industry. Preparing a Revised Resettlement Action Plan Report containing cost of compensation and resettlement for each affected household and a gender analysis in compliance with the AfDB and EIB Involuntary Resettlement Standards and Guidelines.
- 2014** **Kenya: Consultancy Services for Reviewing and Updating of the Resettlement Action Plan (RAP) for the Proposed Rehabilitation of Lodwar-Lokichogio-Nakodok Road (A1), 240 Km**
 Client: **Kenya National Highways Authority (KeNHA)**
 Participating in the Project as: **Deputy Team Leader**

Main project features: The proposed road project commences at Lodwar, at the roundabout on the road from Kitale, and ends at Nadapal at the border with South Sudan and is 240 km highway. The Consultant is reviewing the initial RAP study carried by the Road Design Consultant and validate it for implementation.

The RAP study entailed a survey of the amount of land, enumeration of the number of structures (permanent, semi-permanent and temporary), the actual number of people and the households that will be affected by the proposed road upgrading activities.

The project also included valuation of land, structures, crops and trees to be affected in the resettlement process

- 2014 Kenya - Resettlement Action Plan (RAP) Study for the Proposed Lower Nzoia Irrigation Development Project – Phase II**
Client: **National Irrigation Board (NIB)**
Participating in the Project as **Team Leader**
The objective of the RAP Study was to carry out a census survey of all the persons, land area and property affected by the proposed irrigation project. Use of questionnaires to collect data. Determine the sources of income for each affected household, value of affected, type of structures (residential houses, commercial buildings, structures belonging to institutions (schools, dispensaries/hospitals) and infrastructure (water pipelines, roads, power lines etc). Determine loss of income, loss of land and other property using the current market value for valuation. Identify and propose possible resettlement sites and prepare a Resettlement Action Plan Report containing cost of compensation and resettlement for each household and in compliance with. The World Bank Operational Policy 4.12 – Involuntary Resettlement.
- 2013 Kenya – Updated Resettlement Action Plan (RAP) for the Proposed Eastern African Electricity Highway 500KV HVDC Project: Shamata to Suswa (LOT 4)**
Client: **Kenya Electricity Transmission Company(KETRACO)**
Participated in the Project as **Coordinator**
The objective of the RAP Study was to carry out a census inventory survey of the project affected persons, land and property and the impact of the proposed project on source of income.
Used questionnaires to collect data. Determined compensation costs and resettlement. Baseline socio-economic survey was carried out to generate data for monitoring and evaluation. Verification of compliance with the resettlement regulations that govern the process was done and guidelines provided to the implementing agencies for guidance to minimise resettlement impacts and to safeguard livelihoods. A Resettlement Action Plan (RAP) Report was prepared compliant with the Local Regulations on Land Acquisition and the World Bank Regulations 4.12 – Involuntary Resettlement.
- 2012 Kenya - Consultancy Services for the Resettlement Action Plan (RAP) for the Proposed Machakos – Konza – Kajiado – Namanga (155Km) 132kV Transmission Line**
Client: **Kenya Electricity Transmission Company(KETRACO)**
Participated in the Project as **Team Leader**
The objective of the RAP Study was to carry out a census inventory survey of the project affected persons, land and property along the transmission line wayleave and the impact of the proposed project on source of income (livelihoods) of affected households. Used questionnaires to collect data. Determined compensation costs and resettlement. Baseline socio-economic survey was carried out to generate data for monitoring and evaluation. Verification of compliance with the relocation and resettlement regulations that govern the process was done and guidelines provided to the implementing agencies to guide them in minimising resettlement impacts and to safeguard livelihoods. A Resettlement Action Plan (RAP) Report was prepared compliant with the World Bank Regulations 4.12.
- 2012 Kenya – Resettlement Action Plan (RAP) for the Proposed Upgrading of Rumuruti – Maralal Road (101km) to Bitumen Standards.**
Client: **Kenya National Highways Authority (KeNHA)**
Participated in the project as **Team Leader**
The objective of the RAP Study was to carry out inventory survey of all assets and to identify all project affected persons, land and property along the road corridor and the impact of the proposed project on the livelihoods of affected persons. Used questionnaires to collect data. Determined compensation costs and resettlement.

Baseline socio-economic survey was carried out to generate data for monitoring and evaluation. Verification to determine compliance with the relocation and resettlement regulations that govern the process was done.

Guidelines for implementing agencies to minimise resettlement impacts and safeguard livelihoods was also provided. A Resettlement Action Plan (RAP) Report was prepared compliant with the Local Regulations on Land Acquisition and Compensation and the International Development Association (IDA).

2012 Kenya – Preparation of a Resettlement Policy Framework (RPF) to be relied upon in the implementation of the proposed Judicial Performance Improvement Project (JPIP)
Client: **The Judiciary**

Participated in the Project as **Team Leader**

The objective of the proposed RPF policy was to develop guidelines that would be relied upon during implementation of the construction and rehabilitation of court facilities (court buildings and other infrastructure) all over Kenya under the Judicial Performance Improvement Project (JPIP). The Resettlement Policy Framework (RPF) document was prepared following Environmental Management and Coordination Act (EMCA) 1999, the Environmental (Impact Assessment and Audit) Regulations, 2003 and the World Bank Operation Policies. The document was approved in Washington by the World Bank and Public Disclosure Authorized. The document is being used to prepare ToR for Consultants who will be appointed by the Judiciary to carry out RAP Studies on proposed projects before construction activities commence.

2011 Kenya – Resettlement Action Plan (RAP) for the Proposed Construction of Four Interchanges at Nyahururu Turnoff, Njoro Turnoff, Mau Summit Turnoff and Ahero Turnoff

Client: **Kenya National Highways Authority (KeNHA)**

Participated in the Project as **Team Leader**

The objective of the RAP Study was to carry out census survey of all assets and to identify all project affected persons, land and property in the location where the interchanges are going to be constructed and the impact of the proposed project on the livelihoods of affected persons.

Used questionnaires to collect data. Determined compensation costs and resettlement. Baseline socio-economic survey was carried out to generate data for monitoring and evaluation. Verification of compliance with the relocation and resettlement regulations that govern the process was also done. Guidelines for implementing agencies to minimise resettlement impacts and safeguard livelihoods was also provided.

A Resettlement Action Plan (RAP) Report was prepared compliant with the Local Regulations on Land Acquisition and Compensation, the International Development Association (IDA) and the World Bank's Operational Policy 4.12 Involuntary Resettlement.

2010 Kenya - Resettlement Action Plan for the Proposed Voi-Taveta (110) 132 kV Single Circuit Transmission Line

Client: **Kenya Power and Lighting Company - KPLC**

Participated in the Project as **Team Leader**

The objective of the RAP Study was to carry out a census survey of the project affected persons, land and property along the transmission line wayleave and the impact of the proposed project on source of income (livelihoods) of affected households. Used questionnaires to collect data. Determined compensation costs and resettlement.

Baseline socio-economic survey was carried out to generate baseline data for monitoring and evaluation during project cycle.

Verification of compliance with the relocation and resettlement regulations that govern the process was done and guidelines provided to the implementing agencies to guide them in minimising resettlement impacts and to safeguard livelihoods. A Resettlement Action Plan (RAP) Report was prepared compliant with the World Bank Regulations 4.12 was prepared.

- 2012** **Kenya - The Project on the Development of National Water Master Plan 2030**
 Client: **Nippon Koei Co., Ltd. Water Resources Management Authority - WRMA**
 Participated in the Project as **Project Manager**
 The project involved assessing and evaluating the current status of availability, reliability, quality, and vulnerability of the Country's water resources and projecting up to the year around 2050 taking into consideration climate change.
 Reviewing the National Water Master Plan towards the year 2030 taking into consideration climate change and formulating action plan up to the year 2022, strengthening capacity of water resources management. The team carried out groundwater inventory of existing boreholes distributed all over Kenya was done where water level, *insitu* measurements (Electrical Conductivity, pH and Temperature) were taken. Samples were collected and submitted to a lab for Full Chemical Analysis (FCA).
 Water use survey where inventory was carried out by determining unit water requirements and permits for the following uses – Irrigation water use, Power generation water use, Domestic water use and Industrial water use.
- 2011** **Kenya – Design & Supervision of Groundwater Well Installation & Remediation at a Shell Service Station in South Coast, Mombasa.**
 Client: **Kenya Shell Limited**
 Participated in the Project as **Team Leader**
 Developed Groundwater Remediation Well Design for Shell South Coast Service Station and supervised Groundwater Remediation Activities. Prepared a Groundwater Remediation Report for submission to the Client. The activities involved ensuring proper well installation, Groundwater Monitoring during the remediation exercise and appropriate disposal. Prepared a groundwater Remediation Report and submitted to the Client.
- 2011** **Kenya - Environmental Risk Assessment**
 Client: **Kenya Shell Limited**
 Participated in the Project as **Team Leader**
 Conducted Environmental Risk Assessment (ERA) at Shell South Coast Service Station – Mombasa. The ERA was carried out after a Kerosene Underground Storage Tank accidentally released its contents to the surrounding ground.
 The risk assessment was carried out to determine whether the soil or any other sensitive receptors (like groundwater) have been impacted or there is potential that they will be impacted by the released product.
 It involved site inspection for potential contaminant source areas, identification of geo-probe locations around the IK UST and the Tank Farm area, soil vapour survey using a 2020 Pro Plus Photo Ionisation Detector (PID) for reading the volatile hydrocarbon contamination. Soil and Groundwater samples were collected for TPH & PAH laboratory analysis and prepared Environmental Risk Assessment (ERA) Report for submission to the client.
- 2010** **Kenya - Environmental Risk Assessment and Due Diligence**
 Client: **Kenya Shell Limited**
 Participated in the Project as **Team Leader**
 Conducted Environmental Risk Assessment and Due Diligence Survey at Kenyatta Street Service Station Thika.
 The Due Diligence Assessment entailed Geo-probe Soil Gas Survey by use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses, Soil & Groundwater Sampling for Hydrocarbon Laboratory Analysis of various parameters including the following: Individual BTEX compounds, Volatile organics, Individual PAH, TPH by Gas Chromatography, Phenol and Mineral oil. An Environmental Risk Assessment Report was prepared with recommendations on appropriate remediation and submitted to the Client.
- 2010** **Kenya: Environmental and Social Impact Assessment of the Proposed Tourist Tented Camp Lodge at Ekime Site in Mwingi National Reserve**
 Client: **Chester House Limited**
 Participated in the project as **Team Leader**
 The Study involved conducting field investigation on the proposed Tented Camp Lodge in Mwingi National Reserve through evaluation of impacts associated with wildlife migration patterns, local area bio-diversity, the Tana River that passes next to the proposed facility, natural resources, animals and persons living in the project area and proposed appropriate

mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.

2009 Kenya: Environmental and Social Impact Assessment (ESIA) of the Proposed Tourist Tented Camp Lodge at Golo 1 Site in Meru National Reserve

Client: **Chester House Limited**

Participated in the project as **Team Leader**

The Study involved conducting field investigation on the proposed Tented Camp Lodge in Meru National Park. The study involved the evaluation of impacts associated with the project on Wildlife migration patterns, the local area bio-diversity and the Murewa River that passes next to the proposed facility. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.

2009 Kenya: Environmental and Social Impact Assessment (ESIA) of the Proposed Tourist Tented Camp Lodge at Kambi Ya Simba Site in Kora National Park

Client: **Chester House Limited**

Participated in the project as **Team Leader**

The Study involved conducting field investigation on the proposed Tented Camp Lodge in Kora National Park. The study involved the evaluation of impacts associated with the project on Wildlife migration patterns, the local area bio-diversity and the Tana River that passes next to the proposed facility. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.

The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.

2009 Eritrea – Supervision of TCP Remediation at Assab Depot - 2009

Client: **Kenya Shell Ltd**

Participated in the Project as **Coordinator**

The reconnaissance study revealed presence of 22 drums containing tricresyl phosphate (TCP) additives. The drums were stored on unpaved ground and traces of the leaking product drums were first observed in 2005. Remediation was done as follows:

- Identified and Inspected trucks to be used in transporting recovered products/wastes.
- Identification and purchase of UN approved drums for storage of decanted products
- Inspected remediation equipment at Massawa to ensure all are in good order.
- Inducted truck drivers on safety to ensure that they observe the required measures while driving to and from Assab with the recovered products.

TCP Remediation Report was prepared and submitted to the Client.

