**Momnai Energy Ltd**

# *Environmental, Social & Health Impact Assessment (ESHIA) for:*

*11 May 2022*

***Final Report***

*33kV Transmission Line at Bamburi, Mombasa County*

## *Main Report*


**Prepared by:**
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*11 May 2022*

***Final Report***

*33kV Transmission Line at Bamburi, Mombasa County*

## *Main Report*

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## CERTIFICATION

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| *Position:* | **Firm of Experts** |
| *NEMA Reg.* No: | **0184** |
| *Date/Stamp:* | 11 May 2022 |

PANAFCON LIMITED P.O. Box 53147 - 00200, NAIROBI 11 MAY 2022

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| *Position of Officer*: | **ESG Associate** |
| *Signed:* | |
| *Date/Stamp:* | **11 May 2022** |

## LIST OF ACRONYMS

| | |
|---|---|
| ACC | Assistant County Commissioner |
| AAMLE | Aerodromes Anes Meteorology Legislation Enforcement |
| BD | Biological Diversity |
| BP | Bank Procedure |
| °C | Degrees Celsius |
| CBOs | Community Based Organisations |
| CSR | Cooperate Social Responsibility |
| DC | District Commissioner |
| DCC | Deputy County Commissioner |
| DDO | District Development Officer |
| DDP | District Development Plan |
| DEO | District Environment Officer |
| DO | District Officer |
| EMCA | Environmental Management and Coordination Act (1999) |
| EMP | Environmental Management Plan |
| ESHIA | Environmental, Social & Health Impact Assessment |
| GBV | Gender Based Violence |
| GHG | Green House Gas |
| GoK | Government of Kenya |
| Ha | Hectares |
| KCAA | Kenya Civil Aviation Authority |
| KeNHA | Kenya National Highways Authority |
| Km | Kilometres |
| KMC | Kenya Meat Commission |
| kV | Kilo Volts |
| KWS | Kenya Wildlife Service |
| m | metres |
| M | Million |
| m asl | metres above sea level |
| Mm | millimetres |
| NEMA | National Environment Management Authority |
| OSHA | Occupational Safety and Health Act |
| PCM | Public Consultation Meeting |
| PDP | Part Development Plan |
| PPA | Power Purchase Agreement |
| PPE | Personal Protective Equipment |
| ROW | Right of Way |
| SEA | Sexual Exploitation and Abuse |
| SH | Stakeholder |
| STI | Sexually Transmitted Infection |
| TB | Tuberculosis |
| TL | Transmission Line |
| TOR | Terms of Reference |
| UNEP | United Nations Environment Programme |
| URTI | Upper Respiratory Tract Infection |
| UTI | Urinary Tract Infection |
| UTM | Universal Transverse Mercator |
| VAC | Violence Against Children |
| WRMA | Water Resources Management Authority |
| µS/cm | Micro siemens per Centimetre |

## PROJECT SUMMARY

| | |
|---|---|
| Consulting Services for: | **Consultancy Services for carrying out Environmental, Social and Health Impact Assessment (ESHIA) Study for the Proposed 33kV Transmission Line (TL) at Bamburi, Mombasa County** |
| Project Objectives | Momnai Energy Ltd intends to develop a 33kV Transmission Line (TL) at Bamburi, Mombasa County. Bamburi Cement PLC will provide land on sub-lease basis for the project for 25 years at its production site in Mombasa off Mombasa – Malindi Road.<br><br>The TL will be connected to the existing sub-station at the Bamburi Cement Plant. Bamburi has entered into a Power Purchasing Agreement (PPA) with the project company. The TL will be confined within Bamburi Cement PLC land. |
| ESHIA Study Objectives: | The main objective of the ESHIA Study is:<br>To evaluate the Environmental and Social Impacts that will arise from the Proposed 33kV Transmission Line that will be installed within Bamburi Cement PLC land in Bamburi. The ESIA Study was to;<br>• Identify the Environmental, Social and Health Impacts of the proposed project.<br>• Recommend appropriate and cost-effective mitigation measures to address project impacts during construction and operation.<br>• Generate baseline data for monitoring and evaluation of how well the mitigation measures will be implemented during the project cycle.<br>• Evaluate and identify viable project alternatives.<br>• Prepare an Environmental, Social and Health Impact Assessment Study Report compliant with the Environmental Management and Coordination Act (1999) including the subsequent NEMA Regulations, IFC Performance Standards, World Bank Group EHS Guidelines, EIB Environmental and Social Standards and the ILO Conventions detailing Project Impacts, Project Alternatives, Proposed Mitigation Measures, Environment Management and Monitoring Plans and Decommissioning. |
| Client: | **Momnai Energy Ltd** |
| Consultants: | **PANAFCON Ltd** |
| Report Title: | **ESHIA Study – Final Main Report** |
| Submission Date: | **11 May 2022** |

# EXECUTIVE SUMMARY

## E.1 INTRODUCTION

Momnai Energy Ltd intends to develop a 3km long 33kV Transmission Line (TL) at Bamburi, Mombasa County. Bamburi Cement PLC will provide land on sub-lease basis for the project for 25 years. The TL starts at the proposed 33kV switch station located at the boundary between Block A and Block B. The TL will run southwards to the existing substation at the Bamburi Cement Plant. The TL will be confined within Bamburi land.

### E1.1 Project Location

The proposed project area is in Bamburi Location, Kisauni Sub County in Mombasa County. It borders Kilifi County to the north and Kwale County to the south. The 3km 33kV Transmission Line (TL) will run southwards from the solar plant 33kV switch station located at the boundary of Block A and Block B. Approximately 1km of the TL will run along the western boundary of Block A and continue southwards following an existing road to the substation within Bamburi Cement Plant. The coordinates at the start of the Transmission Line are; Start Terminal (Solar Plant) UTM 580773mE, 9559812mN (LongLat: 39.71742, -4.00676) End Terminal (Substation) UTM 579542mE, 9557393mN (LongLat: 39.71742, -4.00676). The altitude of the area is approx. 20m above mean sea level.

### E1.2 ESHIA Study Objective

The main objective of carrying out the environmental, social and health impact assessment was to identify any likely significant impacts on the environment and any other receptors as a result of the project so as to develop appropriate mitigation measures to effectively manage these impacts. The evaluation of the project impacts was done in compliance with the National Environmental Legislation, IFC Performance Standards, EIB Environmental and Social Standards, The Environmental, Health and Safety (EHS) Guidelines and International Labour Organization (ILO) Conventions.

### E1.3 ESHIA Study Methodology

The ESHIA methodology followed a systematic process that predicted and evaluated the impacts the project could have on the physical, biological, social/ socio-economic and cultural environment, and identified measures that the Project will take to avoid, reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The study methodology comprised of the following activities:

- Preliminary Meetings;
- Desktop Review;
- Environmental Screening;
- Environmental Scoping;
- Stakeholder Engagement
  - ✓ Initial Stakeholder / Sensitization Meetings;
  - ✓ Public Consultation Meeting;
  - ✓ Public Disclosure Meeting.
- Environmental Baseline Data collection;
  - ✓ Site Evaluation and Collection of Biophysical Data
  - ✓ Soil and Water Analysis;
  - ✓ Ambient Air Quality Assessment;
  - ✓ Ambient Noise Assessment.
- Ecological/Archaeological Assessment;
- Baseline Socio-Economic Studies;
- Data Evaluation, Analysis and Reporting.

## E2 PROJECT DESCRIPTION

The proposed 3km long 33kV Transmission Line is going to evacuate power from the Solar PV Power plant to an existing sub station within the Bamburi Cement Plant. The evacuated power will solely be used by Bamburi Cement PLC for its operations.

## E3 LEGAL FRAMEWORK

The applicable frameworks that have been used in this study are:

**a) National Guideline**

- The applicable environmental and social regulations and policies in Kenya which include the Environmental Management and Coordination Act (EMCA) 1999 and the associated regulations.

  The proposed Utility Solar PV Power Plant and TL is listed under the second schedule of section 58(4) of the Environmental Management and Coordination Act, 1999 (Rev, 2015) and Legal Notice No. 101 of June 2003 (Environmental Impact Assessment and Audit Regulations (Rev. 2019) as a project to be subjected to an Environmental Impact Assessment (EIA). It is categorized as medium risk project.

**b) International Standards that include:**

- Under the IFC Performance Standards (2012), the proposed project has minimal environmental and social impacts that will arise during construction and operation therefore falls under Category B of IFC PS1.

**The Applicable IFC Performance Standards used in the study**

| PS | Performance Standard | Remarks |
|---|---|---|
| PS1 | Assessment and Management of Environmental and Social Risks and Impacts. | ***Applicable*** There are Environmental and Social risks that will arise during construction |
| PS 2 | Labour and Working Conditions | ***Applicable*** The project is going to employ skilled and unskilled workers to offer services in the project and their welfare will need to be taken care of. |
| PS 3 | Resource Efficiency and Pollution Prevention | ***Applicable*** There are project activities like maintenance of vehicles and machines, fugitive dust and exhaust emissions that have the potential to cause pollution. |
| PS 4 | Community Health, Safety, and Security | ***Applicable*** Community members will be employed in the project. Project vehicles will also be transporting materials and waste outside the site exposing community members to safety risks |
| PS 5 | Land Acquisition and Involuntary Resettlement | ***Not Applicable*** There are persons occupying the project land hence there will be no displacement |
| PS 6 | Biodiversity Conservation and Sustainable Management of Living Natural Resources | ***Applicable*** Project is located in a modified natural habitat with flora and fauna. Hence there will be habitat loss and fragmentation of natural habitat |
| PS 7 | Indigenous Peoples | ***Not Applicable*** There are no indigenous peoples in the project as described in PS 5 |
| PS 8 | Cultural Heritage | ***Not Applicable*** Site evaluation has been done and a no objection to proceed given. However, a "Chance Find Procedure" has been provided should the Contractor encounter anything of cultural importance. |

- EIB Environmental and Social Standards According to EIB Environmental and Social Standards, the project is listed under Annex II - Industry Energy that requires screening and development of necessary mitigation measures and therefore falls under Category B.

**The Applicable EIB Environmental and Social Standards used in the study**

| Standards | Standard | Remarks |
|---|---|---|
| 1 | Environmental and Social Impacts and Risks | ***Applicable***<br>ESHIA Study is being carried out to identify potential impacts for mitigation |
| 2 | Stakeholder Engagement | ***Applicable***<br>There are stakeholders that need to be meaningfully consulted and engaged |
| 3 | Resource Efficiency and Pollution Prevention | ***Applicable***<br>Project will use machines and vehicles that can impact soil and other resources |
| 4 | Biodiversity and Ecosystems | ***Applicable.***<br>Project is located in a modified natural habitat with flora and fauna. Hence there will be habitat loss and fragmentation of natural habitat |
| 5 | Climate Change | ***Not Applicable***<br>The Solar PV Power Plant project is addressing climate change by endeavouring to reduce GHG |
| 6 | Involuntary Resettlement | ***Not Applicable***<br>*There are no persons being displaced* |
| 7 | Vulnerable Groups, Indigenous Peoples and Gender | ***Partially Applicable***<br>*The project area has gender issues* |
| 8 | Labour Rights | ***Applicable***<br>The project will employ people and there is potential for labour influx. Worker's rights issues will arise |
| 9 | Health, Safety and Security | ***Applicable***<br>There construction activities that will pose safety risks hence require assessment |
| 10 | Cultural Heritage | ***Not Applicable***<br>*Site evaluation has been done and a no objection to proceed given. However, a "Chance Find Procedure" has been provided should the Contractor encounter anything of cultural importance.* |

- The World Bank (WB) Group's Environmental, Health and Safety (EHS) Guidelines were also applied.

## E.4 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

### E4.1 The Physical Environment

The site area is generally uneven arising from the past mining activities. The area is dominated by *Casuarina equisetifolia* plantation with some indigenous species mostly on the periphery and a few woody or climbing species in the interior. Other species found in relatively high numbers include the invasive *Leucaena leucocephala* and *Azadirachta indica* and several grass species. The trees within this area have been grown under the restoration program being carried out by Bamburi Cement PLC. The area is served with murram roads where the transmission line will traverse from the solar plant to the substation.

### E4.2 Climate

Rainfall is bi-modal with the long rains usually starting from March/April and continues until July, while the short rains occur in November and December. Total annual precipitation averages 1,100 mm. The highest average monthly rainfall occurs in May (230mm) while the lowest average monthly rainfall occurs in the month of February (15mm). The hottest months are January-March (33°C). The lowest temperatures are recorded in the months of July (18°C).

### E4.3 Topography

The site area has slightly uneven topography due to the mining activities that have been carried out.in the past. The elevation of site area is approx. 20m above sea level.

Having been previously excavated for fossil coral limestone that is then burned into cement clinker, some level of rehabilitation was carried out. However, the area topography has uneven ground arising from the previous material extraction activities.

### E4.4 Geology and Soil

The Geology of Bamburi area is composed of Coral Limestone of Pleistocene age. The rock is a well-bedded, compact, slightly siliceous, muddy limestone with thin partings of sandy shale and stringers of crystalline calcite.

The soils are 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 project site was previously an active material source area for Bamburi Cement, however after the extraction of materials, the site area has been rehabilitated and flora and fauna introduced.

### E4.5 Baseline Data Collection and Analysis

In order to have baseline data for future monitoring purposes, on site ambient air and noise measurements was carried out. Further, soil and water samples were collected for laboratory analysis. The results are provided in **Appendix 6,7, 8,and 9.**

#### a) Soil and Water

Soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) and Heavy Metals [Lead (Pb), Nickel (Ni), Cadmium(Cd), Mercury (Hg), Chromium (Cr) and Lithium (Li)]. All the parameters analyzed were found to be within the limits contained in the National Environment Management Authority (NEMA) Environmental Inspection and Monitoring Manual (developed for petroleum industry) Document Revision Draft 2.0 Issued October 2020.

#### b) Ambient Air Quality

Air samples were analyzed for Particulate Matter ($PM_{10}$ and $PM_{2.5}$), Sulphur Dioxide ($SO_2$), Nitrogen Dioxide ($NO_2$). All the parameters analyzed were found to be within the limits contained in the Environmental Management and Coordination Act (Air Quality) Regulations 2014.

#### c) Ambient Noise Levels

The assessment was undertaken using a Larson Davis 870 precision integrating Sound Level Analyser with 902 pre-amplifier and integrated with a speed monitor. The noise level assessment undertaken at the proposed project site at Bamburi has shown that the locations registered noise levels that complied with the maximum Occupational Exposure Levels (OEL) as contained in the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009.

#### d) Ecological Resources

Using standard methodology, a detailed field survey of different species of flora and fauna occurring in the site area was conducted. This included Plants, Mammals (bats, small & large mammals) Avifauna (birds), Herpetofauna (reptiles and amphibians) and Invertebrates. The proposed site for the construction of the Solar PV Power Plant in Mombasa can be classified as 'Modified' following guidelines provided by IFC; which means the land has a large proportion of plant species that are of non-native origin, and/or human activity has substantially modified the area's primary ecological functions and species composition prior to the onset of a project.

Three (3) blocks of land (A, B & C) measuring an estimated 65ha in total and TL Corridor were surveyed for different taxonomic groups. Block A (Lat.-3.986142, Long. 39.729773) located south of the start of Bamburi airstrip, had been mined of coral limestone about five years ago with all-natural vegetation lost, and had been restored with *Casuarina equisetifolia* trees.

Block B (Lat. -3.981802, Long. 39.729763) borders local community to the west, and Bamburi airstrip to the east. This area is characterised by the various indigenous trees, a few Doum palms (*Hyphaene thebaica*), as well as many coastal deciduous trees and bush species averaging at most 10m tall.

Since the project site is neither a protected area nor a key biodiversity area, and given that not many IUCN listed species occur at the site, it is considered that the project will not have major impacts on biodiversity if the proposed mitigation measures are adhered to.

The detailed ecological study report is provided under **Appendix 12**.

**e) Physical Cultural Resources**

Archaeological and Cultural Heritage impact assessment has been undertaken to identify and ensure the protection of archaeological and cultural heritage assets associated with the project footprint area/sites to ensure that effective management and mitigation controls are in place. The result indicates that there are no cultural heritage (archaeological & historical) sites and features in the project study area, since the site had previously been mined and refiled, any cultural materials that are likely to be found on site are therefore going to be in secondary context.

Therefore, the proposed development of the TL will not result in the damage, destruction and long term (permanent) loss of archaeological heritage resources specifically burials or terrestrial archaeological resources because there will be no further excavation beyond the previous excavation on site and construction and installation activities. The impact of the proposed surface clearance will be minimal and restricted to the areas where the TL, access roads and associated infrastructure will be located and will not affect the entire project area. Given the low archaeological and cultural sensitivity of the general wider project area the intensity of the impact is regarded as being low. However, this report has provided a "Chance Find Procedure" that will be used by the Contractor to safeguard any findings. A Chance Finds Procedure (CFP) has been provided under **Appendix 13** for this purpose.

**f) Socio-economic Environment**

The project is located in Kisauni Sub County which is a peri urban area. From the socioeconomic survey which was carried out, the main economic activity in the area is commercial enterprises and accounts for 50% of the total number of respondents. These are informal businesses including food kiosks, vegetable vendors among others. The income from the businesses is generally low for most families. Farming is minimal accounting for only 9% as the area is predominantly urban. Individuals earning their livelihoods through employment accounts for 15%. Major employers include the hotel industry, the Kenya Ports Authority, the Government of Kenya, Container Freight Terminals and various private institutions such as banks.

## E5 ANALYSIS OF PROJECT ALTERNATIVES

An analysis of "With" and "Without" Project scenario reveals that the positive impacts outnumbered the adverse impacts of the proposed development. The adverse impacts are envisaged only during the construction phase which will be temporary in nature and of a short duration. Appropriate mitigation measures will be adopted to limit these adverse impacts during the construction phase. The proposed project will reduce dependence of fossil fuel for production of power resulting into considerable reduction in greenhouse gas emissions thereby reducing the carbon footprint. The evacuated power will alleviate day time interruption of electricity supply to the Grinding Plant.

## E6 PUBLIC AND STAKEHOLDER CONSULTATIONS AND DISCLOSURE

Public consultations were carried out as an integral part of the social and environmental assessment process of the project with an objective to inform and educate stakeholders about the proposed actions, and to receive and record public perceptions about the project. It assisted in identification of the likely issues and problems associated with the project as well as the needs and concerns of the population likely to be impacted.

This participatory process helped in addressing the public concerns about the project and also provided an environment where the local people gave their input on the proposed project hence making them part and parcel of the development process.

### E6.1 Key Informants Interviews

Initial engagement with Key Stakeholders was done in November 2021. Further consultations were carried out in February 2022. Each Key Stakeholder was visited, briefed on the proposed project, before their views were sought through an interactive interview session. They were also provided with questionnaires. Outcome of the interviews are summarized in **Table 38**, the minutes and attendance registers are given under **Appendix 3**.

### E6.2 Public Consultation Meeting

The Public discussion meeting was held on 8th February at Maweni Bamako Grounds, in Bamburi Location Kisauni Sub County. The local community and relevant stakeholders including both government and private sector representatives participated in this meeting.

The meeting was attended by a total of 154 people (84 men and 70 female). The agenda, minutes of the meeting, list of participants and attendance sheets are provided as **Appendix 4** of this report.

### E6.3 Public Disclosure Meeting

Project impacts disclosure meeting was carried out on Thursday 28, April 2022. The meeting was convened to disclose the findings of the study and the project mitigation measures that will be carried out to mitigate the identified impacts. It also discussed the next steps in the project process. The key outcomes of the meeting were:

- The identified impacts can be managed through the mitigations provided in the ESMP;
- The community and the other stakeholders supported the implementation of the project.

The detailed outcome of the disclosure meeting is presented under **Appendix 5**.

## E7 PROJECT IMPACTS AND MITIGATION MEASURES

The project has both positive and potential negative impacts. Detailed evaluation of the impacts and mitigation measures are provided in Chapter 7 of this Report. A summary of these impacts including enhancement measures for the positive impacts and mitigation measures for the negative impact are provided below.

### E7.1 Positive Impacts

a) ***Climate Change Mitigation and Adaptation*** – The TL will evacuate 14.5MWac of clean energy generated from the solar plant to be used at the Bamburi Cement Plant in Mombasa. The proposed enhancement measure is to have the youth taking interest in enhancing their knowledge in the green energy sector. The project can impart skills and knowledge of solar power technology to the youth through hands on engagement and training.

c) ***Employment opportunities for Youth and Community*** **-** The project will provide job opportunities for the youth and members of the community. The proposed enhancement measures include preparing and implementing a gender plan to promote equity in job issuance and offer training opportunities and apprenticeships to males and females in Bamburi area in order to enhance their skills.

d) ***Services to Workers*** - The workers at the project will require various goods and services to be provided by the community members. Proposed enhancement measures include giving priority to Bamburi community members to provide goods and services. Such services should be on an arranged programme making the community members offering such services maximize benefits from their services.

e) ***Sourcing for Locally Available Materials -*** During construction, materials that will be used in the project that are available locally shall be sourced from local suppliers. Proposed enhancement measure includes offering opopportunity to supply building materials such as cement, sand and other small accessories and tools to Bamburi community members as first priority.

f) ***Evacuation of Clean Energy for Use by Bamburi Cement -*** The TL will evacuate 14.5MWac of clean energy generated from the solar plant to be used at the Bamburi Cement Plant in Mombasa. This will contribute to lowering the need to use energy generated from sources that are releasing GHG. The proposed enhancement measures is that, the experience gained in this project will benefit other upcoming similar projects.

### E7.2 Negative Impacts and Mitigation Measures

**a) Fugitive Dust and Exhaust Emissions**

***Impacts*** - Fugitive dust and exhaust emissions will arise during construction activities at the site and vehicle movements inside the site and outside. Stockpile materials from excavations will also generate fugitive dust.

***Mitigations*** – Removal of vegetation form the project footprint areas only. Control of vehicles speeds and Sprinkling water to suppress dust. Vehicles should be well maintained and unnecessary raving of engines and idling should be minimized to reduce exhausted emissions. Workers to be provided nose masks to protect them from inhalation of fugitive dust and exhaust emissions.

**b) Noise Emissions**

***Impacts –*** Machinery and vehicles being used during construction will generate noise.

***Mitigations*** – Ensuring vehicles and machines are well maintained. Minimizing vehicle movements and instructing drivers to minimis raving of vehicles and other machinery. Workers to be provided ear muffs to protect them from excess noise.

**c) Biodiversity**

***Impacts*** – Site vegetation clearing will have impact on flora through loss of habitat and segregation. There is high potential for invasive species to invade cleared areas.

***Mitigations*** – Only clear vegetation from the project footprint areas. Carry out clearing of vegetation systematically and with caution to allow for fauna to migrate to neighbouring areas. Uproot any invasive species that emerge in a timely manner. Ensure workers do not kill any fauna encountered at the site. Promote the planting of trees in areas not directly affected and nurture them to grow.

**d) Physical Cultural Resources**

**Impacts –** Archaeological and Cultural Heritage impact assessment has been undertaken to identify and ensure the protection of archaeological and cultural heritage assets associated with the project footprint area/sites to ensure that effective management and mitigation controls are in place. The result indicates that there are no cultural heritage (archaeological & historical) sites and features in the project study area, since the site had previously been mined and refiled, any cultural materials that are likely to be found on site are therefore going to be in secondary context.

***Mitigations*** – It is thus recommended that the developer immediately notifies the National Museums of Kenya (NMK) if any archaeological materials are detected/uncovered in the course of project preparing the site for operation. A Chance Finds Procedure (CFP) is provided under **Appendix 10** for this purpose.

**e) Soil Erosion and Contamination**

**Impacts –** During site preparation, soil will be excavated and made loose**.** This will result in soil erosion and siltation of downstream surface water sources (ponds and wetlands). Oils, fuels and chemicals used at the site may spill on to the soil and cause contamination.

***Mitigations*** – Put in place soil control measures including compacting excavated soil, sprinkling of water and ensuring speedy removal of excavated soil for appropriate reuse or disposal. Machines and vehicles to be well maintained to avoid oil leaks to the ground. Oils, fuels and hydraulic fluids are to be stored on paved areas with containment.

**f) Solid and Liquid Waste**

***Impacts –*** During construction, the domestic waste from the contractor's camp and construction waste from construction activities will be generated. There will also be sanitary waste generated at the site.

***Mitigations*** – Contractor shall provide appropriate waste bins within the site and encourage waste segregation. A NEMA registered firm shall be engaged to collect waste for appropriate disposal. Sanitary waste shall also be collected by a NEMA registered firm. Hazardous waste like used oil and hydraulic fluid is generated, the Contractor shall manage the handling of such waste through the use of a Chain of Custody Form for accountability. A NEMA registered hazardous waste handling firm shall be engaged to dispose of such waste.

**g) Occupational Health and Safety**

***Impacts*** – Injuries or accidents may occur during construction arising from using machines and tools. Those working at heights may be exposed to falls.

***Mitigations*** – Contractor to prepare and implement and Occupational Safety and Health Management Plan (OSHMP) and provide workers with appropriate PPE to protect them from injuries. Those working at heights shall be provided with harnesses. Contractor to ensure PPEs are used appropriately by workers.

**h) HIV and Communicable Diseases STIs**

***Impacts –*** The project area is susceptible to the spread of HIV/AIDS and other communicable diseases

***Mitigations*** – Contractor to provide HIV/STIs Management Plan. And sensitize workers and the community on prevention mechanisms. Provision of protection items like condoms to be availed to workers.

**i) Community Health and Safety**

***Impacts -***The presence of machinery and vehicles moving in and out of the project site may pose safety risks to community members or those using the access road to the site.

***Mitigation*** – Evaluation of risks associated with vehicle and machine movements to be done and measures put in place including identification of appropriate routes and instruction of drivers to control speeds.

**j) Impact of Increased Traffic**

***Impacts –*** The Bamburi – Mtambo road that connects to the private road to the site has heavy traffic hence a high risk for accidents.

***Mitigations* –** The Contractor to prepare a Traffic Management Plan for construction activities. Traffic Marshals to be provided to control traffic at the junction of the road from the site and the Bamburi – Mtambo road to avoid accident occurring.

**k) Water Resources**

***Impacts*** – Construction activities will have modest demand for water.

***Mitigation* –** The water requirement for the construction of the TL will be supplied by a water bowser**.**

## E8 Grievance Management/Redress Mechanism

A Grievance Redress Mechanism GRM has been formulated to receive and facilitate resolution of complainants (project affected people, local community and workers) concerns and grievances regarding the project's performance during the construction, operation and decommissioning phases of the project. The mechanism will be able to address the concerns and complaints in a timely fashion by using an easy to understand, transparent and effective grievance redress process that is readily accessible to all segments of the project area population including workers and community members.

## E9 COMMUNITY DEVELOPMENT ACTION/FRAMEWORK

The Consultant engaged with the local community and from these consultations, certain socio-economic areas were found to be inadequate, a list of which has been provided under Chapter 9 of this report.

## E10 CONCLUSION AND RECOMMENDATIONS

### E10.1 Conclusion

The proposed TL is not expected to cause any significant adverse effects on the surrounding environment. The evacuation of power from the solar power plant to the sub-station will help Bamburi Cement PLC transition to use of clean energy, save costs and contribute to the reduction of GHG emissions.

### E10.2 Recommendation

The TL can be implemented at the proposed site. All the mitigation measures provided in the ESMP and the Monitoring Plan need to be implemented as indicated to safeguard the biodiversity and physical environment of the project area. Health and Safety of the workers and community members have also been identified as key areas that require dedicated observance. Environmental, Social and Health issues of the project need to be monitored, data analysed and used to improve the safeguards performance of the project.

# 1 INTRODUCTION

## 1.1 Project Background

Momnai Energy Ltd intends to develop a 3km long 33kV Transmission Line (TL) at Bamburi, Mombasa County. Bamburi Cement PLC will provide land on sub-lease basis for the project for 25 years. The TL starts at the proposed 33kV switch station located at the boundary between Block A and Block B. The TL will run southwards to the existing substation at the Bamburi Cement Plant. The TL will be confined within Bamburi land.

## 1.2 Project Proponent

The 33kV Transmission Line is being developed by:

***Momnai Energy Ltd***
The Pavilion,
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Bamburi Cement PLC has entered into a Power Purchase Agreement (PPA) with the Momnai Energy Ltd.

## 1.3 Project Location and Site

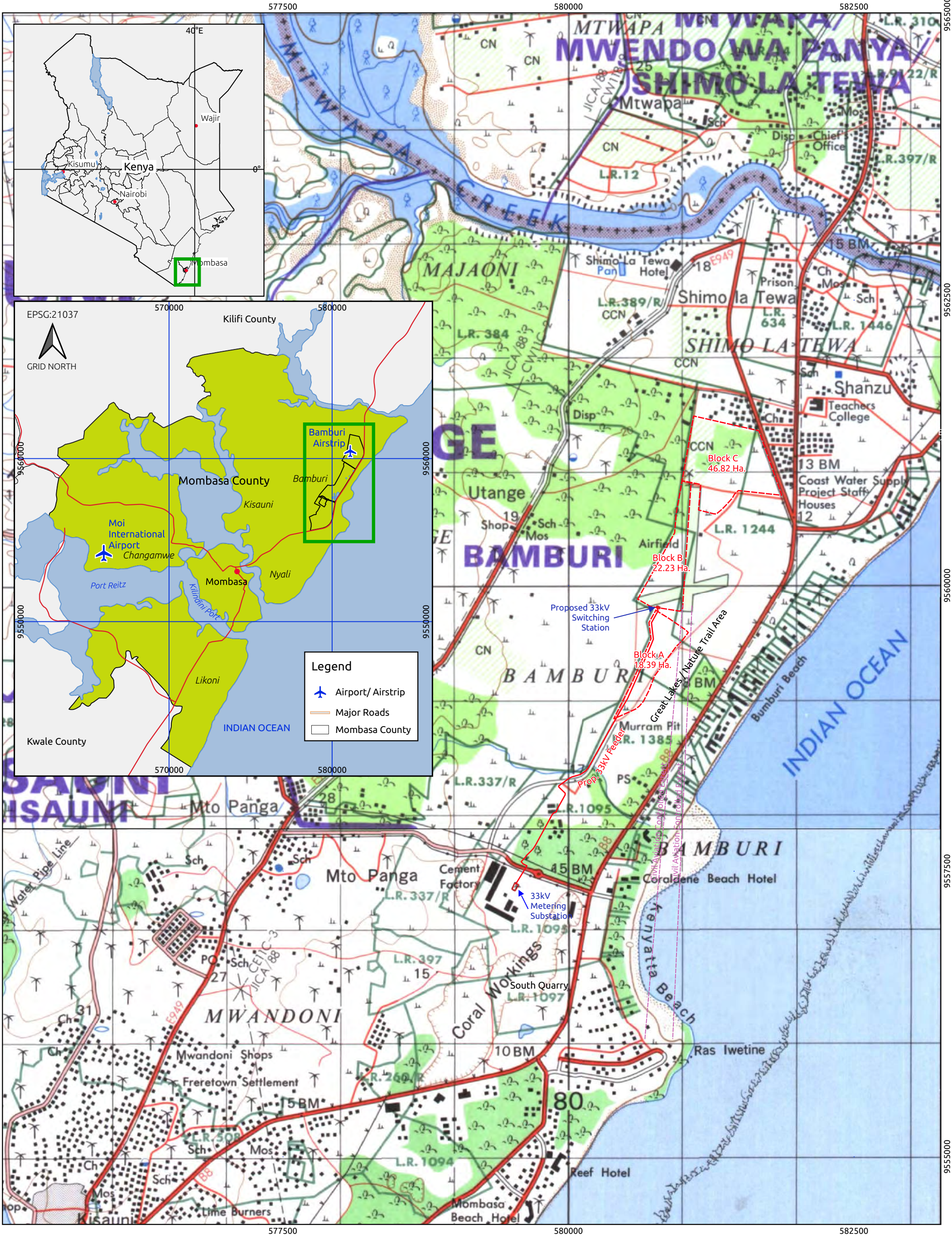
### 1.3.1 Project Location

The proposed 3km 33kV Transmission Line will run southwards from the solar plant 33kV switch station located at the boundary of Block A and Block B. Approximately 1km of the TL will run along the western boundary of Block A and continue southwards following an existing road to the substation within Bamburi Cement Plant. The coordinates at the start of the Transmission Line are; Start Terminal (Solar Plant) UTM 580773mE, 9559812mN (LongLat: 39.71742, -4.00676) End Terminal (Substation) UTM 579542mE, 9557393mN (LongLat: 39.71742, -4.00676). The altitude of the area is approx. 20m above mean sea level.

Refer to **Map 1** for the site location.

### 1.3.2 The Site

The Transmission Line will start off at the 33kV switch station located at the boundary Block A and Block B. It will then run southwards for approx. 1km along a murram road on the western boundary of Block A and then continue southwards to the existing substation located within Bamburi Cement Plant. Block A had been mined of coral limestone about five years ago and all-natural vegetation lost. The land has since been restored with *Casuarina equisetifolia* trees.




Environmental, Social and Health Impact Assessment for Proposed Momnai Solar Farm Power Project at Bamburi, Mombasa

Map Sheet 1 : Bamburi Power Plant Proposed Transmission Line

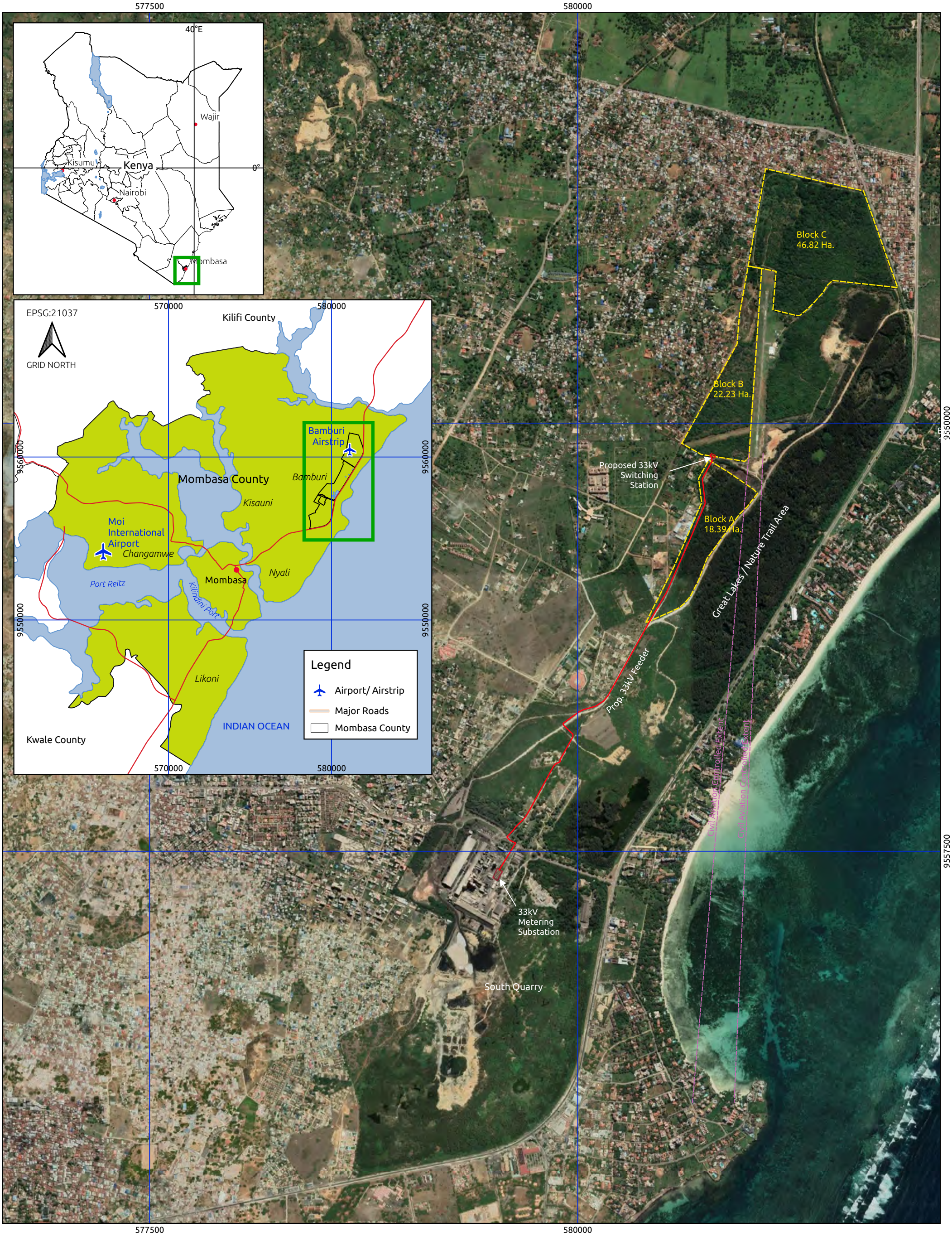
LEGEND

- Proposed Transmission Line
- Project Site Blocks

1000 0 1000 2000 m

EPSG:21037

Grid North




Environmental, Social and Health Impact Assessment for Proposed Momnai Solar Farm Power Project at Bamburi, Mombasa

Map Sheet 2 : Proposed Bamburi Power Plant Transmission Line

500 0 500 1000 m

EPSG:21037
Grid North

LEGEND

- Project Site Blocks
- Proposed Transmission Line

## 1.4 Power Generation

The electricity sub-sector in Kenya has witnessed various reforms that have led to efficiency and revamped competition. Electricity generation is completely unbundled with increased private sector participation while electricity transmission is undertaken by both Kenya Power and the Kenya Electricity Transmission Company (KETRACO). The distribution segment is mainly carried out by Kenya Power. However, a number of mini-grids have been licensed to supply to customers in marginalized areas and selected gated communities (EPRA, 2021).

### 1.4.1 Installed Electricity Capacity in Kenya

The total installed capacity with the inclusion of off-grid power was recorded at 2984MW as at May 2021. **Table 1** below presents an analysis of the installed electricity capacity by technology.