2009 Zimbabwe –Tank/Product Line Integrity Testing

Client: **Aviation Refuelling Equipment PLC/ Total Zimbabwe**

Participated in the Project as **Team Leader**

The project involved tank integrity testing of underground storage tanks (USTs) and product line using equipment that operates as a non - volumetric tank tightness testing system that uses vacuum and is EPA Third party Approved. The equipment is equipped with the following components: Motor/ Blower Assembly, Pressure Sensor, Microphone, Water Sensor Probe and Meter, Product Line Tester and Leak Detector Tester

- 2009 NEMA Kenya – Appointed to participate in the Technical Advisory Committee (TAC) of the National Environment Management Authority (NEMA) for 4 Weeks**
 Participated in the EIA Reports Review as **Chairman**
 Carried out review of Environmental Impact Assessment Reports for several Projects in order to determine project sensitivity and licensing.
 Field review visits were made to obtain first hand information regarding the project sites.
 Prepared a review report on the projects and submitted to NEMA for further action.
- 2009 Kenya – Site Environmental Risk Assessment (ERA) through Soil Sampling & analysis to investigate the extent of released product after a petroleum tanker accident.**
 Client: **Multiple Hauliers Ltd**
 Participated in the project as **Team Leader**
 The (ERA) exercise was composed of:
- Used Geo-probe equipment to penetrate to the subsurface at selected spots to depths of between 0.9m and 3.75m below ground level to collect soil samples for TPH lab analysis.
 - Use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses
 - Preparation of site area sketch and taking of photos.
- The soil gas survey was done to reveal presence and extent of hydrocarbon contamination from the tanker accident and to determine the area requiring soil remediation (cleanup). Site Risk Assessment Report was prepared and submitted to the Client.
- 2009 Kenya– Environmental and Social Impact Assessment (ESIA) for upgrading of facilities at Wajibu Service Station in Thika.**
 Client: **Libya Oil Kenya Limited**
 Participated in the project as **Team Leader**
 The project involved conducting ESIA for the upgrading of facilities at a Service Station in Thika Town. Used questionnaires to collect data. The ESIA Study identified and evaluated impacts of the project on natural resources and persons living and operating in the project area and proposed appropriate mitigation measures to minimize/eliminate impacts including safety measures to be put in place. Baseline socio-economic survey to generate data for monitoring and evaluation during project cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.
 The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Report was submitted to NEMA and an EIA License was issued
- 2009 Kenya – Environmental and Social Impact Assessment (ESIA) for upgrading of facilities at Valley Service Station in Nakuru**
 Client: **Libya Oil Kenya Limited**
 The project involves conducting Environmental Impact Assessment (EIA) for the upgrading of facilities at a Service Station in Nakuru Used questionnaires to collect data. The ESIA Study identified and evaluated impacts of the project on natural resources and persons living and operating in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts including safety measures to be put in place. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared.
 The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.
- 2009 Kenya (Completed January 2009) – Environmental Risk Assessment and Due Diligence Survey at Seven (7) Reseller Depot.**
 Client: **Kenya Shell Limited**
 Participated in the project as **Team Leader**
 Conducted Environmental Risk Assessment and Due Diligence Survey at Seven (7) Depots distributed all over Kenya.
 The Due Diligence Environmental Assessment entailed Geo-probe Soil Gas Survey by use of the PHOTOVAC 2020 PRO Plus PID, Soil & Groundwater Sampling for Hydrocarbon Laboratory Analysis of various parameters including: Individual BTEX compounds, Volatile organics, Individual PAH, TPH by Gas Chromatography, Phenol and Mineral oil. Prepared Environmental Due Diligence Assessment Reports for the client.

- 2008-2009 Kenya – Environmental Impact Assessment of Proposed Service Station in Bungoma.**
 Client: **Kenya Shell Limited**
 Participated in the project as **Team Leader**
 Conducted Environmental Impact Assessment (EIA) for a Service Station at Kanduyi in Bungoma
 The ESIA identified impacts of the project on natural resources and persons living in the project area and proposed appropriate mitigation measures to minimize impacts. Baseline socio-economic survey to generate data for monitoring and evaluation was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Report was submitted to NEMA.
- 2008 Kenya – Environmental Site Assessment - Signode Packaging Systems**
 Client: **ERM South Africa**
 Participated in the project as **Team Leader**
 The project involved intrusive Geo-probe Soil Sampling for Laboratory Analysis. The drilling and installation of Monitoring Wells (MWs) was done for the purpose of groundwater monitoring (Groundwater Level Measurement & Groundwater Sampling for Laboratory Analysis). A Site Assessment Report was prepared and submitted to the Client
- 2008: Kenya – Site Environmental Risk Assessment (ERA) through Soil Sampling and analysis to investigate the presence of released product.**
 Client: **Kenya Shell Ltd**
 Participated in the project as **Team Leader**
 The (ERA) exercise was composed of:
- Use of Geo-probe equipment to penetrate to the subsurface at selected spots to depths of between 0.9m and 3.75m below ground level to collect soil samples for TPH analysis.
 - Use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses
 - Preparation of site area sketch and taking of photos.
- The fieldwork involved the execution of a Geo-probe soil gas survey with the aim of determining the presence and concentration of hydrocarbon contaminant.
 This was meant to reveal any areas impacted by petroleum hydrocarbon releases either from the operations within the station or any other neighbouring facilities. A Site Assessment Report was prepared and submitted to the Client
- 2008: Sudan – Groundwater Monitoring at the Port Sudan Installation, Port Sudan**
 Client: **Shell Company of the Sudan Limited**
 Participated in the project as **Team Leader**
 Carried out the Groundwater monitoring activities at the Port Sudan Installation in Port Sudan Town, Sudan.
 The groundwater monitoring exercise involved the following activities:
- Measurement of Groundwater Level using an Electric Deeper
 - Use of Teflon tube and check valve to purge the 3 piezometers/monitoring wells.
 - Collection of groundwater samples from the piezometers/monitoring wells for insitu tests and laboratory analysis.
- Prepared Groundwater Monitoring Report containing historical comparison of the analysis results and submitted to Client.
- 2008: Kenya – Soil and Groundwater sampling and analysis for investigation of a product release**
 Client: **Kenya Shell Ltd**
 Participated in the project as **Team Leader**
 The study entailed soil investigations to determine the extent of the product spread after a release in one of the USTs at a service station. It involved Soil Gas survey using the PID (Photo Ionization Detector), visual observations of soil and groundwater, situ measuring of pH and EC of groundwater samples collected from boreholes and wells in the neighborhoods and eventual sampling and analysis of groundwater and soil samples for lab analysis.
 A comprehensive report of the onsite findings /observations and laboratory sample analysis was compiled and submitted to the client. This report had recommendations on the best mitigation measures against the release and remediation actions were proposed.

- 2008:** **Kenya – Environmental and Social Impact Assessment of the Proposed Man Eaters Of Tsavo Lodge – Tsavo West National Park**
 Client: **Come to Africa Safaris**
 Participated in the project as **Team Leader**
 The Study involved conducting field investigation on the proposed Tented Camp Lodge in Tsavo West National Park through evaluation of impacts associated with wildlife migration patterns and local area bio-diversity and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued.
- 2008** **Kenya: Environmental Impact Assessment of the Aberdare National Park Section of the Proposed Mwiyo Location Water Project in Nyeri North District.**
 Client: **Tana Water Services Board/ La Femme Engineering Services**
 Participated in the project as **Team Leader**
 The Study involved field investigations on the proposed water pipeline route within the Aberdare Forest and National Park and the evaluation of the water intake along the Honi River. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA.
- 2007 - 2008:** **Kenya: Remediation and Environmental Cleanup of Sludge.**
 Client: **Kenya Petroleum Refineries Limited**
 Participated in the project as **Team Leader**
 The project involves the supervision of the construction of a bioreactor for treatment of sludge material and the collection of soil and groundwater samples for lab analysis. Periodical site environmental assessment is carried out to determine sludge biodegradation progress and thereby provide mitigation measures.
- Kenya - Groundwater and Soil sampling at Kenya Cuttings Ltd**
 Client: **ERM Southern Africa**
 Participated in the project as **Team Leader**
 The project involved the sampling of soil and groundwater. Four soil bores were advanced by means of the geo-probe, with continuous soil coring taking place. Groundwater was samples from existing and newly installed piezometer in the site area for laboratory analysis.
- 2007:** **Kenya – Self Environmental and Occupational Health & Safety Audits for 135 Sites**
 Client: **Kenya Shell Ltd**
 Participated in the project as **Team Leader**
 The study entailed soil and groundwater investigations to determine environmental risk associated with the fuel storage and dispensing facilities for comparison with the previous audit.
 The self audit were compared with the previous Initial Audit carried out in 2004 including the current environmental status of the site in accordance with the Environmental Management and Coordination Act (EMCA) 1999, Environmental (Impact Assessment and Audit) Regulations of 2003 and the EIA and Audit Guidelines.
 The EA evaluated how effectively the sites are implementing the proposed EMP in 2004 and consideration any new environmental mitigation measures introduced to safeguard the environment. Prepared Environmental Audit Reports and submitted them to NEMA.

- 2007: Zanzibar- Environmental Groundwater Monitoring Well Drilling and Installation**
 Client ERM Southern Africa – BP Zanzibar Depot
 Participated in the project as **Team Leader**
 The project involved the drilling and installation of five groundwater monitoring wells at the Zanzibar Fuel Depot located near the Indian Ocean shoreline. The five groundwater monitoring wells (2 inch final diameter) were installed using hand auger equipment. Groundwater samples were collected from existing and newly installed borehole within the site.
- 2007: Kenya - Quarterly Groundwater Monitoring**
 Client: **Kenya Petroleum Refineries Limited - KPRL**
 Participated in the project as **Team Leader**
 The project involved quarterly sampling of groundwater from the existing Monitoring wells installed within the refinery facility for analysis of total petroleum Hydrocarbons and BTEX. Groundwater Monitoring Report was prepared and submitted to the Client.
- 2000 – 2008: Zimbabwe – Environmental Risk Assessment, Tank/Product Line Integrity Testing and Soil /Groundwater Sampling**
 Client: **Aviation Refuelling Equipment PLC/ BP and Shell Zimbabwe**
 Participated in the project as **Team Leader**
 Carried out geo-probe soil sampling for hydrocarbon analysis, tank integrity testing of underground storage tanks (USTs) and product line using equipment that operates as a non - volumetric tank tightness testing system that is EPA Third party Approved. The equipment is equipped with the following components: Motor/ Blower Assembly, Pressure Sensor, Microphone, Water Sensor Probe and Meter, Product Line Tester and Leak Detector Tester, Soil and groundwater samples were collected and analysed for BTEX and TPH. Prepared Environmental Risk Assessment and submitted to the Client.
- 2006 – 2008: Tanzania – Mwalimu Julius Nyerere International Airport (Dar Airport), Dar es Salaam – Environmental Impact Assessment Study – Monitoring Wells Installation and Groundwater Sampling.**
 Client: **Tanzania Airports Authority - TAA**
 Participated in the project as **Team Leader**
 The project involved Consultancy Services for Designing of Wells, Site Location Selection & Installation of six boreholes within the airport boundaries for groundwater monitoring. Groundwater samples were collected and submitted to the laboratory for Hydrocarbon, Full Chemical and Bacteriological Analysis and the preparation of Analysis Report including recommendations for future Environmental Monitoring. Prepared Groundwater Monitoring Report for Mwalimu Julius Nyerere International Airport and submitted to the Client.
- 2006: Kenya – Jomo Kenyatta International Airport - Northern Corridor Transport Improvement Project - Environmental Impact Assessment Screening for Rehabilitation/Upgrading of Airport Pavement**
 Client: **Kenya Airports Authority (KAA)/ World Bank**
 Participated in the project as **Team Leader**
 Carried out Environmental Impact Assessment Screening Study for the Rehabilitation/Upgrading of Airport Pavements of Jomo Kenyatta International Airport. Prepared an Environmental Impact Assessment Screening Report.
- 2006: Kenya – Wilson Airport - Northern Corridor Transport Improvement Project - Environmental Impact Assessment for Upgrading of Airport Facilities.**
 Client: **Kenya Airports Authority (KAA) / World Bank.**
 Participated in the project as **Team Leader**
 Carried out Environmental Impact Assessment Screening Study for the Rehabilitation/Upgrading of Airport Pavements of Jomo Kenyatta International Airport. Prepared an Environmental Impact Assessment Screening Report.

- 2006: Kenya – Kisumu Airport - Northern Corridor Transport Improvement Project - Environmental Impact Assessment for Upgrading of Airport Facilities.**
 Client: **Kenya Airports Authority (KAA) / World Bank**
 Participated in the project as **Team Leader**
 The project involved Environmental Impact Assessment Screening Study for the Upgrading of Airport Facilities at Kisumu Airport. Prepared an Environmental Impact Assessment Screening Report.
- 2006: Kenya – Environmental Impact Assessment for Lubrication Centre for Mobil within Kenya Ports Authority Mombasa**
 Client: **Mobil Oil Kenya Ltd**
 Participated in the project as **Team Leader**
 The EIA evaluated the environmental performance of the project to satisfy the requirements of NEMA and International Practices. The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and EIA License issued.
- 2006: Kenya – Installation of Groundwater Monitoring Wells/Piezometers at Kobil Filling Station and at the Kobil Black Oil Depot –**
 Client: **Kenol-Kobil Ltd**
 Participated in the project as **Team Leader**
 The project involved the assessment and drilling of three monitoring wells. During the drilling and installation of the monitoring wells, lithological logs for the vertical profiles of the wells were prepared. Groundwater was sampled for lab analysis.
- 2006: Madagascar – Supervision of Borehole Drilling & Installation Activities**
 Client: **QIT Madagascar Minerals (QMM) – Fort Dauphin, Madagascar**
 Participated in the project as **Team Leader**
 Carried out investigations to locate drinking water boreholes and supervised the borehole drilling and installation activities. The boreholes were test pumped and the exercise involved the interpretation of borehole pumping test data.
 The results have been used to determine the production of the boreholes drilled for the installation of groundwater abstraction pumps.
 A Groundwater Drilling and Installation Report was prepared and submitted to the Client.
- 2006: Kenya – Second Environmental Audit**
 Client: **Agro Chemical & Food Company - ACFC- Muhoroni Kenya**
 Participated in the project as **Team Leader**
 The study entailed follow-up site investigations to determine site environmental status when compared with the initial Environmental Audit carried out in 2004 and to check the implementation of the proposed mitigation measures. A second Environmental Audit Report was prepared and submitted to NEMA in accordance with the Environmental Management and Coordination Act (EMCA) 1999, Environmental (Impact Assessment and Audit) Regulations of 2003 and the EIA and Audit Guidelines. An Environmental Audit Report was prepared and submitted to NEMA
- 2005 – 2006: Kenya – Environmental Audit (EA)**
 Client: **East Africa Spectre Limited – Nairobi, Kenya**
 Participated in the project as **Team Leader**
 The study entailed follow-up site investigations to determine the site environmental status when compared with the initial Environmental Audit done in 2004 and to check the implementation of the proposed mitigation measures.
 This EA Report was prepared and submitted to NEMA in accordance with the Environmental Management and Coordination Act (EMCA) 1999, Environmental (Impact Assessment and Audit) Regulations of 2003 and the EIA and Audit Guidelines. An EA Report was prepared and submitted to NEMA

- 2005 – 2006: Tanzania – Mwalimu Julius Nyerere International Airport (Dar Airport), Dar es Salaam – Environmental Impact Assessment Study – Pavement Renovation & Waste Disposal (Solid & Sewerage).**
 Client: **Tanzania Airports Authority - TAA**
 Participated in the project as **Team Leader**
 The project involved assessment of the present environmental situation at the airport associated with the Pavement Renovation & Waste Disposal. Prepared a proposal of dedicated Environmental Mitigation Measures following the assessment, incorporated the scope of the civil works to the proposed mitigation measures where necessary /practical. Prepared a Solid Waste Handling and Disposal Report and Submitted to TAA.
- 2005: Zimbabwe – Tank and Product Line Integrity Testing 2005**
 Client: **Aviation Refuelling Equipment PLC/ Mobil Oil Zimbabwe**
 Participated in the project as **Team Leader**
 The project involved carrying out tank integrity testing of underground storage tanks (USTs) and product line using equipment that operates as a non - volumetric tank tightness testing system that uses vacuum and is EPA Third party Approved. Prepared Underground Storage Tanks Integrity Report and submitted to the Client.
- 2005: Kenya- Environmental Scoping Study –**
 Client: **Tourism Trust Fund/European Union**
 Participated in the project as **Team Leader**
 Conducted Environmental Impact Assessment (EIA) Scoping Study for the Development of Tana River basin as a tourist destination and prepared an Environmental Impact Assessment (EIA) Scoping Report and Submitted to the Client.
- 2005: Kenya - Supervision of Tank Removal/Trench Excavation Works and Installation of Monitoring Wells**
 Client: **Parsons Brinckerhoff Ltd, Bristol – UK / ExxonMobil**
 Participated in the project as **Team Leader**
 The project involves Supervision of tank removal/trench excavation works and installation of wide diameter wells for groundwater remediation. Prepared Groundwater Monitoring Report and submitted to the Client
- 2005: Kenya - Environmental Audit (EA), Hydrogeological Investigation and installation of Groundwater Monitoring Wells at Sagana Depot**
 Client: **Kenol Petroleum Company Limited**
 Participated in the project as **Team Leader**

 The project involved carrying out site Environmental Audit and the drilling and installation of three groundwater monitoring wells.
 The preparation of an Environmental Audit Report for Submission to the National Environmental Management Authority (NEMA).
- 2005: Kenya - Environmental Audit (EA), Hydrogeological Investigation and installation of Groundwater Monitoring Wells at Nairobi Joint Depot (NJD)**
 Client: **Kobil Petroleum Company Limited**
 Participated in the project as **Team Leader**
 The project involved carrying out site Environmental Audit and the drilling and installation of three groundwater monitoring wells. The preparation of an Environmental Audit Report for Submission to the National Environmental Management Authority (NEMA).
- 2005: Madagascar - Hydro-geological Investigation and Borehole Site Location**
 Client: **QIT Madagascar Minerals – Fort Dauphin, Madagascar**
 Participated in the project as **Team Leader**
 The work involved site hydro-geological investigation, evaluation borehole lithological profiles and interpretation of borehole pumping test data.
 The results have been used to determine the Fort Dauphin area groundwater potential for the location of groundwater production boreholes for the proposed mining activities in Mandena area, Madagascar.
 Hydro-geological Report was prepared and submitted to the Client.

- 2005: Kenya - Environmental Impact Assessment and Audit for over 150 sites in Kenya**
 Client: **Various Clients including Construction and Petroleum Clients**
 Carried out Environmental Impact and Audit of various sites and the preparation of Environmental Impact Assessment (EIA) and Environmental Audit (EA) Reports for submission to The National Environmental Management Authority (NEMA).
- 2004 – 2005: Kenya – Participated in the Kenyan Chapter of the World Water Assessment Programme (WWAP).**
 Participated in the Study as a **Resource Person**
 The World Water Assessment Programme (WWAP) is a UN system-wide programme that seeks to develop tools and skills needed to achieve a better understanding of basic processes, management practices and policies that will help improve the supply and quality of global freshwater resources.
 Its main objective is to undertake the assessment on what has been achieved by the international community in terms of freshwater initiatives in meeting the water supply and sanitation targets and the Millennium Development Goals (MDGs). The process is intended to contribute to the Kenyan Chapter of the World Water Assessment Report.
- 2003 – 2005: Tanzania – Site Environmental Risk Assessment (ERA) through Soil Sampling and analysis to investigate the extent of released product after a petroleum tanker accident.**
 Client: **Caltex Oil (K) Ltd**
 Participated in the project as **Team Leader**
 The (ERA) exercise was composed of:
- Use of Geo-probe equipment to penetrate to the subsurface at selected spots to depths of between 0.5m and 4.0m below ground level to collect soil samples for TPH lab analysis.
 - Use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses
 - Preparation of site area sketch and taking of photos.
- The fieldwork involved the execution of a Geoprobe soil gas survey with the aim of determining the presence and extent of hydrocarbon contamination. This was meant to reveal any areas impacted by petroleum hydrocarbon spilled from a petroleum tanker accident in order to determine the area requiring soil remediation (cleanup). Hydro-geological evaluation plus drilling and installation of groundwater monitoring well was done. Prepared a Risk Assessment Report and submitted to the Client.
- 2005: Uganda - Environmental Risk Assessment and Hydrogeological Investigation including installation of Groundwater Monitoring Wells at two Depot sites in Kampala and Jinja – Uganda**
 Client: **Caltex Petroleum Company Limited**
 Participated in the project as **Team Leader**
 The project involved the drilling and installation of six groundwater monitoring wells at each of the two Depot sites.
 Carried out soil and Groundwater sampling for laboratory analysis and the preparation of Environmental Site Assessment Reports for the Client.
- 2004: Kenya – Environmental Audit 2004**
 Client: **Kenya Petroleum Refineries Limited - KPRL**
 Participated in the project as **Team Leader**
 The Audit involved the evaluation of the existing site status in accordance with the National Environmental Management Authority (NEMA) Guidelines, the Environmental Management and Co-ordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 and best International Practices. Soil, groundwater and effluent samples were collected for analysis to provide baseline data.
 Proposals were submitted for mitigation and monitoring plans as part of the Audit. An Environmental Audit Report was prepared and submitted to NEMA.

- 2004: Kenya – Initial Environmental Audit**
 Client: **Agro Chemical & Food Company - ACFC- Muhoroni Kenya**
 Participated in the project as **Team Leader**
 The study entailed site investigations to determine environmental risk associated with the operations of the facility to obtain baseline environmental assessment data and prepare an Environmental Audit Report for submission to NEMA in accordance with the Environmental Management and Coordination Act (EMCA) 1999, Environmental (Impact Assessment and Audit) Regulations of 2003 and the EIA and Audit Guidelines. The Environmental Audit evaluated how effectively the site is performing with regard to environmental protection and where necessary proposal for environmental mitigation measures given. An Environmental Audit Report was prepared and submitted to NEMA.
- 2004: Kenya - Environmental and Social Impact Assessment (ESIA) of 2 Service Stations in Nairobi**
 Client: **Total Kenya Ltd**
 Participated in the project as **Team Leader**
 Conducted Environmental Impact Assessment (EIA). The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and EIA License issued.
- 2004: Kenya - Environmental Impact Assessment**
 Client: **Kenya Pipeline Company (KPC).**
 Participated in the project as **Team Leader**
 Participated as the Hydrogeologist/Environmental Impact Assessment Specialist in the project that involved the implementation of an Environmental Impact Assessment Study of the Proposed Common Users' Truck Loading Facility (PS15), Changamwe – Mombasa. Soil sampling for lab analysis and Hydrogeological Data evaluation was carried out. Participated in the preparation of the Final Environmental Impact Assessment Study Report for submission to NEMA.
- 2004: Kenya – Environmental Audit**
 Client: **East Africa Spectre Limited – Nairobi, Kenya**
 Participated in the project as **Team Leader**
 The study entailed site investigations to determine environmental risk associated with the operations of the facility to obtain baseline environmental assessment data and prepare an Environmental Audit Report for submission to NEMA in accordance with the Environmental Management and Coordination Act (EMCA) 1999, Environmental (Impact Assessment and Audit) Regulations of 2003 and the EIA and Audit Guidelines.
 The Environmental Audit evaluated how effectively the site is performing with regard to environmental protection and where necessary we proposed environmental mitigation measures to ensure continued safeguarding of the environment.
 An Environmental Audit Report was prepared and submitted to NEMA.
- 2004: Kenya – Environmental Audit**
 Client: **Coates Brothers (East Africa) Ltd; Manufacturers of ink**
 Participated in the project as **Team Leader**
 The Audit involved evaluation of the existing Plant in accordance with the National Environmental Management Authority (NEMA) Guidelines, the Environmental Management and Co-ordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 and best International Practices. Effluent and Air samples were collected for analysis to provide baseline data. Proposals were submitted for mitigation and monitoring plans as part of the Audit. An Environmental Audit Report was prepared and submitted to NEMA.

- 2004:** **Kenya – Environmental Due Diligence Assessment/Environmental Audit**
 Client: **Total Kenya Ltd, LPG Plant.**
 Participated in the project as **Team Leader**
 The Audit involved the evaluation of the existing LPG Plant in accordance with the National Environmental Management Authority (NEMA) Guidelines, the Environmental Management and Co-ordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 and best International Practices. Soil samples were collected for analysis to provide baseline data.
 Proposals were submitted for mitigation and monitoring plans as part of the Audit. An Environmental Audit Report was prepared and submitted to NEMA.
- 2004:** **Kenya – Environmental Audit**
 Client: **Total Kenya Ltd, Bitumen Plant**
 Participated in the project as **Team Leader**
 The Audit involved the evaluation of the existing Bitumen Plant in accordance with the National Environmental Management Authority (NEMA) Guidelines, the Environmental Management and Co-ordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 and best International Practices. Soil samples were collected for analysis to provide baseline data. Proposals were submitted for mitigation and monitoring plans as part of the Audit. An Environmental Audit Report was prepared and submitted to NEMA
- 2004:** **Kenya – Environmental Audit**
 Client: **Capitol Laundry and Harry's Drycleaners**
 Participated in the project as **Team Leader**
 The Audit involved the evaluation of the existing Laundry and Dry Cleaning facility that emitted Carbon, Sulphur and Nitrogen oxides in the air, discharged detergents and solvents into the public drainage.
 This was done in accordance with the NEMA Guidelines, the Environmental Management and Co-ordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003 and best International Practices. Soil, groundwater and effluent samples were collected for analysis to provide baseline data. Mitigation measures and monitoring plans were prepared as part of the Audit. An Environmental Audit Report was prepared and submitted to NEMA
- 2004:** **Kenya and Uganda – Environmental Site Assessment (Phase I & II) for various Service Stations**
 Client: **Kenya Shell Limited.**
 Participated in the project as **Team Leader**
 Carried out Environmental Site Risk Assessment. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis and the preparation of Site Environmental Assessment Reports.
- 2003:** **Rwanda – Kigali Airport - Environmental Site Assessment (Phase I & II)**
 Client: **Caltex Oil Company (Providing Aviation Fuel to Aircrafts at Kigali Airport)**
 Participated in the project as **Team Leader**
 Carried out Environmental Site Risk Assessment. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis. Site Environmental Risk Assessment Report was prepared and submitted to the Client.
- 2003:** **Eritrea – Environmental Risk Assessment (Phase I & II)**
 Client: **Shell Eritrea**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment of 18 Retail Service Stations, 3 Consumer Sites and 1 Depot. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis and the Preparation of Environmental Risk Assessment Reports.