**Table 1: Power Generation Capacity (MW)**

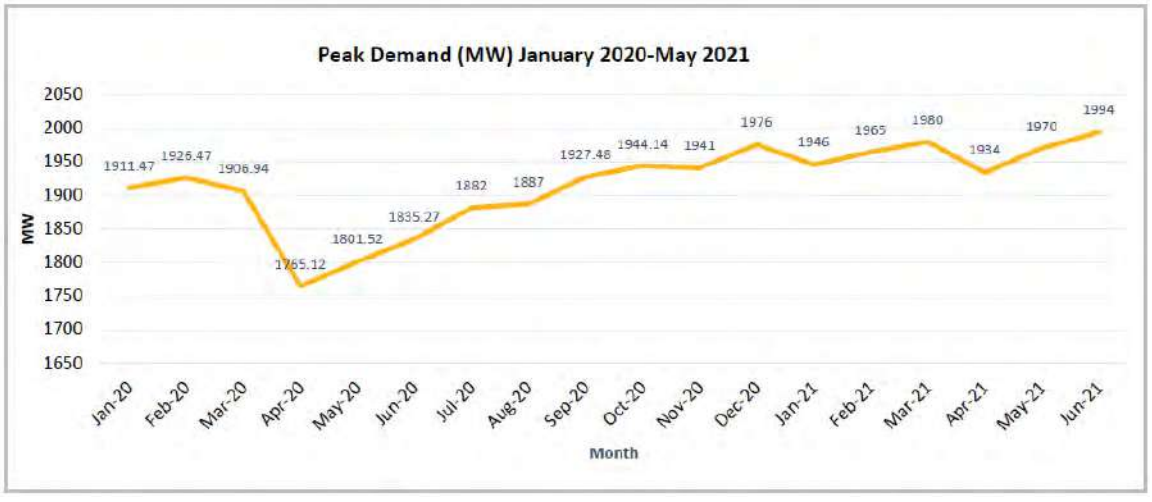
| Capacity in June 2021 | Installed MW | Effective MW |
|---|---|---|
| Hydro | 838.10 | 809.10 |
| Geothermal | 863.13 | 805.10 |
| Thermal (MSD) | 660.32 | 640.40 |
| Thermal (GT) | 60.00 | 56.00 |
| Wind | 435.50 | 375.50 |
| Biomass | 2.00 | 2.00 |
| Solar | 90.25 | 90.30 |
| **Interconnected System** | **2,949.30** | **2,788.40** |
| Off grid thermal | 31.50 | 21.30 |
| Off grid wind | 0.55 | - |
| Off grid solar | 2.26 | 1.90 |
| Imports | - | - |
| **Total Capacity MW** | **2,984.00** | **2,802.00** |

*Source: EPRA (2021)*

### 1.4.2 Analysis of Electricity Peak Demand

As per **Figure 1** below, the Peak demand was recorded at 1994MW on 8th June 2021 against a total installed capacity of 2984 MW.

**Figure 1: Trend in Peak Demand January -June 2021**



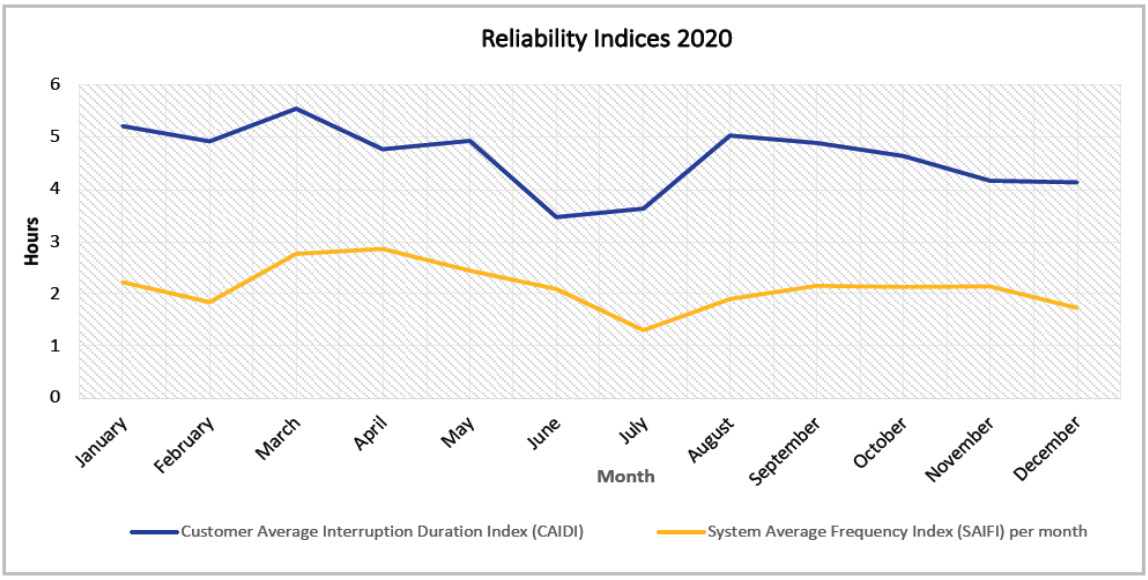

*Source: EPRA (2021)*

### 1.4.3 Reliability Indices

**a) EPRA**

EPRA uses the System Average Interruption Frequency Index (SAIFI) and Customer Average Interruption Duration Index (CAIDI) to measure the reliability of power supply in Kenya. Figure 4 shows the SAIFI and CAIDI for the year 2020. The high loss of power is a clear indication that much more needs to be done to improve on reliability of power supply to customers (EPRA, 2021). **Figure 2** below shows the trend in Reliability indices January-December2020.

**Figure 2: Trend in Reliability Indices January-December 2020**




*Source: EPRA (2021)*

**b) KPLC**

Internally Kenya Power has grouped its customers into 8 regions, one of which is Coast, which covers the Counties of Mombasa, Kilifi, Lamu, Kwale, Taita Taveta and Tana River.

c) **Electricity Supply Status in Bamburi Area**

Bamburi, the area where the proposed project is to be located is in Kisauni Sub County of Mombasa County. Land use in Bamburi is mixed and includes commercial, industrial, tourist and residential area uses. Bamburi Cement PLC, a major cement quarry and factory, is the largest industrial concern in the area. It is about 12 Km north of Mombasa town. Limestone quarrying at Bamburi, for the manufacture of cement began in the early 1950's.

Electricity Supply for the operations at Bamburi Cement factory is provided by Kenya Power through the National Grid. The supply in the area is occasioned by frequent interruptions and as a result, most commercial and industrial customers have installed backup generators which are pollutants and are costly to run. The generators in most instances, are not able to run the factories at full capacity yet the production costs escalate due to the high cost of fuel.

### 1.4.4 Electricity Cost (KWhr)

Electricity in Kenya is sold under a tariff heading which has a base tariff plus several adjustments and levies that add up to the total cost.

The tariff heading for Bamburi Cement factory is CI3 (Commercial & Industrial – 33KV). During 2018 – 2021, the base tariff under CI3 was Kshs 10.5/ KWhr. In Jan 2022, the base tariff was reduced to Kshs 8.00 / KWhr. It is not clear whether this reduction will be sustained beyond 2022. When the base tariff was Kshs 10.5/ KWhr, the aggregate cost of power was about Kshs 19/ KWhr (all costs considered). The reduction of base tariff from Kshs 10.5 to Kshs 8.00/ KWhr brings the aggregate cost to about Kshs 15/ KWhr.

## 1.5 Project Justification

Bamburi Cement PLC is a large consumer of electrical energy to power its operations. The Electricity from the grid is a combination of thermal, hydro and geothermal. The power from the grid is expensive, not always enough and interruptions also do occur. In order to ensure constant supply of affordable clean energy, Bamburi has decided to provide land on sub-lease basis for the project for 25 years under a Power Purchase Agreement (PPA). The Solar Plant that will generate 14.5MWac is located approx. 3km away from the Bamburi Cement Plant where the power is needed. Therefore, the generated 14.5MWac of power needs to be evacuated from the solar plant to the substation at Bamburi Cement Plant. This will be done through the proposed 3km long 33kV Transmission Line.

## 1.6 Justification of the ESHIA Study

The project has the potential to generate impacts during construction and operation phases, hence, a detailed ESHIA study is required to identify the impacts and provide mitigation measures against the impacts. The ESHIA Study Report in compliance with the following guidelines and standards.

**a) National Environmental Management Authority (NEMA)**

The proposed Transmission Line is listed under the second schedule of section 58(4) of the Environmental Management and Coordination Act, 1999 (Rev, 2015) and Legal Notice No. 101 of June 2003 (Environmental Impact Assessment and Audit Regulations (Rev. 2019) as a project to be subjected to an Environmental Impact Assessment (EIA). It is categorized as medium risk project.

**b) International Standards and Guidelines**

IFC Standards require an assessment and management of environmental and social risks and impacts of development projects, which includes stakeholder engagement, analysis and planning, disclosure and dissemination of information and grievance redress mechanism. The proposed project has minimal environmental and social impacts that will arise during construction and operation therefore falls under Category B of IFC PS1.

According to EIB Environmental and Social Standards, the project is listed under Annex II - Industry Energy that requires screening and development of necessary mitigation measures and therefore falls under Category B.

Other international environmental and social assessment standards adhered to in this report include the World Bank Group EHS Guidelines and International Labour Organization (ILO) Conventions.

*This Environmental, Social and Health Impact Assessment Study has identified both positive and negative impacts of the proposed project. The mitigation measures to address the potential negative impacts has been elaborated in the Environmental, Social and Health Management Plan (ESMP) under Chapter 7.*

## 1.7 ESHIA Study Objectives

The purpose of this ESHIA Study is to identify the potential impacts of the project and provide mitigation measures. This was done in compliance with the National Legislation, IFC Performance Standards, EIB Environmental and Social Standards, associated World Bank (WB) Group's Environmental, Health and Safety (EHS) Guidelines, and International Labour Organization (ILO) Conventions. Momnai Energy are committed to implementing the project by adhering to the above standards.

### 1.7.1 Specific objectives are to:

- Improve the environmental and social design of the Project;
- Highlight during the preliminary stages of the project any red flags that may render the project environmentally or socially unfeasible or unsustainable and may result in excess expenditure to implement adequate and appropriate mitigation measures, or jeopardize the Project in any way;
- Prepare a Stakeholder Engagement Plan which can be used during the ESHIA process as well as during the construction and operation phases of the Project;
- Identify all potentially adverse environmental and social impacts of the Project and recommend measures for mitigation;
- Develop a comprehensive Environmental, Social and Health Monitoring and Management Plan (ESHMMP), including mitigation costs;
- Prepare an ESHIA Study Report that meets national regulations and guidelines;
- Prepare a bankable ESHIA Study Report that meets IFC Performance Standards and European Investment Bank's Environmental and Social Standards, The World Bank Group EHS Guidelines and International Labour Organization (ILO) Conventions.

### 1.7.2 Target Group for the ESHIA Study

This ESHIA Report has been prepared for use by different stakeholders that will be involved in the construction, operation and monitoring of the proposed Transmission Line. The report contains useful information on policies, procedures, implementation modalities, analysis of potential environmental, health and social impacts and suggested mitigation measures at various stages of the project activities that need to be adhered to. The information will be useful during planning, implementation, management, maintenance, monitoring and decommissioning of the facility. In this regard, the report will be useful to the following stakeholders:

- Investors, Co-Investors and All Limited Partners;
- Contractor(s) that will be engaged for the construction, operation and decommissioning works of the project;
- Affected and Interested persons including project area communities;
- Relevant government agencies (National and County Governments);
- Planners and Engineers that are involved in the preparation of project designs and plans;
- Persons that will be involved in the management and operation of the facility.

## 1.8 ESHIA Study Methodology

The ESHIA methodology followed a systematic process that predicted and evaluated the impacts the project could have on the physical, biological, social/ socio-economic and cultural environment, and identified measures that the Project will take to avoid, reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable.

The study methodology comprised of the following activities:

- Preliminary Meetings;
- Desktop Review;
- Environmental Screening;
- Environmental Scoping;
- Stakeholder Engagement
  - ✓ Initial Stakeholder / Sensitization Meetings;
  - ✓ Public Consultation Meeting;
  - ✓ Public Disclosure Meeting.
- Environmental Baseline Data collection;
  - ✓ Site Evaluation and Collection of Biophysical Data
  - ✓ Soil and Water Analysis;
  - ✓ Ambient Air Quality Assessment;
  - ✓ Ambient Noise Assessment.
- Ecological/Archaeological Assessment;
- Baseline Socio-Economic Studies;
- Data Evaluation, Analysis and Reporting.

### 1.8.1 Preliminary Meetings

Preliminary meetings were held with the Proponent (Momnai Energy) and Bamburi Cement PLC to obtain relevant project information on the proposed Transmission Line in Bamburi Mombasa. Planning for the execution of field activities was also undertaken. Details of the meetings and outcome are provided in Chapter 6.

### 1.8.2 Desktop Review

The desktop review (published documents) was carried out to identify any environmental, social, health and ecological sensitivities around the project site. This included review of the land use, land cover and topography (Toppo sheet, Satellite imagery), vegetation type and floral and faunal species assemblage in the study area. Information provided by developer (Project site location boundary map, vital installations specifications) was also considered during desktop review process.

Further review was done on:

- Existing legislature, regulations and policies relevant to the proposed project;
- Proposed project engineering designs and construction inputs;
- The land ownership documents.

### 1.8.3 Environmental Screening

The criteria used in screening was based on NEMA Schedule II of Legal Notice No. 101 of 2003, IFC PS1 and EIB S1 and included the following;

- Ecological considerations (Biological diversity, sustainability, ecosystem maintenance)
- Social considerations (economic impacts, social cohesion and disruption, effect on human health, communication, effects on culture and objects of cultural value)
- Landscape impacts (views opened up or closed, visual impacts, compatibility with surrounding area);
- Land uses (effect of proposal on current land uses and land use potentials in the project area, possibility of multiple use, effects of proposal on surrounding land uses and land use potentials)
- Water (impact of proposed project on water resources and drainage patterns or systems)

The outcome of the screening exercise is provided in **Table 2** below.

**Table 2: Results of the Screening Criteria**

| No | Criteria | Results |
|---|---|---|
| 1 | Ecological Impact | • Raw materials such as aggregates and sand will have ecological impacts at points of origin<br>• Vegetation clearance will occur prior to excavation, construction and installation works<br>• Excavations will be undertaken and will impact on the soil profile of the area<br>• Potential displacement of fauna from their habitat<br>• An area of the potential location site had been previously mined for raw materials and later rehabilitated while the remaining part was previously a settlement area and had never been excavated.<br>• The Transmission Line will be located along the existing murram roads in the project area. |
| 2 | Social Considerations | • Project will ensure steady supply of power<br>• Investment will accrue income to proponent<br>• Project will create employment<br>• There will be revenue to the government in the form of levies and taxes<br>• Potential impacts from Labour Influx<br>• Potential occurrence of GBV, SEA and VAC<br>• Within the area of influence, there are commercial enterprises, residential homesteads on the western side of the project site<br>• The site is currently not occupied |
| 3 | Landscape Impacts | • No significant impacts on landscape taking into consideration that the transmission line poles will be erected along the road corridor next to trees within the project area |
| 4 | Land Uses | • Block A had been mined of coral limestone but has been restored through planting of *Casuarina equisetifolia.* Beyond Block A, the TL continues along the existing access road to sub-station at the plant.<br>• There is existence of some wildlife introduced by Bamburi Cement PLC |
| 5 | Water | • The site will either rely on borehole for water supply or water brought in from the plant.<br>• The water from the river and the ponds within the project area is sustaining the ecosystem and shall not be put to use for the project |

**a) International Standards**

The governing standards for IFC, WB and EIB have been used to identify the triggered impacts for assessment.

### 1.8.4 Environmental Scoping

The scoping has been carried out to identify the potential Area of Influence (AoI), identify the potential interactions between the project activities and resources/receptors in the project AoI and to identify the impacts that could arise from these interactions, and to prioritize these impacts in terms of their likely significance. The scoping exercise helped narrow down onto the most critical issues requiring attention during the assessment. The Environmental issues were categorized into physical, natural/ecological, social, economic and cultural aspects.

During the Scoping Study, the following activities were executed:

- The baseline physical assessment of the site and the immediate surrounding areas;
- Initial Key Stakeholder consultations to:
  - ✓ Inform them about the project and the planned activities regarding the ESHIA Study;
  - ✓ Seek their views regarding the project;
  - ✓ Obtain relevant project information.

### 1.8.5 Stakeholder Engagement

The stakeholder engagement process involved the following steps:

#### *1.8.5.1 Initial Stakeholder / Sensitization Meetings*

Sensitization Meetings were carried out with Key Informants including local administration to inform them about the proposed project and the planned ESHIA Study activities. This was carried out between November 4 2021 and January 21, 2022. The Key Informants contacted included County Government, Government Agencies, Service Providers and Local Administration among others. Some of the Key Informants filled in ESHIA questionnaires on the proposed project. Virtual meetings were also carried out with some Key Informants.

#### *1.8.5.2 Public Consultation Meeting*

The Public Consultation Meeting was arranged and carried out on Tuesday February 8, 2022. Project area community were invited to the meeting using the following media:

- ✓ Announcements through chiefs' office in the project area for a period of 1 week prior to the meeting;
- ✓ Announcement posters distributed through the chief's office
- ✓ Radio announcement for period of 1 week prior to the date of the meeting

The details and outcome of the meetings are provided under **Chapter 6** of this report.

#### *1.8.5.3 Public Disclosure Meeting*

Project impacts disclosure meeting was carried out on Thursday 28, April 2022. The meeting was convened to disclose the findings of the study and the project mitigation measures that will be carried out to mitigate the identified impacts. It also discussed the next steps in the project process. The key outcomes of the meeting were:

- The identified impacts can be managed through the mitigations provided in the ESMP;
- The community and the other stakeholders supported the implementation of the project.

The detailed outcome of the disclosure meeting is presented under **Appendix 5**.

### 1.8.6 Environmental Baseline Data Collection

**(a) Site Evaluation and Collection of Biophysical Information**

Physical project site inspections and observations constituted the main baseline survey activities. The Transmission Line is going to be located inside a fenced Bamburi land.

**(b) Soil**

Soil samples were taken and analyzed for Total Petroleum Hydrocarbons (TPH) and Heavy Metals [Lead (Pb), Nickel (Ni), Cadmium(Cd), Mercury (Hg), Chromium (Cr) and Lithium (Li)]. The result of the analysis is provided in **Appendix 7.**

**(c) Water**

The site area has water ponds as a result of the excavations. River Mtopanga traverses the TL corridor. The nearest pond to Block A site is approx. 300m away. Water samples were taken and analysed for the following:

- The total extractable Hydrocarbons;
- The heavy metals of Lead, Nickel, Cadmium, Mercury, Chromium and Lithium. Refer to **Appendix 6** for results

**(d) Air Quality Assessment**

The proposed site was evaluated for potential sources of air emissions including fugitive dust and exhaust emissions from vehicles and machinery. Baseline air quality measurements were carried out by NEMA Registered Laboratory Baseline measurements made included Hydrocarbons, Particulate Matter ($PM_{10}$,) Sulphur Dioxide and Nitrogen Dioxide. See **Appendix 9**

**(e) Noise Measurements**

Baseline Noise measurements were also made within the project area to determine the baseline noise conditions of the project area. Refer **Appendix 8** for measurements.

### 1.8.7 Ecological Survey

Specialised ecological survey was carried out at the proposed site to determine any existence flora and fauna species that may be affected by the proposed project. This evaluation included determination whether there are any endangered/threatened species.

**(a) Vegetation**

A Botanist in the study team carried out a specialized study to determine the type of plants that exist within the site and how they would be impacted by the proposed project and appropriate mitigation measures.

A plot-less method involving random walks as developed by Hall and Swaine (1981) was used to establish plant species diversity and capture habitat types. All vascular plant species were recorded and specimens collected using standard methods (Foreman & Bridson, 1992). Most species were identified on site and the difficult ones collected for confirmation at the East African Herbarium. Identification of indigenous vascular plants followed Agnew (2013), Beentje (1994) and various publications of the Flora of Tropical East Africa. To help understand the individual species distribution within the whole study area, it was subdivided into three sampling blocks and each one was documented separately.

**(b) Avifauna**

An Ornithologist carried out an assessment on the various birds that exist in the project area and determined the potential project impacts and mitigation measures. Threatened/endangered species were also identified.

**(c) Mammals**

Mammal inventory was undertaken in Bamburi/Haller Park (-4.006968, 39.716991), Bamburi Cement Ltd-Mombasa. The study area was divided into three sections; Section A of Bamburi airstrip; B in the middle and found east of the airstrip, while C occurred north of Bamburi airstrip. The three sections had different habitat characteristics. Following IFC (2012) broad habitat classification definitions; Block A was categorized as 'Modified', while B and C were characterized as 'Natural'. Three main methods were used to investigate mammals in the study area as described below.

***Bats Sampling***

Bat were captured with three mist-nets (18m (two) and one 12m (total 48m (Kunz et al. 1996). Mist-nets were opened at 19.00pm and were monitored for two hours until 21.00pm. All captured individuals of bats were identified and released back to the wild at the point of capture. Insectivorous bat activity was monitored with (Pettersson Elektronik ABTM, Uppsala, Sweden (http://www.batsound.com/) in heterodyne mode (Estrada et al. 2004; Musila et al., 2018). The detector was tuned first to 30 kHz, and frequencies varied after each one minutes to 47, 56, 73, 90, 107, and 124 kHz.

Bat activity was quantified as passes, which is a single sequence of two or more recorded echolocation calls as defined by Thomas (1988). The number of passes were used as a sampling unit for general bat activity (Frick 2013). Bat passes were counted along 10-minute transects at the start of each hour from 19.00-21.00hr. Because the Pettersson D200X has bandwidth of 8 kHz (Musila et al. 2018), it was possible to detect the presence of bat species whose echolocation is within the range of 22-128kHz, if they were available at each sampling site surveyed by varying the frequency detector setting from 30-124 kHz. Bat inventory was undertaken at sections A-C and the road corridor between Block A and the sub-station of the study area.

***Rodent sampling***

Rodents and shrews were sampled with Sherman traps (10) and metal snap traps (20 (Musila et al. 2019). The snap traps were set at intervals of 10-10m from each other, and were baited with one raw peanut seed. Sherman traps were baited with oat flakes. All the traps were placed at microhabitats where small mammals (rodents, shrews) were predicted to occur including well defined animal trails, their burrows or places where some droppings were visible. Traps were set in the morning in each transect, and maintained in one transect for one night. Traps were checked once every morning between (before 8am) removed and moved to the next trapping station in a different block. All captured individuals of rodents were identified and released back to the wild at the point of capture and some prepared into museum specimens by skinning and stuffing with cotton wool and deposited with Mammalogy Section Lab, National Museums of Kenya. Rodent inventory was undertaken at sections A-C and the road corridor between Block A and the sub-station of the study area.

***Transect surveys***

Direct and indirect methods were used to survey mammals in sections (A-C) and the road corridor between Block A and the sub-station using transect (100m in length) located in each section. Searches was done by walking along the transect in the morning and evening (Gurnell et al. 2004) at a distant of 30m from the center of walking path (width of transect 60M). Direct method included identifying individuals of mammal species seen during transect searches. Indirect method included using signs of mammals to record the presence of mammals, such as footprints/tracks, scats and burrows (Kingdon 2015). The searches included walking along the transect, listening for animal calls, searching for animal movement in the bushes and trees; as well as scats and footprints of animals on the ground. Any animal sighted or flushed from the bushes or tress; or footprints or scats, and burrows found were identified to species.

**(d) Entomofauna**

The Entomologist carried out specialist studies of the insects that exist in the project area and how the project may impact on their existence. Standardised and opportunistic invertebrate collection methods were applied in selected habitat types. The study site had three blocks A, B, and C and blocks B and C were further divided into three points and A into two points. It also included the TL corridor along the road between Block A and the sub-station. The specimens were labelled and preserved in 70% ethanol. Various methods including use of pitfalls, coloured pan traps, baited butterfly traps (BBT) and general search involving sweep netting and habitat search were applied in this study. Pitfalls majorly targeted the ground dwelling arthropods. These included the snails, spiders, earwigs, ants, millipedes, centipedes among others. These specimens are those without flying ability. The method involved burying the cup in a dug-up pit ensuring that it is the same level as the ground so that while crawling they just fall in the trap (Upton & Chapman, 2010; Nève, 2012). The cup was then filled halfway with a mix of water and soap and left overnight to collect specimens and emptied the following morning. Three traps were set in each point and a total of 24 traps were set in the sampling site. Pan traps utilised the use of coloured plastic traps (blue, white, yellow) which was applied here to collected flower visiting specimens (bees, flies, wasps) and also those that stay in trees like web spinning spiders. In each point, nine pan traps were set. A total of 72 traps were set in the site.

A mixture of water and soap was added to the traps which were then left overnight and emptied the following day in the morning. The BBT involved a butterfly trap containing bait. A mixture of ripe bananas and pineapples was prepared and left until fermentation (at least 48 hours). The trap was hoisted in a tree and bait was added to attract flying insects especially butterflies. Three traps were set in each point each morning and emptied evening to avoid vandalism and also destruction of the traps by animals (Freitas et al. 2014). Three traps were set in each point and 24 in total in the site. After all the passive traps were set, the remainder of the time was used to actively search for invertebrates within the transect. The methods applied were sweep netting and general search hand picking specimens using a pair of forceps. The target species included those that hide under rocks, in foliage and also flying insects that may not be captured in the set traps.

**(e) Herpetofauna**

The Herpetologist carried out field sampling of herpetofauna from 22 – 26 November 2021. The study covered the Blocks A, B and C within the North Quarry including the TL corridor along the road between Block A and the sub-station. A combination of three main techniques were applied: i) Visual encounter survey (VES) was used. Due to the flexibility and simplicity of the method, VES is frequently used for rapid assessments and the evaluation of larger areas to generate species inventories (Rödel & Ernst, 2004; Heyer et al., 2014; McDiarmid et al., 2012). The site was actively searched by the expert assisted by a local guide for potential breeding areas of amphibians (e.g. marsh, small water pools, water channels) and suitable microhabitats for both amphibians and reptiles (e.g. stones, crevices, leaf litter/debris, rotten log). It was necessary to examine or uncover these places deliberately to search for the eggs and tadpoles of amphibians in aquatic habitats or to reveal the presence of the amphibians and reptiles hiding under these covers. This was applied along transect lines across the site besides general surveys of the whole site with focus on suitable microhabitats, ii) Additionally, pitfall traps using sunken buckets were also used to trap small reptiles and amphibians. At least three (3) trap arrays consisting of five (5) traps each were deployed in each sampling block, iii). To supplement the two methods above, nocturnal sampling mainly targeting amphibian habitats such as wetlands was implemented between 6.00 pm and 9.00 pm in pre-identified sampling locations. All species observed were identified following Spawls et al. (2018) , Channing and Rodell (2019) and Frost (2021). Species conservation status were based on IUCN Red list Version 2021-2 (IUCN, 2021). Project impacts were deduced and appropriate mitigation measures proposed.

### 1.8.8 Physical Cultural Resources

Archaeological and Cultural Heritage impact assessment has been undertaken to identify and ensure the protection of archaeological and cultural heritage assets associated with the project footprint area/sites to ensure that effective management and mitigation controls are in place. The assessment included a desktop review of any available documents and records associated with archaeological and cultural heritage resources within the project sites as well as field survey of project site.

The major set of data was mined from the archaeological and cultural heritage records filed with the National Museums of Kenya through its Standard African Site Enumerations System (SASES).

### 1.8.9 Baseline Socio Economic Studies

**(a) Recruitment of Enumerators**

Enumerators were identified within the project area and recruited through the local administration to assist the Consultant in the administration of socioeconomic questionnaires. Before executing the task, they were taken through an induction course to train them how to communicate with the respondents and administer the socioeconomic questionnaire.

**(b) Conducting the Survey**

During the Public Consultation Meeting (PCM), the project area community were informed that as part of the Consultations during the study, a few members of the Consultant team and enumerators from their community will visit them at their residences and businesses to administer questionnaires. The survey was therefore carried out after convening the PCM.

### 1.8.10 Data Evaluation, Analysis and Reporting

**a) Environmental Impact Identification and Analysis**

Environmental assessment was carried out to identify potential impacts of the project on the environment, biodiversity and the community. The assessment was carried out in three main steps, as follows:

- Prediction of potential impacts
- Execution of specialized ecological studies on biodiversity and evaluation and assessment of the impacts in terms of their significance
- Identification/ proposing mitigation measures for minimizing the effects of the significant impacts.

After exclusion of the negligible impacts, the remaining aspects were assessed based on the following criteria:

- Magnitude of the impact;
- Duration: period of time that impact lasts;
- Mitigation measures; its availability whether integrated in the project design or implemented as management measures; and
- Residual impacts.

Where negative environmental impacts are expected, majority of them will be experienced during the construction phase. To help manage the potential negative impacts, mitigation measures are suggested and the residual impact evaluated.

**b) Ecological Data Analysis**

Extensive biodiversity inventory was used to determine the Level of Concern Category (LCC) for the proposed TL corridor. This is the level at which using the information available, a decision is made about the vulnerability of the species and habitats where they occur. The LCC is determined by combining the extent of the project coverage, expected magnitude of impacts, duration of the anticipated impact and probability of occurrence of the impact. Three levels of sensitivities were used in this assessment i.e.; **Low** (Where this impact would not have a direct influence on the decision to develop the project in the area); **Medium** (Where the impact could influence the decision to develop the project in the area unless it is effectively mitigated) and **High** (Where the impact will have an influence on the decision process to develop the project).

In order to achieve minimum impacts on biodiversity from the project, the Consultant applied the mitigation hierarchy recommended by Bennun et al 2021. A sequence of actions intended to avoid, and where avoidance is not possible, to minimize and, when impacts occur, to restore, and where significant residual impacts remain, offset.

**c) Socioeconomic Analysis**

Descriptive statistics such as percentages and frequencies have been used to demonstrate the distribution of respondents according to such variables as age, gender, marital status, and level of education, economic activities / occupation, access to basic social and infrastructural amenities and their preferred livelihood restoration strategies and resettlement sites.

The analysed data have also been presented in form of pie charts and bar graphs that can quickly illustrate the study findings or data distribution. The qualitative data were transcribed and analysed manually with a view to developing emerging patterns and concepts to describe and explain relationships, trends, preferences, and processes in the study areas.

## 1.9 ESHIA Study Team

A summary list of the members of the ESHIA Study Team is given in **Table 3** below.

**Table 3: List of Members of the ESHIA Study Team**

| # | Names | Position |
|---|---|---|
| **A)** | **Project Management** | |
| 1. | Mr Richard Okello | Project Manager |
| **B)** | **Environmental & Socioeconomic Survey/Stakeholder Consultations** | |
| 2. | Mr Joshua Oyieko | Team Lead/Environmental Lead Expert |
| 3. | Dr Dan Adino | Sociologist |
| 4. | Ms Jane Ogonji | Sociologist |
| 5. | Mr Kennedy Kijana | Environmentalist |
| **C)** | **Terrestrial Ecology Studies** | |
| 6. | Dr Ronald K. Mulwa | Conservation Ecologist/Team Leader |
| 7. | Dr Simon Musila | Mammologist |
| 8. | Mr Victor Wasonga | Herpetologist (Reptiles & Amphibians) |
| 9. | Ms Grace Kioko | Entomologist |
| 10. | Mr Kennedy Matheka | Botanist |
| 11. | Mr Jerry Onyango | Research Assistant (RA) |
| 12. | Mr Quincy Obonyo | Research Assistant (RA) |
| 13. | Mr Brian Omondi | Research Assistant (RA) |
| **D)** | **Physical Cultural Resources Assessment** | |
| 14. | Dr Emmanuel Ndiema | Archaeologist |
| **E)** | **Sampling and Onsite Measurements** | |
| 15. | Ms Mariam Athman | Associate Environmental Expert |
| 16. | Mr Calvince Odhiambo | Associate Environmental Expert |
| **F)** | **Technical Backstopping** | |
| 17. | Mr Fredrick Maseno | Safety and Occupational Health Expert |
| 18. | Mr Murunga A. Kubondo | Electrical Engineer/Energy Expert |

## 1.10 Structure of the Report

This ESHIA Study Report comprises of the following:

- Executive Summary;
- Chapter 1: Introduction;
- Chapter 2: Project Description
- Chapter 3: Policy, Legal and Administrative Framework;
- Chapter 4: Baseline Environmental and Social Conditions;
- Chapter 5: Analysis of Project Alternatives
- Chapter 6: Public and Stakeholder Consultations and Disclosure

- Chapter 7: Significant Environmental & Social Impacts and Mitigation Measures
- Chapter 8: Environmental, Social and Health Management Plans;
- Chapter 9: Monitoring Plans
- Chapter 10: Conclusions and Recommendations;
- Bibliography;
- Appendices

# 2 PROJECT DESCRIPTION AND PHYSICAL ENVIRONMENT

## 2.1 Nature of the Project

The proposed 3km long 33kV Transmission Line is going to evacuate power from the Solar PV Power Plant to an existing substation within the Bamburi Cement Plant. The evacuated power will solely be used by Bamburi Cement PLC for its operations.

## 2.2 Land Ownership and Use

### 2.2.1 Land Ownership

The land where the proposed Transmission Line is going to traverse belongs to Bamburi Cement PLC. The proof of land ownership is provided under **Appendix 11**

### 2.2.2 Land Use

The Transmission Line will start off at the 33kV Switch Station located at the boundary of Block A and B. It will then run southwards for approx. 1km along a murram road on the western boundary of Block A and then continue southwards to the existing substation located within Bamburi Cement Plant. Block A was previously excavated for raw materials but has since been restored with *Casuarina equisetifolia trees*. The proposed Transmission Line will not have major adverse effects that cannot be mitigated.

## 2.3 Project Design

### 2.3.1 Project Components

**Components**

- 2.5 MVA (415 Volts/33kV) step up transformer located at the Solar Plant
- 3KM long 33 kV overhead double circuit transmission line
- 33 kV cables
- Powerline poles
- 30 MVA (33 kV/11 kV) step down transformer at the main Bamburi substation

Refer to **Map 3** for the project design layout.


Environmental, Social and Health Impact Assessment for Proposed Momnai Solar Farm Power Project at Bamburi, Mombasa

Map Sheet 3 : Proposed Bamburi Power Plant Transmission Line - Design Layout

EPSG:21037

400 0 400 800 1200 m

Grid North

LEGEND

- Proposed Transmission Line
- Site Grid
- Solar Panel Blocks
- Metering Substation/ Switching Station
- Project Site

### 2.3.2 Description of Procedure

**Transmission Line Installation Activities**
The overhead transmission line will be installed using the following steps:

- The transmission line wayleave corridor will be surveyed and holes are dug for the transmission poles.
- Place the poles near the holes and assemble the brackets and related materials.
- Erect the poles and ensure they are well anchored into the soil. Use stay wires wherever there are likely to be uneven loads on the poles and at regular intervals on the transmission line.
- String the transmission line.
- Install a new 30 MVA (33 kV/11 kV) step down transformer at the main Bamburi substation.
- The two 33 KV lines are terminated on the 33 kV panel of the 30 MVA transformer.
- The 11 kV side of the transformer is connected to the 11 kV side of the Bamburi sub station.

**Power Evacuation**
Power from the solar plant will be evacuated southwards to the substation located within the Bamburi Cement Plant via approx. 3km long 33kV Transmission line with a wayleave corridor of 10m.

### 2.3.3 Associated Facilities

The associated facilities to the transmission line include the following:

- ***Access Road to the Site*** – The site area has existing road networks within the project area that are used by Bamburi Cement for their operations. The Transmission Line will be located along these existing roads.
- ***Transmission Line for Evacuation of Power*** – There will be 3km long 33kV Transmission Line that will be evacuating Power from the solar plant to the Bamburi Cement Plant, Mombasa.
- ***Existing Substation*** – The existing substation within the Bamburi Cement Plant, Mombasa site where the evacuated power from the solar plant will be connected.

### 2.3.4 Project Area of Influence (AoI)

The effects of the project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions. Some activities would impact a larger radius than other identified impact sources. The spatial and temporal dimensions have therefore been taken into account to define a Project's Area of Influence. Refer to **Map 4**.

The Project Area of Influence (AoI) for different environmental and social receptors is provided in **Table 4** below.

**Table 4: Project Area of Influence**

| # | Environmental and Social Issues | Area of Influence | Justification |
|---|---|---|---|
| 1 | **Air Quality** | 500 m | Dust emissions, fugitive dust, etc. is typically observed within 100-200m from the construction/operation area. A minimum of 500m AoI has been taken to capture all sources of these emissions including vehicle movement across access roads |

| # | Environmental and Social Issues | Area of Influence | Justification |
|---|---|---|---|
| 2 | **Noise Pollution** | 500 m | Noise can often be detected up to 400-500m from any operation |
| 3 | **Water Environment** | 500 m | Water body located in the vicinity of the project area may get impacted due to activities at project footprint. The nearest surface water body (pond) is approx. 300m from Block A while Indian Ocean is approx. 1 km from the site |
| 4 | **Land Environment** | 500 m | Impacts on soil and land are often restricted to the project footprint area. An AoI of 500m taken into account, indirect effects usually occur due to vehicle/ heavy machinery movements and activities at the site |
| 5 | **Socio-economic Conditions** | 5 km | An AoI of 5 km radius is considered for socio- economic consultations to determine perceived impacts due to the project including employment opportunities etc. |
| 6 | **Ecology** | 5 km | An AoI of 5 km radius is considered for the ecological study.<br><br>The Indian Ocean is approx. 1 km from the site |

### 2.3.5 Core and Buffer Zones

The AoI defined above has been divided into a core and buffer zone:

**Core Zone**: The core zone is defined as the radius extending from the project footprint area which would have majority of the impacts (during mobilization, construction, operation and decommissioning phase)**.** The core zone area for the study is project foot print area and adjacent area within 500 m radius.

**Buffer Zone**: the buffer zone of the study area is in general 5 Km radius from the proposed project site.

575000 580000 585000

9565000 9560000 9555000

MTWAPA

MTWAPA CREEK

SHIMO LA TEWA

Block C
46.82 Ha.

Block B
22.73 Ha.

Block A
18.39 Ha.

Proposed 33kV
Switching
Station

500m Buffer

1000m Buffer

2500m Buffer

Great Lakes Nature Trail Area

Prop. 33kV Feeder

BAMBURI

KISAUNI

33kV
Metering
Station

South Quarry

Civil Aviation Controlled Extent

Civil Aviation Controlled Extent

5000m Buffer

575000 580000 585000

Environmental, Social and Health Impact Assessment for Proposed Momnai Solar Farm Power Project at Bamburi, Mombasa

Map Sheet 4 : Proposed Bamburi Power Plant Transmission Line - Project AOI

LEGEND

- Proposed Transmission Line
- River/stream
- Water Ponds
- Project Site Blocks

1000 0 1000 2000 3000 m

EPSG:21037

Grid North

## 2.4 Project Inputs

### 2.4.1 Environment, Health and Safety (EHS)

The contractor and the supervising consultant will engage a full time Environment, Health and Safety Specialist (EHS). The implementation of the management plans and corrective actions will be the responsibility of the EHS specialist. During construction and operation phases, site EHS specialist will supervise third parties to implement the management action plans in coordination with site manager.