- 2003: Senegal – Environmental Risk Assessment (Phase I & II) of 1 LPG Depot for Shell Senegal**
 Client: **Shell Senegal**
 Participated in the project as **Team Leader**
 Carried out Environmental Site Risk Assessment. The Environmental Risk Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis and the preparation of Environmental Site Environmental Risk Assessment Reports.
- 2003: Rwanda – Environmental Risk Assessment (Phase I & II) of 1 Aviation (Airport) Depot**
 Client: **Caltex Oil Limited.**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment.
 The Environmental Site Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis and preparation of Site Environmental Risk Assessment Reports
- 2003: Lesotho – Environmental Risk Assessment (Phase I & II) of 14 Retail Service Stations**
 Client: **BP Africa Ltd.**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis, Tank and Product Line Integrity Testing and The preparation of Site Environmental Risk Assessment Reports.
- 2003: Swaziland – Environmental Risk Assessment (Phase I & II) of 12 Retail Service Stations**
 Client: **BP Africa Ltd.**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis, Tank and Product Line Integrity Testing and The preparation of Site Environmental Risk Assessment Reports.
- 2003: Mozambique – Environmental Risk Assessment (Phase I & II) of 30 Retail Service Stations and 30 Consumer sites**
 Client: **BP Africa Ltd.**
 The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis and The preparation of Site Environmental Risk Assessment Reports.
- 2002: Malawi – Environmental Risk Assessment (Phase I & II) of 65 Retail Service Stations and 30 Consumer Sites**
 Client: **BP Africa Ltd.**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis, Tank and Product Line Integrity Testing and The preparation of Site Environmental Risk Assessment Reports.
- 2003: Zambia – Environmental Risk Assessment (Phase I & II) of 90 Retail Service Stations and 25 Consumer Sites**
 Client: **BP Africa Ltd.**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment. The Assessment entailed Geoprobe Soil Gas Survey, Soil and Groundwater Sampling for Lab Analysis, Tank and Product Line Integrity Testing and the preparation of Site Environmental Risk Assessment Reports.
- 2002: Kenya (Mwingi Town) – Environmental Risk Assessment of Mwingi Caltex Service Station**
 Client: **Caltex Oil Kenya Ltd**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment to establish source of released subsurface petroleum product detected near a neighbouring surface water source used by the local community. The project involved soil gas survey and soil sampling for lab analysis. A Site Environmental Risk Assessment Report was prepared.

- 2002: Kenya - Presented a paper on “Impact on Groundwater Resources due to encroachment in Recharge Areas in Nakuru” at the National Conference on Integrated Water Resources Management Strategy” held at KCCT College Mbagathi, Nairobi, Kenya.**
- 2002: Mauritius – Environmental Impact Assessment of the proposed Mer-Rouge Depot**
 Client: **The Oil Industry in Mauritius.**
 Participated in the project as **Team Leader**
 The ESIA Study identified and evaluated impacts of the project on natural resources, animals and persons living in the project area and proposed appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The project involved soil, air and water sampling for lab analysis and the preparation of an Environmental Impact Assessment Report for Project Approval and Implementation.
- 2001: Botswana and Tanzania - Environmental Risk Assessment and Hydrogeological Evaluation of various Depots**
 Client: **BP Africa**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment through the collection of soil and water samples for lab analysis and the drilling and installation of groundwater monitoring wells in the following countries:
- Tanzania (Dar es salaam, Mtwara, Zanzibar and Mwanza Depots)
 - Botswana (Gaberone and Serule Depots)
- Prepared Site Environmental Risk Assessment Reports and submitted to the Client.
- 2001: Mali, Senegal, The Gambia, Cape Verde, Niger, Ghana, Burkina Faso, Cote de Ivoire, Guinea, Cameroon Chad, Togo and Gabon - Environmental Risk Assessment for 206 Retail Service Stations and Consumer Sites in several Countries of West/Central Africa.**
 Client: **Shell and BP**
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment. The project entailed soil gas survey and soil sampling for chemical analysis. Site Environmental Risk Reports were also prepared and submitted to the Client.
- 2000: Kenya - Environmental Risk Assessment and Hydrogeological Evaluation in various countries in the East African Region:**
 Client: Kenya Shell Limited
 Participated in the project as **Team Leader**
 Carried out Environmental Risk Assessment using the Distribution Risk Based Tool (DRBT). This was impact assessment which included on-site assessment, sampling and analysis of soil and water samples, Installation of shallow wells (piezometers) and deep wells (boreholes). The sites were:-
 Ethiopia - Akaki depot , Addis Ababa
 Djibouti - Aviation depot, Djibouti
 Uganda - Kampala depot, Kampala
 - Mbale depot, Mbale
 Sudan - Shagara depot, Khartoum
 - Port Sudan Installation, Port Sudan
 Mauritius - Fort William joint industry Depot, Mauritius
- Prepared an Environmental Risk Assessment Report containing Drilling and Installation of the Boreholes and Hydrogeological Evaluation of the site.
- 1999: Kenya - Environmental and Social Impact Assessment (EIA) and Resettlement Action Plan (RAP) for the Sondu Miriu Hydroelectric Power Station in Sondu, Kenya.**
 Client: **Nippon Koei/KPLC**
 Participated in the project as **Coordinator**
 This study was carried out to evaluate the environmental impact of the proposed Sondu Miriu Hydroelectric Power Generation on the environment and the people living near the power plant and a Resettlement Action Plan for the affected households.

The assessment included the evaluation of the flora and fauna and the resettlement of the affected population. An evaluation of the socio-economic aspects of the project was also done, including a monitoring plan was also done.

1999:

Kenya - Groundwater Survey Unit of the Water Resources Assessment and Planning Project (WRAP) - Ministry of Water Resources, Nairobi

1. Carried out an intensive two (2) weeks Training Course for Ministry of Water Resources Staff on the "Application of GIS and Remote Sensing to Water Resources Evaluation and Management. The GIS software used was the Integrated Land and Water Information System (ILWIS). The course was attended by 12 Ministry of Water Officers.
2. Conducted a one (1) month Basic Training Course for WRAP Staff on The Application of Geographical Information System (GIS) for the Collection, Storage, Manipulation and Analysis of Resources Data where the Geographic Location is Critical to the Analysis.
 - Applied Geophysical Exploration Methods (Resistivity & Electromagnetic) to investigate saline groundwater pockets and seawater intrusion in Kilifi District coastline.
 - Evaluation of groundwater quality data with the intention of establishing the extent of seawater intrusion and delineation of saline groundwater plumes in Kilifi District.
- Applied the TECSOFT software for water quality analysis and preparation of diagrams for classifying the different types of groundwater found.

1992 – 1998:

Kenya - Ministry of Water Resources, Nairobi - Survey Unit (which undertakes Geophysical Groundwater Exploration).

Position – In-charge of Groundwater Assessment Activities

Carried out the following duties:

- Geophysical Groundwater investigation
 - Interpretation of Geophysical Data on:
 - - Electromagnetic (EM)
 - - Resistivity Profile (RP)
 - - Vertical Electrical Sounding (VES)
 - Geological Mapping and related structures like faults, folds with the aim of establishing the most appropriate geophysical method to be used in Groundwater Survey
- Participated in the field Geophysical Groundwater Investigations and Report Preparations for Baringo, Meru, Samburu, Isiolo, Kilifi and Marsabit Districts. The results have been used in compiling the Geophysics and Hydrogeology Chapters of the following reports:
- Water Resources Assessment Study of Meru District
 - Water Resources Assessment Study of Samburu District
 - Water Resources Assessment Study of Isiolo District
 - Water Resources Assessment Study of Kilifi District
 - Water Resources Assessment Study of Baringo District
 - Water Resources Assessment Study of Marsabit District
 - Evaluated and Supervised Drilling of Research Boreholes for groundwater studies in Samburu and Isiolo Districts under the WRAP Drilling Program.
 - Assisted the drilling team in logging of drilling samples (lithological logs) and the identification of aquifer locations for screen and casing insertion.

1986 – 1998:

Kenya - Geologist - Ministry of Water Resources, Nairobi: Geology Section of Resources Division.

Position On The Job -Trainee Geologist

Undertook on-the-job training on Groundwater Investigation (using Geophysical Exploration Techniques) and Hydrogeology.

LANGUAGES:

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Kiswahili	Excellent	Excellent	Excellent

Certification:

I, the undersigned, certify that, these data correctly describe me, my qualifications, and my experience.



Date: **14 June 2017**

[Signature of staff member]



Date: **14 June 2017**

[Signature of authorized representative of the firm]

Full name of staff member: **Joshua Oyieko**

Full name of authorized representative: **Richard Okello**

2. Irene Muchoki –Sociologist/Community Development Expert

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Proposed Position:	Sociologist		
Name of Firm:	Panafcon Ltd		
Name of Staff:	Irene Wanjiku Muchoki		
Profession:	Sociologist/Environmental		
Date of Birth:	1974		
Years with Firm/Entity:	17	Nationality:	Kenyan

Membership of Professional Societies:

Registered in Kenya as EIA/EA Lead Expert with the National Environment Management Authority (NEMA) under the Environmental Management and Coordination Act (EMCA 1999) and the Environmental Impact Assessment and Audit Regulations 2003 Registration Number 0970.

Key Qualifications:

Irene is an Environmentalist and Community Development Expert holding a Masters of Art Degree in Rural Sociology and Community Development from the University of Nairobi. She also has B.Sc. Degree from University of Nairobi, a Post-graduate Diploma in Business Management from Kenya Institute of Management and Certificate in ISO 14001: Environmental Management Systems (EMS) training from Kenya Bureau of Standards. She is currently undertaking

She has over 15 years progressive experience in the Environmental, Social and Engineering Consultancy business. During this period, she has attained skills in Environmental and Social primary data collection and site investigation, desktop review, research work, soil and groundwater sampling techniques, report writing project and presentation of project findings. She was involved in the overall RAP and ESIA project planning in a team of other experts such as the Valuer, Surveyor, Socio economist and enumerators. She was also involved in the day to day planning, scheduling and organizing of the ESIA Studies. She has hands-on experience in planning, scheduling and organizing of ESIA studies and writing ESIA reports according to the provision of EMCA 1999.

In addition, she has extensive experience in general office and project management having held senior management positions with her current employer. She has been involved in management of project teams as a Team Leader. She is part of the Business Development team in the company through which have made contacts with potential clients and developed worthy business opportunities and continually maintain good consultant-client relationships. She has been for many years been the Internal Quality Assurance and Control Auditor for the company where she has ensured quality is maintained throughout the project cycle.

She is registered as an EIA/EA Lead Expert with the National Environment Management Authority (NEMA) under the Environmental Management and Coordination Act (EMCA 1999) and the Environmental Impact Assessment and Audit Regulations 2003. She is conversant with the principles and application of ISO 14001: Environmental Management Systems (EMS).

She has in addition carried out the following activities as part of the ESIA and RAP projects undertaken:

Evaluation of Project Environmental and Social Impacts on project area population focusing on the following:

- Safety of project workers and local community by use of appropriate safety gear and working area barriers;
 - Health of project workers and local community regarding communicable (HIV AIDS, STI and TB) and water borne diseases;
 - Awareness creation through public consultation meeting (PCM) discussion and training;
 - Evaluation of Gender, Poverty and Vulnerable groups in terms of the socio-economic activities and exposure to diseases and safety within the project area;
 - prevention of sexually transmitted diseases through use of condoms, use of mosquito nets for prevention of mosquito bites and malaria and removal of stagnant water near homesteads;
 - Promotion of use of potable water and appropriate sanitation;
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Education:

2012 - 2016:	Masters of Arts - Rural Sociology and Community Development, University of Nairobi
2006 - 2007	Post Graduate Diploma in Business Management, Kenya Institute of Management
1995 - 1999	Bachelor of Science Honours Degree, University of Nairobi, Kenya
1990 - 1994	Secondary School Education at Kenya High School, Nairobi

Professional Qualifications:

2002:	Certified Public Accountant (CPA). Registered with (Kenya Accountants & Secretaries National Examinations Board) KASNEB and have undertaken and passed Section One exams (Law 1, Economics & Financial Accounting)
2005:	Environmental Management System Training in ISO 14001 by Kenya Bureau of Standards (KEBS) Nairobi Kenya.
2004:	Sustainable Environmental Management Training at Kenya Institute of Administration, Nairobi Kenya.

Employment Record/Experience:

2000 - Date	Panafcon Ltd, Nairobi – Kenya Environmental Scientist/ RAP Expert/ Social Development Specialist
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Relevant Professional Experience:

2016:	<p>Kenya – Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) of the Proposed Relocation of Kipevu Oil Terminal (KOT) (ongoing)</p> <p>Client: Kenya Ports Authority (KPA)</p> <p>Participating in the Project as: Team Leader</p> <p>The objective of the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) Studies is to identify the environmental impacts of the proposed relocation on people and the environment. To determine project alternatives and cost effective mitigation measures plus a monitoring plan. Questionnaires will be used to collect data. The ESIA Study is going to identify and evaluate environmental impacts of the relocation on natural resources and operations in the project area and propose appropriate mitigation measures to minimize/eliminate impacts including safety measures. The RAP Study is going to evaluate any loss of structures and operations within the project area. Baseline socio-economic survey to generate data for monitoring and evaluation will be collected during the project cycle.</p> <p>An ESIA Study Report containing EMP and a Monitoring Plan will be prepared for submission to NEMA. A RAP Study Report will also be prepared.</p> <p>The ESIA Study will be carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies.</p>
2016:	<p>Kenya: Environmental and Social-Economic Impact Assessment of the Thange River Basin.</p> <p>Client: Kenya Pipeline Company Limited</p> <p>Participating in the Project as: Deputy Team Leader</p> <p>The objective of the Environmental and Social-Economic Impact Assessment (ESEIA) Study was carried out to assess the impact of the oil spill incident to the community and environment of Thange River Basin and propose cost effective mitigation measures plus a monitoring plan.</p>

Geoprobe Soil Gas Survey and sampling of water, soil and biota for lab analysis was done. Groundwater flow direction and velocity were determined to establish the movement of petrochemical contaminant. Questionnaires were administered to collect data on the community. Medical Evaluation was done on the site area community members and their livestock. The ESEIA Study identified and evaluated environmental impacts on natural resources and persons in the project area and appropriate mitigation measures proposed. A socio-economic impact was done to determine loss of resources and livelihood for the affected community that were evaluated. The Oil Spill ESEIA Report has been submitted to NEMA.

2014

Kenya – Environmental and Social Impact assessment (ESIA) Study for the proposed Isinya – Nairobi East 400kV Transmission Line

Client: Kenya Electricity Transmission Company Ltd (KETRACO)

Participated in the Project as **Deputy Team Leader**

The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Isinya- Nairobi East (75km) 400kV Double Circuit Line and

Sub stations project. Use questionnaires to collect data.

The ESIA Study was to identify and evaluate the impacts of the project on natural resources, animals and persons living in the project area and propose appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA report was submitted to NEMA and the EIA licence issued to the client.

2014

Kenya: Review and Update the Environmental and Social Impact Assessment (ESIA) for the Proposed Rehabilitation of the Lodwar- Lokichogio-Nakodok 240Km (A1) Road

Client: Kenya National Highways Authority (KeNHA)

Participating in the Project as: **Deputy Team Leader/ Environmental Expert**

Objective of Reviewing and Updating of Lodwar-Nakodok Road ESIA Study were:

Reviewing and updating the ESIA Study Report compiled in 2013;

Ensuring all environmental consequences of construction and operation of the road are evaluated and addressed as part of the mitigation measures in the final road design; Review and update the Draft ESIA Report to conform with World Bank Operational Policies and Kenya National Highways Authority (KeNHA) requirements; To identify gaps in the Draft ESIA Report and address them in the revised version; To conduct second Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the project

2014

Kenya: Environmental and Social Impact Assessment (ESIA) for the Proposed Athi river- Mariakani Axle Load Control Station.

Client: Kenya National Highways Authority (KeNHA)

Participating in the Project as: **Deputy Team Leader**

The objective of the Proposed Reconstruction and Modernisation of Athi River Axle Load

Control Station is to improve the infrastructure of the weigh bridge station and achieve the following:

- Enhance road safety and improve working conditions at the station;
- Preserve road infrastructure.
- Optimise road transportation through reduction of time spent at the axle load station;
- Eliminate interruption of traffic flow by trucks that cross from one side of the highway to another to have their axle loads checked.
- Eliminate/reduce health and safety risks posed by roadside packed trucks containing explosive or dangerous cargo

- To conduct Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project and disclose the positive and negative impacts of the project
- To conduct a Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the project.

2013 Kenya - Consultancy Services for the Environmental & Social Impact Assessment of Mombasa – Nairobi 400kV Transmission Line (Alternative A – Kibwezi)

Client: Kenya Electricity Transmission Company Ltd KETRACO

Participating in the Project as: **Environmental/ Deputy Team Leader**

The main objectives of this consultancy services include but not limited to the following:

- To ensure that the above project is implemented in an environmentally and socially sustainable manner.
- To provide an ESIA report to KETRACO and their financiers prior to the finalization of financial decision regarding the Kibwezi section of the line
- Alternative A is considered the most preferred/ optimal alternative out of 6 alternative routes identified by the initial ESIA Consultant.

2013 Kenya - Consultancy Services for the Environmental & Social Impact Assessment for the Proposed Nyahururu - Maralal 132 kV Transmission Line

Client: Kenya Electricity Transmission Company Ltd KETRACO

Participating in the Project as: **Environmental/ Deputy Team Leader**

The main objectives of this consultancy services include but not limited to the following:

- to comply with the Environmental Management and Coordination Act (EMCA) 1999 as stipulated in the Environmental (Impact Assessment and Audit) Regulations 2003 Legal Notice No. 101.
- to verify the adherence and compliance of the World Bank's Safeguard Policies.
- to ensure that the above project is implemented in an environmentally and socially sustainable manner.

2013 Kenya - Consultancy Services for the Environmental & Social Impact Assessment for the Proposed Sondu-Homa Bay-Awendo-Migori-Isebania 132 kV Transmission Line

Client: Kenya Electricity Transmission Company Ltd KETRACO

Participating in the Project as: **Environmental/ Deputy Team Leader**

The main objectives of this consultancy services include but not limited to the following:

- To comply with the Environmental Management and Coordination Act (EMCA) 1999 as stipulated in the Environmental (Impact Assessment and Audit) Regulations 2003 Legal Notice No. 101.
- To verify the adherence and compliance of the World Bank's Safeguard Policies.
- To ensure that the above project is implemented in an environmentally and socially sustainable manner.

2013 Kenya - Consultancy Services for the Environmental & Social Impact Assessment and Resettlement Action Plan for the Proposed Voi-Taveta 132 kV Single Circuit Transmission Line

Client: KPLC/ World Bank

Participating in the Project as: **Environmental/Community Development Expert**

The main objectives of this consultancy services include but not limited to the following:

- To comply with the Environmental Management and Coordination Act (EMCA) 1999 as stipulated in the Environmental (Impact Assessment and Audit) Regulations 2003 Legal Notice No. 101.
- To verify the adherence and compliance of the World Bank's Safeguard Policies.
- To ensure that the above project is implemented in an environmentally and socially sustainable manner.
- To prepare a Resettlement Action Plan (RAP) to guide the implementation process.

2013

Kenya- Environmental & Social Impact Assessment for the Study for Proposed Lower Nzoia Irrigation Development Project-Phase II

Client: National Irrigation Board (NIB)

Participating in the Project as: **Community Development Expert**

The objective of the ESIA Study was to evaluate the Environmental and Social Impact of implementing the proposed project in Lower Nzoia. Identify and evaluate impacts of the proposed project on the natural resources, animals and persons living in the project area and recommend appropriate mitigation measures to eliminate or minimize impacts and provide a monitoring plan.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle is to be carried out. The study is to determine loss of income (livelihood), cost of land and other property using the current market value.

An ESIA Study Report containing EMP and a Monitoring Plan is to be prepared. The study is to be done with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License issued to the client.

2011-2012

Kenya and Ethiopia - Consultancy Services for Carrying out Environmental and Social Impact Assessment of Proposed Gibe III Hydroelectric Power Project: Downstream of Gibe III: Kenyan Perspective

Client: Kenya Electricity Transmission Company Ltd (KETRACO)

The Gibe III hydroelectric power project is being implemented by the Ethiopian Electric Power Corporation (EEPCO). It is located within the Gibe – Omo River Basin 675 km trajectory from its terminus at Lake Turkana, Kenya – Ethiopia border. The objective of the project is to evaluate the effect of the Gibe III Hydroelectric Power Dam on the 675km downstream along River Omo and the Lake Turkana environment where the river feeds into.

The potential effects downstream include hydrological (particularly on the River Omo and Lake Turkana), socio-economic for the inhabitants, ecological for plants & animals, archeological & cultural areas including the wetlands

2012

Kenya – Environmental and Social Impact Scoping for the Menengai Geothermal Project Phase 1 Project

Client: Geothermal Development Company (GDC)/ELC

Participated in the Study as the **Environmental**

The objective of the ESIA Scoping Study was to collect the environmental baseline data and evaluate the potential Environmental and Social Impacts of Menengai Geothermal Development Project in Nakuru. This information was intended to provide background environmental and socio-economic data for future use to carry out ESIA Studies for specific components of the Geothermal Development at Menengai Geothermal Development Site.. The baseline study involved the following activities:

Field assessment collect data and information;

- Evaluation of the project area population distribution and demographics;
- Evaluation of the current health status and education of the community;
- Evaluation of the forest cover and other vegetation within the project area;
- Evaluation of project area community's livelihoods, socio-cultural backgrounds, The Study Identified potential environmental and social impacts arising from geothermal project activities including:

- Civil works associated with construction of access roads, drill sites, drilling and testing of production and injection geothermal wells and construction of the evacuation power line.
- Development of the Steam Above Ground Pipeline System ;
- Construction of the Power Plant
- The Power Plant Operation Activities
- The alternative transmission line routes

The ESIA Scoping Study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, AfDB, ADB and World Bank Safeguard Policies.

2012: Kenya – Environmental Impact Assessment of the Proposed LPG Filling Plant in Kisumu
Client: KenolKobil Ltd

The objective of the Environmental and Social Impact Assessment (ESIA) Study was to identify the environmental impacts of the LPG plant on people and the environment, project alternatives and cost effective mitigation measures plus a monitoring plan. Questionnaires were used to collect data. The ESIA Study identified and evaluated environmental impacts on natural resources and persons in the project area and proposed appropriate mitigation measures to minimize/eliminate impacts including safety measures. Baseline socio-economic survey to generate data for monitoring and evaluation during project cycle was collected. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License was issued to the Client.

2015: Kenya: Resettlement Action Plan for Proposed Lower Nzoia Irrigation Development Project-Phase I
Client: Ministry of Water and Sanitation.

Participating in the Project as: **Community Development Expert**

The objective of the RAP Study was to carry out a census survey of all the persons, land area and property affected by the irrigation project. Use of questionnaires to collect data. Determine the sources of income for each affected household, value of affected, type of structures (residential houses, commercial buildings, structures belonging to institutions (schools, dispensaries/hospitals) and infrastructure (water pipelines, roads, power lines etc). Determine loss of income, loss of land and other property using the current market value for valuation. Identify and propose possible resettlement sites and prepare a Resettlement Action Plan Report containing cost of compensation and resettlement for each household and in compliance with.

The World Bank Operational Policy 4.12 – Involuntary Resettlement.

2014: Kenya: Consultancy Services for Reviewing and Updating of the Resettlement Action Plan (RAP) for the Proposed Rehabilitation of Lodwar-Lokichogio-Nakodok Road (A1), 240 Km

Client: Kenya National Highways Authority (KeNHA)

Participating in the Project as: **Team Leader**

Main project features: The proposed road project commences at Lodwar, at the roundabout on the road from Kitale, and ends at Nadapal at the border with South Sudan and is 240 km highway. The Consultant is reviewing the initial RAP study carried by the Road Design Consultant and validates it for implementation.

The RAP study entailed a survey of the amount of land, enumeration of the number of structures (permanent, semi-permanent and temporary), the actual number of people and the households that will be affected by the proposed road upgrading activities.

The project also included valuation of land, structures, crops and trees to be affected in the resettlement process.

- 2014:** **Kenya - Consultancy Services for the Resettlement Action Plan and census study for Kenya – Tanzania Power Interconnector 400Kv Transmission Line.**
Client: Kenya Electricity Transmission Company Ltd KETRACO
Participating in the Project as **Community Development Expert**
The main objectives of this consultancy services carry a detailed RAP.
- The RAP will entail a survey on the amount of land that will be affected by the proposed line, the number of structures that will be affected by the proposed line, the actual number of people that will be affected and the actual number of households that will be affected by the proposed line.
 - The consultancy will also carry out estimation of valuation for land to be affected, estimated valuation of structures to be affected, estimated valuation of crops and trees likely to be affected.
- 2014:** **Name of Assignment or Project: Resettlement Action Plan Study for Proposed Lower Nzoia Irrigation Development Project-Phase II covering 5,316 ha.**
Client: National Irrigation Board (NIB)
Position held: **Community Development Expert**
Main project features: Carryout a detailed RAP Study of the proposed Lower Nzoia Irrigation Development Project (LNIDP) – Phase II project which covers part of Ugenya and Bunyala Districts. The irrigation infrastructure to be developed will be constructed in the project area to take water to the farmers through open canals. The project has a total gross area of 5,316 ha. The existing homestead settlements will remain where they are except those that will be affected by the Main or Secondary Canals, Intake Weir, Sedimentation Pan, Office Blocks and Staff Houses.
The RAP study entailed a survey of the amount of land much of which is highly subdivided into small portions, enumeration of the number of structures (permanent, semi-permanent and temporary), the actual number of people and the households that will be affected by the proposed line.
The project also included valuation of land, structures, crops and trees to be affected in the resettlement process.
- 2013:** **Kenya - Consultancy Services for the Preparation of a Detailed Updated Resettlement Action Plan and Census Study for Eastern African Electricity Highway 500KV HVDC Project - Shamata - Suswa Section (Lot 4)**
Client: Kenya Electricity Transmission Company Ltd KETRACO
Participating in the Project as **Environmental/ Deputy Team Leader**
The main objectives of this consultancy services carry a detailed RAP.
- The RAP will entail a survey on the amount of land that will be affected by the proposed line, the number of structures that will be affected by the proposed line, the actual number of people that will be affected and the actual number of households that will be affected by the proposed line.
 - The consultancy will also carry out estimation of valuation for land to be affected, estimated valuation of structures to be affected, estimated valuation of crops and trees likely to be affected.
- 2012:** **Kenya - Consultancy Services for the Resettlement Action Plan for the Proposed Machakos – Konza – Kajiado – Namanga (155Km) 132kV Transmission Line**
Client: Kenya Electricity Transmission Company Ltd KETRACO
Participated in the Project as **Environmental/Community Development Expert**
The main objectives of this consultancy services was to carry out a detailed RAP.
- The RAP survey on the amount of land that will be affected by the proposed line, the number of structures that will be affected by the proposed line, the actual number of people that will be affected and the actual number of households that will be affected by the proposed line.