**Environment, Social, Health and Safety Management System (ESHS) Committee**
ESHS committee will be formed at project management level to review the performance of project on environmental, health, safety and social aspects. Regular updating of ESHS Committee will be the responsibility of the ESHS Officer in addition to supporting the project management to achieve the goals as committed in the Policy. ESHS committee will be formed consisting of one member from HR, Finance, Project and Quality Health, Safety and Environment (QHSE) departments. The QHSE Head will be the ESHS coordinator for implementing this ESHS and will be interfacing with several other departments to ensure smooth and efficient functioning of the ESHS.

### 2.4.2 Powerline Poles, Cables and Accessories

Construction of the Transmission Line that will evacuate power from the solar power plant to the substation will require powerline poles, cables and accessories.

### 2.4.3 Construction Machines/Equipment

**Table 5** shows some of the main construction machines required for construction of transmission line.

**Table 5: Main Construction Machines/Equipment**

| Type | Type |
|---|---|
| Truck (3 ton) | Excavator |
| Truck with crane | Welding machine |
| Concrete mixing machine | Light truck |
| Power shovel | Cutting machine |
| Back hoe | Water tank truck |
| Stringing winch | Diesel engine generator |
| Stringing tension | |

**33kV transmission line**
The 33 kV Transmission Line will be overhead type supported by concrete pole/foundation. The interval of installation will be between 80-100m. The height of the poles will be approx. 14m 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 exact location of the Transmission Line poles will be determined in the ensuing detailed design.

**Construction Method**
During construction of the Transmission Line pole foundations, there will be excavation of the base of the pole, installation of the pole using cranes and stringing of the conductors.

### 2.4.4 Water Requirement

The installation and operation activities of the transmission line will require modest quantity of water. Water will be required during the construction of the electrical poles. The water requirement for construction activities will be brought to site using a water tanker hence there will be no need to interfere with the water resources within the site area.

### 2.4.5 Oil

During construction, there will be unused and used oil recovered from machinery and vehicles including oil filters and oil rugs. These hazardous materials will need to be kept in paved areas with containment to avoid impact to soil and groundwater.

### 2.4.6 Security

The construction and operations activities of the Transmission Line will be carried out in a secured area within the wayleave corridor, however full-time security will be required for the infrastructure.

### 2.4.7 Labour

The project will require both skilled and unskilled labour during construction and operation phases of the project. This will result in migrant labour influx that may result in Community Health and Safety risks. There will be need to put in place a Labour Influx Management Plan and conduct labour influx risk assessment with focus on the key impacts on local community. Workers (e.g., masons, supervisor, unskilled laborers) are expected daily to be working at the transmission line site. Most workers will be sourced locally, although skilled workers 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 following guidance of the Labour Influx Plan. Normal working hours are planned to be from around 08:00-17:00 from Monday to Saturday. Works outside of normal working hours will be sought from the relevant local authorities.

## 2.5 Project Outputs

### 2.5.1 Power

The Transmission Line will have the capacity to evacuate 14.5MW of power and transmit it to the substation located within Bamburi Cement Plant. The power from the solar plant will be converted to AC through inverters at the solar plant and directly evacuated through the proposed 3km long 33 kV Transmission Line to the sub-station.

## 2.6 Project Schedule and Phasing

The project activities are divided into four phases as listed below:

a) Pre-Construction (Preparation Activities);
b) Construction;
c) Operation (including maintenance and repair);
d) Decommissioning.

**a) Pre-Construction (Preparation Activities)**

Before the project construction activities commence, the site will be prepared. Site preparation activities will involve vegetation clearance, levelling and grading of the land.

There will also be mild excavation works and transportation of materials. Some access roads exist however any additional access roads that may be required shall be considered to ensure safe operations at the facility.

**b) Construction Activities**

Bulky materials such as metallic structure of the trackers will be carefully piled at designated areas of the site. In order to avoid piling large quantities of materials on site, delivery of such bulky materials shall be done in required quantities. Where feasible delivery will be timed to coincide with the time of installation. Construction activities will involve the following:

- Construction of labour camp, site office, equipment and supplies storage areas, and waste pits;
- Clearance of vegetation within the footprint of the transmission line corridor. Low-lying vegetation along the transmission line corridor will be maintained.
- Establishment of temporary construction yard and access road.
- Construction of concrete foundation for the concrete pole. This will include excavation of the base of the pole, concrete placement and backfilling. The concrete mix will be prepared at the site.
- Stringing of transmission cables. 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.

***Construction Materials***

Construction works will require raw materials such as fill soil, cement, aggregates, gravel and wood. Materials that are locally available will be procured from licensed suppliers.

**T*emporary Construction Facilities***

Temporary construction facilities such as stockyard are planned to be established within a secured area in the wayleave corridor of the transmission line. Other temporary construction facilities may include worker's camp. The requirement and locations of these facilities will be considered in more detail in the detailed design stage.

**c) Operation Activities**

During the operation phase, the following project activities will be carried out:

- Regular inspection of the transmission line infrastructure;
- The Control of vegetation like weeds, bushes etc. along the transmission line wayleave corridor;
- Operation and maintenance of transmission line facilities.

**d) Decommissioning Phase Activities**

During decommissioning, there will be activities associated with the following:

- Preparation of a project decommissioning plan;
- Restoration of material source areas;
- Removal and disposal or reuse of transmission line infrastructure;
- Restoration of the transmission line corridor by planting of indigenous trees.

## 2.7 Existing Infrastructure and Activities

The proposed 33kV Transmission Line will be located along the existing road network within the site area. The first 1km will run along the western boundary of Block A.

The rest of the transmission line will continue southwards along the remaining part of the existing road network to the Bamburi Cement Plant. The corridor to be used for the transmission line contains the trees planted during restoration of the project area by Bamburi Cement PLC.

## 2.8 Project Budget

The proposed 3km 33kV Transmission Line in Bamburi, Mombasa is estimated to cost approx. USD 100,000.

# 3 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

## 3.1 Policy Framework

The Republic of Kenya has a policy, legal and administrative framework for environmental and social management. The broad objectives of the policy are: -

- To ensure optimal use of natural resources while improving environmental quality.
- To conserve natural resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same.
- To develop awareness that inculcates environmental stewardship among the citizenship of the country.
- To integrate environmental conservation and socio-economic aspects in the development process.
- To ensure that national environmental and social goals contribute to international obligations on environmental management and social integrity.
- To achieve the above policy objectives, it is directive that appropriate reviews and evaluations of all forms of developmental project plans and operations are carried out to ensure compliance with the environmental policy and legal frameworks.

The following section provides details of the relevant policies in the country.

### 3.1.1 Sessional Paper No. 10 of 2012 on Kenya Vision 2030

The Kenya Vision 2030 is a comprehensive national development plan for the period 2008 to 2030. The plan was developed following successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which ensured the country's economy was back on the path for realization of rapid economic growth since 2002. The country's GDP growth rose from 0.6% to 7% in 2007, but declined to 1.7% and 1.8% in 2008 and 2009, respectively. The objective of the Vision 2030 is to transform Kenya into a middle-income country with a consistent annual economic growth of 10 % by the year 2030. The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This goal is expected to be achieved by developing basic infrastructure services such as roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others while ensuring that the country has a clean, secure and sustainable environment by 2030 through reduction of pollution and improvement of waste management.

*The proposed Utility Solar PV Power Plant and TL will contribute to the realization of the goals of Vision 2030 through provision of clean, reliable and efficient green energy and improvement of human health among others.*

### 3.1.2 Sessional Paper No. 10 of 2014 on the National Environment Policy

The policy seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also to recommend strong institutional and governance measures to support achievement of desired objectives and goals. **Section 5.6.1** emphasizes that the environment aspects of such infrastructural developments are distinct and unique such as effects on flora and fauna, social and psychological disruption, vegetation clearance, excavation works and spillages during construction. **Section 5.9** on energy use emphasizes that the Government will develop and promote an integrated national strategy for generation and sustainable utilization of renewable energy.

The Policy also emphasizes that environmental education and public awareness should be promoted at all levels and there should be 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: It calls for:

- Sustainable use of freshwater and wetland resources and the conservation of river and lake ecosystems. It calls for involvement and empowerment of communities in conservation and protection of endangered plants and wildlife species, management of forest, freshwater and Wetland ecosystems;
- Development and promotion of integrated national strategy for generation and sustainable utilization of renewable energy and emphasizes that all significant development projects are subjected to EIA and regular environmental audits.

*ESHIA has been carried and the project will need to adhere to the requirement of regular audit as required by NEMA.*

### 3.1.3 The National Biodiversity Strategy of 2000

The National Biodiversity Strategy and Action Plan (NBSAP) was formulated to enable Kenya address national and international commitments defined in Article 6 of the Convention on Biological Diversity (CBD). The strategy is a national framework of action for ensuring that the present rate of biodiversity loss is reversed, and present levels of biological resources are maintained at sustainable levels for posterity.

The general objectives of the strategy are to conserve Kenya's biodiversity; to sustainably use. its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

*The proposed TL will need to comply with the requirements of this strategy since the project may lead to loss of biodiversity in some areas. An in-depth biodiversity assessment has been carried out on the site to understand the biodiversity status, of the proposed site to identify potential impact of construction and operation of the TL and to identify mitigation / enhancement measures. Based on the assessment, a Biodiversity Management Plan has been prepared and forms part of this ESHIA Report and will form part of the works contract to meet the commitment under NBSAP and to satisfy critical habitat requirement under IFC PS 6.*

### 3.1.4 Sessional Paper No. 3 of 2009 on National Land Policy

The Land Policy in Kenya is guided by the environmental management principles which are aimed at restoring the environmental integrity through introduction of incentives and encouragement of use of technology and scientific methods for soil conservation, among others. The policy further requires fragile ecosystems to be managed and protected by developing a comprehensive land use policy bearing in mind the needs of the surrounding communities. The policy also requires zoning of catchment areas to protect them from degradation and establishment of participatory mechanisms for sustainable management of fragile ecosystems. The policy also called for development of procedures for co-management and rehabilitation of forest resources while recognizing traditional management systems and sharing of benefits with contiguous communities and individuals. Lastly, all national parks, game reserves, islands, front row beaches and all areas hosting fragile biodiversity are declared as fragile ecosystems under the policy.

The policy recognizes that sustainable management of land based natural resources depends largely on the governance system that defines the relationships between people, and between people and resources. To achieve an integrated approach to management of land-based natural resources, all policies, regulations and laws dealing with these resources need to be harmonized with the framework established by the Environmental Management and Coordination Act (EMCA Cap 387). The policy also addresses land management on ecosystem protection (including wetlands). Measures for protection are required for fragile ecosystems. The policy also calls for the protection of watersheds, lakes, drainage basins and wetlands. The policy prohibits settlement and agricultural activities in water catchment areas and calls for identification, delineation and gazettement of all water courses and wetlands.

*There are wetlands within the AoI (Refer to **Map 4**). The proposed TL has potential of impacting wetlands on the project area. It is important to undertake appropriate mitigation measures to minimize or avoid degradation of wetlands.*

### 3.1.5 Wildlife Policy of 2011

The wildlife policy is aimed at promoting protection and conservation of wildlife in Kenya, both in protected and non-protected areas. The policy is implemented by the Kenya Wildlife Service (KWS).

*The proposed TL will need to be consistent with this policy. Since the biodiversity (birds, small mammals, reptiles, amphibians, insects etc) occurring at the site will be disturbed during the construction and operation of the facility, appropriate mitigation measures must be implemented to minimize disturbance to wildlife.*

### 3.1.6 Wetlands Policy of 2013

The wetlands policy is intended to promote protection of wetlands in Kenya. The policy sets out strategic measures for the protection of existing wetlands.

*There are wetlands within the AoI (Refer to **Map 4**). The proposed TL has potential of impacting wetlands on the project area. It is important to undertake appropriate mitigation measures to minimize or avoid degradation of wetlands.*

### 3.1.7 Public Health Policy of 2014

The public health policy calls upon the project proponents to ensure that buildings are adequately provided with utilities so that they are fit for human habitation.

*The site office must be provided with all amenities/utilities that are essential for safeguarding public health for all people using the facilities.*

### 3.1.8 Occupational Health and Safety Policy of 2012

This policy is intended to protect safety and health of workers in work places. The proposed project will provide employment opportunities to many workers in various categories during construction and operation.

*The contractor will be expected to comply with the requirements of this policy when engaging workers in various construction activities. The environmental management provides mitigation measures that can be undertaken to ensure compliance with the requirements of this policy.*

### 3.1.9 HIV/AIDS Policy of 2009

The policy identifies HIV/AIDS as a global crisis that constitutes one of the most formidable challenges to development and social progress. The Pandemic heavily affects the Kenyan economy through loss of skilled and experienced manpower due to deaths, loss of man hours due to prolonged illnesses, absenteeism, reduced performance, increased stress, stigma, discrimination and loss of institutional memories, among others.

*Due to the large number of workers who will be involved in the project and the associated social issues with projects of such as scale, HIV/AIDS has been considered as one of the potential impacts, but adequate mitigation measures have also been proposed to that effect.*

### 3.1.10 Kenya National Policy on Gender and Development (NPGD), 2000

The purpose of the Gender Policy is to institutionalize The Kenya National Policy on Gender and Development (NPGD) within Gender, Children and Social Development. It articulates the policy approach of gender mainstreaming and empowerment of women at the ministry level. The policy seeks a society where women, men, children and persons with disabilities enjoy equal rights, opportunities and a high quality of life.

*This report has addressed in depth matters to do with gender and development. The project shall be governed under this principle during the entire project period.*

### 3.1.11 The Kenya National Climate Change Response Strategy of 2010

This strategy provides measures that the Government of Kenya is taking to address issues related to the impact of climate change on various sectors of the economy. The proposed Solar PV Power Plant is one of the renewable energy technologies that produces clean energy that reduces greenhouse gas emissions and other pollutants.

*Solar PV Power Plant and TL therefore will contribute to reduction of climate change effects.*

### 3.1.12 The National Poverty Eradication Plan (NPEP) of 1999

The National Poverty Eradication Plan (NPEP) was formulated with an objective of reducing the high levels of poverty in Kenya by 50 percent by the year 2015, as well as to strengthen the capabilities of the poor and vulnerable groups to earn income. The plan also aimed at reducing gender and geographical disparities in order to create a healthy, better-educated and more productive population. The formulation of the plan was guided by the goals and commitments agreed during the World Summit for Sustainable Development (WSSD) of 1995.

The plan therefore focuses on the delivery of four WSSD themes of poverty eradication; reduction of unemployment; social integration of the disadvantaged people and creation of an enabling economic, political, and cultural environment through development of transport and communication sector. The plan is implemented by the Poverty Eradication Commission (PEC) that was established in collaboration with various Government Ministries, bilateral and multilateral donors, the private sector, Community Based Organizations (CBOs) and Non-Governmental Organizations (NGOs).

*The NPEP is relevant since the proposed Solar Plant and TL will create an enabling environment that will contribute immensely in the enhancement of economic growth in Kenya. The proposed project will also impact the construction industry and business in general thereby having great relevance to poverty eradication in the country.*

### 3.1.13 The Poverty Reduction Strategy Paper (PRSP) of 2000

The Poverty Reduction Strategy Paper (PRSP) for Kenya has the broad objective of reducing poverty and promoting economic growth. This policy articulates Kenya's commitment and approach to tackling endemic poverty through involvement of the poor communities in both rural and urban areas in various socio-economic development activities.

*The proposed project, during and after implementation will offer various employment opportunities to Kenyans and will therefore contribute directly towards the realization of the broad national goal of reducing poverty in the country. In addition, the project will stimulate economic development by directly contributing to the construction industry and other key sectors of the economy to thrive.*

### 3.1.14 The National Energy and Petroleum Policy 2015

The overall objective of the energy and petroleum policy is to ensure affordable, competitive, sustainable and reliable supply of energy to meet national and county development needs at least cost, while protecting and conserving the environment. This policy stipulates the transformation of the Rural Electrification Authority (REA) into Rural Electrification and Renewable Energy Corporation (REREC) to be the lead agency for development of renewable energy resources other than geothermal and large hydro-power plants.

*The proposed Solar PV Power Plant and TL will aid in meeting this objective.*

### 3.1.15 The Gender Policy 2011

The overall goal of this Policy Framework is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya

The policy provides direction for setting priorities. An important priority is to ensure that all ministerial strategies and their performance frameworks integrate gender equality objectives and indicators and identify actions for tackling inequality. In addition, each program will develop integrated gender equality strategies at the initiative level in priority areas. Within selected interventions, the policy will also scale-up specific initiatives to advance gender equality.

*This policy will be referred to during Project implementation especially during hiring of staff to be involved in the project, procuring of suppliers and sub consultants and sub-contractors to the project.*

## 3.2 Legal Framework

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

The main legislation is the Environmental Management & Coordination (Amended) Act (EMCA) of 2015. The Act emphases that every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution and relevant laws and has the duty to safeguard and enhance the environment. It also empowers stakeholders to participate in sustainable management of the natural resources.

It calls for Environmental and Social Impact Assessment (ESIA) to guide the implementation of environmentally and socially sound decisions. There are other relevant local laws and regulations that have been looked into. They include but not limited to, the Constitution, the Water Act of 2016, The County Government Act 2012 among others.

The other regulations, standards, guidelines and conventions that have been evaluated in relation to this project include:

- Applicable National Environmental Management, Occupational Health and Safety, Public Health and Labour laws and regulations;
- IFC Performance Standards;
- EIB Environmental and Social Standards;
- The World Bank Group EHS Guidelines; and
- International Labour Organization Conventions.

### 3.2.1 The Constitution of Kenya

Various issues related to environmental management have been taken on board in Constitution of Kenya. Article 42 of the Bill of Rights contained in the Constitution provides that '*every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures*.

Article 54 provides for the rights of persons with disability while Article 56 highlights the rights of marginalized groups to participate in the decision-making process with regards to developments, thus, highlighting the need for consultation during the ESIA process and during the implementation of the project. Article 60 elaborates on Land Policy that which emphasizes that land shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable ensuring that there is:
(e) Sound conservation and protection of ecologically sensitive areas;
(f) Elimination of gender discrimination in law, customs and practices related to land and property in land;
(g) encouragement of communities to settle land disputes through recognized local community initiatives consistent with this Constitution.

Land classification is provided in Article 61 while Article 64 elaborates on Private Land ownership. Article 69 provides for the need to establish systems of environmental impact assessment, environmental audit and monitoring of the environment and public participation.
Chapter 5 of the new constitution provides the main pillars on which the 77 environmental statutes are hinged and covers "Land and Environment" and includes the aforementioned articles 69 and 70. Part 1 of the Chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property.

Part 2 of the Chapter directs focus on the environment and natural resources. It provides for a clear outline of the state's obligation with respect to the environment. The Chapter seeks to eliminate processes & activities likely to endanger the environment.

Article 69 states that the State shall:

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

- Encourage public participation in the management, protection and conservation of the environment;
- Protect genetic resources and biological diversity;
- Establish systems on environmental impact assessment, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and,
- Utilize the environment and natural resources for the benefit of the people of Kenya. 16

There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this Chapter.

In conformity with the Constitution of Kenya 2010, every activity or project undertaken within the Republic of Kenya must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment.

Section 70 provides for enforcement of environmental rights thus: -:

- If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.
- On application under clause (1), the court may make any order, or give any directions, it considers appropriate —

  (a) to prevent, stop or discontinue any act or omission that is harmful to the environment; (b) to compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or

  (b) To provide compensation for any victim of a violation of the right to a clean and healthy environment.
- For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

Essentially, the Constitution has embraced and provided further anchorage to the spirit and letter of the Environmental Management and Co-ordination Act (EMCA), 1999, whose requirements for environmental protection and management have largely informed Sections 69 through to 71 of the Document. In Section 72 however, the new constitution allows for enactment of laws towards enforcement of any new provisions of the Supreme Law.

*The proposed project complies with the Constitution by proposing a framework in its ESHIA on Social, Health, Safety and Environmental protection.*

### 3.2.2 Environmental Guidelines

In line with the Kenyan Constitution, NEMA has developed a number of guidelines which are part of a series of environmental management tools for environmental management under the Environmental Management and Coordination Act, CAP 387 of the Laws of Kenya. Below is a highlight of the key project relevant guidelines.

### 3.2.3 The Integrated Land Use Guidelines

Land in Kenya is a key factor of production, making its proper management a requirement for sustainable development.
The demand for arable land, grazing, forestry, wildlife, tourism and urban development are greater than the land resources available. These demands become more pressing every year with continued population growth. To address the identified key issues in land use management within a development-oriented approach poses challenges to all stakeholders and requires integrative solutions across the policy, socio-economic, and environment sectors.

the Integrated National Land Use Guideline is aimed at the prevention and mitigation of land degradation, addressing land use conflicts and managing both natural and anthropogenic disasters through the promotion of sustainable land management. It takes into account the provisions of the New Constitution of Kenya 2010 (specifically Chapter Five – Sections 60 - 72 which deal with "Land and Environment" as well as the various other laws, regulations, policies and guidelines in the different land sectors.

### 3.2.4 Technical Guidelines on the Management of used Oil and Oil Sludge in Kenya (NEMA, 2014)

The main objective of the guidelines is to ensure effective and efficient collection and transportation systems for used oil. These guidelines target government agencies (responsible for decision making, formulating policies and enforcing health and safety aspects of used oil and oil sludge management in the country), small generators, bulk generators of used oil and oil sludge, garages, used oil treatment plants, recycling and disposal facilities, and other interested stakeholders. The Proponent is envisioned to use heavy machinery which will require servicing hence producing used oil. These guidelines provide direction on safe management of used oil and oil sludge in Kenya and are a main regulatory reference material for management of used oil in Kenya and hence will be used as a key reference point to create awareness on hazards associated with handling used oil and to provide guidance on infrastructure for management of used oil.

### 3.2.5 Environmental Management and Coordination Act (EMCA, Cap 387)

The Environmental Management and Coordination Act (EMCA), 1999, is the framework law on environmental management and conservation in Kenya. Part II Article 3 of this Act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. To achieve this goal, the projects listed under the Amended Second Schedule of EMCA, Legal Notice No. 31 of 2019 must be subjected to Environmental Impact Assessment (EIA). The Solar Power Plant is listed under **Medium Risk Category, Item 8 (f) Solar Power Farms or Plants**. The aim of the EIA is to reduce negative environmental outcomes of the listed projects by implementing mitigation measures. There are several other regulations that have been formulated within the framework of EMCA, that are applicable to the proposed project.

*Under EMCA, NEMA has gazetted legal tools that govern conduct of EIAs and general environmental protection. The Proposed TL has been screened against these tools with results outlined below.*

#### *3.2.5.1 EMCA (Environmental Impact Assessment and Audit) Regulations, 2003*

The Environmental (Impact Assessment and Audit) Regulations provides ESIA process for preparation of the EIA Project or Study Reports that have to be submitted to NEMA for review and issuance of EIA License. The regulations provide details on the aspects to be evaluated and ESMPs and Monitoring plans to be prepared.

*The proposed project must comply with the requirements of the regulations that also include conducting regular monitoring and annual audits. The project requires an EIA license from NEMA before commencement of any activity.*

### *3.2.5.2 EMCA (Water Quality) Regulations, 2006*

The EMCA (Water Quality) Regulations, 2006 apply to water used for domestic consumption, industrial, recreation, fisheries, wildlife and irrigation, among others. The Contractor will be expected to provide water for consumption that meets the water quality standards as provided in the First Schedule of these regulations and provided in Table 1. The proposed project will need to comply with the requirements of this regulation to ensure water sources in the project area are protected from pollution and over abstraction. The project will also need to comply with the regulations that prohibit undertaking of development within a minimum of 6m from the highest ever recorded flood level of a river system. The regulation prohibits pollution of water bodies and requires that all substances discharged into the water bodies should meet the effluent discharge standards set under the Third Schedule of the regulations**.**

**Table 6: Quality Standards for Domestic Water (NEMA)**

| No | Parameter | Guide Value (max allowable) |
|---|---|---|
| 1 | pH | 6.5 – 8.5 |
| 2 | Suspended solids | 30 (mg/L) |
| 3 | Nitrate-$NO_3$ | 10 (mg/L) |
| 4 | Ammonia –$NH_3$ | 0.5 (mg/L) |
| 5 | Nitrite –$NO_2$ | 3 (mg/L) |
| 6 | Total Dissolved Solids | 1200 (mg/L) |
| 7 | Scientific name *(E.coli)* | Nil/100 ml |
| 8 | Fluoride | 1.5 (mg/L) |
| 9 | Phenols | Nil (mg/L) |
| 10 | Arsenic | 0.01 (mg/L) |
| 11 | Cadmium | 0.01 (mg/L) |
| 12 | Lead | 0.05 (mg/L) |
| 13 | Selenium | 0.01 (mg/L) |
| 14 | Copper | 0.05 (mg/L) |
| 15 | Zinc | 1.5 (mg/L) |
| 16 | Alkyl benzyl sulphonates | 0.5 (mg/L) |
| 17 | Permanganate value (PV) | 1.0 (mg/L) |

*Source: Water Quality Regulations - 2006 (NEMA)*

### *3.2.5.3 EMCA (Fossil Fuel Emission Control) Regulations, 2006*

The EMCA (Fossil Fuel Emission Control) Regulations, 2006 aims at eliminating or reducing emissions emitted from internal combustion engines to acceptable levels. The regulation provides guidelines on use of clean fuels, use of catalysts and inspection procedures for engines and generators.

*This regulation is applicable to the proposed project since there will be use of vehicles, machinery and equipment that depend on fossil fuel as their source of energy. The requirements of the regulation must be implemented to eliminate or reduce air quality degradation.*

*Sections of the regulation citing the standards of recommended emission levels will be given to the contractor and or pinned at strategic points in the contractor's field offices*.

### *3.2.5.4 EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006*

The EMCA (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006 provides that no person shall engage in any activity that may have an adverse impact on any ecosystem; may lead to the introduction of any exotic species or to unsustainable use of natural resources, without an Environmental Impact Assessment License issued by the Authority under the Act. The regulation requires NEMA in consultation with the relevant lead agencies, to impose bans, restrictions or similar measures on the access and use of any threatened species to ensure its regeneration and maximum sustainable yield.

*The proposed TL is located in an area with diverse ecosystems which will need to be protected as per the requirements of this regulation.*

### *3.2.5.5 EMCA (Waste Management Regulations, 2006)*

The Waste Management Regulations are basically aimed at streamlining the handling, transportation and disposal of various types of wastes. The broad goal of the regulations is to protect human health, wildlife and the environment. The regulations will be critical during the construction phase of the project when various wastes will be generated. Since there will be both ordinary and hazardous (used oil and hydraulic fluid) wastes generated, the Contractor will be expected to engage a NEMA registered/approved waste collection firm to manage the transportation and disposal of waste.

*The Contractor will follow the Waste Management Plan to carry out segregation, storage, transportation and disposal of waste at all the operational areas (Office, Workshop area and Construction site).*

**Table 7: Waste Management Regulations**

| | **PART II – GENERAL PROVISIONS** |
|---|---|
| *Responsibility of Waste Generator* | (1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.<br><br>(2) Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these Regulations.<br><br>(3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility. |
| *Segregation of Waste by Generator* | 5. (1) Any person whose activities generate waste, shall segregate such waste by separating hazardous waste from non-hazardous waste and shall dispose of such wastes in such facility as is provided for by the relevant Local Authority. |
| *Cleaner Production Principles* | 6. (1) Any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles:<br>improvement of production process through:<br>conserving raw materials and<br>energy |

| | **PART II – GENERAL PROVISIONS** |
|---|---|
| | (ii) eliminating the use of toxic raw materials within such time as may be prescribed by the Authority<br><br>(iii) reducing toxic emissions and wastes<br>monitoring the product cycle from beginning to end by:<br>identifying and eliminating potential negative impacts of the product.<br><br>(ii) enabling the recovery and re-use of the product where possible.<br><br>(iii) reclamation and recycling.<br><br>(c) incorporating environmental concerns in the design, process and disposal of a product. |
| *Waste Transportation License* | 7. (1) No person shall be granted a license under the Act to transport waste unless such person operates a transportation vehicle approved by the Authority upon recommendation from the relevant lead agency.<br><br>Any vehicle used for transportation of waste or any other means of conveyance shall be labelled in such a manner as may be directed by the Authority.<br><br>The Authority in consultation with the relevant lead agency may designate particular geographical areas as areas for operation for licensed waste transporters.<br><br>The application for a license to transport waste shall be in Form I of the First Schedule to these Regulations and shall be accompanied by the prescribed fee set out in the Second Schedule.<br><br>A license issued under the Act for the transportation of waste shall be in Form II of the First Schedule to these Regulations and shall be valid for one year from the date of issue. |
| *Mode of transporting waste.* | A person granted a license to transport waste shall ensure that:<br><br>(1) the collection and transportation of such waste is conducted in such a manner that will not cause scattering, escaping and/or flowing out of the waste;<br><br>(2) the vehicles and equipment for the transportation of waste are in such a state that shall not cause the scattering of, escaping of, or flowing out of the waste or emitting of noxious smells from the waste;<br><br>(3) the vehicles for transportation and other means of conveyance of waste shall follow the scheduled routes approved by the Authority from the point of collection to the disposal site or plant; and<br><br>(4) he or his agent(s) possess at all times during transportation of the waste, a duly filled tracking document as set out in Form III of the First Schedule to these Regulations and shall produce the same on |

| | **PART II – GENERAL PROVISIONS** |
|---|---|
| | demand to any law enforcement officer. |
| *Transportation of waste by licensed transporter* | 9. Any person licensed to transport waste shall collect waste from the designated area of operations or storage areas and shall deliver such waste to the designated storage site, disposal site or plant. |
| *Transitional Provision for transporting waste* | 10. Any person, who before the commencement of these Regulations was carrying on the business of transporting waste, shall apply to the Authority for a license for the transportation of waste within ninety days after the commencement of these Regulations in the prescribed Form I as set out of the First Schedule to these Regulations. |
| *License for disposal facility* | 11. (1) Any person granted a license under the Act and any other license that may be required by the relevant Local Authority to operate a waste disposal site or plant, shall comply with all conditions imposed by the Authority to ensure that such waste disposal site or plant operates in an environmentally sound manner.<br><br>(2) An application for a license to operate a waste disposal site or plant shall be in Form IV of the First Schedule to these Regulations and shall be accompanied by the prescribed fee set out in the Second Schedule.<br><br>A license issued under the Act for the operation of a waste disposal site or plant shall be as in Form V as set out in the First Schedule to these Regulations. |
| *Transitional Provision for disposal facilities* | 12. Any person who before the commencement of these Regulations was carrying on the business of operating a waste disposal site or plant shall apply to the Authority for a license as prescribed in these Regulations within ninety days after the commencement of these Regulations. |
| *Waste treatment by operators of disposal sites. Cap 265* | 13. Any operator of a disposal site or plant shall apply the relevant provisions on waste treatment under the Local Government Act and Regulations thereunder to ensure that such waste does not present any imminent and substantial danger to public health, the environment and natural resources. |
| *Validity of license and renewals* | 14. A license to operate a waste disposal site or plant shall be valid for a period of one year from the date of issue and may be renewed for a further similar period on such terms and conditions as the Authority may deem necessary or impose for purposes of insuring public health and sound environmental management. |
| *Requirement for Environmental Audit* | 15. Every licensed owner or operator of a waste disposal site or plant shall carry out an annual environmental audit pursuant to the provisions of the Act. |
| *Re-use and recycling plants* | 16. Notwithstanding any provisions to the contrary herein, these Regulations shall apply to plants and sites established for re-use or re-cycling of wastes. |

#### *3.2.5.6 EMCA (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009*

The Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009 applies to all wetlands in Kenya whether occurring in private or public land. The objectives of the regulations are to provide for the conservation and sustainable use of wetlands and their resources.

*There are wetlands within the AoI (Refer to **Map 4**). The proposed TL has potential of impacting wetlands on the project area. It is important to undertake appropriate mitigation measures to minimize or avoid degradation of wetlands.*

### *3.2.5.7 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009*

This regulation prohibits generation of excessive noise and vibration in habited areas. These Regulations determine the level of noise that will permissible in particular during the construction of the improvements, the following factors will be considered:

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

The Contractor will be expected to meet the noise level requirements as provided in the following schedules of the regulations and also carry out noise level monitoring:

- Schedule 1 – Noise levels at residential and commercial sites – Table 8
- Schedule 2 – Noise levels at Construction sites – Table 9
- Schedule 3 – Noise Levels at quarry sites

*The Contractor to observe noise level requirement according to the regulations.*

**Table 8: Maximum Permissible Noise Levels – Residential and Commercial (NEMA)**

| **Zone** | | **Sound Level Limits dB(A)** | | **Noise Rating Level (NR) (Leq,14 h)** | |
|---|---|---|---|---|---|
| | | Day | Night | Day | Night |
| A. | Silent Zone | 40 | 35 | 30 | 25 |
| B | Places of worship | 40 | 35 | 30 | 25 |
| C. | Residential: Indoor<br><br>Outdoor | 45<br><br>50 | 35<br><br>35 | 35<br><br>40 | 25<br><br>25 |
| D. | Mixed residential (with some Commercial and places of entertainment) | 55 | 35 | 50 | 25 |
| E. | Commercial | 60 | 35 | 55 | 25 |

*Source: Noise and Excessive Vibration Pollution Control) Regulations, 2009*

**Table 9: Maximum Permissible Noise Levels for Construction Sites (NEMA)**

| **Facility** | | Maximum Noise Level Permitted (Leq) in | |
|---|---|---|---|
| | | Day | Night |
| (i) | Health facilities, educational institutions, homes for disabled etc. | 60 | 35 |
| (ii) | Residential | 60 | 35 |
| (iii) | Areas other than those prescribed in (i) and (ii) | 75 | 65 |

*Source: Noise and Excessive Vibration Pollution Control) Regulations, 2009*

### *3.2.5.8 EMCA (Air Quality) Regulations, 2014*

The objective of this regulation is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g., motor vehicles).

The construction activities will generate emission of fugitive dust caused by a combination of on-site excavation, movement of earth materials, movement of construction vehicles and machinery and exposure of bare soil and soil piles to wind. In addition, air quality will be impacted by exhaust emissions from diesel engines of earth moving equipment and generators, as well the potential burning of solid waste on-site.

*The Contractor will be required to observe the limits for Air Quality as provided in Schedule 1 – Ambient Air Quality Tolerance Limits. The Proponent shall ensure that the Contractor observes the policy and regulatory requirements and implement the mitigation measures proposed in this report.*

**Table 10: Schedule 1 – Ambient Air Quality Tolerance Limits**

| | Pollutant | Time weighted Average | Industrial area | Residential, Rural & Other area | Controlled areas*** |
|---|---|---|---|---|---|
| 1. | Sulphur oxides ($SO_X$); | Annual Average* | 80 $g/m^3$ | 60 $g/m^3$ | 15 $g/m^3$ |
| | | 24 hours** | 125 $g/m^3$ | 80 $g/m^3$ | 30 $g/m^3$ |
| | | | | | |
| | | Annual Average | | 0.019 ppm/50 $g/m^3$ | |
| | | Month Average | | | |
| | | 24 Hours | | 0.048ppm /125 $g/m^3$ | |
| | | One Hour | | | |
| | | Instant Peak | | 500 $g/m^3$ | |
| | | Instant Peak (10 min) | | 0.191 ppm | |
| | | | | | |
| 2. | Oxides of Nitrogen ($NO_X$); | Annual Average* | 80 $g/m^3$ | 60 $g/m^3$ | 15 $g/m^3$ |
| | | 24 hours** | 150 $g/m^3$ | 80 $g/m^3$ | 30 $g/m^3$ |
| | | 8 hours | | | |
| | | | | | |
| | | Annual Average | | 0.2 ppm | |
| | | Month Average | | 0.3 ppm | |
| | | 24 Hours | | 0.4 ppm | |
| | | One Hour | | 0.8 ppm | |
| | | Instant Peak | | 1.4 ppm | |
| | | | | | |
| 3. | Nitrogen Dioxide | Annual Average | 150 $g/m^3$ | 0.05 ppm | |
| | | Month Average | | 0.08 ppm | |
| | | 24 Hours | 100 $g/m^3$ | 0.1 ppm | |
| | | One Hour | | 0.2 ppm | |
| | | Instant Peak | | 0.5 ppm | |
| | | | | | |
| 4. | Suspended Particulate matter (SPM) | Annual Average* | 360 $g/m^3$ | 140 $g/m^3$ | 70 $g/m^3$ |
| | | 24 hours** | 500 $g/m^3$ | 200 $g/m^3$ | 100 $g/m^3$ |
| | | mg/Kg | | | |
| | | Annual Average**** | | 100 $g/m^3$ | |
| | | 24 hours*** | | 180 $g/m^3$ | |
| | | | | | |
| 5. | Respirable Particulate Matter (<10 m) (RPM) | Annual Average* | 70 $g/m^3$ | 50 $g/m^3$ | 50 $g/m^3$ |

| | Pollutant | Time weighted Average | Industrial area | Residential, Rural & Other area | Controlled areas*** |
|---|---|---|---|---|---|
| | | 24 hours** | 150 g/Nm$^3$ | 100 g/Nm$^3$ | 75 g/Nm$^3$ |
| | | | | | |
| 6. | $PM_{2.5}$ | Annual Average | 35 g/m$^3$ | | |
| | | 24 hours | 75 g/m$^3$ | | |
| | | | | | |
| 7. | Lead (Pb) | Annual Average* | 1.0 g/Nm$^3$ | 0.75 g/Nm$^3$ | 0.50 g/m$^3$ |
| | | 24 hours** | 1.5 g/m$^3$ | 1.00 g/m$^3$ | 0.75 g/m$^3$ |
| | | Month Average | | 2.5 | |
| | | | | | |
| 8. | Carbon monoxide (CO)/ carbon dioxide ($CO_2$) | 8 hours** | 5.0 mg/m$^3$ | 2.0 mg/m$^3$ | 1.0 mg/m$^3$ |
| | | 1 hour | 10.0 mg/m$^3$ | 4.0 mg/m$^3$ | 2.0 mg/m$^3$ |
| | | mg/Kg | | | |
| | | 24 hours** | | | |
| | | | | | |
| 9. | Hydrogen Sulphide | 24 hours** | 150 g/m$^3$ | | |
| | | | | | |
| 10. | Non-methane hydrocarbons | | | | |
| | | instant Peak | 700ppb | | |
| | | | | | |
| 11. | Total VOC | 24 hours** | 600 g/m$^3$ | | |
| | | | | | |
| 12. | Ozone | 1-Hour | 200 g/m$^3$ | 0.12 ppm | |
| | | 8 hours (instant Peak) | 120 g/m$^3$ | 1.25 ppm | |
| | | | | | |

### 3.2.6 The Energy Act, 2019

The Energy Act is set to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes. It also governs the management and sustainable use of energy resources and enhancing protection of the environment.