- The consultancy carried out estimation of valuation for land to be affected, estimated valuation of structures to be affected, estimated valuation of crops and trees likely to be affected

2012: Kenya – Resettlement Action Plan for the Proposed Upgrading of Rumuruti – Maralal Road to Bitumen Standards

Client: Kenya National Highways Authority (KeNHA)

Participating in the Project as **Deputy Team Leader**

The main objectives of this consultancy services is to prepare a Resettlement Action Plan for the proposed road upgrading project in accordance with applicable operation procedures of the Government of Kenya and International Development Association (IDA).

2012: Kenya – Resettlement Action Plan for the Proposed Construction of Additional Lanes on JKIA-Likoni-James Gichuru-Rironi Road (A104) and Associated 4 Projects

Client: Kenya National Highways Authority (KeNHA))

Participated in the Project as **Deputy Team Leader**

The objective of the project was to identify all potential project affected persons and the impacts of the proposed projects on the livelihoods of affected persons and recommend measures to minimize Resettlement effects and safeguard livelihoods.

Carry out a socio-economic survey to generate baseline data for monitoring and evaluation during project implementation period. Carry out an asset inventory survey of all potential assets that will be affected by the proposed projects. Verify compliance with the Relocation and Resettlement Regulations that govern the industry.

Provide guidelines to stakeholders participating in the minimizing resettlement impacts of the project.

Recommend cost effective measures to be implemented to safeguard the livelihoods. Prepare a Resettlement Action Plan (RAP) report compliant to The World Bank Regulations.

2013: Kenya – Judicial Performance Improvement Project:

Client: The Judiciary/ World Bank

Participated in the Project as **Deputy Team Leader**

The preparation of an Environmental & Social Impact Assessment of Rehabilitation of Facilities at Kangema Law Court.

The objective of the Environmental and Social Impact Assessment (ESIA) Study was to identify the effects of the Rehabilitation exercise on the environment and the surrounding communities in order to identify project impacts, appropriate project alternatives and develop cost effective mitigation measures and a monitoring plan.

Preparation of an Environmental Impact Assessment Study Report for submission to the National Environmental Management Authority (NEMA) and the EIA License was submitted to the client.

2013: Kenya – Judicial Performance Improvement Project:

Client: The Judiciary/ World Bank

Participating in the Project as **Deputy Team Leader**

The preparation of an Environmental & Social Impact Assessment of Rehabilitation of Facilities at Kitui Law Court.

The objective of the Environmental and Social Impact Assessment (ESIA) Study is to identify the effects of the Rehabilitation exercise on the environment and the surrounding communities in order to identify project impacts, appropriate project alternatives and develop cost effective mitigation measures and a monitoring plan.

Preparing of an Environmental Impact Assessment Study Report for submission to

the National Environmental Management Authority (NEMA) for EIA License.

- 2012: Kenya – Environmental Impact Assessment of the Proposed LPG Filling Plant in Kisumu**
Client: KenolKobil Ltd
 Participating in the Project as **Deputy Team Leader**
 The objective of the Environmental and Social Impact Assessment (ESIA) Study is to identify the effects of the LPG plant on the environment in order to identify project impacts, appropriate project alternatives and develop cost effective mitigation measures and a monitoring plan. Preparing of an Environmental Impact Assessment Study Report for submission to the National Environmental Management Authority (NEMA) for EIA License.
- 2012: Kenya – Integrated Urban Water Management Study (IUWM) for Nairobi and Satellite Towns**
Client: World Bank and ICLEI
 The project activities involve Review existing literature on the current state of policies and practices in water resources, water supply, sanitation, drainage, institutional and legal frameworks, for the water sector in Nairobi. Develop an outline for the assessment report of the local water situation in Nairobi. Identify stakeholders to be invited to the initial workshop in Nairobi (Kenya). Revise list of stakeholders to be invited to the strategy workshop in Nairobi.
 Develop a common understanding of challenges linked to water management in Nairobi Map and analyse stakeholder institutions and relevant legal and financial frameworks at national, sub-national and local level relevant for water governance in Nairobi. Ensure logistical arrangement and participate in strategy workshop. Develop programme and report for strategy workshop. Develop preliminary IUWM strategy for Nairobi based on outcomes of the workshop.
 Develop a roadmap to finalize and operationalise the developed IUWM strategy for Nairobi in consultation with the relevant World Bank Team in Nairobi.
- 2011: Kenya - The Project on the Development of National Water Master Plan 2030 – Water Use and Groundwater Survey**
Client: Nippon Koei Co., Ltd. Water Resources Management Authority (WRMA)
 The project involved assessing and evaluating availability, reliability, quality, and vulnerability of the Country's water resources up to around 2050 taking into consideration of climate change, reviewing the National Water Master Plan towards the year 2030 taking into consideration of climate change and formulating action plan up to the year 2022, strengthening capacity of water resources management.
- 2010: Kenya - Environmental Impact Assessment for the Proposed Borehole at Kawangware Area on L.R. No. Dagoretti/Riruta/1409**
Client: Margaret Njeri Muiruri
 The proposed borehole will be used to provide water for domestic use. The client has a tenancy of about 28 houses that will rely on the proposed borehole once completed
- 2009: Kenya – Site Environmental Risk Assessment (ERA) through Soil Sampling and analysis to investigate the extent of released product after a petroleum tanker accident.**
Client: Multiple Hauliers Ltd
 The (ERA) exercise was composed of:
- Use of Geo-probe equipment to penetrate to the subsurface at selected spots to depths of between 0.9m and 3.75m below ground level to collect soil samples for TPH lab analysis.
 - Use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses
 - Preparation of site area sketch and taking of photos.
- The fieldwork involved the execution of a Geoprobe soil gas survey with the aim of determining the presence and extent of hydrocarbon contamination.

This was meant to reveal any areas impacted by petroleum hydrocarbon spilled from a petroleum tanker accident in order to determine the area requiring soil remediation (cleanup).

- 2009: Kenya – Environmental Impact Assessment of upgrading of facilities at Wajibu Service Station in Thika.**
Client: Libya Oil Kenya Limited
 The project involves conducting Environmental Impact Assessment (EIA) for the upgrading of facilities at a Service Station in Thika Town and preparing an Environmental Impact Assessment Report for submission to the National Environmental Management Authority (NEMA) for EIA License.
- 2009: Kenya – Environmental Impact Assessment of upgrading of facilities at Valley Service Station in Nakuru**
Client: Libya Oil Kenya Limited
 The project involves conducting Environmental Impact Assessment (EIA) for the upgrading of facilities at a Service Station in Nakuru Town and preparing an Environmental Impact Assessment Report for submission to the National Environmental Management Authority (NEMA) for the NEMA License.
- 2008: Kenya (Completed January 2009) – Environmental Due Diligence in Seven (7) Reseller Depot.**
Client: Kenya Shell Limited
 Conducted Environmental Due Diligence Assessment of Seven (7) Depots and prepared Environmental Due Diligence Assessment Reports for submission to the Client.
 The Due Diligence Environmental Assessment entailed Geo-probe Soil Gas Survey by use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses, Soil & Groundwater Sampling for Hydrocarbon Laboratory Analysis of various parameters including the following: Individual BTEX compounds, Volatile organics, Individual PAH, TPH by Gas Chromatography, Phenol and Mineral oil.
- 2008: Kenya – Environmental Impact Assessment of Proposed Service Station in Bungoma.**
Client: Kenya Shell Limited
 Conducted Environmental Impact Assessment (EIA) for a Service Station in Bungoma and preparing an Environmental Impact Assessment Report for submission to The National Environmental Management Authority (NEMA) for NEMA License.
- 2008: Kenya – Environmental Risk Assessment (ERA) through Soil Sampling and analysis to investigate the presence of released product.**
Client: Kenya Shell Ltd
 The (ERA) exercise was composed of:
- Use of Geo-probe equipment to penetrate to the subsurface at selected spots to depths of between 0.9m and 3.75m below ground level to collect soil samples for TPH analysis.
 - Use of the PHOTOVAC 2020 PRO Plus PID to read the soil gas responses
 - Preparation of site area sketch and taking of photos.
- The fieldwork involved the execution of a Geoprobe soil gas survey with the aim of determining the presence and concentration of hydrocarbon contaminant.
- 2008: Sudan – Groundwater Monitoring at the Port Sudan Installation, Port Sudan**
Client: Shell Company of the Sudan Limited
 Carrying out the Groundwater monitoring activities at the Port Sudan Installation in Port Sudan, Sudan
 The groundwater monitoring exercise involved the following activities:
- Measurement of Groundwater Level using an Electric Deeper

- Use of Teflon tube and check valve to purge the three 3 piezometers/monitoring wells.
- Collection of groundwater samples from the piezometers/monitoring wells for insitu tests and laboratory analysis.
- Preparation of a groundwater monitoring report containing historical comparison of the analysis results.

2008: Kenya – Soil and Groundwater sampling and analysis for investigation of a product release

Client: Kenya Shell Ltd

The study entailed soil investigations to determine the extent of the product spread after a release in one of the USTs. It involved Soil Gas survey using the PID (Photo Ionization Detector), visual observations of soil and groundwater, situ measuring of pH and EC of groundwater samples collected from boreholes and wells in the neighborhoods and eventual sampling and analysis of groundwater and soil samples for lab analysis.

2008: Kenya: Environmental Bio-remediation of Sludges.

Client: Kenya Petroleum Refineries Limited

The project involves the supervision of the construction of a bioreactor for treatment of sludge material and the collection of soil and groundwater samples for lab analysis. Periodical site environmental assessment is carried out to determine sludge biodegradation progress and thereby provide mitigation measures.

2007: Tanzania - Installation of 5 monitoring wells to a maximum depth of 4 metres below ground level at BP Zanzibar Depot.

Client: ERM Southern Africa

The five monitoring wells were advanced by hand auger and cased to prevent collapse and ensure the correct installation of monitoring wells. The project included logging, field screening and sample collection.

Monitoring wells were constructed of 63 mm diameter PVC piping (or equivalent) screened to approx 1m above the water table with a plain riser from the top of the screened section to the ground level.

A clean gravel pack surrounded the screened section and a bentonite seal was put in place from the top of the gravel to the surface.

2007: Kenya – Self Environmental and Occupational Health & Safety Audits for 135 Sites

Client: Kenya Shell Ltd

The study entailed soil and groundwater investigations to determine environmental risk associated with the fuel storage and dispensing facilities to provide environmental assessment data in relation to the previous audit.

The report presented the results of the self audit in comparison with the previous Initial Audit carried out in 2004 including the current environmental status of the site

2007: Kenya - Environmental Soil and Ground water sampling - Kenya Cuttings Ltd

Client: ERM Southern Africa

The project involved the sampling of soil and groundwater. Four soil bores were advanced by means of the geoprobe, with continuous soil coring taking place. Groundwater was samples from existing and newly installed borehole within the site.

2001 - 2007 Kenya: - Environmental Bio-remediation of Sludges.

Client: Kenya Petroleum Refineries Limited

The project involves the supervision of the construction of a bioreactor for treatment of sludge material and the collection of soil and groundwater samples for lab analysis

2006: Kenya – Environmental Impact Assessment for Northern Corridor Transport Improvement Project
Client: Kenya Airports Authority / World Bank
 The project involves Consultancy Services for the Upgrading of Facilities at Kisumu and Wilson Airport Study and Rehabilitation / Upgrading of Airport Pavements Design Study at Jomo Kenyatta International Airport.


2006: Kenya – Environmental Impact Assessment for Lubrication Centre for Mobil within Kenya Ports Authority Mombasa
Client: Mobil Oil Kenya Ltd
 The EIA will evaluate the environmental performance of the project to satisfy the requirements of the National Environmental Management Authority (NEMA) and International Practices.

Languages:

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Kiswahili	Excellent	Excellent	Excellent

Certification:

I, the undersigned, certify that, these data correctly describe me, my qualifications, and my experience.



Date: **14 June 2017**

[Signature of staff member]



Date: **14 June 2017**

[Signature of authorized representative of the firm]

Full name of staff member: **Irene Wanjiku Muchoki**

Full name of authorized representative: **Richard Okello**

3. Fredrick Maseno – Safety and Occupational Health Professional

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Proposed Position: Health and Safety Expert
Name of Firm: Panafcon Ltd
Name of Staff: Fredrick Matoke Maseno
Profession: Safety & Health Management, Trainer and auditor
Date of Birth: 16th April 1966
Years with Firm/Entity: Associate **Nationality:** Kenyan

Membership of Professional Societies:

- Registered as an Occupational Safety Adviser – Directorate of Occupational Safety and Health Services, Certificate No. OSH ADV/043
 - Registered as a Fire Safety Auditor – Directorate of Occupational Safety and Health Services, Certificate No. OSH FSA/069
-

Key Qualifications:

Fredrick Maseno holds a Master of Science degree in Safety Engineering. He has 26 years of experience in Construction Site Safety and Health Management; General Occupational Safety and Health Management, Risk Assessment, Safety and Health Auditing; Fire Safety Auditing; Construction Site Training Programmes Development and Implementation, Safety and Health Construction Sites Drawings Review, Construction Sites Safety and Health Method Statements Review and Disaster Management in Kenya.

He has been the construction Site Safety Manager at Olkaria I Additional Units and Olkaria IV Geothermal Power Plants Project in Kenya in the last three years. He has 7.5 years experience in on-site safety management. Fredrick has been engaged in various capacities in Kenya in Occupational Safety and Health Management and Training. He is very conversant with the local health and safety legislation.