The Act establishes the Energy and Petroleum Regulatory Authority (EPRA) with the mandate to regulate among others the generation, importation, exportation, transmission, distribution, supply and use of electrical energy with the exception of licensing of nuclear facilities.

The Act also establishes the Rural Electrification and Renewable Energy (REREC) that has the following functions among others to develop and update the renewable energy master plan taking into account county specific needs and the principle of equity in the development of renewable energy resources.

*The project will be licensed and governed by the act.*

### 3.2.7 The Wildlife Management and Conservation Act 2013

The Wildlife and Conservation Act deals with the conservation and management of wildlife in Kenya. The Act provides that wildlife should be conserved to yield optimum returns in terms of cultural, aesthetic, scientific and economic benefits. The Act requires that full account be taken of the interrelationship between wildlife conservation and land use.

*The proposed TL will be located within a rehabilitated area with some wildlife. The construction activities will make mitigation provisions for the existing wildlife as informed by the specialist ecological studies that have been carried out. Refer to* ***Chapter 4*** *and* ***Appendix 12****.*

### 3.2.8 The Water Act 2016

The Water Act No. 43 of 2016 was assented to on 20th September 2016. The new Act repealed the water Act 2002. The Act provides for the establishment of the Water Resources Authority (WRA) who have the responsibility to regulate the management and use of water resources. The Act provides for the regulation, management and development of water resources and water and sewerage services in line with the Constitution. The enactment of this law aimed at aligning national water management and water services provision with the requirements of the Constitution of Kenya 2010 particularly on the devolving of water and sanitation services to the county governments.

The Act stipulates that a permit shall be required in all cases of proposed diversion, abstraction, obstruction, storage or use of water, with minor exceptions relating to use for domestic purposes (Section.36). A person shall not 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.

*The TL will require very modest quantity of water mainly during construction which can be supplied through use of a water bowser.*

### 3.2.9 The Public Health Act (Chapter 242) of Revised Edition 2012

The Public Health Act (Chapter 242) is an Act of Parliament that provides for securing and maintaining good health of citizens. The Act contains directives that are focused on ensuring protection of human health. There are provisions within the Act that deal with water, air and noise quality as they pertain to human health. An environmental nuisance includes the emission from premises of waste waters, gases and exhaust emissions which could be regarded as injurious to health. The owner and/or occupier of premises responsible for such nuisances are liable to prosecution under the Act.

*The construction of the proposed TL has potential for pollution risks related to soil, water, air and noise during construction. The contractor will need to ensure that air and water pollution is controlled and does not affect workers and people within the project site area.*

### 3.2.10 Occupational Safety and Health Act 2007

The Act provides for protection of workers during construction and operation phases of the project. This Act will provide some guidance on the mitigation measures for any negative impacts in particular those concerning the workers within the site. Section 17 of the Act further highlights the importance of an employer or in this case Contractor to ensure the health and safety of persons other than his/her employees. As such this Act also ensures the inclusion of community health and safety in this ESIA.

*The project construction, operation and decommissioning activities will have occupational, public health, safety and security issues that have to be mitigated and monitored and this ESHIA proposes a number of mitigation measures as provided under Chapter 7.*

### 3.2.11 The Environment and Land Court Act, 2011

This is an Act of Parliament to give effect to Article 162(2) (b) of the Constitution to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of land. The Environment and Land Court is one of the Courts contemplated by article 162(2). It is a Superior Court and has the same status as the High Court. The court is established under section 4 of the Environment and Land Court Act No. 19 of 2011. It has jurisdiction to hear any other dispute relating to environment and land.

The jurisdiction of the court is provided under section 13 of the Act. The Court has original and appellate jurisdiction to hear and determine all disputes in accordance with Article162(2) (b) of the Constitution and with the provisions of the Act or any other written law relating to environment and land. The court has powers to deal with disputes relating to land administration and management.

The court is also empowered to hear cases relating to public, private and community land and contracts or other instruments granting any enforceable interests in land. The court also exercises appellate jurisdiction over the decisions of subordinate courts or local tribunals in respect of matters falling within the jurisdiction of the Court. The court further exercises supervisory jurisdiction over the subordinate courts, local tribunals, persons or authorities in accordance with Article 165(6) of the Constitution.

*Whereas the project will have an internal Grievance Redress Mechanism (GRM), cases that may not be dealt with conclusively will have the option to seek legal redress through the courts in the event that they are not satisfied with the outcome from GRM.*

### 3.2.12 The National Museums and Heritage Act, 2006

This Act provides for the establishment of the National Museums of Kenya (NMK) to serve as the national repositories for things of scientific, cultural, technological and human interest. The Act provides for the control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya.

*An archaeological and cultural impact assessment has been carried out as part of the ESHIA Study to evaluate the cultural heritage of the project area. The outcome of the assessment is provided in **Chapter 7** and **Appendix 13**.*

### 3.2.13 HIV / AIDS Act, 2006

The Act provides for measures of prevention, management and control of HIV and AIDS. It Promotes public health, counselling, support and care for those affected or living with HIV.

*This Act will ensure that the Contractor makes provision for Voluntary Counselling and Testing (VCT) for the workers. This will greatly contribute to management of HIV and AIDS and also bringing down stigmatization.*

### 3.2.14 The National Gender and Equality Act, 2011

National Gender Equality Commission is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution. NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEC Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination. Gender mainstreaming in the project will ensure that the concerns of women and men form an integral dimension of the project design, implementation, operation and the monitoring and evaluation ensures that women and men benefit equally, and that inequality is not perpetuated.

*The contractor will develop labour management plan. This plan will ensure that gender equality is addressed to the best level possible.*

### 3.2.15 The Employment Act, 2007

The Employment Act, 2007 defines the fundamental rights of employees including the basic conditions of employment of workers. It also regulates employment of children under section 56 which makes it illegal to employ children under the age of 13 years. Children between ages 13 – 16 years can be employed in light work while those between 16 and 18 are considered employable.

*The contractor on site will have to employ casual labourers (those who are engaged on need basis and paid daily) probably from the communities where the project is located during construction. The basic conditions of employees should be observed to avoid unnecessary conflicts during the construction works. The Contractor shall pay the entire amount of the wages earned by or payable to the workers. Payment of such wages shall be done at the end of a working day at or near the place of work. The Contractor shall also ensure that all statutory deductions are submitted without delay to appropriate government agencies e.g., Kenya Revenue Authority, NSSF, NHIF, among others.*

### 3.2.16 The Sexual Offences Act, 2006

This Act protects people and employees from any unwanted sexual attention or advances by staff members. This act ensures the safety of women, children and men from any sexual offences which include: rape, defilement, indecent acts.

*This law will govern the code of conduct of the Contractor's staff and provide repercussions of any wrong doing. The labour management plan will ensure that sexual rights are protected.*

### 3.2.17 Physical Planning Act (Cap. 286)

This Physical Planning Act, Cap. 286 provides for the preparation and implementation of physical development plans. Section 36 of the Act provides for environmental impact assessments and states that 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'.

*The Proponent and Contractors of the proposed TL will need to comply with the requirements of this Act.*

*The developer will be required to fulfil the following:*

- *Submit land ownership documents to the County Government of Mombasa;*
- *Prepare and submit a planning report to the County Government of Mombasa;*
- *Pay requisite statutory fees;*

*The approval process will take approximately one (1) month from the date of submission.*

### 3.2.18 The County Governments Act 2012

The promulgation of the 2010 Constitution brought about devolution and the setting up of County Governments. This Act provides for the roles and functions of the County Government. The County Government approves all development activities within the County, as such will be a major stakeholder for the proposed project.

*The Contractor will be expected to carry out implementation of the project in consultation with the County Government of Mombasa.*

### 3.2.19 Land Act, 2012.

The Land Act was enacted by Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources, and for connected purposes. The Act applies to all land declared as (a) public land under Article 62 of the Constitution; (b) private land under Article 64 of the Constitution; and (c) community land under Article 63 of the Constitution and any other written law relating to community land.

The Land Act guarantees security of tenure for land under (a) freehold; (b) leasehold; (c) such forms of partial interest as may be defined under the Act and other law, including but not limited to easements; and (d) customary land rights, where consistent with the Constitution and guarantees equal recognition and enforcement of land rights arising under all tenure systems and non-discrimination in ownership of, and access to land under all tenure systems. Under the Lands Act 2012, The Wayleaves Act, Cap 292 and The Land Acquisition Act, Cap. 295 have been revoked but Sections 8 and 9 allow for Compulsory Acquisition as an option in acquiring land for public utility.

*The land to be occupied by the project is private land belonging to Bamburi Cement PLC. Bamburi will provide the land on sub-lease basis to Momnai Energy for 25 years.*

### 3.2.20 The Climate Change Act, 2016.

The Act establishes the National Climate Change Council whose main function is to advise the National and County Governments on legislative and other measures necessary for mitigating and adapting to the effects of climate change. It provides the legal and institutional framework for the mitigation and adaption to the effects of climate change; to facilitate and enhance response to climate change; to provide for the guidance and measures to achieve low carbon climate resilient development and for connected purposes.

*The proposed Solar PV Power Plant and TL is one of the renewable energy technologies that produces clean energy that reduces greenhouse gas emissions and other pollutants to the environment.*

### 3.2.21 The Energy (Solar Photovoltaic Systems) Regulations, 2012

The Energy (Solar Photovoltaic Systems) Regulations, 2019. apply to a Solar PV system manufacturer, importer, vendor, technician, contractor, system owner, a Solar PV system installation and consumer devices. The Regulations provide the following requirements:

- A person shall not design, install, commission, maintain or repair a Solar PV system unless he is licensed by the Authority.
- A person shall not engage in the importation, manufacture, sale or installation of Solar PV systems or Solar PV system components without a valid license issued by the Authority.
- A contractor or technician shall ensure that any Solar PV installation work is carried out and complies with the relevant Kenya Standard and all other relevant technical, legal and regulatory requirements applicable in Kenya.

*The developer will be required to fulfil the following:*

- *Obtain license for power generation from EPRA;*
- *Obtain license for transmission of power from (Kenya Power)*
- *Pay requisite statutory fees;*

*The approval process takes approximately one (1) month from the date of submission.*

*The proposed project causes no greenhouse gases to be emitted after installation. It alleviates dependence on foreign oil and fossil fuels and reduce the overall power deficit on the national grid.*

### 3.2.22 Environmental Related Permits and Licenses

**Table 11** below lists the environment-related permits required in the Project.

**Table 11: Environment-Related Permits required in the Project**

| No. | Relevant activity | Statute | Requirement | Competent Authority | Responsible Agency for Obtaining Clearance | Period of Acquisition | Duration |
|---|---|---|---|---|---|---|---|
| **Pre-Construction Stage** | | | | | | | |
| 1 | Construction and operation of Solar Power Plant and TL | Environmental Management and Coordination Act (EMCA) Cap 387, Amended 2015 | Need to submit ESHIA report to obtain EIA license | NEMA | Momnai Energy | Upon approval of ESHIA report | Max 90 Days from date of submission of ESHIA Report |
| **2** | Construction of Utility Solar Panels and TL at Bamburi Cement Land | Civil Aviation Act, 2013 | Need to obtain permission to install overhead TL tower | Kenya Civil Aviation Authority (KCAA) | Momnai Energy | After the study | Indefinite |
| **3** | 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 |
| **4** | Construction and operation of Solar PV Power Plant and TL | The Energy (Solar Photovoltaic Systems) Regulations, 2012 | Need to obtain license to develop and operate the plant | Energy and Petroleum Regulatory Authority (EPRA) | Momnai Energy | Before commencement of construction | |
| | | | Need to obtain license to develop and operate the plant | Kenya Power | Momnai Energy | Before commencement of construction | |
| **5** | Construction and operation of Solar PV Power Plant and TL | County Governments Act No. 17 of 2012 revised in 2017 | Need to obtain clearance of ESHIA report | County Governments of Mombasa County | Momnai Energy | Upon approval of ESHIA report | Approx. 1 month from submission |
| **6** | Setting up of construction Office and/or Social Amenities | Environmental Management and Coordination Act (EMCA) Cap 387, Amended 2015 | 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, 2016 Water resources management rules,2007 | 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 | Period of Acquisition | Duration |
|---|---|---|---|---|---|---|---|
| **8** | Drilling of boreholes (if required) | Environmental Management and Coordination Act (EMCA) Cap 387, Amended 2015 | 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 from site | 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) | License to manufacture explosives pursuant to the explosives (Blasting explosive) (amendment) rules of 1969 section 11 of the Explosives Act, CAP 115 | Appointment of a blaster | Mines and Geology Department in Ministry of Environment and Forestry | Contractor | Before blasting works | Max 1 month |
| **2** | Blasting the bedrocks by use of Ammonium nitrate-fuel oil explosives (if required) | License to manufacture explosives pursuant to section 18 of the Explosives Act, CAP 115 | Need to obtain permit to blast | Mines and Geology Department in Ministry of Environment and Forestry | Contractor | Mines and Geology Department in Ministry of Environment and Forestry | Max 3weeks |
| **3** | 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 |

| No. | Relevant activity | Statute | Requirement | Competent Authority | Responsible Agency for Obtaining Clearance | Period of Acquisition | Duration |
|---|---|---|---|---|---|---|---|
| **4** | Registration of construction site a workplace | Registration of campsite as a work place pursuant to OSHA No. 15 of 2007 | Need to obtain workplace registration certificate for the contractor's campsite | DOSHS | Contractor | Before commencement of construction | 2 weeks |
| **5** | Employment of a safety officer to enhance compliance to OSHA,2007 | Notice of appointment of Safety Officer / Supervisor pursuant to Building Operations and Works of Engineering Construction Rules, 1984 | Need to appoint a safety officer to oversee and enhance safety issues on site | DOSHS | Contractor | Before commencement of construction | 1 week |
| **5** | First aid on site | Obtain First Aid Leaflets from DOSHS pursuant to First Aid Rules, 1977 | Need to have a first aider and adhere to rules | DOSHS | Contractor | Before commencement of the work | 1 week |
| **6** | Compensation issues on site | Registration for Workmen's Compensation pursuant to Workers Injury Benefits Act No. 13 of 2007 | Need to insure the workers in case of any injuries on site | DOSHS | Contractor | Before commencement of the work | 1 week |
| **Operational phase** | | | | | | | |
| **7** | Registration of construction site a workplace | Registration of campsite as a work place pursuant to OSHA No. 15 of 2007 | Need to obtain workplace registration certificate for the contractor's campsite | DOSHS | Contractor | Before commencement of construction | 2 weeks |

## 3.3 International Guidelines

### 3.3.1 IFC Performance Standards on Environmental and Social Sustainability

The IFC Performance Standards are intended to provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations in relation to project-level activities. IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced.

IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives.

There are eight IFC Performance Standards that the proposed project at Bamburi in Mombasa County is supposed to meet throughout the life of this investment.

**Table 12: IFC PS on Environmental and Social Sustainability**

| PS | Performance Standard | Remarks | Triggered |
|---|---|---|---|
| PS1 | ***Assessment and Management of Environmental and Social Risks and Impacts.***<br>• Identify project E&S risks and impacts<br>• Adopt mitigation hierarchy (anticipate/avoid, minimize, compensate/offset)<br>• Improve performance through an Environmental and Social Management System (ESMS)<br>• Engagement with Affected Communities, other stakeholders | Applies to all projects that have environmental and social impacts<br><br>Requirements being Addressed in the ESHIA Report<br>This ESHIA process will culminate in the implementation of the EMMP by the Proponent. | Yes |
| PS 2 | ***Labour and Working Conditions***<br>• To promote the fair treatment, non-discrimination, and equal opportunity of workers.<br>• To establish, maintain, and improve the worker-management relationship.<br>• To promote compliance with national employment and labour laws.<br>• To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.<br>• To promote safe and healthy working conditions, and the health of workers.<br>• To avoid the use of forced labour. | Applies to workers directly engaged by the client (direct workers), workers engaged through third parties contracted workers), as well as workers engaged by the client's primary suppliers (supply chain workers).<br><br>Project area community will be employed in the project as unskilled or skilled labourers. There is potential for migrant workers to move into project area looking for job opportunities | Yes |
| PS 3 | ***Resource Efficiency and Pollution Prevention***<br>• Avoid, minimize, and reduce project-related pollution<br>• More sustainable use of resources, including energy and water<br>Reduced project-related Greenhouse Gas (GHG) emissions | There are project activities like maintenance of vehicles and machines, fugitive dust and exhaust emissions that have the potential to cause pollution. | Yes |

| PS | Performance Standard | Remarks | Triggered |
|---|---|---|---|
| PS 4 | ***Community Health, Safety, and Security***<br>• To anticipate and avoid adverse impacts on the health and safety of the Affected Community<br>• To safeguard personnel and property in accordance with relevant human rights principles | The project area community will either be directly or indirectly affected by the project | Yes |
| PS 5 | ***Land Acquisition and Involuntary Resettlement***<br>• Avoid, minimize adverse social and economic impacts from land acquisition or restrictions on land use<br>• Improve or restore livelihoods and standards of living<br>• Improve living conditions among displaced persons | Project being implemented on private land belonging to project proponent and there is no settlement on the land | No |
| PS 6 | ***Biodiversity Conservation and Sustainable Management of Living Natural Resources***<br>• Protection and conservation of biodiversity<br>• Maintenance of benefits from ecosystem services<br>• Promotion of sustainable management of living natural resources | Project is located in a modified natural habitat with flora and fauna. Hence there will be habitat loss and fragmentation of natural habitat | Yes |
| PS 7 | ***Indigenous Peoples***<br>• Ensure full respect for IPs (human rights, dignity, aspirations, livelihoods, culture, knowledge, practices)<br>• Avoid, minimize adverse impacts<br>• Sustainable and culturally appropriate development benefits and opportunities<br>• Free, Prior and Informed Consent (FPIC) in certain circumstances | There are no indigenous peoples in the project as described in PS 5 | No |
| PS 8 | ***Cultural Heritage***<br>• Protection and preservation of cultural heritage<br>• Promotion of equitable sharing of cultural heritage benefits | Site evaluation has been done and a no objection to proceed given. However, a "Chance Find Procedure" has been provided should the Contractor encounter anything of cultural importance. | No |

### 3.3.2 World Bank Group Environmental, Health and Safety (EHS) Guidelines

The Environmental, Health and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These General EHS Guidelines are used in addition to the local guidelines in order to provide mitigation measures for the various environmental and social impacts that will be identified in this report. The main EHS guidelines that will be used alongside local policies include:

- Environmental Guidelines
- Occupational Health and Safety Guidelines
- Community Health and Safety Guidelines
- Construction and Decommissioning Guidelines

*The project will be designed to operate in compliance with the relevant World Bank EHS Guidelines.*

### 3.3.3 EIB Environmental and Social Standards

The EIB is a public institution driven by the policy objectives of the European Union and their principles of sustainable development, public participation, and accountability. It seeks to promote sustainable and inclusive growth while protecting the natural and social environment in a holistic manner, thereby ensuring that requirements relating to the protection of the environment and human well-being are integrated in the definition, preparation and implementation of all operations. To this end EIB has developed 10 Environmental and Social Standards out of which the 8 applicable standards are highlighted below.

#### *3.3.3.1 Assessment and Management of Environmental and Social Impacts and Risks*

These standards underscore the importance of managing environmental and social impacts and risks throughout the life of a project through the application of the precautionary principle. The standard's requirements allow for the development of an effective environmental and social management and reporting system that is objective and encourages continual improvements and developments. The standard includes requirements for stakeholder engagement and disclosure throughout the life of the project.

*An Environmental, Social and Health Impact Assessment (ESHIA) Study has been undertaken to identify the potential risks and impacts and develop appropriate mitigation measures and a monitoring plan has been instituted.*

#### *3.3.3.2 Pollution Prevention and Abatement*

The objective of this standard is to avoid and minimise pollution. It outlines a project-level approach to resource efficiency and pollution prevention and control in line with best available techniques and internationally disseminated practices.

*The commissioned ESHIA Study has identified potential pollution sources and provided mitigation measures. Refer to Chapter 7 for details.*

#### *3.3.3.3 Biodiversity and Ecosystems*

This standard outlines the approach and measures the promoter has to take to protect and conserve all levels of biodiversity. The standard applies to all habitats (marine and terrestrial) whether or not previously disturbed or legally protected. It focuses on major threats and supports the sustainable use of renewable natural resources and the equitable sharing of benefits from the project's use of natural resources.

*A dedicated ecological study has been carried out to identify the flora and fauna present in the project area so that appropriate mitigation measures can be provided. Refer* ***Appendix 12*** *of this report.*

#### *3.3.3.4 Climate Related Standards*

EIB financing as a whole is aligned with EU climate policies, which should be taken into account at all stages of the project cycle, in particular regarding the assessment of the economic cost of greenhouse gas emissions and the climate vulnerability context.
Specifically, project promoters must ensure that all projects comply with appropriate national and, where applicable, EU legal requirements, including multilateral agreements, related to climate change policy.

*The proposed project is a renewable energy source that will provide clean energy without Greenhouse Gases emission hence complies with both the national and EIB requirements.*

#### *3.3.3.5 Cultural Heritage*

Through its projects, the EIB recognises the central role of cultural heritage within individual and collective identity, in supporting sustainable development and in promoting cultural diversity. Consistent with the applicable international conventions and declarations, this standard aims at the identification, management and protection of tangible and intangible cultural heritage that may be affected by project activities. It emphasises the need for the implementation of a "chance-find procedure", which outlines the actions to be taken if previously unknown cultural heritage is encountered.

*An archaeological and cultural impact assessment has been carried out as part of the ESHIA Study to evaluate the cultural heritage of the project area. The outcome of the assessment is provided in* ***Chapter 7*** *and* ***Appendix 13.***

#### *3.3.3.6 Labour Standards*

Good labour practices and the use of appropriate codes of conduct are important to ensure the fair treatment, non-discrimination and equality of opportunity of workers. This standard aims at ensuring that project implementation is carried out in compliance with the core labour standards of the International Labour Organisation and with national labour and employment laws. The standard also requires the establishment, maintenance and improvement of worker-management relationships.

*The Contractor will prepare a labour management plan which will be expected to comply with these requirements.*

#### *3.3.3.7 Occupational and Public Health, Safety and Security*

The EIB expects promoters to protect and secure public and occupational health, safety and security and promote the dignity of the affected community in relation to project-related activities, with particular attention to vulnerable groups. The standard also requires promoters to adhere to the international norms and relevant human rights principles when using security services.

*The project construction, operation and decommissioning activities will have occupational, public health, safety and security issues that have to be mitigated and monitored and this ESHIA proposes a number of mitigation measures as provided under* ***Chapter 7.***

#### *3.3.3.8 Stakeholder Engagement*

This standard requires promoters to uphold an open, transparent and accountable dialogue with all project affected communities and relevant stakeholders in an effective and appropriate manner. The value of public participation in the decision-making process is stressed throughout the preparation, implementation and monitoring phases of a project. The right to access to remedy, including through grievance resolution, is actively required.

*Consultations and engagement with stakeholders and project area community is being carried during this ESHIA Study. A Stakeholder Engagement Plan and Grievance Redress Mechanism will be developed as part of the study.*

**Table 13: EIB Environmental and Social Standards**

| Standards | Standard | Remarks | Trigger |
|---|---|---|---|
| 1 | Environmental and Social Impacts and Risks | This Standard applies to all projects likely to have significant environmental, climate and/or social impacts and risks.<br><br>*ESHIA Study has been carried out and potential impacts have been identified for mitigation* | Yes |
| 2 | Stakeholder Engagement | This Standard applies to all projects likely to have significant environmental, climate and/or social impacts and risks.<br><br>*Stakeholders have been engaged and will be meaningfully consulted and engaged throughout the project life cycle* | Yes |
| 3 | Resource Efficiency and Pollution Prevention | This Standard applies to all projects likely to have significant environmental, climate and/or social impacts and risks.<br><br>*Project will use machines and vehicles that can impact soil and other resources* | Yes |
| 4 | Biodiversity and Ecosystems | This Standard applies to all projects likely to have significant environmental, climate and/or social impacts and risks<br>.<br>*The site has flora and fauna hence there will be habitat loss and fragmentation of natural habitat.* | Yes |
| 5 | Climate Change | This Standard further recognises the role of finance in supporting low-carbon and climate-resilient development, i.e. in (i) addressing climate change by reducing greenhouse gas (GHG) emissions; "Do No Significant Harm" principle<br><br>T*he Solar PV Power Plant and TL is endeavouring to reduce GHG emissions* | No |
| 6 | Involuntary Resettlement | This Standard also applies to the displacement of persons without formal, traditional or recognisable usage rights, who are occupying or utilising land prior to the cut-off-date8<br><br>*There are no persons being displaced* | No |
| 7 | Vulnerable Groups, Indigenous Peoples and Gender | Applies whenever vulnerable, marginalised or discriminated-against persons and/or groups are affected by the project<br><br>*The project area has gender issues* | Yes - Gender |
| 8 | Labour Rights | This Standard applies to project workers including full-time, part-time, temporary, seasonal and migrant workers<br><br>*The project will employ people and there is potential for labour influx* | Yes |
| 9 | Health, Safety and Security | This Standard applies to all projects that are likely to affect, directly or indirectly, occupational and/or public health, safety and security and the specific requirements that need to be addressed<br><br>*There are construction activities that will pose safety risks hence require assessment* | Yes |

| Standards | Standard | Remarks | Trigger |
|---|---|---|---|
| 10 | Cultural Heritage | This Standard also applies to projects under implementation that are likely to have a significant impact on cultural heritage but were not previously identified as such and for which chance find procedures shall be applied.<br><br>*Site evaluation has been done and a no objection to proceed given. However, a "Chance Find Procedure" has been provided should the Contractor encounter anything of cultural importance.* | No |

## 3.4 International Conventions

Kenya is signatory to several international conventions and treaties that would need to be adhered to when implementing this project. These conventions are geared towards environmental protection and conservation.

### *3.4.1.1 International Labour Organization (ILO) Conventions*

The Government of Kenya has ratified 50 ILO Conventions and those that are relevant to this study include:

- Safety and Health in Construction Recommendation, 1988 (No. 167)
- Minimum Age Convention, 1973 (No. 138) Minimum age specified: 16 years
- Migrant Workers (Supplementary Provisions) Convention, 1975 (No. 143)
- Equality of Treatment Convention (Social Security) Convention, 1962 (No 118)
- Workmen's Compensation (Accidents) Convention, 1925 (No 17)
- Equality of Treatment (Accident Compensation) Convention, 1925 (No. 19)
- Abolition of Forced Labour Convention, 1957 (No. 105),
- Equal Remuneration Convention, 1951 (No. 100)
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111)
- Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187);
- Night Work Convention, 1990 (No. 171);
- Asbestos Convention, 1986 (No. 162)
- Occupational Safety and Health Convention, 1981 (No. 155)
- Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148)
- Medical Care and Sickness Benefits Convention, 1969 (No. 130);
- Night Work (Women) Convention (Revised), 1948 (No. 89)
- Minimum Wage Fixing Convention, 1970 (No. 131)
- Worst Forms of Child Labour Convention, 1999 (No. 182)

### *3.4.1.2 Other Conventions*

- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention) 2001;
- United Nations (UN) Convention on Biological Diversity 1994 UN Framework Convention on Climate Change, 1992;
- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (Basel Convention) 1989;
- Montreal Protocol on Substances that Deplete the Ozone Layer Vienna Convention on the Ozone Layer 1985;
- Convention Concerning the Protection of the World Cultural and National Heritage (World Heritage Convention), Paris, 1975;

- Convention on the Conservation of Migratory Species of Wildlife Animals, 1979
- Convention on Biodiversity (CBD)
- Convention on the Conservation of Migratory Species
- United Nations Framework Convention on Climate Change (UNFCCC): Paris Agreement
- United Nations Convention to Combat Desertification (UNCCD)
- The World Heritage Convention
- New Partnership for Africa Development (NEPAD)

## 3.5 Institutional Framework

There are various national institutions that are important in energy matters related to environmental management in Kenya.

These are described in **Table 14** overleaf.

**Table 14: Roles of Organizations involved in the Project**

| No. | Institution | Role/Function |
|---|---|---|
| 1 | Ministry of Energy | The Ministry of Energy is responsible for formulation and articulation of energy policies through which it provides an enabling environment for all stakeholders. The task of the ministry includes national energy planning, training of manpower and mobilization of financial resources |
| 2 | Energy and Petroleum Regulatory Authority (EPRA) - Replaces Energy Regulatory Commission (ERC) from 2019 | EPRA is responsible for the economic and technical regulation of the electric power, renewable and petroleum sub sectors.<br>It has the mandate of:<br>• Regulating among others:<br>✓ Generation, importation, exportation, transmission, distribution, supply and use of electrical energy with the exception of licensing of nuclear facilities;<br>✓ Production, conversion, distribution, supply, marketing and use of renewable energy;<br>• Co-ordinate the development and implementation of a national energy efficiency and conservation action plan, in consultation with relevant statutory authorities and other stakeholders;<br>• Issue, renew, modify, suspend or revoke licenses and permits for all undertakings and activities in the energy sector;<br>• Formulate, set, enforce and review environmental, health, safety and quality standards for the energy sector in coordination with other statutory authorities; |
| 3 | Rural Electrification and Renewable Energy Corporation (REREC) Replaces Rural Electrification Authority (REA) from 2019 | Rural Electrification and Renewable Energy (REREC) has the following functions among others:<br>• Develop and update the renewable energy master plan taking into account county specific needs and the principle of equity in the development of renewable energy resources;<br>• Develop, promote and manage in collaboration with other agencies, the use of renewable energy and technologies, including solar energy among others;<br>• Provide an enabling framework for the efficient and sustainable production, conversion, distribution, marketing and utilization of biomass, solar, wind, small hydros, municipal waste;<br>• Promote, in collaboration with other agencies, the development of appropriate local capacity for the manufacture, installation, maintenance and operation of renewable technologies such as biodigesters, solar systems, turbines and other renewable energy technologies;<br>• Promote international co-operation programmes focusing on renewable energy sources; |
| 4 | KENGEN | A State Corporation with GoK shareholding of 70% and private shareholding of 30% as at June 2014. It is mandated to generate electric power, currently producing the bulk of electricity consumed in the country. The company currently utilises various sources including hydro, geothermal, thermal and wind to generate electricity. |

| No. | Institution | Role/Function |
|---|---|---|
| 5 | Kenya Power | The Kenya Power and Lighting Company PLC (Kenya Power) owns and operates most of the electricity transmission and distribution system in the country and sells electricity to consumers. Kenya Power is a State Corporation with Government of Kenya (GoK) shareholding of 50.1% and private shareholding of 49.9%.<br>• It purchases electrical energy in bulk from KenGen and other power producers and carries out transmission, distribution, supply and retail of electric power.<br>• It also builds and maintains the power distribution and transmission network and retail electricity to its customers. |
| 6 | Energy Tribunal | This quasi-judicial body was established under section 108 of the Energy Act, 2006. It came into operation in July 2007 to primarily hear appeals against the decisions of ERC. It also has jurisdiction to hear and determine all matters referred to it relating to the energy sector |
| 7 | The County and Sub-County Environment Committees | The Environment Committee swill:<br>• Approve applications for Contractor's site camps<br>• Provide permits for quarries and borrow pit sites<br>• Audit the Contractors camps and construction sites for safeguards compliance |
| 8 | The National Environment Management Authority (NEMA | NEMA will:<br>• Approve the ESHIA Report<br>• Issue EIA License for project implementation<br>• Carry out independent Audit to determine compliance with ESMP |
| 9 | Kenya Wildlife Service (KWS) | KWS will<br>Guide and monitor project construction throughout the project cycle since the project area though in a private land, wildlife species are present |
| 10 | Water Resources Authority (WRA) | WRA<br>• Provides necessary water abstraction permits for boreholes and surface water sources (rivers, streams etc)<br>• Monitors water use in the region and provides guidance water use |
| 11 | The National Museums of Kenya (NMK) | NMK will:<br>• Carry out recovery of any physical, cultural or archaeological artefacts encountered during construction<br>• Guide the Contractor's team on the protection of physical cultural resources |
| 12 | County Governments of Mombasa | County Governments will:<br>• Provide approval for the project<br>• Provide Approval for camp sites, borrow pit and quarry sites.<br>• Provide support |

| No. | Institution | Role/Function |
|---|---|---|
| 13 | County Government - Department of Education, Gender, Youth, and Social Services | County Department will:<br>• Provide support to any group at higher risk of being subjected to discriminatory practices, violence, natural or environmental disasters, or economic hardship than other groups within the state<br>• Provide support to any group or sector of society (such as women, children or the elderly) |
| 14 | The Ministry of Public Service, Youth and Gender Affairs | To coordinate gender mainstreaming in national development planning and promote equitable political and socio-economic development for women, men, girls and boys. |
| 15 | National Construction Authority (NCA) | NCA<br>• Registers contractors carrying out construction activities in Kenya<br>• Inspects constructions for compliance |
| 16 | Kenya National Commission on Human Rights (KNCHR), | KNCHR:<br>• Investigates and provides redress for human rights violations<br>• Carries out research and monitor the compliance of human rights norms and standards,<br>• Conducts human rights education, |
| 17 | Commission on Administrative Justice (CAJ) also known as the "Office of the Ombudsman" | CAJ<br>• Investigates any conduct in state affairs or any act or omission in public administration in any sphere of Government<br>• investigate complaints of abuse of power, unfair treatment, manifest injustice or unlawful, oppressive, unfair, or unresponsive official conduct. |
| 18 | National Gender and Equality Commission | The Commission:<br>• Ensures that there is gender equality and equity throughout the implementation of the project.<br>• Representatives will monitor and evaluate gender quality and equity with regards to job provision and harassment cases on site to ensure compliance with the law. |
| 19 | Directorate of Occupational Safety and Health Services (DOSHS) | DOSHS:<br>• Provides OSH permits for workplaces of the project including campsites and quarries<br>• Conducts inspections to ensure conformance to OSHA |
| 20 | Contractor | **Contractor**<br>• Will engage the following dedicated full-time safeguards staff<br>✓ Environmental Safeguards Specialist<br>✓ Social Safeguards Specialist<br>✓ Registered Occupational Health and Safety (OHS) Expert<br>• Will Prepare the CESMPs and other plans before construction begins |

| No. | Institution | Role/Function |
|---|---|---|
| | | • Will operationalize and implement the CESMPs<br>• Will have full time Environmental, Health and Safety and Social Specialists<br>• Will carry out day to day management of E H& S risks evaluation<br>• Will report on incidents and accidents to the Project Supervisor and regulators |

# 4 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

This section describes the major elements of the project area's environment, encompassing the physical, biological and social environment as well as the condition of the proposed project site. The information presented in this section is based on observation of the project area by the consultants as well as information from secondary literature.

## 4.1 Standards Triggered by the Project

During the evaluation of the project for impacts, IFC Performance Standards (PS) PS1, PS2, PS3, PS4 and PS6 were triggered as shown in **Table 12**. Under the EIB Environmental and Social Standards, the project triggered Standards 1, 2, 3, 4, 7, 8 and 9 (**Table 13**).

The ESHIA Study has been carried out taking into cognisance of the above standards triggered by the project.

## 4.2 The Physical Environment

The site area is generally uneven arising from the past mining activities. The area is dominated by *Casuarina equisetifolia* plantation with some indigenous species mostly on the periphery and a few woody or climbing species in the interior. Other species found in relatively high numbers include the invasive *Leucaena leucocephala* and *Azadirachta indica* and several grass species. The trees within this area have been grown under the restoration program being carried out by Bamburi Cement PLC. The area is served with murram roads where the transmission line will traverse from the solar plant to the substation.

### 4.2.1 Climate

**(a) Rainfall**

Rainfall is bi-modal with the long rains usually starting from March/April and continues until July, while the short rains occur in November and December. Total annual precipitation averages 1,100 mm. The highest average monthly rainfall occurs in May (230mm) while the lowest average monthly rainfall occurs in the month of February (15mm). **Table 15** provides the average monthly rainfall for Bamburi area.

**Table 15: Average Monthly Rainfall in Bamburi Area, Mombasa**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rainfall (mm) | 35 | 15 | 60 | 155 | 230 | 90 | 80 | 75 | 70 | 100 | 105 | 85 |

**(b) Temperature**

The hottest months are January-March (33°C). The lowest temperature s are recorded in the months of July-Temperature (18°C). **Table 16** provides the average maximum and minimum temperatures.

**Table 16: Average Monthly Max and Min Temperature**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max Temp (°C) | 33 | 33 | 33 | 32 | 30 | 29 | 27.5 | 27.5 | 29 | 30 | 31 | 32 |
| Min Temp (°C) | 22 | 22 | 22 | 22 | 21 | 20 | 18 | 18 | 18 | 20 | 22 | 22 |

**(c) Surface Wind**

The surface wind speeds vary between 10.8Km/hr and 18Km/Hr. The windiest month of the year in Bamburi is May and June (18km/hr) while the month with the lowest wind speed is November (10.8). **Table 17** provides the monthly average wind speeds.

**Table 17: Average Monthly Surface Wind (Km/Hour)**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind Speed (Km/Hr) | 14.4 | 14.4 | 14.4 | 14.4 | 18 | 18 | 14.4 | 14.4 | 14.4 | 14.4 | 10.8 | 14.4 |

**(d) Relative Humidity**

The average annual relative humidity is 74.75% and average monthly relative humidity ranges from 70% in February to 80% in May. **Table 18** provides the average monthly humidity.

**Table 18: Average Monthly Relative Humidity (%)**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Relative Humidity (%) | 71 | 70 | 74 | 77 | 80 | 77 | 79 | 76 | 73 | 73 | 73 | 74 |

### 4.2.2 Topography

The site area has slightly uneven topography due to the mining activities that have been carried out.in the past The elevation of site area is approx. 13m above sea level. Having been previously excavated for fossil coral limestone that is then burned into cement clinker, some level of rehabilitation was carried out. However, the area topography has uneven ground arising from the previous material extraction activities.

### 4.2.3 Geology and Soil

#### *4.2.3.1 Geology*

The Geology of Bamburi area is composed of Coral Limestone of Pleistocene age. The rock is a well-bedded, compact, slightly siliceous, muddy limestone with thin partings of sandy shale and stringers of crystalline calcite. Refer to **Map 5**.

575000 580000 585000

9560000 9555000 9550000

N W E S

Mtwapa Creek

Nguu Tatu Hills

Shanzu

Utange

MTWAPA

Block C

Block B

Block A

Bamburi

Junda

Kisauni

Tudor

Kongowea

Nyali

Indian Ocean

Kenya

## Key

- Boreholes/Wells
- Major roads
- Administrative_division
- Corals, Coral reefs & Breccia
- Lagoonal, N Mombasa Crag
- Upper Jurassic shales
- Wind blown, superficial sands
- Kambe Limestone

Environmental, Social and Health Impact Assessment for Proposed Momnai Solar Farm Power Project at Bamburi, Mombasa

Map Sheet 5 : Proposed Bamburi Power Plant - Geological Map

LEGEND

Project Site Blocks

1000 0 1000 2000 3000 4000 m

EPSG:21037

Grid North

#### *4.2.3.2 Baseline Data for Soil and Water*

The soils are 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 project site was previously an active material source area for Bamburi Cement, however after the extraction of materials, the site area has been rehabilitated and flora and fauna introduced. Refer to **Map 6**.

In order to have baseline data for future monitoring purposes, soil sample was collected for the analysis of Total Petroleum Hydrocarbons (TPH) and Heavy Metals [Lead (Pb), Nickel (Ni), Cadmium (Cd), Mercury (Hg), Chromium (Cr) and Lithium (Li)].

**a) Methodology**

The sampling, handling, storing and transporting of the soil and water samples to the laboratory was done by NEMA Approved Laboratory according to ISO 5667:2012 Part 3 - Guidance on the Preservation and Handling of Samples. The samples were collected follows:

- ***Soil*** – Soil 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 collected from Block A and Block B
- ***Water*** – Water samples – Water Samples were collected from the ponds existing within the blocks (Block A and Block B)

The baseline soil and water samples were analysed for the following:

- The total extractable hydrocarbons recorded results which are within the test limit;
- The heavy metals of Lead, Nickel, Cadmium, Mercury, Chromium and Lithium have also recorded results which are within the limit.

**b) Interpretation of the results**

***Soil Analysis Results***

All the parameters analyzed were found to be within the limits contained in the National Environment Management Authority (NEMA) Environmental Inspection and Monitoring Manual (developed for petroleum industry) Document Revision Draft 2.0 Issued October 2020.

Refer to **Tables 19** and **20** below for soil Analysis Results for Block A.

**Table 19: TPH Analysis Results for Soil Sample from Block A**

| Tests | Results | Units | Test limits | Method | Ref. Std |
|---|---|---|---|---|---|
| (- C5- C6 ) Pentanes | 12.2 | µg/kg | * | AQTP 148 | NEMA |
| (- C>6 - C8 ) Hexanes | 11.6 | µg/kg | * | AQTP 148 | NEMA |
| (- C>8 - C10 ) Heptanes | 27 | µg/kg | * | AQTP 148 | NEMA |
| (- C>10 - C12 ) Octanes | 45.8 | µg/kg | * | AQTP 148 | NEMA |
| (- C>12 - C16 ) Nonanes | 106 | µg/kg | * | AQTP 148 | NEMA |
| (- C>16 - C35 ) Decanes | 117 | µg/kg | * | AQTP 148 | NEMA |

**Table 20: Heavy Metals Analysis Results for Soil Sample from Block A**

| Tests | Results | Units | Test limits | Method | Ref. Std |
|---|---|---|---|---|---|
| Lead, as Pb | 0.95 | µg/kg | 375 | AQTP 150 | NEMA |
| Nickel, as Ni | 0.88 | µg/kg | 150 | AQTP 150 | NEMA |
| Cadmium, as Cd | 1.06 | µg/kg | 1.4 | AQTP 150 | NEMA |
| Mercury, as Hg | <0.01 | µg/kg | 6.6 | AQTP 150 | NEMA |
| Chromium, as Cr | <0.01 | µg/kg | 64 | AQTP 150 | NEMA |
| Lithium, as Li | <0.01 | µg/kg | N/A | AQTP 150 | NEMA |

Refer to **Tables 21** and **22** below for soil Analysis Results for TL.

**Table 21: TPH Analysis Results for Soil Sample from TL**

| Tests | Results | Units | Test limits | Method | Ref. Std |
|---|---|---|---|---|---|
| (- C5- C6 ) Pentanes | 6.22 | µg/kg | * | AQTP 148 | NEMA |
| (- C>6 - C8 ) Hexanes | 13.19 | µg/kg | * | AQTP 148 | NEMA |
| (- C>8 - C10 ) Heptanes | 19.66 | µg/kg | * | AQTP 148 | NEMA |
| (- C>10 - C12 ) Octanes | 45.33 | µg/kg | * | AQTP 148 | NEMA |
| (- C>12 - C16 ) Nonanes | 76.15 | µg/kg | * | AQTP 148 | NEMA |
| (- C>16 - C35 ) Decanes | 82.39 | µg/kg | * | AQTP 148 | NEMA |

**Table 22: Heavy Metals Analysis Results for Soil Sample from TL**

| Tests | Results | Units | Test limits | Method | Ref. Std |
|---|---|---|---|---|---|
| Lead, as Pb | 6.28 | µg/kg | 375 | AQTP 150 | NEMA |
| Nickel, as Ni | < 0.01 | µg/kg | 150 | AQTP 150 | NEMA |
| Cadmium, as Cd | < 0.01 | µg/kg | 1.4 | AQTP 150 | NEMA |
| Mercury, as Hg | <0.01 | µg/kg | 6.6 | AQTP 150 | NEMA |
| Chromium, as Cr | <0.01 | µg/kg | 64 | AQTP 150 | NEMA |
| Lithium, as Li | <0.01 | µg/kg | N/A | AQTP 150 | NEMA |

***Water Analysis Results for Blocks A***

All the parameters analyzed were found to be within the limits contained in the National Environment Management Authority (NEMA) Environmental Inspection and Monitoring Manual (developed for petroleum industry) Document Revision Draft 2.0 Issued October 2020.

Refer to **Table 22** and **24** for Water Analysis Results for Block A.

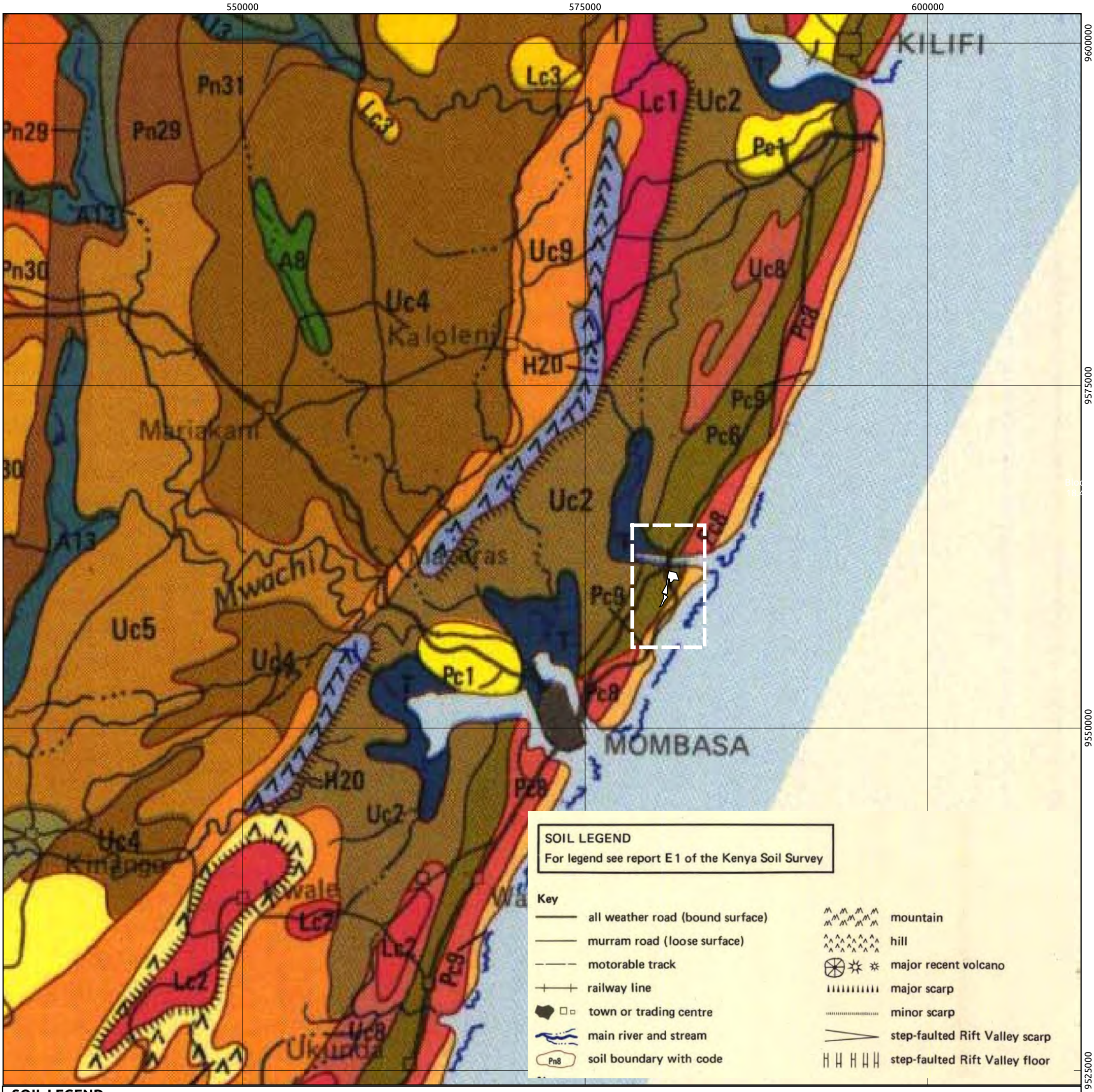
**Table 23: TPH Analysis Results for Water Sample from Block A**

| Tests | Results | Units | Test limits | Method | Ref. Std |
|---|---|---|---|---|---|
| (- C5- C6 ) Pentanes | 7.11 | µg/kg | * | AQTP 148 | NEMA |
| (- C>6 - C8 ) Hexanes | 12.07 | µg/kg | * | AQTP 148 | NEMA |
| (- C>8 - C10 ) Heptanes | 19.41 | µg/kg | * | AQTP 148 | NEMA |
| (- C>10 - C12 ) Octanes | 23.26 | µg/kg | * | AQTP 148 | NEMA |
| (- C>12 - C16 ) Nonanes | 40.21 | µg/kg | * | AQTP 148 | NEMA |
| (- C>16 - C35 ) Decanes | 50.61 | µg/kg | * | AQTP 148 | NEMA |

**Table 24: Heavy Metals Analysis Results for Water Sample from Block A**

| Tests | Results | Units | Test limits | Method | Ref. Std |
|---|---|---|---|---|---|
| Lead, as Pb | < 0.01 | µg/kg | 375 | AQTP 150 | NEMA |
| Nickel, as Ni | < 0.01 | µg/kg | 150 | AQTP 150 | NEMA |
| Cadmium, as Cd | < 0.01 | µg/kg | 1.4 | AQTP 150 | NEMA |
| Mercury, as Hg | < 0.01 | µg/kg | 6.6 | AQTP 150 | NEMA |
| Chromium, as Cr | < 0.01 | µg/kg | 64 | AQTP 150 | NEMA |
| Lithium, as Li | < 0.01 | µg/kg | N/A | AQTP 150 | NEMA |

During the construction phase, soil and water contamination may result from leaks and spills of oil, lubricants, or fuel from heavy equipment, improper handling of chemical/fuel storage and wastewater. Such spills could have an impact on soil and water quality, The site shall apply proper storage and handling for fuel, oil and lubricants. The Certificates for the Soil and Water Analysis are provided in **Appendices 6 & 7.**




## SOIL LEGEND

**PROJECT SITE SOIL CLASSIFICATION** (Source: Report E1 of the Kenya Soil Survey)

Pc6 - Complex of very deep soils of varying drainage condit1on, colour, consistence, texture and sahnoty (albic ARENOSOLS, orthic FERRALSOLS, gl ey1c LUVISOLS, solod1c PLANOSOLS, pellic VERTISOLS)

**Other Soil classes within the vicinity of the project site**

- T - MANGROVE SWAMPS. Very poorly drained, very deep, olive to greenish grey, soft (unripe), excessively saline, moderately to strongly sodic, loam to clay; in many places with sulfidic material (thionic FLUVISOLS, saline phase and gleyic SOLONCHAKS)
- Uc2 - association of:
  - Well drained to imperfectly drained, shallow to moderately deep, yellowish brown to very dark grey, firm to very firm clay; on dissected parts (eutric CAMBISOLS, partly lith1c phase)
  - Imperfectly drained, deep, dark grey to olive grey, very firm clay, with a humic topsoil and a sodic deeper subsoil; on interfluves (verto-luvic PHAEOZEMS, sodic phase; with vertic CAMBISOLS, sodic phase)
- Pc8 - Well drained, deep, dark red t0 reddish brown, friable, sandy clay loam to sandy clay, with a topsoil of loamy sand (rhodic FERRALSOLS)
- Pc9 - well drained, shallow, dark brown to dark reddish brown, friable, rocky, sandy clay loam to sandy clay (LITHOSOLS; with ferralic CAMBISOLS, lith1c phase)

Environmental, Social and Health Impact Assessment for Proposed Momnai Solar Farm Power Project at Bamburi, Mombasa

Map Sheet 6 : Proposed Bamburi Power Plant - Soils Map

LEGEND
Project Site Blocks

5000 0 5000 10000 15000 20000 m

EPSG:21037

Grid North

### 4.2.4 Hydrology, Hydrogeology and Water Quality

#### *4.2.4.1 Hydrology*

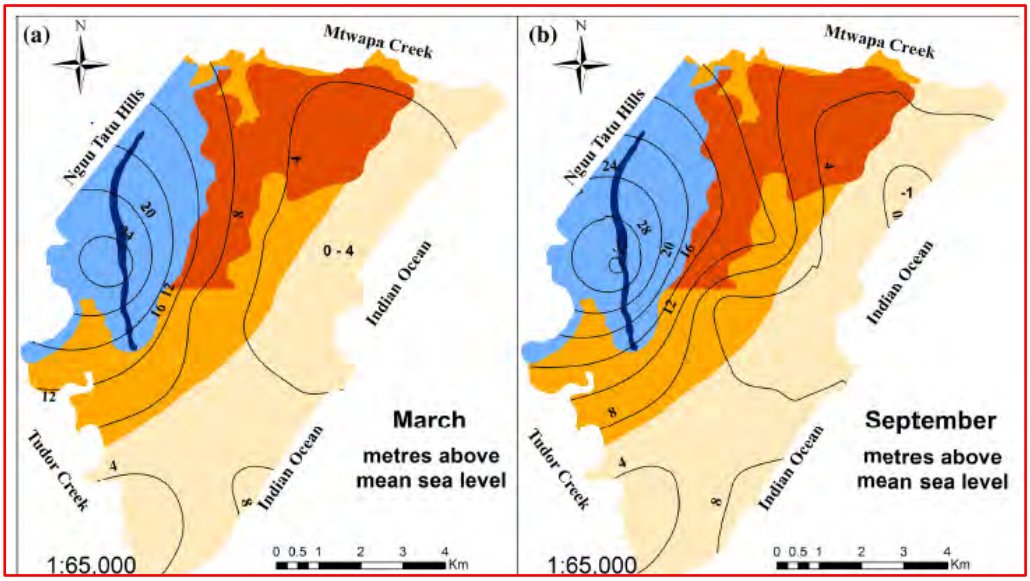
The site area has water ponds as a result of the excavations. A recreation area has been created on the eastern side of Block A that has been recommended for the Solar Plant and TL. The water in the ponds is brackish. The nearest pond to Block A site is approx. 300m away.

River Mtopanga which originates from Mwakirunge area flows eastwards across the Transmission Line corridor almost at mid-point towards the Indian Ocean. Refer to **Map 4**.

#### *4.2.4.2 Hydrogeology*

The site lies in the coastal lowland where the groundwater is being exploited from the aquifers in the quaternary sands and Pleistocene coral reefs. The groundwater levels are relatively shallow occurring between 8-20m above mean sea level and increases westwards as you approach Nguu Tatu Hills. Since the area is relatively close to the Indian Ocean Coastline (approx. 1km) a significant number of the groundwater water sources are being affected by the seawater intrusion. The lower water levels above mean sea level indicate that sea water intrusion is more probable to impact the water quality.

**Figure 3: Water Level above Mean Sea Level**




Source: *Temitope Ezekiel Idowu et al: Hydrogeochemical assessment of a coastal aquifer using statistical and geospatial techniques: case study of Mombasa North Coast, Kenya, 2017*

The **Figure 3** above shows the measured water levels above mean sea level in March before the long rains and in September after the rains.

#### *4.2.4.3 Water Supply*

Kisauni area is served by Mombasa Water Supply and Sanitation Company.
Due to the high demand against the insufficient availability of the resource, the supply is not able to meet the ever-growing demand.

Studies carried out on the water supply indicate that piped water is of quality and can be used for all purposes including drinking, though the quantities are not adequate to meet the demand. Alternative water sources that are being exploited is groundwater, however some of the wells/boreholes are tapping brackish or saline water due to the closeness of the area to the sea.

#### *4.2.4.4 Groundwater Quality*

A study carried out on groundwater quality within Kisauni area revealed variations in water quality and water levels above mean sea level (water heads) and salinity. The groundwater pH generally experienced only minor changes across the entire period of observation recording alkaline values mostly between 7 and 8. Only two mildly acidic values (6.65 & 6.98) were observed in the data, and they occurred in the rainy month of June. These values coincide with the WHO (2011) pH range for rainwater; hence, the mild acidity might be due to the prevalent rainfall in that season. A small number of the samples were outside the range of 6.5 – 8.5 specified for drinking purposes by the Kenya drinking water guidelines.

The values and concentrations of the Electrical conductivities and Total Dissolved Solids vary vastly in the groundwater across the project area. For instance, the EC values varied from 761.5 to 10585µS/cm at pre-monsoon, while TDS values ranged from 438 to 5281mg/l within the same water sources This significant variation in EC and TDS values across the project area is equally observed in June and September.

Approximately 33% of the samples reported Electrical Conductivity values of <1,500µS/cm which is considered as the Kenya Drinking Water Standard (2008). 26% recorded values of between 1,500-3,000µS/cm (brackish water) while the remaining were above 3,000µS/cm. The elevated is due to the modest impact of sea water intrusion.

### 4.2.5 Ambient Air Quality

The proposed site was evaluated for potential sources of air emissions including fugitive dust and exhaust emissions from vehicles and machinery. Baseline air quality measurements were carried out by NEMA Registered Laboratory. These included Particulate Matter (PM10), Sulphur dioxide (SO2),. Nitrogen dioxides (NO2) and Hydrocarbons (HCs).

#### 4.2.5.1 *Particulate, Matter (PM)*

Particulate Matter (PM) are airborne particles that include dust, smoke and soot. PM can either be emitted naturally (e.g., windblown dust from unpaved roads) or through human activity (e.g., stack emissions). PM is defined by size, with coarse particles being between 2.5-10 microns (µm), fine particles less than 2.5 µm, and ultrafine particles less than 0.1 µm. PM has adverse effects on humans, such as respiratory illnesses (asthma, bronchitis) or cardiovascular diseases and is also considered to be carcinogenic.

It can also affect vegetation by inhibiting the plant's photosynthetic properties; by coating the leaves; thereby blocking the penetration of natural light and hindering plant growth.

NEMA ambient air quality guidelines for PM10 and PM2.5 are presented in the **Table 25** below.

**Table 25: Air Quality Standards for PM10 and PM2.5**

| # | Pollutant | Time weighted Average | Industrial area | Residential, Rural & Other area | Controlled areas*** |
|---|---|---|---|---|---|
| 5. | Respirable Particulate Matter (<10 m) (RPM) | Annual Average* | 70 $g/m^3$ | 50 $g/m^3$ | 50 $g/m^3$ |
| | | 24 hours** | 150 $g/Nm^3$ | 100 $g/Nm^3$ | 75 $g/Nm^3$ |
| | | | | | |
| 6. | PM2.5 | Annual Average | 35 g/m3 | | |
| | | 24 hours | 75 g/m3 | | |

4.2.5.2 ***Sulphur Dioxide (SO2)***

Sulphur dioxide is a colourless gas and is characterised as having a sharp, irritant odour. It is a primary pollutant, which can react easily with other substances to form secondary pollutants such as sulphur trioxide and sulfuric acid, amongst others. $SO_2$ is formed by human activities through mainly industrial processes that contain sulphur, such as the combustion of coal, oil or gas.

$SO_2$ is damaging to the human respiratory function when inhaled, causing coughing and shortness of breath. Either long term exposure or exposure to a large dose can result in chronic respiratory disease and the risk of acute respiratory illness.

With regards to the impacts on vegetation, $SO_2$ can inhibit the photosynthetic properties of plants and in some cases, eliminate more sensitive species on the ecosystem level with continuous exposure.

The NEMA guidelines and standards for ambient $SO_2$ levels are presented in the **Table 26** below.

**Table 26: Air Quality Standards for SO2**

| # | Pollutant | Time weighted Average | Industrial area | Residential, Rural & Other area | Controlled areas*** |
|---|---|---|---|---|---|
| 1. | Sulphur oxides (SOX); | Annual Average* | 80 $g/m^3$ | 60 $g/m^3$ | 15 $g/m^3$ |
| | | 24 hours** | 125 $g/m^3$ | 80 $g/m^3$ | 30 $g/m^3$ |
| | | | | | |
| | | Annual Average | | 0.019 ppm/50 $g/m^3$ | |
| | | Month Average | | | |
| | | 24 Hours | | 0.048ppm /125 $g/m^3$ | |
| | | One Hour | | | |
| | | Instant Peak | | 500 $g/m^3$ | |
| | | Instant Peak (10 min) | | 0.191 ppm | |

4.2.5.3 ***Nitrogen Dioxide (NO2)***

Nitrogen dioxide is a naturally forming gas, characterised as having an irritating odour. Small quantities can be produced by plants, soil and water, but anthropogenic activities, such as the combustion of fossil fuels and biomass, are the sources of most $NO_2$. Nitrogen dioxide is one of a group of gases called nitrogen oxides ($NO_x$).

While all of these gases are harmful to human health and the environment, $NO_2$ is of greater concern. It primarily gets in the air from the burning of fuel in vehicles, power plants, and off-road equipment.

Human respiratory tract irritation represents a direct effect of $NO_2$ exposures. Due to it being relatively insoluble (relative to $SO_2$), $NO_2$ can penetrate deep into the lungs, causing potential tissue damage.

Effects of $NO_2$ exposure include alveolar tissue disruption and obstruction of the respiratory bronchioles. Long term effects of exposure include increased potential for lung infections.

The NEMA guidelines and standards for ambient $NO_2$ levels are presented in the **Table 27** below.

**Table 27: Air Quality Standards for $NO_2$**

| # | Pollutant | Time weighted Average | Industrial area | Residential, Rural & Other area | Controlled areas*** |
|---|---|---|---|---|---|
| 3. | Nitrogen Dioxide | Annual Average | 150 $g/m^3$ | 0.05 ppm | |
| | | Month Average | | 0.08 ppm | |
| | | 24 Hours | 100 $g/m^3$ | 0.1 ppm | |
| | | One Hour | | 0.2 ppm | |
| | | Instant Peak | | 0.5 ppm | |

### *4.2.5.4 Hydrocarbons (HCs)*

Hydrocarbon-based gasoline and diesel vehicles and equipment will be used at the site during the construction and operations. These vehicles and equipment will create harmful emissions and polluting exhaust emissions. The cause of the harmful emissions is the incomplete combustion of the fuels that cause the hydrocarbons to react with nitrogen oxides (often produced from high temperatures and oxygen in excess of the amount needed to burn the fuel). When the resultant gases hit the sunlight, they form ground-level ozone/smog being produced. The Ozone is a very potent irritant and can not only cause eye or throat irritations, but potentially serious lung damage or respiratory trouble to the site workers.

The NEMA guidelines and standards for Hydrocarbons (HCs) levels are presented in the **Table 28** below.

**Table 28: Air Quality Standards for HCs**

| # | Pollutant | Time weighted Average | Industrial area | Residential, Rural & Other area | Controlled areas*** |
|---|---|---|---|---|---|
| 10. | **Non-methane hydrocarbons** | | | | |
| | | **instant Peak** | **700ppb** | | |
| | | | | | |
| 11. | **Total VOC** | **24 hours**** | **600 g/m3** | | |
| | | | | | |
| 12. | **Ozone** | **1-Hour** | **200 g/m3** | **0.12 ppm** | |
| | | **8 hour (instant Peak)** | **120 g/m3** | **1.25 ppm** | |

**a) Methodology**

The assessment of air quality was carried out on 9th February, 2022 at two locations namely:

- Block A at Coordinates -3.98566, 39.72906
- Block B at Coordinates -3.98421, 39.72749

The air quality assessment was done with respect to the Environmental Management and Coordination (Air Quality) Regulations 2014, the Second Schedule - 'Priority Air Pollutants' and the Third Schedule – 'Emission Limits for Controlled and Non-Controlled Facilities'. It was also aimed at providing baseline data for future environment management and monitoring.

The method used in the measurement of the air quality is suitable for the determination of the concentrations of pollutant substances in the atmosphere (Ref. BSN 481). A volume of air is drawn through a collection substrate such as a filter mounted on a sampler and the number of pollutants collected is determined by Gas Chromatography. The sampling methods for determining the level of pollutants has been evaluated in both Laboratory and field-based tests to determine their performance with respect to the MDHS 70 - Methods for the Determination of Hazardous Substances, Occupational Medicine and Hygiene Laboratory of the United Kingdom.

**b) Interpretation of the results**

All the parameters analyzed were found to be within the limits contained in the Environmental Management and Coordination Act (Air Quality) Regulations 2014. Refer to **Table 29** below.

**Table 29 (a & b): Air Quality Results**

a) **Particulate Matter Results**

| Sampling Position | Wi (mg) | Wf (mg) | Total volume $m^3$ | Flow rate L/min | Sampling Period (mins) | Weight of PM (mg) | PM mg/N m) |
|---|---|---|---|---|---|---|---|
| **Block B** | 25.0 | 25.1 | 0.01 | 2 | 5 | 0.1 | 15 |
| **Block A** | 25.0 | 25.3 | 0.01 | 2 | 5 | 0.3 | 30 |

**b) Other Parameters Results**

| Sampling Position | Parameters/ Results | | | | |
|---|---|---|---|---|---|
| | O2 | Nitrogen dioxides NO2, (ppm) | Sulphur dioxide SO2, (ppm) | Hydro-carbons HC's (ppm) | Carbon Dioxides (CO2) |
| **Block B** | 8.31 | 0.26 | 1.05 | 29 | 8.85 |
| **Block A** | 7.29 | 7.33 | 5.06 | 41 | 8.96 |

The Air Quality Measurement Result Certificate is provided in **Appendix 9.**

### 4.2.6 Ambient Noise

According to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009, noise pollution means "the emission of uncontrolled noise that is likely to cause danger to human health or damage to the environment". These Regulations prohibit the production of any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Noise is categorized as a physical hazard, and is known to cause workers hearing loss, and also affects body parts other than the hearing organs. Reports have revealed that noise causes mental disturbances, masking of speech, work performance, sleep etc, (Özer & Irmak, 2008). Studies conducted in various countries reveal that the effect of exposure to high noise levels with various frequencies caused noise induced hearing loss of workers exposed to the noise (Bies & Hansen, 1996; Yilmaz & Özer, 2005).

The recommended noise limits to inhibit hearing loss (occupational deafness) by International Labour Organization (ILO), World Health Organization and The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009 are:

- 90dB (A) for 8 hours daily as the Occupational Exposure Level (OEL), which most workers can continually be exposed to noise without developing occupational hearing loss in industries.
- For workshops and plant areas where occasional communication is required, the recommended limit is 65 - 85 dB (A).

**a) Methodology**

The noise level assessment was carried out on 7th February, 2022. The samples were collected from the following locations:

- Block A at coordinates -3.98566, 39.72906
- Block B at coordinates -3.98421, 39.72749

The Standards used during the noise level assessment were:

- The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009.
- The Factories and Other Places of work (Noise Prevention) and Control Rules 2005.

The assessment was undertaken using a Larson Davis 870 precision integrating Sound Level Analyser with 902 pre-amplifier and integrated with a speed monitor. The assessment was conducted in accordance with international noise standards, in particular ISO 1996:1822 - Acoustic Description and Measurement of Environmental Noise, and British Standard (BS) 4112: 1997 – Method of Rating Industrial Noise affecting Mixed and Residential areas. The particular values recorded during the noise assessment were reported as the equivalent continuous sound level (Leq). The A - weighting network is most commonly used in the measurement of industrial and environmental noise because it causes the sensitivity of the meter to vary with the frequency and intensity of the sound like the sensitivity of the human ear.

**b) Interpretation of the results**

The noise level assessment undertaken at the proposed project site at Bamburi has shown that the locations registered noise levels that complied with the maximum Occupational Exposure Levels (OEL) as contained in the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009. Refer to **Table 30** below.

**Table 30: Noise Level Results**

| Area / Location | Measured Levels [Leq dB(A)] LA eq | | Recommended Levels (TLV) | Comments |
|---|---|---|---|---|
| | Lo | Hi | | |
| Block B | 44.175 | 64.575 | 90 | OK |
| Block A | 52.5 | 69.26 | 90 | OK |

The Noise Measurement Result Certificate is provided in **Appendix 8.**

### 4.2.7 Physical Cultural Resources

Archaeological and Cultural Heritage impact assessment has been undertaken to identify and ensure the protection of archaeological and cultural heritage assets associated with the project footprint area/sites to ensure that effective management and mitigation controls are in place. The result indicates that there are no cultural heritage (archaeological & historical) sites and features in the project study area, since the site had previously been mined and refiled, any cultural materials that are likely to be found on site are therefore going to be in secondary context.

Therefore, the proposed TL will not result in the damage, destruction and long term (permanent) loss of archaeological heritage resources specifically burials or terrestrial archaeological resources because there will be no further excavation beyond the previous excavation on site and construction and installation activities.

The impact of the proposed surface clearance will be minimal and restricted to the areas where the TL will transverse. Given the low archaeological and cultural sensitivity of the general wider project area the intensity of the impact is regarded as being low. However, this report has provided a "Chance Find Procedure" that will be used by the Contractor to safeguard any findings. A Chance Finds Procedure (CFP) is provided herewith below for this purpose.

***Chance Find Procedures***
*The Contractor will be expected to apply the following chance find procedure to protect any cultural artefacts that could be encountered during construction.*

*In cases where culturally valuable materials are uncovered during excavation:*
- *Stop work immediately following the discovery of any materials with possible archaeological, historical, paleontological, or other cultural value;*
- *The artefact shall not be moved from where it has been found, unless supervised by an Archaeologist;*
- *Prevent and penalize any unauthorized access to the artefacts;*
- *Announce findings to project manager and notify relevant authorities;*
- *Protect artefacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artefacts;*
- *The Archaeologist together with the contractor and project manager, will undertake an inspection of the cultural heritage site;*
- *In consultation with the project manager and Contractor, the Archaeologist will determine the appropriate course of action to take;*
- *Sensitive sites defined in the Chance Finds Report shall be marked off with hazard tape, detour signs and if necessary, the site secured as detailed in the chance finds report. The site will be secured to prevent any damage or loss of removable object;*
- *Restart construction works only after obtaining authorization from the relevant authorities*

### 4.2.8 Protected Area Designations

The project site is neither a protected area nor a key biodiversity area. However, after the excavation works to obtain materials for the cement plant, rehabilitation efforts by Bamburi Cement have converted this area into a forested ecosystem with some flora (exotic Trees) and fauna.

### 4.2.9 Visual Aesthetics

The transmission line poles will be located along existing road corridor from the solar plant to the existing substation at the Bamburi Cement Plant. The area is a private land with grown trees hence the existence of the electric poles will not cause serious visual intrusion.

## 4.3 Health and Safety

In this project Safety, Health and Accident Prevention is everyone's responsibility. Momnai Energy are sincerely interested in the safety and welfare of their employees, community and environment protection, as such, these safety and health rules are to be strictly observed at all times.

A HSE policy will be formulated and hence abuse or disregard of this policy is a violation and will be treated accordingly. Everybody's help in preventing accidents and injuries benefits one and every fellow employee.

The Provision of safe, health and environment friendly working conditions and the maintenance of a healthy and safe environment on the construction site are critical concerns to Momnai Energy. A risk assessment of all hazards during all the phases from site preparation to Decommissioning will be carried out.
The risk assessment will serve to highlight the following:

- Identify potential hazards
- Indicate the potential risk
- Set out controls to reduce/eliminate the potential risk
- Indicate the level of actual risk to personnel after controls have been setup
- Show further actions taken to control the risk

It is expected that Risk assessment will be done for the project before job safety analysis is carried out for each specific task.

Momnai Energy is therefore intending to:

- Invest in what is necessary to achieve this vision.
- Work with Contractors to make that vision a reality.
- Provide individuals the opportunity, responsibility and accountability to make the vision happen.

Momnai Energy believe that:

- Associates and Contractors have both contractual and moral obligations to adopt the policy vision.
- Each Contractor will integrate Momnai vision within its project management organization, its supervisors, and its employees into the concept of a wholly safe and effective work environment.

Momnai Energy recognize:

- That the vision is achievable if there is commitment to being Incident and Injury Free.

## 4.4 Biological Environment

This study was undertaken at Bamburi Cement PLC, Mombasa (-4.006968, 39.716991). Three blocks of land (A, B & C) measuring an estimated 65ha in total and the TL corridor were surveyed for different taxonomic groups. Block A (Lat.-3.986142, Long. 39.729773) located south of the start of Bamburi airstrip, had been mined of coral limestone about five years ago with all-natural vegetation lost, and had been restored with *Casuarina equisetifolia* trees. (*Plate 1*).

Block B (Lat. -3.981802, Long. 39.729763) borders local community to the west, and Bamburi airstrip to the east. This area is characterised by the various indigenous trees, a few Doum palms (*Hyphaene thebaica*), as well as many coastal deciduous trees and bush species averaging at most 10m tall.

At the time of the survey the trees had shed their leaves, and the ground floor in some areas was covered by thick dry leaves litter, while other areas with few trees and bushes had bare ground. The canopy was open, allowing large portion of the ground being exposed to sunlight. There were also several open pockets in the bushland (*Plate 2*).

*Plate 1: Block A Vegetation Characteristics*
*(Plantation of exotic Casuarina equisetifolia a pioneer trees used to restore mined. Inset: forest floor covered in dry Casuarina leaves and Mombasa Train Millipede which assist in leaves decomposition)*

*Plate 2: Block B Vegetation Characteristics*
*(Open undergrowth of natural deciduous bushes and trees and ground covered in dry leaves litter)*

*Plate 3: The access road corridor where the TL will run along*

### 4.4.1 Ecological Studies

***Impact Assessment***

To identify the potential impacts of the proposed TL on biodiversity in the study area, guidelines provided by International Finance Corporation's (IFC) Performance Standard 6 were used (IFC, 2012).

These guidelines recognize that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development (IFC, 2012).

Potential impacts are determined by considering: (i) the location and scale of project activities, (ii) its supply, (iii) the project's proximity to areas of known biodiversity value or areas known to provide ecosystem services; and (iv) the types of technology that will be used (e.g., underground mining versus open pits) to implement it (IFC, 2012).

An extensive biodiversity inventory was used to determine the Level of Concern Category (LCC) for the site proposed for the TL. This is the levels at which using the information available a decision is made about the vulnerability of the species and habitats where they occur. The LCC is determined by combining the extend of the project coverage (how much area will the project be implemented), expected magnitude of impacts, duration of the anticipated impact and probability of occurrence of the impact. Three levels of sensitivities are provided in this assessment; low (Where this impact would not have a direct influence on the decision to develop in the area);

Medium (Where the impact could influence the decision to develop the area unless it is effectively mitigated) and High (Where the impact must have an influence on the decision process to development). **Tables 31** and **32** below shows the criteria for assessing and ranking impacts risks. In order to achieve minimum impacts on biodiversity from the project, we applied the mitigation hierarchy recommended by Bennun et al 2021.

A sequence of actions intended to avoid, and where avoidance is not possible, to minimize and, when impacts occur, to restore, and where significant residual impacts remain, offset (Bennun et al. 2021).

**Table 31: Criteria for assessing Significance of Impacts *(after IFC 2012)***

| **Extent** | | **Magnitude** | |
|---|---|---|---|
| Localized (At localized scale and a few hectares in extent) | **1** | Small and will have no effect on the environment | **0** |
| Study area (The proposed site and its immediate environs) | **2** | Minor and will not result in an impact on the processes | **2** |
| Regional (County level) | **3** | Low and will cause a slight impact on the processes | **4** |
| National (Country) | **4** | Moderate and will result in process continuing but in a modified way | **6** |
| International (Beyond Kenya) | **5** | High (processes are altered to the extent that they temporarily cease) | **8** |
| | | Very high and results in complete destruction of patterns and permanent cessation of the processes | **10** |

| **Duration** | | **Probability** | |
|---|---|---|---|
| Very short (0 – 1 Years) | **1** | Highly improbable (<20% chance of occurring) | **1** |
| Short (1 – 5 Years) | **2** | Improbable (20 – 40% chance of occurring) | **2** |
| Medium term (5 – 15 years) | **3** | Probable (40% - 70% chance of occurring) | **3** |
| Long term (>15 years) | **4** | Highly probable (>70% - 90% chance of occurring) | **4** |
| Permanent | **5** | Definite (>90% chance of occurring) | **5** |

***Risk*** *= (Extent + Duration + Magnitude) x Probability*

**Table 32: Ranking of the Significance of Risk**

| | | **Probability Consequence (Extent + Duration + Magnitude)** | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **Probability** | **1** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| | **2** | **2** | **4** | **6** | **8** | **10** | **12** | **14** | **16** | **18** | **20** | **22** | **24** | **26** | **28** | **30** | **32** | **34** | **36** | **38** | **40** |
| | **3** | **3** | **6** | **9** | **12** | **15** | **18** | **21** | **24** | **27** | **30** | **33** | **36** | **39** | **42** | **45** | **48** | **51** | **54** | **57** | **60** |
| | **4** | **4** | **8** | **12** | **16** | **20** | **24** | **28** | **32** | **36** | **40** | **44** | **48** | **52** | **56** | **60** | **64** | **68** | **72** | **76** | **80** |
| | **5** | **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **55** | **60** | **65** | **70** | **75** | **80** | **85** | **90** | **95** | **100** |

| **Key** | | |
|---|---|---|
| **Low** | <30 | Where this impact would not have a direct influence on the decision to develop in the area |
| **Medium** | 30-60 | Where the impact could influence the decision to develop in the area unless it is effectively mitigated |
| **High** | >60 | Where the impact must have an influence on the decision process to development. |

Based on the above, a detailed field survey of different species of flora and fauna occurring in the areas was conducted. This included Plants, Mammals (bats, small & large mammals) Avifauna (birds), Herpetofauna (reptiles and amphibians) and Invertebrates.