Education:

2009 M.Sc. (Safety Engineering) - Washington International University
1989 B.Sc. (Hons) - University of Nairobi

Relevant Professional Experience:

- 2015-2016** **Howard Humphreys (EA) Limited in JV with China Wu Yi Limited**
 Participating in the Project as: **Health & Safety Supervisor**
 Involved in advising the joint partner in all matters involving safety health and environment.
 Construction safety in a road project in Mombasa-Port Reitz, Road C110, Moi airport Road project. Involving construction of bridges overpasses and interchanges.
- 2015** **Howard Humphreys (EA) Limited**
 Participating in the Project as: **Site Safety Manager**
 Consulting on enforcement of all safety, health and environment matters in the construction of a green gum manufacturing facility in Mavoko, Athi River, Machakos County.
 Project involved ground preparation, foundation preparation, steel structure erection, stone laying and roofing.
 Permits to work approval were done for all works.
 Risk assessment was done for every activity
- 2012-2015** **Howard Humphreys (EA) Limited**
 Participating in the Project as: **Site Safety Manager**
 - Monitoring Occupational Safety and Health in the execution of Olkaria I Additional Units and Olkaria IV Geothermal Power Plants Project, Naivasha. Project entailed
-

- Steam field development
 - Construction of two 140 MW power plants
 - Construction of HV substations and transmission lines.
- EHS objectives set for this project included;
- Identification of new hazards, assessment and control of risk.
 - Consultant meeting client's expectations and contractual obligations in monitoring safety performance on site.
 - Ensuring Project related EHS issues and learning's were communicated
 - Ensuring that lessons were learnt from near misses and potential incidents including accidents
 - Promoting EHS awareness amongst project team members.
 - Promoting EHS awareness and Consultant's safety culture among project team members including client
 - Ensuring excellent EHS performance was recognized
 - Ensuring Legal and contract requirements were met.

2010-2012

Howard Humphreys (EA) Limited

Participating in the Project as: **Health & Safety Officer**

- Providing professional Occupational Safety and Health advice to the office and clients.
- Monitoring Occupational Safety and Health standards in expansion Of Jomo Kenyatta international Airport.
- Monitoring Occupational Safety and Health standards in strengthening of Nairobi Water pipeline transmission for Athi Water Services Board.
- Involved in Occupational Safety and Health auditing and training for the Central Bank of Kenya.
- Carried Fire life and Safety Audit for Citibank, Nairobi.

2008-2010

Howard Humphreys (EA) Limited

Participating in the Project as: **Site Health & Safety Officer**

- Supervision of a Contractor on observation and maintaining of Occupational Safety and Health Standards in the construction of a geothermal plant for Kengen at Olkaria, Naivasha.
- The project involved construction of a 35 MW power plant being an extension to existing two units at Olkaria 2. Related construction of steam pipelines was done.
- Extensions were done to existing Olkaria 2 live substation.
- Hazards included a) Remote start up and shut down b) Live electrical circuits c) Noise/Vibration d) Corroded handrails, gratings and access structures e) Poor lighting f) Accumulation of geothermal gases g) Hot surfaces h) Hot fluids I) Tripping
- hazards j) Unpaved roads

2005-2006

Auditor/Trainer - Bureau Veritas Kenya Limited

- Executing Quality management system Implementation and Health and Safety training in accordance with DOHSS curriculum
- Carrying out Quality management system and safety surveys/audits
- Evaluating customers' compliance/conformity with legislations/standards as required
- Offering professional safety advice and consultancy on occupational safety and health concerns to customers as may be required.

2001-2003

Securicor Security Services (K) Limited

Participating in the Project as: **Safety Officer**

- Carrying out safety surveys/audits
- Ensuring safety procedures and instructions through inspections
- Ensuring close liaison and consultation with relevant individuals, organisations and government departments involved in and dealing with occupational health and safety matters (activity)

- Assisting in investigation of serious incident of safety at Securicor's premises and customers' assignment as need arises
- Offering professional safety advice and consultancy on safety to customers as may be required.
- Carrying out frequent fire-fighting and safety drills in order to maintain fire safety awareness and alertness.
- Drawing and updating fire orders and instructions
- Ensuring fire equipment are in place and in serviceable state

1992-2001

**District Occupational Health & Safety Officer Government of Kenya
Responsibilities:**

- Monitored trends in the occurrence of industrial accidents in order to identify gaps, and provide long-range planning.
- Conducted training in occupational health and safety for various industries.
- Inspection of factories and other workplaces in accordance with the Act. This included several visits to various industrial establishments, governed by the Act.
- Carrying out investigation of industrial accidents for purposes of the Act.
- Identified potential hazards and provided recommendations on enhancement.
- Provided solutions to various health and safety challenges as raised by industry.
- Evaluated compliance of the above industries with the requirements of Factories and other Places of Work Act, CAP 514.
- Varied experience for eleven (11) years dealing with various types of places of work both as a law enforcer and as well as offering advisory services.

1990-1992

**Occupational Health & Safety Officer Government of Kenya
Responsibilities**

- Primarily involved in the enforcement of the Factories and Other Places of Work Act (As Amended in 1990) Cap 514.
- Inspection of Factories and other workplaces in accordance with the said Act. This included several visits to various industrial establishments, governed by the Act.
- Conducted training in occupational health and safety for various industries.
- Identified potential hazards and provided recommendations on enhancement.
- Provided solutions to various health and safety challenges as raised by industry.
- Evaluated compliance of the above industries with the requirements of Factories and other Places of Work Act, CAP 514.

Languages:

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Kiswahili	Excellent	Excellent	Excellent

Certification:

I, the undersigned, certify that, these data correctly describe me, my qualifications, and my experience.



Date: **14 June 2017**

[Signature of staff member]



Date: **14 June 2017**

[Signature of authorized representative of the firm]

Full name of staff member: **Fredrick Maseno**

Full name of authorized representative: **Richard Okello**

4. Charles Ataya – Ecologist

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Proposed Position:	Ecologist		
Name of Firm:	Panafcon Ltd		
Name of Staff:	Charles Ataya		
Profession:	Zoologist		
Date of Birth:	1959		
Years with Firm/Entity:	Associate	Nationality:	Kenyan

Membership of Professional Societies:

Member of the International Institute for Aerospace Survey and Earth Sciences (ITC) Alumni – Kenya Branch.

Key Qualifications:

Mr. Ataya has Master in Zoology from Panjab University, Chandigarh, India and also Master in Environmental System Analysis and Monitoring (ESM2) from The International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, The Netherlands. He also holds a BSc. In zoology from Panjab University Chandigarh India.

Mr. Ataya has over 25 years experience is the Deputy/Head of Aerial Surveys Section in the Department, whereby he supervises Aerial Survey Census activities. He is also a Training Coordinator in admitting students on attachment from other institutions; identifying training needs for fellow staff members and representing the Department in the Ministerial Training Committee.

He has carried out the following activities as part of the ESIA projects undertaken

- Evaluation of biological conditions in the Proposed Project Area.
 - Plants of special significance; Forests
 - Evaluation of Positive & Negative impacts
 - Wildlife, Wetlands/River Ecosystems, Agricultural land
 - Project Alternatives & Mitigation Measures
-

Education:

2000:	M. Sc. (Environmental System Analysis & Management) - International Institute for Geo-Information Science and Earth Observation – (ITC)-The Netherlands
1985-1987:	Masters Degree (MSc) in Zoology - Panjab University, Chandigarh, India
1982-1985:	Bachelors Degree (BSc) in Zoology - Panjab University, Chandigarh, India

Professional Qualifications:

2009	Managing the Training and Development Function – GTI, Mombasa
2007:	Flood and Drought Monitoring In African Trans-Boundary Water Basins Department of Geomatic Engineering, Kwame Nkrumah University Of Science & Technology, Ghana
2006:	Senior Management Seminar (SMS) Kenya Institute of Administration (KIA)
2005:	Environmental Impact Assessment & Audit (EIA/A) Kenya Institute of Administration (KIA)
1998/00:	Master of Science In Environmental System Analysis And Monitoring (ESM2)

The International Institute for Aerospace Survey And Earth Sciences (ITC),
Enschede, The Netherlands

1991: Remote Sensing and Applications
The National Institute for Space Research (INPE) Brazil

Employment Record/Experience:

2007	Department of Resource Surveys And Remote Sensing (DRSRS), Nairobi Principle Natural Resource Scientist
2007-2003	Department of Resource Surveys And Remote Sensing (DRSRS), Nairobi Senior Ecologist
1995-2003	Department of Resource Surveys And Remote Sensing (DRSRS), Nairobi Ecologist I
1988-1995	Department of Resource Surveys And Remote Sensing (DRSRS), Nairobi Ecologist II

Relevant Professional Experience:

2016	<p>Kenya – Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) of the Proposed Relocation of Kipevu Oil Terminal (KOT) (ongoing)</p> <p>Client: Kenya Ports Authority (KPA)</p> <p>Participating in the Project as: Ecologist/Biologist</p> <p>The objective of the Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) Studies is to identify the environmental impacts of the proposed relocation on people and the environment. To determine project alternatives and cost effective mitigation measures plus a monitoring plan. Questionnaires will be used to collect data. The ESIA Study is going to identify and evaluate environmental impacts of the relocation on natural resources and operations in the project area and propose appropriate mitigation measures to minimize/eliminate impacts including safety measures. The RAP Study is going to evaluate any loss of structures and operations within the project area. Baseline socio-economic survey to generate data for monitoring and evaluation will be collected during the project cycle.</p> <p>An ESIA Study Report containing EMP and a Monitoring Plan will be prepared for submission to NEMA. A RAP Study Report will also be prepared. The ESIA Study will be carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies.</p>
2015	<p>Kenya: Review and Update the Environmental and Social Impact Assessment (ESIA) for the Proposed Rehabilitation of the Lodwar-Lokichogio-Nakodok 240Km (A1) Road</p> <p>Client: Kenya National Highways Authority (KeNHA)</p> <p>Participating in the Project as: Assistant Ecologist</p> <p>Objective of Reviewing and Updating of Lodwar-Nakodok Road ESIA Study were:</p> <p>Reviewing and updating the ESIA Study Report compiled in 2013;</p> <p>Ensuring all environmental consequences of construction and operation of the road are evaluated and addressed as part of the mitigation measures in the final road design; Review and update the Draft ESIA Report to conform with World Bank Operational Policies and Kenya National Highways Authority (KeNHA) requirements;</p> <p>To identify gaps in the Draft ESIA Report and address them in the revised version;</p> <p>To conduct second Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the project.</p>

- 2014** **Kenya – Environmental and Social Impact assessment (ESIA) Study for the propose Isinya – Nairobi East 400kV Transmission Line**
Client: Kenya Electricity Transmission Company Ltd (KETRACO)
Participated in the Project as **Ecologist**
The objective of the ESIA Study was to evaluate the Environmental and Social Impacts of the proposed Isinya- Nairobi East (75km) 400kV Double Circuit Line and Sub stations project. Use questionnaires to collect data.
The ESIA Study was to identify and evaluate the impacts of the project on natural resources, animals and persons living in the project area and propose appropriate mitigation measures to minimize or eliminate impacts. Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle was carried out. An ESIA Study Report containing EMP and a Monitoring Plan was prepared. The ESIA study was carried out with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies The ESIA report was submitted to NEMA and the EIA licence issued to the client.
- 2014** **Kenya: Environmental and Social Impact Assessment (ESIA) for the Proposed Athi river- Mariakani Axle Load Control Station.**
Client: Kenya National Highways Authority (KeNHA)
Participating in the Project as: Ecologist/Biologist
The objective of the Proposed Reconstruction and Modernisation of Athi RiverAxle Load Control Station is to improve the infrastructure of the weigh bridge station and achieve the following:
- Enhance road safety and improve working conditions at the station;
 - Preserve road infrastructure.
 - Optimise road transportation through reduction of time spent at the axle load station;
 - Eliminate interruption of traffic flow by trucks that cross from one side of the highway to another to have their axle loads checked.
 - Eliminate/reduce health and safety risks posed by roadside packed trucks containing explosive or dangerous cargo
 - To conduct Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project and disclose the positive and negative impacts of the project
- To conduct a Public Consultation Meetings to sensitise all the stakeholders about the project, seek their inputs into the project design and disclose the positive and negative impacts of the project.
- 2013:** **Kenya - Consultancy Services for the Environmental & Social Impact Assessment Environmental & Social Impact Assessment for the Proposed Sondu-Homa Bay-Awendo-Migori-Isebania132 kV Transmission Line**
(Client: Kenya Electricity Transmission Company Ltd KETRACO)
Participating in the Project as Ecologist
The main objectives of this consultancy services include but not limited to the following:
- to comply with the Environmental Management and Coordination Act (EMCA) 1999 as stipulated in the Environmental (Impact Assessment and Audit) Regulations 2003 Legal Notice No. 101.
 - to verify the adherence and compliance of the World Bank's Safeguard Policies.
 - to ensure that the above project is implemented in an environmentally and socially sustainable manner.
- 2013** **Kenya - Consultancy Services for the Environmental & Social Impact Assessment of Mombasa – Nairobi 400kV Transmission Line (Alternative A – Kibwezi)**
Client: Kenya Electricity Transmission Company Ltd KETRACO
Participating in the Project as: **Ecologist**

The main objectives of this consultancy services include but not limited to the following:

- To ensure that the above project is implemented in an environmentally and socially sustainable manner.
- To provide an ESIA report to KETRACO and their financiers prior to the finalization of financial decision regarding the Kibwezi section of the line
- Alternative A is considered the most preferred/ optimal alternative out of 6 alternative routes identified by the initial ESIA Consultant.