The surveys were conducted between 15th and 19th November 2021. The key findings on flora and fauna are presented in the following sub sections while the full ecological study report is presented as **Appendix 12** of this report.

### 4.4.2 Conclusion

Since the project site is neither a protected area nor a key biodiversity area, and given that not many IUCN listed species occur at the site, it is considered that the project will not have major impacts on biodiversity if the proposed mitigation measures are adhered to.

## 4.5 Socio-economic Environment

### 4.5.1 Socio-economic Profile

Mombasa is endowed with rich coastal and maritime resources with a huge potential for development of the Blue Economy. The County, through the Department of Agriculture, Livestock, Fisheries and Cooperatives and its development partners have prioritized training in fisheries management, capacity building the fisheries sub-sector, aquaculture, fishing gear technology, seamanship in all the sub counties to conserve the rare and endangered species and the ecosystem. The County has 65km2 of open water and access to 40km2 of the Exclusive Ecological Zone (EEZ) which is a high potential fishing ground. The local communities living adjacent to the ocean are however unable to fully exploit the fish potential due to lack of appropriate fishing gear and vessels and the recent attacks by pirates in the Indian Ocean waters. The main types of fish caught include rabbit fish, scavenger, snappers, parrot fish, surgeon fish as well as sharks, lobsters and prawns. There are 14 fish landing sites in the County some of which face the risk of being encroached as is common along and near the beaches and hence made inaccessible. The main crops under cultivation in the County include cassava, cucurbits family, maize, vegetables, millet and sorghum. These are most preferred due to their resistance to diseases and pests. The climatic conditions of the County make plants prone to diseases and pests and therefore, highly resistant varieties are encouraged. The main livestock bred in the County include goats, sheep, cattle, chicken and other poultry. The Kenya Meat Commission's abattoir, which is located in the County, imports animals for slaughter from other counties due to unavailability of beef cattle in the County.

Mombasa City being an ancient town hosts several tourist attractions and world heritage sites. Of significant mention is the historic Fort Jesus Museum which is also a UNESCO World Heritage site, the Likoni Ferry Services and the gigantic Elephant Tusks along Moi Avenue are the city's land marks as they are major tourist attraction sites. Additionally, several buildings in the old town including the Old Port are a major tourist attraction. The white sandy beaches are also of significant attraction to both international and domestic tourists. The County is a host to the Mombasa Marine Park which is home to a variety of fishes and other sea features and two private nature trails, Haller Park and Butterfly Pavilion, operated by Bamburi Cement factory. Project Area Administration
The proposed Solar power TL is located in Bamburi Location which is situated in Kisauni Sub County in Mombasa. Administratively, the County is divided into six Sub Counties namely:

Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni and thirty County assembly wards. These are further sub-divided into thirty locations and fifty-seven sub-locations as shown in **Table 33**.

**Table 33: Area and Administrative Units by Sub County**

| | Divisions | Locations | Sub-Locations | Villages |
|---|---|---|---|---|
| Changamwe | 1 | 4 | 10 | 58 |
| Jomvu | 1 | 3 | 7 | 65 |
| Kisauni | 3 | 6 | 9 | 200 |
| Nyali | 2 | 4 | 8 | 55 |
| Likoni | 2 | 6 | 9 | 145 |
| Mvita | 1 | 7 | 14 | 134 |
| **Total** | **10** | **30** | **57** | **657** |

*Source: County Integrated Development Plan of Mombasa County-2022*

### 4.5.2 Population and Household Characteristics

The communities living in the village surrounding Bamburi Cement Production Plant displays many of the characteristics of the urban poor caught in chronic poverty traps, which face multiple and interlocking forms of disadvantage. Isolation, insecurity, weak economic integration, limited political leverage, and a challenging natural environment combine to produce high levels of risk and vulnerability. The highest rates of poverty are observed among those who are not in involved in formal employment or waged labour.

#### *4.5.2.1 Demographic Characteristics*

The population and density distribution for Sub counties in Mombasa County is given in **Table 34** below.

**Table 34: Population and Density Distribution by Sub County**

| Sub County/ County | Male | Female | Total | Land Area Sq. Km | Density Persons Per Sq. Km |
|---|---|---|---|---|---|
| Changamwe | 68,761 | 63,121 | 131,882 | 18 | 7,457 |
| Jomvu | 83,002 | 80,410 | 163,415 | 37 | 4,432 |
| Kisauni | 146,748 | 145,176 | 291,930 | 88 | 3,328 |
| Likoni | 126,962 | 123,392 | 250,358 | 40 | 6,187 |
| Mvita | 75,565 | 78,601 | 154,171 | 15 | 10,543 |
| Nyali | 109,219 | 107,346 | 216,577 | 23 | 9,610 |
| **Mombasa** | **610,257** | **598,046** | **1,208,333** | **220** | **5,495** |

*Source: Kenya Population and Housing Census (2019)*

### 4.5.3 Population and Livelihood Outlook in Kisauni Sub County

The project area falls within the existing municipal boundary of Mombasa City. Mombasa is a cosmopolitan town inhabited by people from diverse ethnic backgrounds. Villages in Kasauni are dominated by the Mijikenda community. The Mijikenda are a coastal Bantu community inhabiting the region from the Tanzania border to the Sabaki and Umba rivers. "Mijikenda" means nine villages namely, Giriama, Digo, Duruma, Rabai, Kambe, Chonyi, Jibana, Kauma and Ribe. Each community speaks its own dialect. The Mijikenda are settled along the Coastal hinterland in fortified villages called "*Kaya*". Today, 11 "*Makaya*" are inscribed into the list of UNESCO World Heritage Sites. However, the project is being implemented in Bamburi location which is largely urban and no *Kaya* is being affected.

Furthermore, the project will be implemented on a private land belonging to Bamburi Cement PLC and shall not have any negative impact on the livelihoods and cultures of the local people.

The population demographic data is secondary obtained from Kenya Population and Housing Census (2019). In 2009 the total population of Kisauni Sub County stood at 194,065 comprising of 100,138 males and 93,927 females. In 2019, the population of Kisauni Sub County had grown to 146,748 for males and 145,176 for females. Bamburi Centre is rapidly growing due to the presence of Bamburi Cement Plant.

**Table 35: Disaggregated Population and Density for Kisauni Sub County**

| Parameter | 2009 (Census) | 2019 (Census) |
|---|---|---|
| Male | 100,138 | 146,748 |
| Female | 93,927 | 145,176 |
| **Total** | **194,065** | **291,930** |
| Area (Sq. Km) | **88** | |
| Population Density (Persons Per/ Sq. Km | 2,205 | 3,317 |

*Source: Kenya Population and Housing Census (2019)*

#### *4.5.3.1 Vulnerable and Marginalised*

The County population of those above 65 years of age stands at 15,576, and 0.9 percent of the total population as orphans. Social protection is very crucial in planning for the vulnerable in society. Mombasa County, through the Department of Education and Children have constructed 8 ECDE centres across the 6 Sub Counties and have provided the milk feeding program to the children from ECDE level up to class 3 for improved nutritional care and retention rate. Through collaboration with the Social Departments in the County, a social protection policy is being developed to ensure equal opportunity for the vulnerable in Mombasa County.

#### *4.5.3.2 Religion*

The population of Mombasa County is diverse, recent figures indicate that the City is divided between Christians and Muslims (51 and 41 per cent respectively) with one third of inhabitants originating outside the region.

#### *4.5.3.3 Education*

The County's literacy rate stands at 57 per cent due to high accessibility to learning institutions. There are a total of 645 primary schools (95 publics and 550 private) in the County with an enrolment of 70,345 students in public and 76,301 in private. At the secondary school level, there are 35 public secondary schools with a student population of 14,576 and a teacher population of 423.

### 4.5.4 Housing Conditions

In the County, 65.6 per cent of all houses are stone walled while those made of brick walls stand at 7.5 per cent. Corrugated roofing accounts for 69.0 per cent of all roofing materials while tiles make up 9.7 per cent of all the houses in the County. Most of the mud walled houses are found in the slum areas where they are temporarily built.

In these areas, land ownership is not guaranteed as most of the residents do not legally own land and they occupy. Most of the land are owned by absentee landlords.

### 4.5.5 Access to Water and Sanitation

Water in the County is managed by the Mombasa Water and Sewage Company. Water supply for the County is from Mzima Springs in Taita Taveta County, Marere, Sabaki/Baricho in Kilifi County and Tiwi Boreholes in Kwale County. This supply only meets 65 per cent of the County water demand. Additionally, most residents rely on borehole water that contains a high percentage of faecal contamination and not very safe for domestic use. In total, 73.9 per cent of the total population has access to safe water. The County also sources its water from 452 shallow wells spread across the entire County, three permanent springs, four water pans found in the rural areas of the County and a number of boreholes operated by private investors, NGOs and local CBO's. These sources are complemented by the pipe water system that is sourced from Mzima springs, Marere, Sabaki/Baricho and Tiwi Boreholes. The piping system is currently under rehabilitation by the Coast Water Services Board. The average distance from the water source is estimated at 0.1km which is fairly close compared to the national average of 1.2km. This is as a result of the geographical size of the County and the multiple sources of water. Sanitation coverage in the County stands is 71 per cent. More efforts are being put in place to ensure that this coverage is increased. Some of the efforts being put in place include the community strategy where the Ministry of Health is establishing community units manned by community health workers to try and address sanitation, hygiene and health issues as well as stepping up the water and sanitation programme compliance in the County.

### 4.5.6 Health Conditions

#### *4.5.6.1 Disease Prevalence (Morbidity)*

**Morbidity**

The five most common ailments in the County are malaria, which accounts for 48 per cent followed by flu and other ailments accounting for 18.7 per cent while stomach ache account for 5.2 per cent and respiratory infections of which upper respiratory infections account for 0.7 per cent and lower respiratory infections account for 3.3 per cent cumulatively accounting for 4.1 per cent. Diarrhoea is also rampant and accounts for 2.3 per cent of all disease incidences in the County.

**Disease Prevalence at the Project Site Area**

Records obtained at the nearest heath institution to the proposed site indicate the following:

- **Bamburi Dispensary:** *Upper Respiratory Tract Infection (URTI), Skin Diseases*
- **County Government of Mombasa – Department of Public Health Utange Dispensary – Scabies, Malaria, Worm Infestation:** *Upper Respiratory Tract Infections (URTI),*
- **Sub County Public Health Office, Kisauni Sub County:** *Upper Respiratory Tract Infection (URTI) Diarrhea Diseases, Malaria, HIV/AIDS, Urinary Tract Infection.*

#### *4.5.6.2 Health Facilities*

The County hosts the Coast Level Five Hospital which is a referral facility serving the entire coast region. Other notable private hospitals include the Aga Khan Hospital, the Mombasa Hospital and Pandya Memorial Hospital. Other lower evel hospitals include the Tudor and Port Reitz level four hospitals. These are further complemented by fifteen private hospitals, four nursing homes, nine health clinics of which two are public and seven privately managed. There are 27 dispensaries out of which 25 are public and two are private.

Additionally, there are 106 private clinics, some specializing on particular ailments while others being general clinics. (*Mombasa County Integrated Development Plan 2017-2022*).

#### *4.5.6.3 Nearest Health Institution to Project Site*

The nearest health institutions to the proposed project site are:

- Bamburi Dispensary – Public Hospital;
- Utange Dispensary - Public Hospital.

### 4.5.7 Community Challenges

#### *4.5.7.1 Gender Based Violence*

Gender-based violence is a problem in Kenya whose nature is multi-faceted. Results from KDHS 2008/2009, revealed that 39 percent of married, divorced or separated women aged 15 to 49 years reported to have suffered some form of violence during their lifetime. Gender-based violence identified as a significant driver of HIV/AIDS. Findings show an increased risk of HIV acquisition among victims of gender-based violence and a positive HIV status being a risk factor for violence.

***Potential Causes of Gender Impacts***

Mombasa county is leading in the region with the highest number of Gender Based Violence (GBV) cases reported at the Coast of Kenya, this is according to Healthcare Assistance Kenya (HAK). The research carried out by the organisation between 2007 and March 2017, shows that a total of 433 cases have been reported in Mombasa, out of the total 17,224 cases of GBV reported in Kenya during this period. According to the data on Gender Based Violence in Kenya by HAK, out of the 433 cases of GBV in Mombasa, women cases are leading with 199, followed by girls 123, boys-64 and finally men 47

#### *4.5.7.2 Cases of Misconduct and Violence*

The coastal region in general is experiencing the rising cases of domestic violence. There are also cases of the emergence of criminal gangs in the coastal city. These are mainly attributed to the high rate of drugs and substance abuse in the region (KNA, 2019[1]).

#### *4.5.7.3 High Unemployment*

In Kenya, 80 per cent of the unemployed are believed to be below the age of 35. The rate of unemployment in Mombasa, Kenya's second largest city and home to the region's largest port, is estimated to be 44 per cent[2].

The significant level of unemployment among the youth is contributing to the high level of drug and substance abuse, observed increase in crime and insecurity and domestic violence.

### 4.5.8 Economic Characteristics

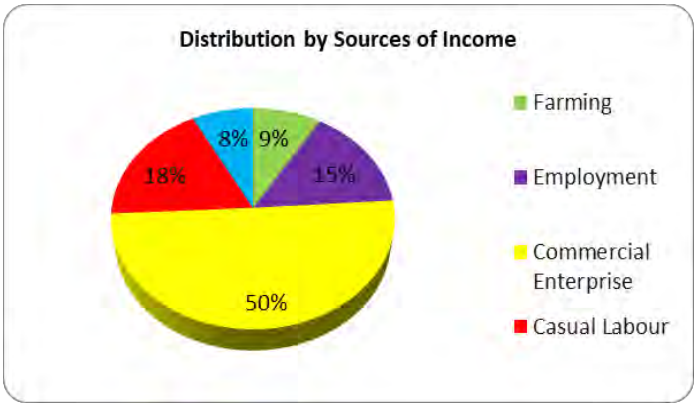
The primary data collected during the socio-economic survey has been used to evaluate the baseline status of the project area community.

[1] https://www.kenyanews.go.ke/drugs-abuse-linked-to-domestic-violence-in-kisauni/
[2] https://riftvalley.net/sites/default/files/publication-documents/Big%20Barrier%20-%20RVI%20Rift%20Valley%20Forum%20Meeting%20Report%20%282017%29.pdf

#### *4.5.8.1 Livelihood of Respondents*

Kisauni is a peri urban area and the main economic activity of communities in Kisauni Sub County is commercial enterprises and accounts for 50% of the total number surveyed as shown in **Figure 4**. These are informal businesses including food kiosks, vegetable vendors among others. The income from the businesses is generally low for most families. Farming is minimal accounting for only 9% as the area is predominantly urban. Individuals earning their livelihoods through employment accounts for 15 %. Major employers include the hotel industry, the Kenya Ports Authority, the Government of Kenya, Container Freight Terminals and various private institutions such as banks.

**Figure 4: Sources of Income Categories for Persons located next to Project Area**

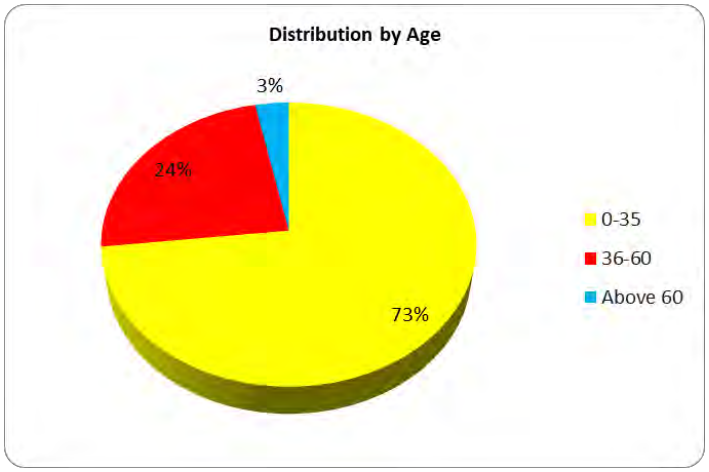



**Source:** ESHIA Study Socio-economic Survey, 2022

#### *4.5.8.2 Age Distribution*

In **Figure 5**, majority of the respondents fall under the age bracket of 0-35years (73%) followed by respondents under the aged 36-60 years (24%). Those that fall in the age bracket of 60 years and above (3%). This implies that the population found in Kisauni are largely a youthful population.

**Figure 5: Age Distribution of Respondents**

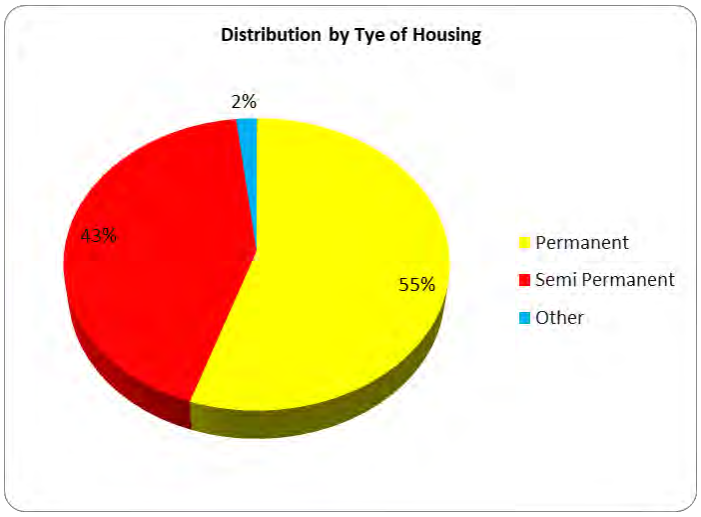



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.3 Quality of Housing Structures of the Residents*

Majority of the Kisauni respondents live in permanent houses (55%) while 43% live in semi-permanent houses. This shows that the Kisauni communities are predominantly urban. Make shift structures (Mabati) only form 2% of the housing structures found in Kisauni. **Figure 6** provides distribution by type of housing in the project area.

**Figure 6: Age Distribution of Respondents**

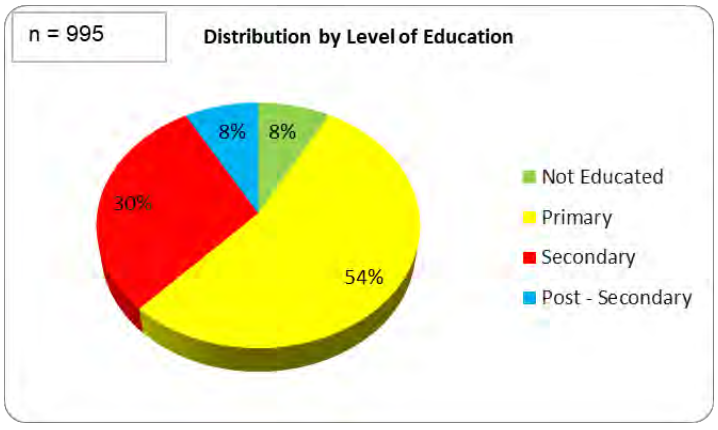



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.4 Level of Education of Respondents*

As shown in **Figure 7**, majority (54%) of the respondents had attained primary school level of education, 30% had attained secondary level of education and a further 8% had attained post-secondary education. While 8 % had no formal education.

**Figure 7: Age Distribution of Respondents**

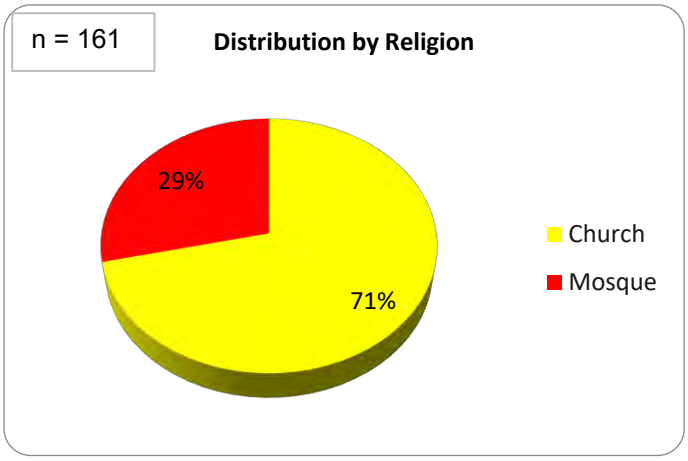



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.5 Religious Following*

Majority of the Kisauni respondents were Christians s (71%) while a small number (29%) were Muslims. This will have a very profound effect on the way the project is implemented and more so on the behaviour and conduct of the contractor's team.

**Figure 8: Distribution of Respondents According to Religious Following**

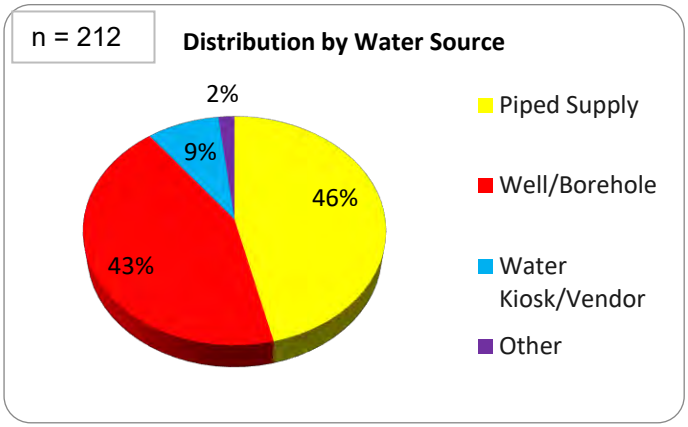



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.6 Distribution Respondents Drinking Water Source*

Majority of Kisauni respondents have access to piped water (46%) while 43% get their water from wells/boreholes. A small section of the respondent 9% purchase water from kiosks/vendors. Other sources of water accounted for 2 %.

**Figure 9: Age Distribution of Respondents**



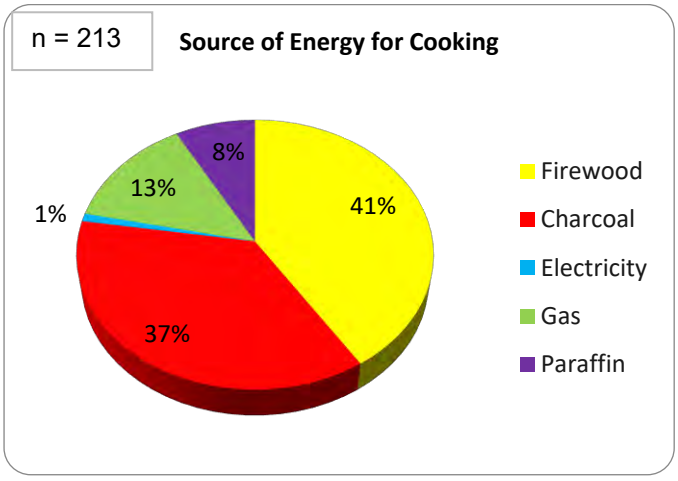

*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.7 Source of Energy for Cooking*

Kisauni respondents exclusively use five sources of energy for cooking (Firewood 41%, Charcoal 37%, Gas 13%, Paraffin 8% and Electricity 1%). This is a very worrying trend when considering the need to conserve forest resources. See **Figure 10**.

Firewood does not only deplete forest resources; it significantly contributes to air pollution resulting in Upper Respiratory Tract Infection (URTI) which is also reported as one of the most prevalent OPD diseases at almost every health facility in the project area. Sensitization of the project area community should be carried out and since poverty levels are high, there should be a drive to provide alternative clean sources of energy (e.g., Gas) at subsidized cost. High dependency on wood fuel and charcoal is depleting the forest cover and contributing to climate change.

**Figure 10: Source of Energy for Cooking**

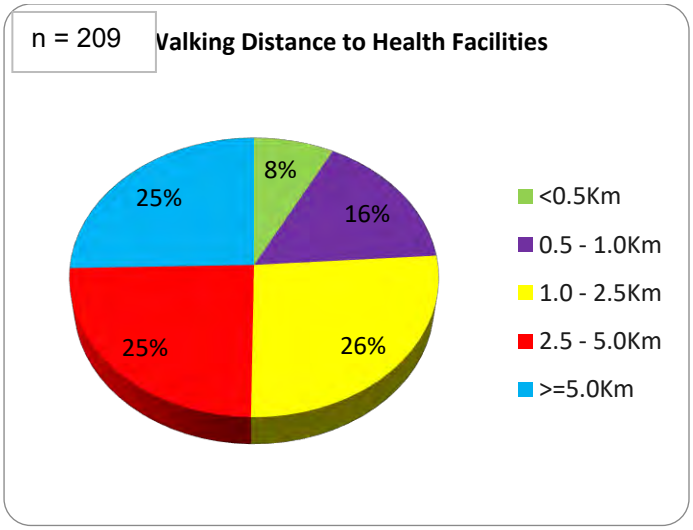



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.8 Distance to Health Care/Dispensary*

A total of 26 % of the respondents have to travel between 1.0-2.5km to reach a health facility. 25% have to travel between 2.5-5km to reach a health facility. At the same time a significant 25% have to travel more than 5km. On the other hand, 8% travel for less than 0.5 Km to the nearest health facility. The respondents who travel for between 0.5-1.0 Km accounted for 16 %.

**Figure 11: Distance to Health Care**

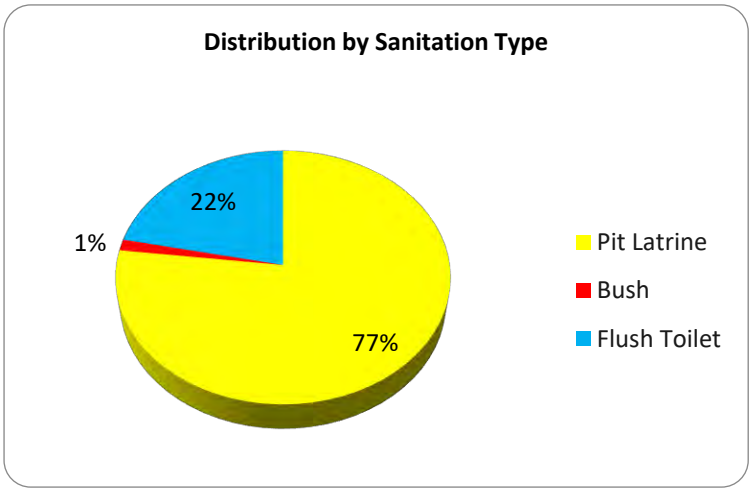



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.9 Sanitation Facilities*

Majority of the respondents (77%) use pit latrines. About 22% use flush toilets. Only 1% of the respondents in Kisauni lack sanitation facility and use open defecation. See **Figure 12**.

**Figure 12: Sanitation Type**

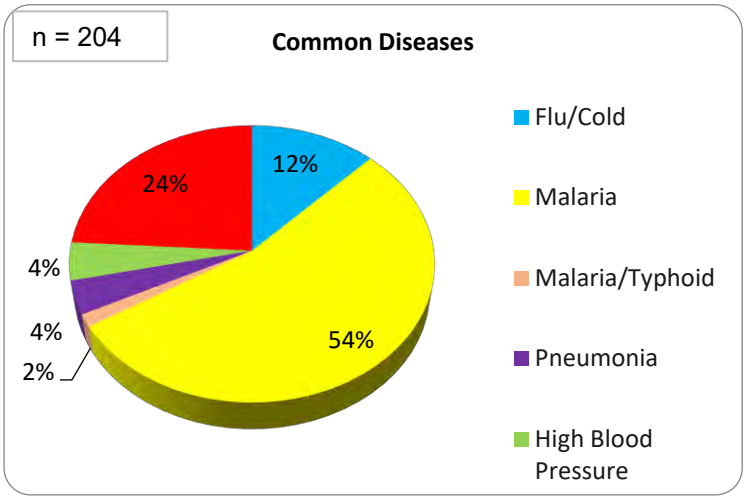



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.10 Common Diseases*

The diseases reported by respondents are as shown in **Figure 13.** Malaria and typhoid appear to be the biggest challenge at 54 %. Other diseases accounted for 24%, Flu/cold (12%), High blood pressure and pneumonia accounted for combined 8%. Only 2% of the respondents said that a combination of malaria and typhoid is a problem.

**Figure 13: Common Diseases**

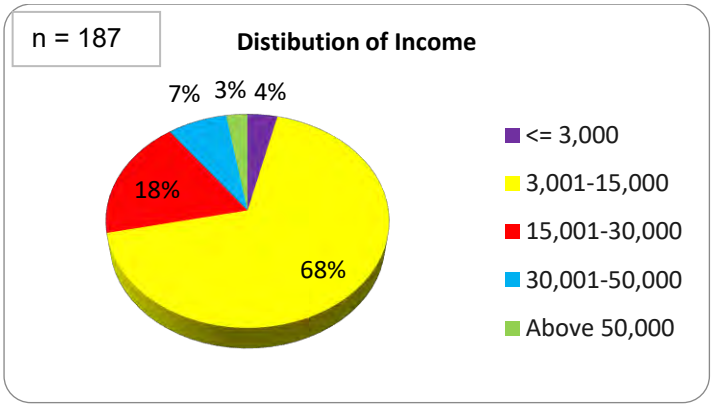



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.11 Distribution of Income*

Majority of the respondents (68%) earn between 3,000/= - 15,000/= a month as their income. See **Figure14**. Those earning between 15,000/=- 30,000/= form 18%. Those earning between 30,000/= - 50,000/= form 7% of the community while those earning above 50,000/= form 3%. It is important to note that there are some community members who get 3,000/= or less and they account for 4% of the respondents. This generally shows that although the survey was done in the urban centres, the income levels are generally low for persons with families to feed, clothe, pay for medical care and take children to school.

**Figure 14: Distribution of Income**

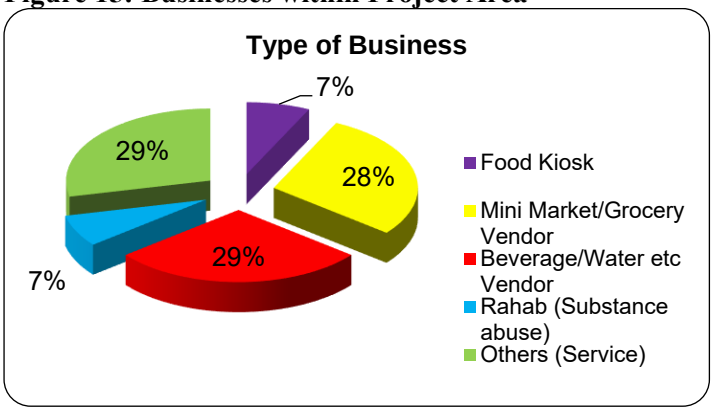



*Source: ESHIA Study Socioeconomic Survey*

#### *4.5.8.12 Businesses within Project Area*

Beverage /water/vendors form the bulk of the businesses run by respondents at 29% followed by Mini markets/grocery vendors at 28%. Other businesses combine to account for 42% of businesses owned by the respondents. Majority of the employees are male (62%) while 38% are female. Almost all businesses 86% are connected to electricity while only 14% do not have electric connection. A total of 43% businesses are connected to sewer line while 57% are not connected. Majority (64%) of the respondents said that their businesses are connected to piped water supply while 36% rely on other water sources. Majority (86%) of the businesses use electricity for lighting.

**Figure 15: Businesses within Project Area**




*Source: ESHIA Study Socioeconomic Survey*

### 4.5.9 Land Ownership and Land Use Pattern

A sizeable number of people living in the peri-urban areas of the County practice subsistence small scale farming and keep different types of livestock. Land ownership for agricultural and livestock activities remains a thorny issue in the County as most of the residents do not legally own land and the ones, they cultivate on are owned by absentee landlords. Land ownership is a very important factor in the socio-economic development of the County. However, by July 2013, only 30 per cent of the residents had title deeds to their land. In addition, only 1 per cent of the County population is supported by agriculture which translates to 6,797 individuals. The County experiences very high incidences of landlessness thus leading to a large number of squatters. However, efforts were to be made to correct the imbalance and boost economic activities on the land by issuance of title deeds (*Mombasa County Integrated Development Plan 2017-2022*).

### 4.5.10 Conflict and Security

Mombasa is a fairly safe destination. Other than occasional terrorist threats and election atmosphere, the County has been peaceful and has even attracted local tourism during high peak season. The National police and County inspectorate have been working in harmony to ensure order on the roads and on heavily populated areas as expected.

### 4.5.11 Road Access

There is a total of 257.17km of bitumen surface roads, 127km of gravel surface roads and 91.29km of earth surface roads in the County. Main classified roads include Mombasa - Malindi road and Likoni – Lunga Lunga Road connecting Kenya and Tanzania. The Likoni Ferry links the Island to Likoni and subsequently to Kwale and Tanzania through the Lunga-Lunga Border. Kenya Ferry Services operates more than 7 ferries and carries over 250,000 people and over 5,000 vehicles per day across the Likoni channel. The County has ten kilometres of railway line and three railway stations from the colonial era. The Standard Gauge Railway replaces this parallel and colonial Uganda Railway that was originally built during the British colonial rule in the 19th century. The County has one international airport, the Moi International Airport in Changamwe Sub County.

The project site can easily be accessed since there are access roads in the area.

# 5 ANALYSIS OF PROJECT ALTERNATIVES

## 5.1 Alternative Location of Site

Solar projects are non-polluting energy generation projects which are site-specific and dependent on the availability of solar irradiance resource. Advantages of the selected site:

- There are no settlements at the site. The Transmission Line will be installed along existing access road in the project area;
- The site area has tall trees hence visual intrusion from the power line poles will not be significant;
- The power will be evacuated to an existing sub-station within Bamburi Cement Factory located approx. 3km from the proposed plant;
- Being that the site has been excavated for raw materials, the existence of cultural property of archaeological importance is remote and this report has provided a "Chance Find Procedure" that will be used by the Contractor to safeguard any findings. Refer to **Appendix 10**.
- Detailed Ecological Survey was commissioned by the Consultant to evaluate the ecological importance of the site and the appropriate mitigations that the site will require to eliminate or minimize impacts. The ecological impact report has been prepared indicating that the installation of the solar plant will not have irreversible impacts on the site. Refer to **Appendix 12**.

## 5.2 Analysis of Alternative Energy Sources

Bamburi Cement PLC has been using electrical energy supplied by Kenya Power to carry out its operations at the Bamburi Plant. The Plant uses a lot of electrical energy which is generated from various energy sources including Hydro-power, Thermal, Geothermal. The thermal energy source is produced by burning fossil fuel.

Due to the high demand for power for its operations, Bamburi has decided to go green energy to reduce the emission of GHG. To this end Bamburi has partnered with Momnai Energy to install a 14.5MWac Solar PV Power Plant at the Bamburi, Mombasa site. An Analysis of Energy sources as provided in **Table 36** indicates that the best alternative clean energy source available that can be exploited is Solar. The generated power will be evacuated by the proposed TL to an existing sub-station within Bamburi Cement Factory located approx. 3km from the proposed plant.

**Table 36: Types of Energy Sources**

| Energy Source | Hydro | Thermal Generators | Wind | Geothermal | Biomass Energy | Solar Energy |
|---|---|---|---|---|---|---|
| **GHG Emission** | Low | High | Low | Low | High | Low |
| **Availability in Kenya** | High usage but affected by low water levels. Partially reliable – Clean Energy | Largely used in Commercial Places – Environmental Polluter | High potential, low usage – Clean Energy | High usage/ potential – Clean Energy | High usage – Environmental Polluter | High Potential – Clean Energy |

## 5.3 Ease of Access to the Site

The site has several access points. This will make management of traffic easier especially during construction.

## 5.4 The No Project Scenario

Under the "No Project Option", any potential adverse environmental, social and Health impact associated with the project would not occur. On the other hand, preliminary assessment indicates that the disadvantages with the no project scenario include the following:

- Continued emission of GHG since Bamburi Cement is a large power consumer of power that partly generated by burning thermal energy;
- Increased power deficit and load shedding;
- There would be a lost opportunity to promote renewable energy, which would set back the momentum of achieving the Vision 2030 target toward clean energy production;
- Loss of employment opportunities for the local people who could have been employed during the construction and operation phases of the project;
- Loss of government revenue through reduced taxes;
- Loss of business for suppliers and contractors

# 6 PUBLIC AND STAKEHOLDER CONSULTATIONS AND DISCLOSURE

## 6.1 Introduction

The overall objective of the exercise is to involve citizens in project formulation and implementation at the local level. More specifically, the objective is to put in place a durable system of intra-community co-operation through collective action, which creates communal discussion forums for the implementation of development activities. The foregoing is particularly pertinent in the context of Article 35 of the Constitution of Kenya which, provides that '*every citizen has the right of access to information held by the state; and information held by another person and required for the exercise or protection of any right or fundamental freedom*'. For instance, a question would arise about a project such as Bamburi solar power project and the TL, and how it affects the local people's right to a clean and healthy environment enshrined in Article 42 of the Constitution of Kenya. This was determined inter alia through subjecting the project to public participation and consultation that is the subject of this chapter.

### 6.1.1 National Requirements

**(a) EMCA 1999 and other National Statutes on Stakeholder Engagement**

Within Kenya, EMCA requires a project proponent to seek the views of persons/communities that may be affected by the project to be consulted, at least explain project potential impacts and obtain oral/written comments, which will be included in the ESIA for implementation by the proponent. The EMCA 1999 calls for effective stakeholder participation and public consultation in the EIA process, in this case ESHIA Study. This chapter elaborates on the Stakeholder Engagement and Public Consultations including Public Consultation Meetings (PCMs) that have taken place in the project area with regards to the proposed TL in Bamburi Location, Mombasa County. Several other Kenyan national statutes also require that stakeholders and communities in project areas, especially where the project is likely to affect their livelihoods directly or indirectly are meaningfully consulted. The EHSIA study recommends that the project developer considers stakeholder concerns during all phases of project implementation (Planning, Construction, Operation, and Decommissioning phases). Key focus on the negative impacts of the project and mitigation measures have been outlined in the ESMP and MP.

### 6.1.2 International Standards on Stakeholder Engagement

IFC Performance Standard 1 (PS1), EIB Environmental and Social Standard 1 (S1) and World Bank Environmental and Social Standard 10 (ESS10) were used to guide the process of stakeholder engagement.

### 6.1.3 Objectives of the Consultation Process

- Identification of significant impacts, public's interest and values;
- Identification of priorities for assessment;
- Encouraging public understanding of the proposed project;
- The public can contribute local knowledge and values to the prediction, evaluation and mitigation of impacts;
- Improvement in quality and acceptability of ESHIA report;
- Public contribute to evaluation of quality and acceptability of report;
- Public comment on acceptability of project impacts;
- Public evaluate impacts that occur and support project environmental management process.

## 6.2 Stakeholder Analysis

The stakeholder Analysis involved the following process:

- Identification and Mapping of Key Stakeholders;
- Defining the mode of consultation and engagement.

### 6.2.1 Stakeholder Identification and Mapping

Stakeholders have been identified according to how they relate or interact with the project. The stakeholders that have been identified are grouped into categories provided in the **Table 37** below.

**Table 37: Project Area Stakeholders**

| No | Stakeholder Grouping | Stakeholders | Stakeholder Category |
|---|---|---|---|
| 1 | Government | Kenya Wildlife Service (KWS) | Primary |
| | | Ministry of Interior and Coordination of National Government (CC, DCC, ACC, Chiefs, Asst Chiefs and Village Elders)) | Secondary |
| | | National Environment Management Authority | Primary |
| | | County Government of Mombasa | Primary |
| | | Government Hospitals | Primary |
| | | National Museums of Kenya | Primary |
| 2 | Institutions | Kenya Power | Primary |
| | | Kenya Electricity Generating Company | Secondary |
| | | Kenya Electricity Transmission Company | Secondary |
| | | Energy and Petroleum Regulatory Authority (EPRA) | Primary |
| | | Rural Electrification and Renewable Energy Corporation (REREC) | Primary |
| | | Kenya National Highways Authority (KeNHA) | Primary |
| | | Kenya Civil Aviation Authority (KCCA) | Primary |
| | | Churches | Secondary |
| | | Water Resources Authority (WRA) | Primary |
| 3 | Local Community | Community Member (Individuals, Households) | Primary |
| | | Businessmen near Project Area | Secondary |
| 4 | Others | Community Based Organizations (CBOs) | Secondary |
| | | Non-Governmental Organizations (NGOs) | Secondary |
| | | Local Political Groups (MP, MCAs) | Secondary |
| | | Migrant Workers and Labourers | Primary |
| | | Contractor | Primary |
| | | Everett Aviation | Primary |

### 6.2.2 Stakeholder Engagement

A number of consultations were carried out during the EHSIA preparation. The stakeholders consulted include local people, representatives and government officials. The stakeholder engagement involved:

- Key informant interviews;
- Public consultation meetings; and
- Disclosure Meeting.

The feedbacks forms from these engagements are described in the following sections.

## 6.3 Key Informants Interviews

The method used to carry out consultation took into consideration the profile of the stakeholders, type of information desired and level of engagement. Each primary key stakeholder was visited at their offices. There was a session of introduction followed by a brief on the prosed project before the views of the stakeholder were sought through an interactive interview session. Initial engagement with some key stakeholders was done in November 2021. Further consultations were carried out in February 2022.

Key informants were provided with a Key Informant Questionnaire to fill. Outcome of the interviews are summarized in **Table 38**.

**Table 38: Project Area Key Stakeholder Questionnaire Analysis**

| Date | Stakeholder | Participant | Issues Discussed/ Mentioned | Support (Yes/ No) |
|---|---|---|---|---|
| 14/11/2021, 15/11/2021 & 02/02/2022 | Ministry of Interior and Coordination of National Government | • County Commissioner (Mombasa)<br>• Deputy County Commissioner (Kisauni Sub County)<br>• Bamburi Police Station<br>• Chief, Assistant Chief and Village Elders (Bamburi and Mwembelegeza) | • Project overview<br>• Public sensitization and mobilization<br>• Public participation<br>• Convening of Public Consultation Meeting (Date, Day and Venue)<br>• Full support of the Office of the CC/DCC<br>• Benefits of the project to the community<br>• Long term benefits to serve the interests of the developer and Bamburi with minimal benefits to the locals<br>• Cutting down of trees might affect the environment hence the need for reafforestation<br>• Noise pollution could pose a hazard to the locals especially during construction and its mitigation<br>• CSR initiatives for the community | Yes |
| 14/11/2021 & 02/02/2022 | County Government | • Office of the County Secretary<br>• Department of Environment, Waste Management and Energy (DoEWE); (Climate Change Unit, Environment Unit, Renewable Energy Unit) | • Project overview<br>• Promotion of clean energy<br>• Adoption and transition to solar power use<br>• Generation of electronic wastes<br>• Enhance cleaner production development of the factory to eliminate dust and particulate matter pollution<br>• Offloading of energy demand on the national grid for use to other sectors<br>• Skill transfer during installation and operation of the power project<br>• Renewable energy will help conserve the environment<br>• National and International Standards need to be adhered to while implementing the project<br>• Development of infrastructure will be spurred<br>• Employment opportunities shall be created<br>• Capacity building component to County Government and Community<br>• CSR initiative to establish ownership advantage | Yes |

| Date | Stakeholder | Participant | Issues Discussed/ Mentioned | Support (Yes/ No) |
|---|---|---|---|---|
| | | | • Maintenance and operation need skilled technical personnel and experts<br>• Consider the location and site of the plant taking into account that solar radiation levels can vary<br>• Incorporate local technicians to learn more about solar energy<br>• Engage the youths to provide unskilled labour | |
| 10/02/2022 | Energy Sector | Kenya Power | • Overview of the solar power plan project<br>• Need to share the project design<br>• Purpose of the project<br>• Will the generated power will be connected to the national grid and how will it be transmitted to the user?<br>• Public safety concerns<br>• Differentiation of power lines highly recommended<br>• Further engagement with the technical team of both Proponent and Kenya Power<br>• Is there use of the way leave?<br>• Need to include CSR | Yes |
| 10/02/2022 | | KENGEN | • Project overview<br>• If the proponent has engaged Kenya Power and EPRA<br>• Will there be power storage provisions?<br>• How dust generated by cement companies that would impede solar power generation be mitigated?<br>• Proponent is a competitor to KENGEN and what are the provisions of surplus power generated?<br>• Proximity to the Game reserve and safety of wildlife<br>• KENGEN is also involved in the development of Solar Systems as a new venture. | Yes |
| 21/02/2022 | | KETRACO | • Project overview<br>• Placement and arrangement of the Photovoltaic (PV) panels and the subsequent 'glare' effect can be a nuisance to the neighbouring community. | Yes |

| Date | Stakeholder | Participant | Issues Discussed/ Mentioned | Support (Yes/ No) |
|---|---|---|---|---|
| | | | • Impacts associated with project activities during:<br>✓ Construction phase such as noise, dust, influx of foreigners to the area, impacts on soils and water quality, waste generation.<br>✓ Decommissioning phase such as waste generation and disposal of photovoltaic cells.<br>• During Construction Phase, mitigation measures should include:<br>✓ Dust suppression activities<br>✓ Monitoring of noise levels including restricting construction activities to take place during daytime. Adhering to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009<br>✓ Developing and implementing a code of conduct for foreign employees entering into the project area<br>✓ Adhering to water quality requirements as per the Environmental Management and Coordination (Water Quality) Regulations, 2006<br>✓ Adhering to waste disposal requirements as stipulated in the Environmental Management and Coordination (Waste Management) Regulations, 2006<br>• During Decommissioning phase, mitigation measures should include<br>✓ Adhering to waste disposal requirements as stipulated in the Environmental Management and Coordination (Waste Management) Regulations, 2006<br>✓ To ensure proper disposal of the PV cells. | |
| 16/11/2021 & 11/02/2022 | Transport | • KCAA | • Project overview<br>• Project design<br>• Project area size | Yes |

| Date | Stakeholder | Participant | Issues Discussed/ Mentioned | Support (Yes/ No) |
|---|---|---|---|---|
| | | | • Height of solar panels and pylons<br>• Proximity of project to airport/airstrip, road and railway line<br>• Project should not be on the flight path<br>• Possible glare from the solar panel interfering with flight visibility<br>• The design must incorporate AAMLE requirement<br>• The developer to provide KCAA with design specifications<br>• KCAA to provide AAMLE requirement | |
| 16/11/2021 | | • KeNHA | • Project overview<br>• Authority to be sought in case of use of wayleave<br>• Negative impacts should be mitigated | Yes |
| 11/2/2022 | Neighbouring Business Community | • Buyoot Properties<br>• Mewa Rehabilitation | • Project overview<br>• Public disclosure meeting to be held<br>• Need to have CSR initiatives for the community such as street lighting<br>• Project will minimize dependence on electricity | Yes |
| 16/11/2021.<br>17/11/2021,<br>02/02/2022,<br>03/02/2022 &<br>08/02/2022 | Other Public Institutions | • WRA<br>• KWS<br>• NMK<br>• KFS<br>• NEMA | • Project overview<br>• Purpose of the study<br>• Convening of Public Consultation Meeting (Date, Day and Venue)<br>• Public disclosure meeting to be held<br>• The project is welcome because it will promote clean energy<br>• Bamburi Cement should conduct underground water assessment in the proposed project area<br>• Hydrological report for the project is necessary<br>• Proper ecological study should be conducted to ensure that the project is located in area with minimal impacts on wildlife | Yes |

| Date | Stakeholder | Participant | Issues Discussed/ Mentioned | Support (Yes/ No) |
|---|---|---|---|---|
| | | | • Hollapark situated within Bamburi forest land is a beautiful tourist attraction site and this should not be affected by the project<br>• Wildlife is usually donated to Bamburi and they are normally taken to the location where the proposed project is to be situated. It is believed that the project will not interfere with the wildlife which have been donated so far.<br>• It is a policy requirement that projects proposed to be implemented along the Coastline include an archaeological study before they are implemented.<br>• It is necessary to know where the project will be located and recommend which additional studies will be necessary.<br>• The proposed project location is within Bamburi forest<br>• The Investors should consider reforestation as one of the project components to compensate for forest cover that would be lost. | |
| 02/03/2022 & 03/03/2022 | Ministry of Health | • Bamburi Dispensary<br>• Utange Dispensary<br>• Public Health | • Project overview<br>• Most prevalent diseases are Upper Respiratory Tract Infections, Skin Diseases, Diarrhoea, Malaria, HIV/AIDS, Urinary Tract Infections, Scabies, Worm Infestation, Coughs, Rhinitis | Yes |
| 25/02/2022 | Private Institution | Everett Aviation Charter Limited | • Project overview<br>• Purpose of the study<br>• Stakeholder engagement and the planned public disclosure meeting<br>• Good project as source of green energy | Yes |

## 6.4 Public Consultation Meeting (PCM)

The Public discussion meeting was held on 8th February at Maweni Bamako Grounds, in Bamburi Location Kisauni Sub County. The local community and relevant stakeholders including both the government and private sector representatives were invited to participate in this Public Consultation Meeting. The proceedings commenced at 10:00 am. The meeting was attended by a total of 154 people (84 men and 70 female). The agenda, minutes of the meeting, list of participants and attendance sheets are provided as **Appendix 4** of this report.

*Plate 4: Public Consultation Meeting at Bamburi, Mombasa*

### 6.4.1 Invitations to the PCM

Stakeholder engagement becomes a successful exercise when proper and participatory communicative methods are used. This ensures that the stakeholders are kept engaged and well informed of the project development at every stage. A combination of communicative methods is usually used to engage with the stakeholders. Invitation to the meeting was sent out one (1) week in advance to all local leaders, government agencies, community members and the general public. The following media was used to invite participants:

- Individual letters to County Government, Government Departments, Private Companies in the vicinity of the project site;
- Posters distributed through the Chiefs Office; and
- Radio Announcements through popular FM station.

### 6.4.2 Brief Overview of PCM Deliberations

The following were the issues covered by the proponent, Consultant, Government Agencies and local political leaders,

- Importance of public participation
- Solar project overview
- Project site
- The project designs
- Details of project proponent
- Details of ESHIA consultant
- Generation capacity
- End user of energy
- The study activities that will be carried out
- Possible adverse impacts both socially and environmentally
- Possible CSR activities
- Possible employment opportunities
- Safety measures

**Table 39** below provides a summary of the main issues expressed by the stakeholders during the PCM while a copy of notice for the meeting (both in English and Kiswahili), the meeting agenda, minutes of the meeting and attendance register are provided under **Appendix 4**.

**Table 39: Views/Comments raised during the PCM**

| Name | Views/Comments | Responses |
|---|---|---|
| **SH 001** | • Kindly make sure that the youth (Men and Women) of the area are given jobs. | *All villages will be given equal employment opportunities (Consultant)* |
| **SH 002** | • We have had problems with Bamburi because of dust<br>• What will be the effects during the 6 months construction period?<br>• What will be the long-term effects of the plant? | *The panels will absorb most of the energy from the sun and will have no effects.*<br><br>*The expected effects that may occur during construction will be captured in the ESHIA report and their respective mitigation measures proposed (Momnai Engineer).* |
| **SH 003** | • Bamburi used to employ but has not been doing so for a while;<br>• Scholarships used to be offered by Bamburi but this does not happen anymore;<br>• Bamburi should try and restore the relationship it had with the surrounding communities by assisting in improving the infrastructure | *These are issues that can be discussed with the office and an agreement reached. However, a formal letter containing all the queries and requests should be written and addressed to Bamburi for consideration (Bamburi Rep).* |
| **SH 004** | • Bamburi should open up the Bamburi road and help repair the Timboni-Shanzu road | *These are issues that require consultation and formal requests from the local administration before a consensus is reached (Bamburi Rep).* |
| **SH 005** | • During the rainy season the Bamburi road floods hindering accessibility, this is a major issue that should be addressed? | *The flooding is an issues Bamburi is aware of and are looking for ways to Readdress it (Bamburi Rep).* |
| **SH 006** | • In the past there were instances where I, the area leaders and the government representatives would table the challenges | *The relationship between Bamburi and the community is good but can be improved on (Bamburi Rep)* |

| Name | Views/Comments | Responses |
|---|---|---|
| | the community is facing with Bamburi, and Bamburi would assist. This is the kind of relationship that should be revived. | |
| **SH 007** | • During employment people from different locations and the elderly should be considered<br>• The employment process should be free and fair<br>• We would like to get subsidized electricity from the project if possible | • *All villages will be given equal opportunities for employment.*<br>• *The electricity will solely be consumed by Bamburi Cement (Bamburi Rep)* |

### 6.4.3 Overall Outcome of the Consultations

The project area leadership, key stakeholders and community members are excited and support the project since it is a green energy project which is the way to go. Community members wanted the following issues looked into:

- Jobs to be fairly given out;
- The good working relationship with Bamburi to be restored;
- Dust to be suppressed.

## 6.5 Public Disclosure Meetings (PDM) to Disclose ESHIA Findings

Project impacts disclosure meeting was carried out on Thursday 28, April 2022. The meeting was convened to disclose the findings of the study and the project mitigation measures that will be carried out to mitigate the identified impacts. It also discussed the next steps in the project process.

The following were the main outcome from the disclosure meeting:

- The identified impacts can be mitigated and therefore the project can proceed observing the management plan provided in the report;
- The project area community expect to benefit from the project through employment and that there will be fairness in the engagement i.e. no discrimination or disparity;
- The project area community hoped that the project will not have negative impacts on their health;
- The project proponent will provide scholarships to deserving cases as part of their CSR;
- Both the project area administration and community were satisfied with the impacts identified and the proposed mitigations and therefore gave the project green light to proceed.

The detailed outcome of the disclosure meeting is presented under **Appendix 5**.

*Registration of the participants during Public Disclosure Meeting at Maweni Bamako Grounds (above)*

*Plate 5: The Area Administration addressing the Public Disclosure Meeting*

## 6.6 Stakeholder Engagement Plan (SEP)

This is an integral part of the larger ESHIA with the aim of guiding the stakeholder consultation processes across the life of the project and during the implementation of the management plans.

The objectives of this plan are aimed at enabling meaningful engagement with stakeholders by identifying different mechanisms for the participation of the said groups. The purpose of the plan is to provide an avenue for affected parties to express their views and opinions and get the appropriate feedback from the project proponent.

### 6.6.1 Stakeholder Engagement Team

The project developer (Momnai Energy) will set up a team that will oversee implementation of the continuous stakeholder engagement.
This will comprise of the following Officers:

- Sociologist (Grievance Officer);
- Project Administration Officer;
- Site Supervisor;
- EHS Officer

### 6.6.2 Grievances

All grievances will be logged in and forwarded to the developers during the construction and operation phase.
For any unresolved grievances and grievances related community health and safety, the developer will forward the grievances to Momnai Management who in turn will subsequently forward them to appropriate authority for redress.

### 6.6.3 Consultations

Consultations with stakeholders will be done by the Project Administration Officer who will also look at the social aspects and work in collaboration with the Sociologist (Grievance Officer) and Site Supervisor and at the site level. Any grievances from the community relating to any issues that might arise from the project activities will be managed by the nominated Grievance Officer based at the Site Office. A grievance desk will be set up at the site and the project implementer will communicate the project area community on how grievances can be lodged.

Consultations with the government agencies will be conducted as per the schedule that will be created with the Site Supervisor of the Developer. All relevant stakeholders will be informed in advance of the planned project activities. The development of the facilities will be based on the ESIA procedures and ESMPs provided in this ESHIA Study Report. Consultations with the primary stakeholders will involve meetings, information boards announcements and an Intranet system to appraise the project employees regarding the procedures of:

- Emergency response system,
- Incident/accident reporting,
- Grievance redress mechanism,
- Human Resources Policies and Procedures,
- Welfare measures
- Communication of general employment conditions,
- Company’s code of conduct for work site,
- EHS concerns,
- Use of PPEs,
- Information and awareness regarding the requirements of labour laws and minimum wages, working hours;
- Worker’s code of conduct including Drivers;
- Retrenchment process

The above process should also be conducted with workers engaged by the contractors.

### 6.6.4 Dissemination of Information

Project related information will be posted on the informational boards at the site office as well as at the management level. Information on the project milestones will be published in advance on the company's website to be available for the public and non-governmental organizations in the area. Should any issues be raised by the stakeholders, the project proponent management comprising of the Grievance Redress Committee at the site level shall respond accordingly in the shortest possible time. Details of which have been provided in the Grievance Redress Mechanism section of the report.

A summary of the consultation activities that the project proponent shall undertake as part of the Stakeholder Engagement Plan pertaining to the project area community and other stakeholders have been provided in the **Table 40**.

**Table 40: Information Sharing to be done during Project Period**

| No | Stakeholder | Information that needs sharing | Timeline | Responsible Entity |
|---|---|---|---|---|
| 1 | Project Area Community | • CSR Progress<br>• Information on Jobs<br>• Project subconsultants<br>• Vendors<br>• Environment and safety issues<br>• Grievance redress | Quarterly (throughout project cycle) | • Project Manager<br>• Grievance Officer<br>• Local leaders<br>• Community Representative |
| 2 | Migrant and Local Workers | • Grievance redress<br>• Training on how to deal with locals<br>• Safeguards sensitization (Health and safety)<br>• Code of conduct<br>• GBV, SEA and AC issues | Quarterly (throughout project cycle) | • Site Supervisor<br>• EHS Officer<br>• Grievance Officer |
| 3 | Government (National and County) | • Permits, Licenses and Approvals)<br>• Unresolved Grievances<br>• Environmental Monitoring Reports | As need arises (throughout project cycle) | • Project Manager<br>• EHS Officer<br>• Grievance Officer |
| 4 | Subcontractors | • Training on dealing with locals<br>• EHS matters<br>• Code of conduct for each worker<br>• Safety induction and toolbox talks<br>• GBV, SEA and VAC issues | Quarterly and as need arises throughout project cycle | • Site Supervisor<br>• EHS Officer<br>• Grievance Officer<br>• |
| 5 | Project Workers | • Safety induction and tool box talks<br>• Code of conduct<br>• GBV, SEA and VAC issues | Quarterly and as need arises throughout project cycle | • Site Supervisor<br>• EHS Officer<br>• Grievance Officer |
| 6 | Financiers | Regular Reports on project progress | Quarterly and as need arises throughout project cycle | • Project Manager<br>• Site Supervisor<br>• EHS Officer<br>• Grievance Officer |

# 7 SIGNIFICANT ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION

## 7.1 Introduction

The proposed project may have an impact on the environment during construction and operation phases. This section assesses the manner in which the Project will interact with elements of the physical, ecological or social environment to generate impacts on the natural environment, resources/receptors. It has been organized as per the Construction, operational and decommissioning phases of the project life cycle to understand the risks and impacts associated with each phase. During the construction phase, the impacts may be regarded as temporary or short-term; while long-term impacts may be observed during the operation stage. IFC's safeguard policies require that (i) impacts are identified and assessed early in the project cycle; (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and (iii) affected people are informed and consulted during project preparation and implementation. IFC emphasizes on the use of a screening process as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.

The impacts are assessed according to each project phase, namely:
- Pre Construction Phase;
- Construction Phase;
- Operation Phase;
- Decommissioning Phase.

## 7.2 Methodology for Impact Assessment

Environmental assessment was carried out to identify potential impacts of the project on the environment, biodiversity and the community. The assessment was carried out in three main steps, as follows:
- Prediction of potential impacts
- Execution of specialised ecological studies on biodiversity and evaluation and assessment of the impacts in terms of their significance
- Identification/ proposing mitigation measures for minimizing the effects of the significant impacts.

After exclusion of the negligible impacts, the remaining aspects were assessed based on the following criteria:
- Magnitude of the impact;
- Duration: period of time that impact lasts;
- Mitigation measures; its availability whether integrated in the project design or implemented as management measures;
- Residual impacts.

Where negative environmental impacts are expected, majority of them will be experienced during the construction phase. To help offset the potential negative impacts, mitigation measures are suggested and the residual impact evaluated.

### 7.2.1 Identification of Project Impacts

The identification of project impacts was by subjecting the project activities to a process of screening,scooping.

This was an iterative process that comes to an end only when the effects of all the identified impacts generated by the project, including residual impacts have been assessed and assigned a mitigation strategy. The process involved the following steps:

- Impact Prediction;
- Impact evaluation;
- Mitigation and Enhancement;
- Residual Impact Evaluation.

### 7.2.2 Impacts that will Occur During Construction

The construction activities that will give rise to environmental and social Impacts are listed below:

- Site Clearing
- Site Excavation and Levelling
- The process of Hauling Earth and Other Materials and Wastes
- Handling and Storage of material
- Drilling and Cutting activities
- Construction of Internal Roads
- Concrete Works - Erection of Concrete and Steel Structures
- Generated domestic and other site wastes including sanitary waste
- Generated hazardous wastes like used oils and other hydraulic fluids
- Painting and Finishing Works
- Water abstraction and drainage of waste water
- Demolition of Structures

Evaluation is carried out on the positive and negative impacts considering the following:

- The Health and Safety Aspects
- Ecological Aspects
- Environmental Aspects

### 7.2.3 Categorization of Impacts

The key issues identified during the assessment were evaluated using various components that individually or in combination with others give rise to impacts that require mitigation measures and monitoring. The significance of the potential impacts has been considered before and after mitigation measures have been applied. The following criteria was used to evaluate the significance of impact of the solar power project on the physical environment, community and the biological environment.

**Table 41: Categorization of Impacts**

| No | Impact | Criteria | Classification |
|---|---|---|---|
| 1 | Impact Nature | An assessment of the type of effect the activity is likely to have on the surrounding project's environment | ***Positive*** *– Affecting the environment positively* |
| | | | ***Negative*** *– Affecting the environment negatively* |
| | | | ***Neutral*** *– No effect on the environment* |
| 2 | Impact Type | Evaluation of how the impact will affect the project's environment | ***Direct*** *– Impacts will be generated directly from project activities* |
| | | | ***Indirect –*** *Impact generated from secondary sources* |
| 3 | Impact Severity | This defines the degree to which the | ***Insignificant****– Potential impacts are minor. The natural environment is not affected by the project* |

| No | Impact | Criteria | Classification |
|---|---|---|---|
| | | project affects the environment | ***Low*** *– There is minimal effect on the natural environment. The social, cultural and natural, cultural and social functions and processes can be reversed to their original state if mitigation measure are applied* |
| | | | ***Medium*** *– Environment is Impacted but can still function. Negative impacts can only be partially reversed* |
| | | | ***High*** *– Environmental, Cultural and social functions and processes are Impacted and cannot be fully reversed* |
| | | | ***Very High*** *- Environmental, Cultural and social functions and processes are Permanently Impacted and cannot be reversed* |
| 4 | Impact Duration | The period of time that the impact lasts on the environment | ***Short Term*** *– The potential impacts only last for a short time - the period of construction or less.* |
| | | | ***Medium – Term*** *– The potential impacts last for approximately 10 years or half the lifetime of the project* |
| | | | ***Long – Term*** *-* |
| | | | ***Permanent But Mitigated -*** *Impact will remain after operational life of project but appropriate mitigation measures have been used to reduce the impacts* |
| | | | ***Permanent But Not Mitigated -*** *Impact will remain after an operational life of the project. No mitigation measures will reduce impact after implementation* |
| 5 | Impact Extent | Defines the spatial or geographical extent that may be affected by the project or associated facilities | ***Project Site*** *– Within the project boundary* |
| | | | ***Local*** *– Impacts extend beyond the project site* |
| | | | ***Regional*** *– Impacts extend beyond the administrative area* |
| | | | ***National*** *– Impacts are considered nationally* |
| | | | ***Transboundary*** *– impacts are considered beyond the nation's boundary* |
| 6 | Likelihood of Occurrence | Defines the chances that the impact will take place | ***Unlikely*** *– No chance that impact will occur* |
| | | | ***Likely*** *– There is a good chance that the impact will occur* |
| | | | ***Certain*** *– The impact will occur whether mitigation measures are implemented or not* |
| 7 | Potential for irreplaceable loss of resource | This defines the degree to which the project can cause the loss of a resource that cannot be replaced | ***Low*** *– No or minimal impact will occur on irreplaceable resource* |
| | | | ***Medium*** *– Impacted unique resource can be replaced with mitigation measures after a period of time* |
| | | | ***High*** *– A high chance the irreplaceable resource will be impacted* |
| 8 | Impact Magnitude | This defines the intensity of the change that has the potential to occur | ***Insignificant*** *– The magnitude of the impact has no effect on the environment* |
| | | | ***Low -*** *There is magnitude of the impact has minimal effect on the natural environment* |
| | | | ***Medium-Low*** *– The magnitude of the impact has some effect on the environment but can be easily reversed with mitigation measures* |
| | | | ***Medium-High*** *– The magnitude of impact is significant and requires more effort to reverse them through mitigations* |
| | | | ***High*** *– The intensity of the impact high and only a small and mitigations can only reverse a very small portion.* |

| No | Impact | Criteria | Classification |
|---|---|---|---|
| | | | ***Very High*** *– The environmental, social and cultural aspects of the project are permanently impacted and mitigation measures cannot reverse the impacts* |
| 9 | Impact Significance | The significance will be rated by combining the consequence of the impact and the probability of occurrence | ***Negligible – No Action required*** |
| | | | ***Low*** *– The impacts are within the acceptable range* |
| | | | ***Medium-Low*** *- Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible* |
| | | | *Medium-High - Impacts are significant and require attention* |
| | | | ***High*** *- Impacts are of great importance, mitigation is crucial* |
| | | | ***Very High*** *– Impacts are very significant. Potential impacts such as loss of a significant portion of a valued species or loss of effective ecosystem function* |

## 7.3 Positive Impacts

### 7.3.1 Climate Change Mitigation and Adaptation

#### *7.3.1.1 Climate Change Mitigations*

The proposed transmission line project will evacuate the generated 14.5MWac of electricity from the Solar Power Plant to the substation located at the Bamburi Cement Plant, Mombasa for use by the plant. This amount of electricity will significantly contribute to the reduction of emission of Green House Gases (GHG) and positively impact climate change. Fossil fuels have been the major culprits on the issue of climate change caused by the release of greenhouse gases such as CO2 into the atmosphere. Consequently, solar energy is among the clean sources of energy. As such, transmission line will also contribute to reducing the use of fossil fuel resulting in lower greenhouse gases (GHGs) emissions thus promoting the mitigation and adaptation of climate change.

#### *7.3.1.2 Enhancement Measures*

Utility solar in Kenya is just taking root in Kenya, opportunities should be created for expertise and knowledge transfer. The youth should take interest in enhancing their knowledge in the green energy sector. The project can impart skills and knowledge of the solar power technology to the youth through hands on engagement and training.

Agencies operating within vicinity of Bamburi Cement Factory PLC expressed interest and requested that since the generated power is going to be used internally by Bamburi Cement, can Bamburi consider connecting them so they could also get reliable clean energy for their operations. The power supply from the grid has frequent outages.

### 7.3.2 Employment Opportunities for Youths and the Community

#### *7.3.2.1 Employment Opportunities*

The project will provide job opportunities for the youth and members of the community. The project will require both skilled and unskilled workers during the construction and operation phases of the project. This will improve the livelihoods status of the community.

#### *7.3.2.2 Enhancement Measures*

- The Developer should prepare a Gender Development Plan that will be implemented to promote gender equality in the sharing of available job opportunities as well as supporting the mitigation of gender- based violence and other gender-related issues within the workforce and in the community.
- A staff recruitment strategy should be established and implemented before and during construction to enable the community members be able to access job opportunities.
- Whereas the minimum requirement for employment may be indicated, training opportunities and apprenticeships should be provided to males and females in Bamburi area in order to enhance their skills. This will increase their competence and enhance their chances of getting employed and career development opportunities for the future.

### 7.3.3 Opportunities to Offer Services

#### *7.3.3.1 Services to Solar Plant Workers*

The project will employ a number of people to work on the Transmission Line that will be evacuating power from the solar power plant to the sub-station. The workers will require various goods and services to be provided by the business enterprises within the project area. This will include transport, food and other services. This will generate business opportunities for the community members.

#### *7.3.3.2 Enhancement Measures*

- Priority should be given to the local community to provide goods and services that may be required by the employees of the project.
- Such services should be on an arranged programme in order to make community members offering such services maximise benefits from their services by using the available extra time to tend to their other businesses/opportunities.

### 7.3.4 Provision of Market for Local Materials

#### *7.3.4.1 Locally Available Materials*

Materials for construction should be sourced locally from suppliers who have the capacity and capability to supply the required materials. This will create a market for local businesses and improve their livelihood.

#### *7.3.4.2 Enhancement Measures*

Priority should be given to the local community within Bamburi area for the supply of construction materials and where it is established that such goods are not available locally then the opportunity to supply the goods can be extended to other providers in other areas.

### 7.3.5 Evacuation of Clean Energy to be used by Bamburi Cement PLC

The TL will evacuate 14.5MWac of clean energy generated from the solar plant to be used at the Bamburi Cement Plant in Mombasa. This will contribute to lowering the need to use energy generated from sources that are releasing GHG.

#### *7.3.5.1 Enhancement Measures*

Success of implementation of this project will enhance and promote usage of solar power as a reliable source of clean energy for industrial production of goods. Government should encourage and support investors who are willing to develop solar energy projects.

## 7.4 Project Impacts and Mitigation Measures During Construction Phase

**a) Project Impacts**

The impacts that will be generated will come from clearing of site vegetation, modest levelling and excavation of the electrical pole bases. Operating trucks and other machines are also going to generate impacts during construction. Oils and fuels that have the potential to contaminate soils and pollute water sources will be handled at the project site.

The Contractor's camp will be generating domestic and sanitary waste that requires appropriate management. Most of the potential impacts occurring during the construction phase are temporary and can be mitigated by applying international and local environmental and social management procedures. The potential impact of each identified activity is discussed and mitigation measures proposed.

### 7.4.1 Land Use Change

#### *7.4.1.1 Baseline Status of the Land Use*

The land where the proposed Transmission Line (TL) Wayleave Corridor will traverse is largely under rehabilitation since the section bordering Block A had been mined and the rest of the road corridor to the sub-station has been modified by the road construction activities. Exotic trees largely composed of *Casuarina equisetifolia* have been planted.

#### *7.4.1.2 Impact Assessment*

The land use is changing from a rehabilitated raw material source to a 33kV TL that will evacuate electrical power from the solar plant to the sub-station. Changes in land will are marked by the presence of TL poles and conductors along the road corridor from the solar plant to the sub-station

However, the impacts on land use will be confined to the project boundary and will therefore not affect any of the neighbouring facilities.

The change may not be that signigicant given the potential impacts that could occur during the construction phase albeit at a reduced scale, since the TL corridor will only be approx. 10m wide.

**Table 42: Land Use Change**

| Impact | Land Use Change | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| | The impact severity is considered medium due to the vegetation along the TL Wayleave Corridor (10 wide) that will need to be cleared | | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| | The potential for irreparable loss of resource is considered significant hence impact is considered medium | | | | | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered medium-low due to the creation of the TL Wayleave Corridor (10m wide) | | | | | |

### *7.4.1.3 Mitigation Measures*

The site area has a water body less than 500m east of the TL wayleave corridor. The impact on land use change can be minimized by implementing the following mitigation measures

- Construction activities must strictly avoid any release of contaminants (chemicals, Oils, hydraulic fluids etc) to the ground
- The construction activities will be restricted within the boundary of the proposed TL Wayleave Corridor and will not alter the land use of the adjacent areas;
- Construction activities shall be restricted to the project footprint areas;
- The proponent shall undertake detailed site drainage study before start of construction and implement the findings of the study
- Proponent shall take tree plantation program wherever possible along the TL Wayleave Corridor
- Waste shall not be allowed to litter in and around the project area;
- On completion of construction activities, land used for temporary facilities shall be restored to the extent possible;
- No soil shall be dumped and or stored in a manner that could be exposed to erosion and siltation of nearby water bodies.
- Indigenous trees shall be planted in open areas where space allows.

#### *7.4.1.4 Significance of Impact*

The mitigation measures provided are intended to reduce the land use change impact of the project since there are potential impacts that can arise during construction phase. The presence of the swamps/wetlands within the AoI makes the land use change more delicate. If the mitigation measures are not implemented, the impact significance would remain Medium-Low, however, if the mitigations are implemented, the impact significance would become low.

| Impact | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Land Use Change | Without Mitigation | Long Term | Project Site | High | Medium-High | Medium | Medium-Low |
| | With Mitigation | Long Term | Project Site | Low | Low | Low | Low |

### 7.4.2 Transmission Line Corridor Clearance

#### *7.4.2.1 Baseline Vegetation of the Site Area*

The TL Wayleave Corridor that traverses the area adjacent to Block A and the unpaved access road is occupied by *Casuarina equisetifolia* trees that have been planted to restore the area. The broad habitat characteristics is classified as modified. This means the TL corridor area has non-native origin and/or human activity has substantially modified the area's primary ecological functions and species composition prior to the onset of a project (IFC, 2012).

#### *7.4.2.2 Impact Assessment*

Before construction activities commence, existing vegetation at the site will need to be cleared. The ecological study identified the existence of less biodiversity in term of flora and fauna in Block A when compared with Blocks B and C. 90 % of Block A is composed of one type of exotic trees (*Casuarina equisetifolia)* grown during restoration. The TL corridor project design shall be used to identify which areas must be cleared. Only the project footprint areas shall be cleared. All other areas shall be preserved and enhanced.

**Table 43: Vegetation Clearance**

| **Impact** | **Vegetation Clearance** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| | The impact severity is medium since the site was already disturbed and site is being restored with exotic trees. | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |

| | | | | | | |
|---|---|---|---|---|---|---|
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Medium-low due to the disturbed nature of the site | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered Medium-low due to the disturbed nature of the site | | | | | |

#### *7.4.2.3 Mitigation Measures*

The Contractor's team that will be clearing the vegetation shall be provided with map showing the footprint of the layout so as to guide them on which areas to clear and avoid the areas to be preserved. The following shall be observed:

- The team shall be required to use the Biodiversity Management Plan to guide them in the process of clearing the TL Wayleave Corridor;
- The vehicles, equipment and machinery to be used shall be checked and verified to be free from oil, fuel and hydraulic fluid leaks;
- The areas to be cleared shall be clearly demarcated and only covering the footprint of the project design;
- Waste management by the site clearing team shall follow the Waste Management Plan.
- There shall be promotion of planting trees in areas where trees can be grown in conformity with the design of the TL corridor.
- The forest patches that do not fall within the TL corridor shall be maintained and well conserved as keystone habitats for biodiversity (refugia and stepping stones)
- There should be no killing or harassing of any wildlife escaping/fleeing to other areas during vegetation clearing process.
- Tree nurseries of the selected plant species shall be established for rehabilitation of disturbed areas.

#### *7.4.2.4 Significance of Impact*

The mitigation measures provided are intended to ensure TL corridor clearing activity impacts are reduced as low as possible. This can be achieved if the mitigations are applied. Otherwise, the significance of impact will remain medium-low. If the mitigations are applied then impact significance will be low.

| **Impact** | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Vegetation Clearance | Without Mitigation | Short Term | Project Site | Medium | Medium-Low | Medium | Medium-Low |
| | With Mitigation | Short Term | Project Site | Low | Low | Low | Low |

### 7.4.3 Impact on Ecology

#### *7.4.3.1 Baseline of the Site Area Ecology*

The vegetation of the first section of the TL wayleave corridor that traverses the western side of Block A is dominated by *Casuarina equisetifolia* plantation with some indigenous species mostly on the periphery and a few woody or climbing species in the interior.

Other species found in relatively high numbers include the invasive *Leucaena leucocephala* and *Azadirachta indica* and several grass species. Three species (*Suregada zanzibarensis*, *Acrostichum aureum* and *Polyspaeria* sp.) recorded here are nationally rare or endemic species. Due to the conservation efforts made by Bamburi Cement PLC. The site area has various species of Mammals, Avifauna, Herpetofauna and Invertebrates as elaborated in **Section 4.4.1** of this report.