2013

Kenya- Environmental & Social Impact Assessment for the Study for Proposed Lower Nzoia Irrigation Development Project-Phase II

Client: National Irrigation Board (NIB)

Participating in the Project as: **Ecologist**

The objective of the ESIA Study was to evaluate the Environmental and Social Impact of implementing the proposed project in Lower Nzoia. Identify and evaluate impacts of the proposed project on the natural resources, animals and persons living in the project area and recommend appropriate mitigation measures to eliminate or minimize impacts and provide a monitoring plan.

Baseline socio-economic survey to generate data for monitoring and evaluation during project implementation cycle is to be carried out. The study is to determine loss of income (livelihood), cost of land and other property using the current market value.

An ESIA Study Report containing EMP and a Monitoring Plan is to be prepared. The study is to be done with reference to EMCA 1999, Environmental (Impact Assessment and Audit) Regulations, 2003, World Bank Safeguard Policies. The ESIA Study Report was submitted to NEMA and an EIA License issued to the client.

2010:

Name of assignment or project: Environmental & Social Impact Assessment (ESIA) and Resettlement Action Plan for Voi _Taita Taveta KPLC Transmission Line

Year: 2010

Location: Voi-Taita Taveta

Clients: Kenya Power & Lighting Company (KPLC)

Main project features : Fauna & Flora studies

Participating in the Project as Ecologist/ Deputy Team Leader

Activities performed: Identification of Biological environment (i.e., flora and fauna)

2008 - 2009:

Name of Assignment or Project: Part time Consultants on various projects Taking stock of Kenya's natural resources:

He has taken a lead role in carrying out aerial surveys census, especially for both wildlife and livestock & other associated parameters (Water, Vegetation, Land Use/Land Cover, Land Degradation, Soil etc.) since 1991. The analyzed information has been used in inventorying and establishing conservation/conditions of the wildlife (especially Elephant, Hirola, and e.t.c.), determining utilization of these animals and finally developed database of the same.

Leading and coordinating a team of Ecologists, Biologists & Technical Officers in carrying out projects in different study areas (multi-disciplinary approach).
Evaluating and Monitoring specific field programmes

Involved in evaluating and monitoring regular collection and analysis of data and information on land use, ecological renewable resources e.g. Forests, and environmental assessment and monitoring, project initiation, formulation and implementation by our staff.

Training of New Biologists/Ecologists & Technical Officers – (Induction)
Involved in carrying out Training Needs Analysis (TNA) for Older & Senior Staff.

Supervision of students on attachment from other institutions:
Involved in training students on attachment in the use of Remote Sensing Data, i.e. Satellite image and Aerial photo interpretation and generation of maps from these products.

Writing project proposals, Data Analysis and Technical Reports writing
This is important for information dissemination and publicity.

Assisted in relating the implication of Environmental Information gathered to long term National Development Planning Process in Resource utilization and Conservation which can lead to improving living standards and poverty alleviation.

Involved in the Preparation of Environmental Education and Awareness for sustainable Development Policy for NEMA

Languages:

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Kiswahili	Excellent	Excellent	Excellent

Certification:

I, the undersigned, certify that, these data correctly describe me, my qualifications, and my experience.



Date: **14 June 2017**

[Signature of staff member]



Date: **14 June 2017**

[Signature of authorized representative of the firm]

Full name of staff member: **Charles Ataya**

Full name of authorized representative: **Richard Okello**

Annex 3: ESIA Study Implementation Schedule

[illegible]

Annex 4: Terms of Reference (ToR) Certification Page

Proposed Mariakani-Dongo Kundu 220kV Transmission Line ESIA Study ToR for NEMA Approval

1. Consultant (Panafcon Ltd)

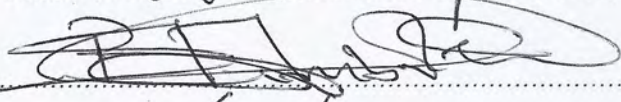
Submitted by:	Panafcon Ltd
Officer Name/Position:	Joshua P. Oyieko/Technical Director
NEMA Reg and No:	Lead Expert / Reg. No. 091
Signed:	
Date/Stamp	20-02-2018



2. Proponent – Kenya Electricity Transmission Company (KETRACO)

Company Name	KETRACO
Officer Name/Position:	GM, TS (Joseph Simi)
Signed:	
Date/Stamp	KENYA ELECTRICITY TRANSMISSION COMPANY LIMITED

3. National Environment Management Authority (NEMA)

Name of NEMA Officer	B. Mambote
Officer Name/Position:	Head of EA section
Signed:	
Date/Stamp	1/3/18

Annex 3: People Contacted during the Study

List of People Contacted During the ESIA Study

#	Stakeholder Name	Department or Organization
1.	Nakazawa Osamu RAP Expert JICA Design Team Email: nakazawa@ideacon.co.jp	<ul style="list-style-type: none"> • Provided Management Support and Project Information
2.	Takeshi Sato ESIA Expert, JICA Design Team Email: sato-t@ides-inc.co.jp	<ul style="list-style-type: none"> • Provided Management Support and Project Information
3.	Cyrus Mbisi EIA/RAP Expert, JICA Design Team Tel: 0720927259 Email: cmbisi@gmail.com	<ul style="list-style-type: none"> • Provided Project Information and support • Participated in the Community Sensitization Meetings
4.	Rahma Mwakisingo Research Assistant JICA Design Team Tel: 0712219475 Email: rahmamkoli@gmail.com	<ul style="list-style-type: none"> • Provided Project Information and support • Participated in the Community Sensitization Meetings
5.	Antony Musyoka Senior Manager, Planning & Projects Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100	<ul style="list-style-type: none"> • Provided Project Information and support
6.	Ramat Godana Senior Environment Expert Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100 Cell: 0720537137 E-mail: rgodana@ketraco.co.ke	<ul style="list-style-type: none"> • Provided Management Support and Project Information • Participated in the Community Sensitization and stakeholders Meetings
7.	Geoffrey Mirasi Senior Socio-Economist Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100 Cell: 0722 442297 E-mail: gmirasi@ketraco.co.ke	<ul style="list-style-type: none"> • Provided Management Support and Project Information • Participated in the stakeholders Meetings

#	Stakeholder Name	Department or Organization
8.	Violet Kaswii Engineer Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100 Email: vkaswii@ketraco.co.ke Tel: 0729317490	<ul style="list-style-type: none"> • Provided Project Information • Participated in the stakeholders Meetings
9.	Budgereee Lang'at Engineer Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100 Email: blang'at@ketraco.co.ke Tel: 0787141255	<ul style="list-style-type: none"> • Provided Project Information and support • Participated in the Community Sensitization Meetings
10.	Petro A. Munyalo Surveyor Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100 Email: pmunyalo@ketraco.co.ke Tel: 0717222795	<ul style="list-style-type: none"> • Provided Project Information and support • Participated in the Community Sensitization Meetings
11.	Edel S Lobo Land Economist Kenya Electricity Transmission Co. Ltd (KETRACO) P.O. Box 34942-00100	<ul style="list-style-type: none"> • Provided Project Information and support
12.	Teresa Njoki Kenya Civil Aviation Authority (KCAA) P. O. Box 30163 – 00100 Nairobi Tel:020-6827470 E-mail: tnjoki@kcaa.or.ke	<ul style="list-style-type: none"> • Received ESIA Team • Filled in stakeholder questionnaire
13.	Solomon K. Dallu Chief Mwavumbo Location 0715280300	<ul style="list-style-type: none"> • Received ESIA Team • Organized and participated in Public Sensitisation Meeting
14.	Ngala Mwamvula Kitangalia Representative Ministry Of Interior and Coordination Of National Government 0707256946	<ul style="list-style-type: none"> • Received ESIA Team • Participated in Public Sensitisation Meeting • Filled in stakeholder questionnaire
15.	Makanzu Rashid Makanzu Village Administrator 0710701696	<ul style="list-style-type: none"> • Participated in Public Sensitisation Meeting • Filled in stakeholder questionnaire

#	Stakeholder Name	Department or Organization
16.	Mwamwero B Katana Ward Administrator 0721787563	<ul style="list-style-type: none"> Participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
17.	Paul Rotich Ministry Of Interior and Coordination Of National Government 0722425605	<ul style="list-style-type: none"> Received ESIA Team Participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
18.	Kathambi Jane Ministry Of Interior and Coordination Of National Government 0727476647	<ul style="list-style-type: none"> Received ESIA Team Participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
19.	Abdalla Salim Chief, Mbunguni Location Ministry Of Interior and Coordination Of National Government 0726480864	<ul style="list-style-type: none"> Received ESIA Team Organized and participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
20.	Mr Fred Ndambuki Personal Assistant To Governor Kilifi Governor's Office Phone: 0720745932	<ul style="list-style-type: none"> Received ESIA Team
21.	Mr Juma Mwamuuga Ward administrator Mariakani Ward Phone: 0705889704	<ul style="list-style-type: none"> Received ESIA Team Participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
22.	Mr Godana Ethulo Wilson Kaloleni Sub-County Sub-County Administrator 0720566388	<ul style="list-style-type: none"> Received ESIA Team Participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
23.	Mr Baya Energy Department Kilifi County Government Tel: 0773854544	<ul style="list-style-type: none"> Received ESIA Team
24.	Prof. James K. Guzo, Chief Executive Officer, Land, Energy, Housing, Physical Planning & Urban Development Tel: 0725824648	<ul style="list-style-type: none"> Received ESIA Team
25.	Yusuf Mohamed Assistant County Commissioner Kilifi North Sub-County Cell: 0738338185	<ul style="list-style-type: none"> Received ESIA Team

#	Stakeholder Name	Department or Organization
26.	Rachel Umazi Assistant Director, Lands, Surveys & Valuation Kilifi County, Cell:0720459290	<ul style="list-style-type: none"> Received ESIA Team
27.	Stephen Rotich, Assistant County Commissioner Kaloleni Sub-County Office Kizulini – Near Kaloleni Cell: 0722425605	<ul style="list-style-type: none"> Received ESIA Team
28.	Evans Achoki County Commissioner Mombasa County Cell: 0720881157 Email: cc.mombasa@interior.go.ke	<ul style="list-style-type: none"> Received ESIA Team
29.	Alex Mlevu Deputy County Commissioner Likoni Sub County 0722508788	<ul style="list-style-type: none"> Received ESIA Team
30.	Athumani Mwatsenga Jiti Chief Ng'ombeni Location 0723029497	<ul style="list-style-type: none"> Received ESIA Team Organized and participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
31.	Benson Kokoi Assistant Chief Munyenzeni Sub location 0724024180	<ul style="list-style-type: none"> Received ESIA Team Organized and participated in Public Sensitisation Meeting
32.	Umazi Mwangolo Chief, Gandini Location 0717077624	<ul style="list-style-type: none"> Received ESIA Team Organized and participated in Public Sensitisation Meeting
33.	Mwatabu Ali Mwamkanyi Assistant Chief Mbunguni sub-Location 0737674853/ 0727480831	<ul style="list-style-type: none"> Received ESIA Team Organized and participated in Public Sensitisation Meeting Filled in stakeholder questionnaire
34.	Fatuma Hamisi Chief, Mrongwe Location 0721646279	<ul style="list-style-type: none"> Received ESIA Team
35.	Mr Nathan Gatundu Kenya Wildlife Service (KWS) Kwale Office	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information

#	Stakeholder Name	Department or Organization
36.	Mr George Waka Ecosystem Conservator Kwale Office	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
37.	Mr Vitalis C. Osodo Forest Manager Kwale Station	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
38.	Mr Joseph Indo County Forester Kwale County	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
39.	Mr Abdulrahman Matano National Museums of Kenya (NMK) Ukunda Office E-Mail: cfcukwale@yahoo.com	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
40.	Mr Elias Kimaru World Wildlife Fund (WWF) Ukunda E-Mail: ekimaru@wwfkenya.org	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
41.	Mr Bernard Ochieng Kenya Wildlife Services Kwale County Research Officer – Shimba Hills National Reserve and Tsavo West National Park E-Mail: bochieng@kws.go.ke	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
42.	Mrs Virginia P. Kingori Forest Officer Kaloleni, Mariakani District Kilifi County	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
43.	Mr Albert Nyabuti Ecosystem Conservator Mombasa County	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
44.	Madam Mdamu Jackline Forester, Dongo Kundu Area County of Mombasa	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information
45.	Fridah Dermmillah Obare Community Education and Extension Warden Mombasa	<ul style="list-style-type: none"> Received ESIA Team Provided Project Information

#	Stakeholder Name	Department or Organization
46.	Paul Gacheru Nature Kenya National Museum of Kenya Museum Hill P.O Box 44486 00100 GPO Nairobi, Kenya Wireless +254 (0) 20 3537568 Mobile +254 771 343138/780 149200 Email: office@naturekenya.org	<ul style="list-style-type: none"> • Received ESIA Team • Provided Project Information • Reviewed the TL
47	Peter Migai World Wildlife Fund (WWF) Mvuli Park, Mvuli Rd, Nairobi Tel: 0722 203407 E-mail: pmuigai@wwfkenya.org	<ul style="list-style-type: none"> • Received ESIA Team • Provided Project Information • Reviewed the TL