***Potential Sources of Impacts***

The potential sources of impacts that can affect the ecology of the project site include the following:

- Clearance of the TL Wayleave Corridor for the project
- Mild site levelling
- Construction Activities

### *7.4.3.2 Impact Assessment*

Since the project site is neither a protected area nor a key biodiversity area, and given that not many IUCN and CITES listed species occur here, it is considered that activities of the TL development will not have major impacts on biodiversity and especially since the TL will traverse areas that have been altered/modified and the TL Corridor will also take up small space (10m wide corridor from the solar plant to the sub station. However, the site has a wetland that requires protection from impact. Given the sensitivity of the wetland, the impact significance is considered medium low

**Table 44: Impacts on Ecology**

| **Impact** | **Impacts on Ecology** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered medium-low due to the disturbed nature of t the TL corridor. | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact magnitude is considered medium-low due to the disturbed nature of t the TL corridor. | | | | | |

### *7.4.3.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on the ecology from construction activities include:

- An elaborate Biodiversity Management Plan shall be prepared to be used for protecting the site;

- Vegetation clearing shall be done following the project TL Corridor footprint
- An elaborate Hazardous Waste Management Plan shall be prepared to guide in protecting the ecosystem from hazardous chemicals;
- The Contractor shall ensure that an emergency response plan for preventing and dealing with emergencies like oil spills is put in place;
- Used or waste oil recovered from generators, vehicles, construction machinery and equipment shall be stored on a paved surface with containment in a secure location at the project site; Appropriate secondary containment capable of containing a larger volume than the largest tank by 10%;
- The waste oil and other hydraulic fluids, which is characterized as hazardous shall either be sold to authorized vendors at frequent intervals; or collected by authorised recyclers;
- Movement of construction and transport vehicles shall be restricted to dedicated routes to minimise any harm to reptiles and small mammals;
- Construction activities should be planned and undertaken in a phased manner to allow for fauna to migrate to areas that are not being affected by the project;
- There shall be strict prohibition on trapping, hunting or injuring wildlife within the site area and should bring a penalty clause under contractual agreements;
- Project related activities shall be carried out during the day;
- Speed limit of vehicles plying in the project area routes shall be kept low 20-25km/hr to avoid road kills.

#### *7.4.3.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts on the ecology. If the mitigation measures are not implemented, the impact would remain Medium-low. However, with the proposed mitigation measures in place, the impact to the ecosystem would be significantly reduced and the impact significance would be reduced to low. It is therefore very critical that the proposed mitigations are strictly implemented to ensure the ecology is protected.

| **Impact** | Scenario | Duration | Extent | Severity | Magnitude | | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|---|
| Impacts on Ecology | Without Mitigation | Short Term | Local | Medium | Medium-Low | | Medium | Medium-Low |
| | With Mitigation | Short Term | Local | Low | Low | | Low | Low |

### 7.4.4 Occupational Health and Safety Risks

The project workers will be exposed to occupational risks due to handling of heavy machinery, construction noise, electromechanical works etc. Construction activities of vegetation clearing, excavation, materials delivery and concrete mixing, installation of Poles, Conductor stringing will generate significant safety risks that require safeguards measures.

Sometimes the high temperatures in the project area will expose the workers to difficult working conditions including the temptation to remove safety gear while working in areas that require such safety precaution. Construction sites may be a source of both liquid and solid wastes that also pose health and safety risks

### *7.4.4.1 Sources of Occupational Health and Safety Risks*

The sources of impact on the health and safety of workers at the Transmission Line Corridor when performing the following construction activities:

- Site clearing activities
- Excavation works and ground levelling,
- Installation TL Poles
- Stringing of Conductors,
- Handling of heavy machinery,
- Construction noise and fugitive dust;
- Electromechanical works.

***Receptors***

The receptors of occupational safety and health impacts are workers both temporary and long term. The level of exposure to risk will vary from one task to another requiring that the seriousness of mitigations also varies with the level of risk.

### *7.4.4.2 Impact Assessment of Occupational Health and Safety Risks*

Arising from the above-mentioned activities that will take place during construction, the workers and other personnel at the solar plant will be exposed to impacts as follows:

- Injuries associated with operation of machinery
- Injuries arising from loading, unloading and lifting heavy materials
- Health impacts arising from being exposed to fugitive dust and exhaust emissions
- Potential injury from a fall due to working at heights
- Impacts from exposure to excessive noise
- Injury from slips and fall
- Overexertion injuries/illnesses
- Fire due to hot works, smoking, failure in electrical installations
- Injury from project vehicle accidents
- Heat stress arising from working under hot weather

The exposures could cause long term impacts if mitigation measures are not implemented hence the severity of impact has been assessed to be high. However, if mitigation measures are implemented as proposed then the impact significance will be medium high.

**Table 45: Occupational Health and Safety Risks**

| Impact | Occupational Health and Safety Risks | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |

| | | | | | | |
|---|---|---|---|---|---|---|
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Medium-High due to high chance of injury occurring | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered Medium-High due to high chance of injury occurring | | | | | |

#### *7.4.4.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on the Occupational Health and Safety from the TL construction activities include:

- The Contractor should prepare a detailed Occupational Safety and Health Management Plan (OSHMP) that will provide all the required health and safety measures to safeguard the workers.
- The Contractor should prepare an Emergency Response Plan
- The Contractor should prepare a Code of Conduct that inter alia commits to the Implementation of the OSHMP and that also commits at individual level to compliance with OSHMP requirements and standards.
- The Contractor should carry out work assessment and identify hazardous substances and working conditions and include safety measures in the OSHMP
- The Contractor should ensure that all construction machines and equipment are in good working conditions and to manufacturer's specifications to prevent occupational hazards.
- The Contractor should appoint a qualified full-time health and safety advisor and fire marshal on-site for the duration of the construction work.
- Establish Health and Safety committee and provide first aid kits and train first aiders
- Induct and train all construction workers on OHS procedures
- Hold daily (or as appropriate) tool box meetings for all workers
- Provide workers with appropriate personal protective equipment (PPE) and instil a mechanism to ensure appropriate usage;
- Adequate training should be provided to staff about raising awareness on the use of Personal Protection Equipment (PPE) and emergency response measures;
- Provide workers with adequate portable drinking water and breaks.
- Train workers on safety procedures/emergency response such as fire, oil and chemical spills.
- Ensure that water is sprayed in dust areas to suppress fugitive dust.
- Work to minimize or altogether eliminate mosquito breeding sites.
- Contractor to provide for medical clinic and nurse within the camp facilities
- Contractor to provide an ambulance vehicle to evacuate during emergency situations
- Maintain the already constructed site fence
- Provide clean and adequate toilets for workers, these toilets shall be to World Health Organisation standards

#### *7.4.4.4 Significance of Impact*

The impacts can cause long term impacts to the health and safety of the construction workers hence the severity of the project is considered medium and impact magnitude is considered high due to the likelihood of getting injuries, however if mitigations are implemented, then the magnitude of impact would be low and the impact significance would also be low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Occupational Health and Safety Risks | Without Mitigation | Short Term | Local | Medium | Medium-High | Medium | Medium-High |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.5 Air Pollution During Construction

#### *7.4.5.1 Baseline Status of the Area*

The 2.7km long 33kV Transmission Line (TL) that will evacuate power from the Solar Plant will pass along the unpaved road on the western boundary of Block A and proceed southwards to the substation located at the Bamburi Cement Factory. Construction of the TL will involve movement of vehicles and use of machinery to excavate bases where the TL poles will be installed and stringing of conductors done.

***Potential Sources of Air pollution;***

Air Pollutants in the area will arise from:

- Fugitive dust from movement of vehicles since the road within the site area is unpaved
- Fumes/exhaust emissions from vehicles, generator and machinery.
- Construction activities including site clearance, operation of earthmoving and excavation equipment.

The project area receives modest rainfall (1,100mm per annum) hence it remains dry for the better part of the year exacerbating fugitive dust situation.

***Potential Receptors of Air Impacts***

Potential receptors of the air pollution impact include the nearby settlements and commercial enterprises that neighbour the proposed site on the western side. Workers will also be impacted by the air pollution from the potential sources on site.

#### *7.4.5.2 Impact Assessment*

Trucks will be making regular trips to the construction site carrying away the excavated soils and bringing in materials for construction. The road where the Transmission Line (TL) corridor is located is made of murram hence dust will be a key concern, however since the excavation activities will be confined to the TL corridor, the fugitive dust and exhaust emissions will be low since the area that will be cleared is small and the holes to be excavated for poles will be done at intervals of 80-100m. The project area receives modest rainfall hence it remains dry for the better part of the year contributing to a slight increase in fugitive dust generation.

**Table 46: Air pollution Impacts from Construction Activities**

| Impact | Air pollution Impacts from Construction Activities | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | Indirect | | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| | Impact severity is considered low since the affected area is small | | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the construction activity is confined to a small area | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the construction activities on the Transmission Line are few and confined to a small area | | | | | |

### *7.4.5.3 Mitigation Measures*

**Contractor to;**

- Avoid machinery and vehicles idling unnecessarily to reduce exhaust emission.
- Suppression of dust by sprinkling water on soil before excavation and periodically when operations are underway to prevent raising of dust.
- Covering all haulage vehicles carrying sand, aggregates, soil, and cement
- Controlling the speed of vehicles when driving through unpaved roads (20km/hour) and the excavation activities at the site.
- Open burning of solid waste at the site shall be prohibited and waste shall be segregated, recycled and disposed of following the developed waste management plan for the facility
- Material handling should be done by competent persons, especially when handling hazardous materials during transfer, storage and use.
- Waste material handling and disposal should be done by an approved waste handler, registered by NEMA
- Educate and raise awareness of construction workers on emission reduction techniques.
- Workers in active construction areas should be issued with appropriate PPE such as, dust masks during dry and windy conditions.
- Dusty material stockpiles shall be enclosed or covered by suitable cloth or netting to prevent dust during loading and transfer from site.
- There shall be no soil stockpiles maintained outside the TL corridor.
- Trucks transporting soil stockpiles shall be totally covered with impervious material to suppress dust during transportation.

- Soil stockpiles shall be covered or water sprinkled regularly to minimise fugitive dust emission.

#### *7.4.5.4 Significance of Impact*

The mitigation measures provided are intended to minimise impacts as low as possible. During the dry season, dust will remain a significant issue since there are settlements and commercial enterprises just outside the western boundary along where the TL will be traversing. The above-mentioned mitigations can minimise impacts if applied, otherwise the significance of impact will remain low but if the mitigations are applied, the impact significance will be very low.

| Impact | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Air pollution | Without Mitigation | Short Term | Local | Low | Low | Low | Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Very Low |

### 7.4.6 Noise Impact

#### *7.4.6.1 Baseline Status of the Site Area*

There are settlements and commercial enterprises located just outside the western boundary of the site fence. Settlement on the eastern side start from approx. 520m from the TL corridor which will be running along the access road that links the power plant site to the sub-station

***Potential Sources of Noise Impact***

The impact from noise will emanate from various construction activities, vehicles/and machinery The construction activities that will generate noise impacts include:

- Construction activities including site preparation, excavation activities of the power line pole foundations and noises from excavation equipment;
- Operation of diesel generator sets, excavators, graders, bulldozers, dump trucks, vibrating roller, wheel loader, rock breaker, flatbed trucks, concrete trucks, cranes, forklifts and various four-wheel drive and service vehicles
- Transportation of, construction material, power line poles, construction machinery and personnel;
- Operation of the batching plant

#### *7.4.6.2 Impact Assessment*

During construction, significant noise impact will emanate from the TL corridor clearing, excavation of the power line poles bases and movement of vehicles within the site and outside.

***Site Preparation***

During site preparation, activities that will generate noise impacts include cutting down of vegetation and excavations activities. These activities will require the use of machinery like excavators, bulldozers, compactors and dump trucks.

***Civil Works and Solar Infrastructure Installation***

The construction activities associated with civil works and installation of the TL infrastructure will involve excavation of holes to mount the power line poles and concrete mixers. Significant noise will also come from concrete mixers and excavations especially when there is bedrock that has to be penetrated. The support activities that will also generate significant noise levels are the movements of trucks and other vehicles on and offsite.

**Table 47: Noise Impacts from Construction Activities**

| **Impact** | **Noise Impacts from Construction Activities** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| | The impact severity is considered medium due to presence of settlements and wildlife close to the site | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The significance of impact is considered Medium-high due to proximity of settlements and wildlife in close proximity to the site | | | | |

### *7.4.6.3 Mitigation Measures to Minimise Impacts of Noise Emission*

The following mitigation measures shall be implemented to reduce potential noise impacts during the construction phase of the project:

- There shall be no discretionary use of noisy machinery within 50m of residential areas and near institutions or use of manual labour in these sections
- The contractor shall consider the noise emission characteristics of equipment when selecting equipment for the project and select the least noisy ones to perform the specific work
- The contractor shall undertake additional noise monitoring during implementation of works in accordance with international noise standards.
- Developer shall instruct their Safety Officers to arrange for inherently quiet construction equipment and machines to maintain the noise level to minimum;
- Night time vehicle movement through the TL corridor shall be restricted
- Drivers shall only use designated roads;
- The number of equipment operating simultaneously should be reduced as far as practicable;

- Equipment known to emit noise strongly in one direction shall be orientated so that the noise is directed away from nearby business enterprises and community settlements;
- All loud and sudden noises shall be avoided wherever possible and fixed noise sources shall be located at least 50m away from the site boundary to minimise noises going beyond site boundary;
- Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections. Undertake loud noise and vibration level activities during the day (i.e., between 8.00 am and 5.00 pm)
- Construction vehicles and machinery shall be well maintained and not kept idling when not in use;
- Construction activities shall be restricted to daylight hours (8.00am – 5.00pm)
- Vibrations from compactors during construction may also have effect on neighboring structures hence similar survey should be done on buildings and photo graphic images and video recordings kept to ensure household damages are identified and addressed Contractor shall avoid night time construction when noise is loudest near habited areas.

#### *7.4.6.4 Significance of Impact*

The noise emissions will largely take place close to the source area and therefore attenuate to manageable levels when going beyond the site boundary. The impact magnitude is considered medium-low due to the low activity level at the TL construction area. But if the mitigation measures are implemented the significance of impact will be low.

| Impact | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Noise Impacts | Without Mitigation | Short Term | Local | Medium | Medium-Low | Medium | Medium-Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.7 Impacts on Flora During Construction

#### *7.4.7.1 Baseline Status of Flora*

The TL will traverse the western boundary of Block A and along the access road. The vegetation of Block A is dominated by *Casuarina equisetifolia* plantation with some indigenous species mostly on the periphery and a few woody or climbing species in the interior. The TL will occupy the area adjacent to the access road where the vegetation is largely exotic.

***Invasive Species***

A total of 6 invasive species was recorded across the three sites; all of which are woody except the herbaceous *Datura metel* recorded just once. The most dominant species include *Calotropis procera*, *Azadirachta indica* and *Leucaena leucocephala*. Notably, all six invasive species were recorded in Block A while Blocks B and C had three species each which indicates that they will be encountered along the TL route.

***Potential Sources of Impacts***

During construction, there will be clearing of vegetation and removal of top soil. The potential sources of impacts that can affect the ecology of the project site include the following:

- Clearance of TL corridor vegetation
- Habitat loss and fragmentation

### *7.4.7.2 Impact Assessment*

***Site Flora***

The TL corridor along the western side of Block A is largely composed of more than 90% as *Casuarina equisetifolia* plantation

***Invasive Species***

House Crows were the main invasive species recorded within the area. Where they moved between the community land and the peripheral parts of project area. Clearing of vegetation along the TL wayleave corridor will enhance proliferation of this invasive species.

**Table 48: Impact on Flora During Construction**

| **Impact** | **Impact on Flora During Construction** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| | The impact severity is considered low due to the small wayleave area affected and disturbed nature of the area abutting the access road | | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the TL wayleave corridor is already disturbed | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the vegetation of the wayleave corridor is exotic and highly disturbed | | | | | |

### *7.4.7.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on flora include:

***Site Flora***

- Installation of the TL shall be done along the access road corridor that is already disturbed.
- Movement of machinery to the TL corridor shall be done following existing access roads to avoid clearing vegetation for new roads;
- Water for use during the construction phase shall not be drawn from existing wetlands to avoid destruction of aquatic flora (and fauna) and deterioration or complete loss of aquatic habitats. Waste water should not be discharged to existing seasonal and permanent wetlands to avoid negative effects on aquatic flora and fauna.
- The access road shall be watered to minimize dust pollution;

- Plant nurseries of the key species should be established for restoration in other areas to avoid complete loss of rare species.

***Invasive Species***

- Control of invasive species should be done promptly to avoid their population explosions which in turn destabilize the growth of indigenous species or displace them completely. The best approach should be constant physical removal of new germinant and saplings before they mature and deposit seeds into the soil thereby replenishing the soil seed banks.
- Vehicles entering the project area should be thoroughly cleaned to avoid introducing invasive species to the site via seeds or fruits.
- Unnecessary soil and vegetation disturbance should be avoided especially since the TL construction activities are largely concentrated where powerline poles are being installed.
- An invasive species management programme should be developed by Bamburi's Lafarge Ecosystems experts for monitoring and control of the species.

#### *7.4.7.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts on the flora. If the mitigation measures are not implemented, the impact would be medium-low. However, with the proposed mitigation measures in place, the impact on flora would be reduced and the impact significance would be low and turn to positive gain since the site plants will be rejuvenated.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impact on Flora | Without Mitigation | Long Term | Project Site | Medium | Medium-Low | Medium | Medium-Low |
| | With Mitigation | Long Term | Project Site | Low | Low | Low | Turn to Positive |

### 7.4.8 Impact on Fauna (Mammals) During Construction

#### *7.4.8.1 Mammals at the Project Site*

A total of 14 mammal species of five orders were recorded in the three blocks of land proposed for solar project. None of the mammals found in the three blocks were endemic to Kenya or globally threatened. A total of 31 bats were captured in the three blocks; with block B and C having the highest bat captures. Bat activity captures was highest in B followed by C and lowest in A.

#### *7.4.8.2 Impact Assessment*

The TL Wayleave Corridor will run along the area adjacent to the access road This area is already disturbed and chances of existence of habitats is low. The broad habitat characteristics of Block A is classified as modified. This means the block has a large proportion of plant species that are of non-native origin, and/or human activity has substantially modified the area's primary ecological functions and species composition prior to the onset of a project (IFC, 2012). In addition, the block has the lowest mammals and lowest activity of bat captures. Hence the impact of TL Wayleave Corridor can be considered as low.

**Table 49: Impact on Fauna (Mammals) During Construction**

| Impact | Impact on Fauna (Mammals) During Construction | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the TL wayleave corridor is already disturbed | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the TL wayleave corridor is already disturbed | | | | | |

### *7.4.8.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on mammals include:

- Restoration of other areas in Bamburi where mining of cement construction materials has been decommissioned to help compensate for lost habitat to mammals
- Avoid clearance of vegetation and land preparation during the rainy season when mammals may be breeding and may affect their local migration
- Clear vegetation sequentially in order to allow most mobile rodents recorded in this study time to gradually migrate towards the neighboring habitat

### *7.4.8.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts on the fauna. If the mitigation measures are not implemented, the impact magnitude would be low. However, with the proposed mitigation measures in place, the impact on fauna would be significantly reduced and the impact significance would be reduced to very-low. It is therefore important that the proposed mitigations are implemented to ensure the fauna at the site is protected.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impact on Fauna (Mammals) | Without Mitigation | Long Term | Local | Low | Low | Low | Low |
| | With Mitigation | Long Term | Local | Low | Low | Low | Very Low |

### 7.4.9 Impact on Avifauna (Birds) During Construction

#### *7.4.9.1 Birds at the Project Site*

A total of 71 bird species within 35 families were recorded from the area during this study. These birds include 18 migratory species, of which 12 are parlearctic and 9 afrotropical migrants (3 falling in both categories). Though not observed during the study, Madagascar Pond Heron, and endangered species is known to occur in the area regularly. Otherwise, all species recorded during this survey are listed as Least Concern by IUCN. Study data indicate that Blocks B and C had a higher bird species richness and bird abundances than Block A.

This is attributable to the fact Block A is mainly composed of monoculture *Casuarina equisetifolia* which is a poor habitat for birds in terms of plant and animal (especially invertebrate) food resources. Block C has diverse habitats e.g. high canopy forest and open acacia woodland patches, thus had more diverse bird species

***Water Birds***
At least 10 typical water-bird species, all occurring in low numbers, were recorded during this study. They occurred mainly in the wetlands in the general area such as the Old Quarry, Great Lake, Tui Pond and Sunset Pond all outside the focal study sites A, B and C.

***Soaring Birds***
Birds that sore or fly above or into the path of the concentrated solar PV light energy risk being burned or singed. During this study very few species were recorded flying or soaring over the site. These were mainly House Crows, Swifts, Swallows and European Bee Eaters.

#### *7.4.9.2 Impact Assessment*

During construction, key potential impacts the project may have on birds, and for which mitigation measures have been suggested include; habitat loss and fragmentation, Given the degraded nature of the TL corridor, the project is expected to have low negative impacts on birds if the proposed mitigation measures are adhered to.

During construction, there will be removal of some vegetation and surface grading. This is expected to cause some habitat loss, degradation and fragmentation, though this will be minimal for the TL corridor. The risk of bird's habitat loss for TL corridor is therefore considered low.

**Table 50: Impact on Avifauna (Birds) During Construction**

| Impact | Impact on Avifauna (Birds) During Construction | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |

| | | | | | | |
|---|---|---|---|---|---|---|
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the TL corridor is already disturbed | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the TL corridor is already disturbed/modified | | | | | |

#### *7.4.9.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on Avifauna include:

- The TL has been aligned along the access road that will have minimal bird habitat disturbance
- Retain/replant some natural vegetation in areas outside the TL corridor
- Minimize dust at the site by watering the roads and construction area.

#### *7.4.9.4 Significance of Impact*

During construction, there is low probability that Avifauna will be impacted, however, removal of vegetation from an already disturbed area creates little impact on their habitat. Therefore, the severity, magnitude and significance of impact will be very low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impact on Avifauna (Birds) | Without Mitigation | Long Term | Local | Low | Low | Low | Low |
| | With Mitigation | Long Term | Local | Low | Low | Low | Very Low |

### 7.4.10 Impact on Herpetofauna During Construction

#### *7.4.10.1 Reptiles s and Amphibians at the Project Site*

A total of 39 species including 12 amphibians and 27 reptiles (i.e., 10 lizards and 17 snakes) were recorded in the present baseline survey. The general amphibian and reptile species richness also varied across the sampling blocks. Block C had the highest number of species (24) followed by Block B (10). The lowest species richness was reported in Block A which only had 2 species.

Despite the prevailing dry conditions during the study duration, a number of amphibians were reported, mostly from the permanent ponds down-stream of Block A. Based on hydrological gradient/connectivity and known sensitivity of wetlands, the man-made ponds within the rehabilitated central quarry of Bamburi Cement Ltd were considered as part of the cumulative impact area of the project. The species documented here were therefore treated as part of the baseline biological parameters for future monitoring and management protocols.

Based on the IUCN Red List criteria, none of the species recorded in this study is listed as Threatened.

### *7.4.10.2 Impact Assessment*

Changes occurring during construction are known to have direct impacts on species microhabitats like burrows, tree backs, stones and other objects used as resting or nesting areas for reptiles and amphibians. However, the TL wayleave corridor is located adjacent to the access road. This area has been modified and disturbed, hence the impact during construction of the TL will be minimal.

**Table 51: Impact on Herpetofauna (Reptiles and Amphibians) During Construction**

| **Impact** | **Impact on Fauna (Reptiles and Amphibians) During Construction** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| | The impact severity is considered low since any existing habitat along the TL corridor adjacent to the unpaved road has undergone modification and is disturbed. | | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since any existing habitat along the TL corridor adjacent to the unpaved road has undergone modification and is disturbed | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since any existing habitat along the TL corridor adjacent to the unpaved road has undergone modification and is disturbed | | | | | |

### *7.4.10.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on herpetofauna include:

- Reduce the use of heavy machinery where possible.
- Water should be sprinkled during construction; There should be proper disposal of all waste matter emanating from the site.
- Use existing road network to minimize clearance of transmission line corridor
- Reptiles and amphibians are expected to move between habitats. The fence type should include under-passes that allow movement of crawling animals
- Clear vegetation sequentially in order to allow most mobile mammals to gradually migrate towards the neighbouring undisturbed areas.

#### *7.4.10.4Significance of Impact*

The mitigation measures provided are intended to reduce impacts on the reptiles and amphibians existing at the project site. If the mitigation measures are not implemented, the impact magnitude would be medium-low. However, with the proposed mitigation measures in place, the impact on herpetofauna would be significantly reduced and the impact significance would be reduced to low. It is therefore important that the proposed mitigations are implemented to ensure the reptiles and amphibians at the site are protected.

| **Impacts** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impacts on Fauna (Reptiles and Amphibians) | Without Mitigation | Short Term | Local | Medium | Medium-low | Medium | Medium-low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.11 Impacts on Invertebrates During Construction

#### *7.4.11.1Invertebrates at the Project Site Area*

A total of 158 invertebrate species were collected from all the sampling blocks. This was from 996 specimens collected and some observed species. The order Hymenoptera (ants, bees and wasps) was the most collected group in all the blocks with majority of specimens belonging to the ants (Formicidae).

The low number of species record may have been due to sampling done in the dry season when most invertebrates are undergoing aestivation. Block B showed the highest abundance of invertebrate species (391) from the crawling cockroaches, ants, crickets and millipedes to the flying butterflies, wasps and flies. Block A showed the least abundance in species (172). The *Myrmeleon* Antlion species was found in specific areas within block A where young *Casuarina* plants were found. The forest also showed a high number of leaves carpeting the forest floor. Millipedes especially the red-legged (*Archispirostreptus gigas*) was a common species in all the sampling blocks Butterflies and dragon flies were mostly seen along the edges of the forest. Common butterfly species that were seen include those from the Pieridae and Nymphalidae families. Snail shells were seen in the sampling sites but no live snail was seen. Around the ponds, dragonflies were seen in plenty such as the *Trithemis arteriosa* found along the Sunset Pond. Sampling done at night yielded a few crawling groups such as the beetles, spiders, cockroaches and crickets.

#### *7.4.11.2Impact Assessment*

The TL wayleave corridor will be running adjacent to the unpaved access road of the project area. Disturbance of the habitat by the increase in human traffic and vehicles at the site which may cause mass destruction of invertebrates. Some invertebrates such as moths are attracted to UV-light especially at night where they may be exposed to predation or death. Garbage may create micro-habitats for Invertebrates to assemble – sometimes they may have chemical residues that my poison the organisms or enter the food chain.

**Table 52: Impacts on Fauna (Invertebrates) During Construction**

| **Impact** | **Impact on Fauna (Reptiles and Amphibians) During Construction** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the TL corridor area is already modified and disturbed | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the TL corridor area is already modified and disturbed | | | | | |

### *7.4.11.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on invertebrates include:

- Avoid areas of high bird species diversity such Block B and C by placing the plants in Block A
- Unnecessary vegetation clearing and ground excavation/soil movement should be voided e.g., by use of existing access roads
- Mount solar above ground on post support spikes, rather than heavy foundations, maintaining habitats for both below and above-ground invertebrates
- Appropriate lighting should be considered to avoid interference with invertebrates such as moths that are attracted to light at night
- Proper chemical disposal methods for both solid and liquid chemicals

### *7.4.11.4Significance of Impact*

The mitigation measures provided are intended to reduce impacts on the invertebrates existing at the project site. If the mitigation measures are not implemented, the impact magnitude would remain low since site is already modified and disturbed. However, if mitigations are implemented the impact significance would be very low. It is therefore important that the proposed mitigations are implemented to ensure the invertebrates are protected.

| **Impacts** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impacts on Invertebrates | Without Mitigation | Long Term | Local | Low | low | Low | Low |
| | With Mitigation | Long Term | Local | Low | Low | Low | Very Low |

### 7.4.12 Impact on Site Soil and Surface Water During Construction

#### *7.4.12.1 Baseline Status of Site Soil and Surface Water*

The project TL Wayleave Corridor will traverse the western boundary of Block A and the unpaved access road then proceeding southwards long the road to the sub station located within the Bamburi Cement Factory. The whole TL Corridor traverses disturbed and modified part of the project area. The soils have been disturbed during mining and rehabilitation of Block A and also the construction and maintenance of the access road. The corridor has undergone rehabilitation and planting of exotic trees.

#### *7.4.12.2Impact Assessment*

The soil of the TL corridor will be subjected to excavation and construction activities. The construction activities that will impact on the site soil include the following:

- Vegetation clearance
- Excavation of the top soil causing soil erosion that can be washed away by surface runoff water into the river/swamps/wetlands/nearby water ponds
- Contamination of surface soils by oils, hydraulic fluids, used batteries, paints, curing chemicals
- Storage of oils fuels and other chemicals at the site;
- Usage of vehicles and machinery that are not well maintained resulting in leakage of fuels and oils to the environment;

**Table 53: Impacts on Site Soil During Construction**

| **Impact** | **Impact on Site Soil During Construction** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| | Impact severity is considered medium due to the potential impact to soil and surface water within the project area | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered medium-low since the construction activities have the potential to contaminate soil and surface water sources although the TL corridor is small. | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact magnitude is considered medium-low since the construction activities have the potential to contaminate soil and surface water sources although the TL corridor is small | | | | |

#### *7.4.12.3Mitigation Measures*

- Set up measures for spill prevention and measures to prevent seeping of contaminants i.e., designated concrete impervious areas for repairs, refuelling and oiling.
- Products such as lubricants and oils should also be well labelled and stored appropriately at their designated storage areas.
- Prepare and display on site spill response procedures and train all the workers on response management.
- Carry out inspection of all machinery and vehicles working at the site and ensure they do not have any oil, hydraulic fluid or fuel leaks before being used
- Maintain spill response kits at the site office.
- Exercise use of water-based fluids including non-toxic chemicals.
- Ensure that no sanitary or waste water is discharged irrationally and ensure compliance with the set legislation on waste water treatment before discharge

#### *7.4.12.4Significance of Impact*

The impacts of soil and surface water contamination can be significant if mitigation measures are not implemented. The impact magnitude is considered medium-low due since the area that can be impacted is small, however, if the mitigation measures are implemented the significance of impact will be low.

| Impact | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impact on soil | Without Mitigation | Short Term | Local | Medium | Medium-Low | Medium-Low | Medium-Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.13 Generation, Storage and Disposal of Solid and Liquid Waste

#### *7.4.13.1Sources of Solid and Liquid and Wastes*

The Transmission Line (TL) construction activities of TL corridor preparation, clearance, excavation works, installation of Power Line Poles and Stringing of Conductors, servicing and repair of machinery/vehicles and other associated activities will generate solid and liquid waste. At the end of construction, the demobilisation will also generate significant waste from demolishing workers camp, other construction wastes and removal of machinery. The above wastes include the following:

**Domestic Waste** – Waste food, food wrappings, cans, bottles and other spoilt containers. Sewerage waste water.

**Construction Wastes** – Packaging waste, scrap metals, construction debris, disused parts.

***Receptors***

The above wastes if not well managed may Impact on the site soil, surface water (the sensitive swamp at the site including the flora and fauna), air and workers

### *7.4.13.2 Impact Assessment*

The improper handling of domestic solid waste that includes papers and food wrappings may lead to them littering the site compound and being blown away to neighbouring areas. The other domestic solid wastes may litter the site compound and make it unhealthy for workers. Waste from construction activities if not well handled may pose health and safety risk to workers and other persons visiting TL site.

The sanitation facilities at the site must be made to work properly. Sanitation waste can also overflow and cause health risk to workers and people visiting the site.

**Table 54: Generation, Storage and Disposal of Solid and Liquid Waste**

| **Impact** | **Generation, Storage and Disposal of Solid and Liquid Waste** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact significance is considered Medium-low since the TL construction activities are limited | | | | |

### *7.4.13.3 Mitigation Measures*

The mitigation measures for solid and liquid waste at the site are as follows

- Following EMCA regulations on Waste Management, 2006 Legal Notice 121, the Contractor should prepare for use an elaborate Waste Management Plan
- The Contractor shall ensure that an Emergency Response Plan for preventing and dealing with emergencies like oil spills is put in place.
- Reducing material residual wastes through accurate estimation of size and quantity.
- Recycle and re-use of construction materials. Use of durable long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.
- Reuse of materials and packaging material to reduce waste.
- Disposal of waste to be done by a NEMA licensed waste handler.

- The nearest local authority or service provider (Mombasa Water Supply and Sanitation Company Limited) can be contracted to regularly collect and dispose sewerage waste from the site.
- If septic tanks are used for the management of sewerage waste at the site, then a proper monitoring system shall be put in place to avoid any overflow inside the site and into the neighbourhood area causing nuisance to the community
- Construction debris and excavated material will be stored in a confined area to prevent spread by wind or water;
- Appropriately positioned waste bins shall be provided (easy to locate and near areas where waste is generated)
- Used or waste oil recovered from generators, vehicles, construction machinery and equipment shall be stored on a paved surface with containment in a secure location at the project site. Appropriate secondary containment capable of containing the 110 percent of the largest tank is to be provided;
- The waste oil and other hydraulic fluids, which is characterized as hazardous shall either be sold to authorized vendors at frequent intervals; or collected by authorised dealers

#### *7.4.13.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts to the site workers, soil and air quality. The presence of wetlands within the AoI providing lifeline to flora and fauna makes mitigations important, however since the activities along the TL are limited, the magnitude and significance is considered Medium-Low. If mitigation measures are applied, then the impact significance becomes low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Generation, Storage and Disposal of Solid and Liquid Waste | Without Mitigation | Short Term | Local | Medium | Medium-Low | Medium | Medium-Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.14 Generation, Storage and Disposal of Hazardous Waste

#### *7.4.14.1 Sources of Hazardous Wastes*

The Transmission Line (TL) construction activities include use of fuel, oils, paints and other chemicals and servicing and repair of machinery and vehicles. This is envisaged to generate hazardous waste. At the end of construction, the demobilisation will also generate hazardous waste like used oil. The hazardous wastes include used oils recovered from machines, equipment and vehicles after service, hydraulic fluids, used batteries, paints, curing chemicals etc

***Receptors***

The above wastes if not well managed may impact on the site soil, air quality and wetlands.

#### *7.4.14.2 Impact Assessment*

Hazardous waste is the most critical waste at this site. Any hazardous waste that finds its way into the soil may be washed off and pollute the nearby wetlands and water bodies. It is therefore critical that none of the hazardous liquid waste finds its way into the soil at the site.

**Table 55: Generation, Storage and Disposal of Hazardous Waste**

| Impact | Generation, Storage and Disposal of Hazardous Waste | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered high since the groundwater is shallow and wetlands providing lifeline to flora and fauna are also present within the project area | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact significance is considered high since the groundwater is shallow and wetlands providing lifeline to flora and fauna are also present within the project area | | | | |

### *7.4.14.3 Mitigation Measures*

The mitigation measures for the impacts of hazardous waste are:

- The Contractor should prepare an elaborate Hazardous Waste Management Plan
- The Contractor should also prepare an emergency response plan for preventing and dealing with emergencies like oil and fuel spills.
- All fuels, hydraulic fluids, engine oils, recovered used oils, curing chemicals, batteries must be stored on paved floors with containment. No vehicle or machine shall be serviced on bare ground. If the vehicles have to be serviced at the site, the Contractor must identify a place within the site and construct a garage with leakproof paved floor with containment and having a roof over it to avoid rain washing off oils.
- All hazardous waste shall be/tracked through the use of a chain of custody form so that they can be accounted for.
- The Contractor should ensure that all workers especially drivers of vehicles/machinery and those working at the garage must be trained on the importance of keeping away the hazardous chemicals from reaching the ground or water sources. They should be inducted on prompt reporting of any fuel or oil leak or spillage for emergency clean-up response.
- Used or waste oil recovered from generators, vehicles, construction machinery and equipment shall be stored on a paved surface with containment in a secure location at the project site. Appropriate secondary containment capable of containing 110 percent of the largest tank is to be provided.
- Provide appropriately positioned waste bins (easy to locate and near areas where waste is generated)

- The waste oil and other hydraulic fluids, which is characterized as hazardous shall either be sold to authorized vendors at frequent intervals; or collected by authorised dealers only.

#### *7.4.14.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts to the site workers and soil. If the mitigation measures are not implemented, the impact magnitude would remain high. However, with the proposed mitigation measures in place, the impact to the ecosystem would be reduced and the impact significance would be reduced to low. It is therefore very critical that proposed mitigations are strictly implemented to ensure the community and resources are protected.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Generation, Storage and Disposal of Hazardous Waste | Without Mitigation | Short Term | Local | High | High | High | High |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.15 Impact of Increased Traffic During Construction

#### *7.4.15.1 Traffic Status of the Project Area*

The project site is located in an area that is both residential, commercial and Industrial (Bamburi Cement Factory) activities. The internal access road to the site is a private road used by Bamburi Cement. However, outside Bamburi.Cement private operations area, the construction vehicles will be traversing the public road with modest to heavy traffic.

***Causes of Increased Traffic***

The Bamburi-Mtamboni Road that connects to the private access road to the site is a relatively busy road with most of the traffic being private and commercial transport vehicles serving Bamburi Town residents. Construction vehicles using this road will increase traffic congestion hence will require proper management to avoid traffic hold ups.

#### *7.4.15.2 Impact Assessment*

Construction vehicles using Bamburi-Mtamboni Road will increase traffic congestion hence will require proper management to avoid traffic hold ups. This will likely occur since construction vehicles have to turn off from this road to access the Bamburi private road to the site. The Bamburi private road to the site has low traffic hence no congestion. Traffic management will be required when construction of the transmission line will be carried out across the Bamburi-Mtamboni road into the Bamburi Cement Factory Ground where the sub station is located. A special Traffic Management Plan will be required for this section to enhance safety of the workers and community.

**Table 56: Impact of Increased Traffic During Construction**

| **Impact** | **Impact of Increased Traffic During Construction** | | |
|---|---|---|---|
| Impact Nature | Positive | Negative | Neutral |
| Impact Type | Direct | Indirect | |

| | | | | | |
|---|---|---|---|---|---|
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | Medium | High | | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered medium-high since there are no alternative routes.to the site | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact significance is considered medium-high since the Bamburi-Mtamboni Road gets congested during peak hours of morning and evening | | | | |

### *7.4.15.3 Mitigation Measures*

- The Contractor should prepare a Traffic Management Plan to provide safety measures for motorists, contractor workers and diversion routes including road signs and barriers.
- In the Traffic Management Plan, the Contractor shall provide guidance on speed limits and any additional measures to control speed
- The Contractor shall post traffic controllers/marshals at active vehicle movement areas to ensure there is order and observance of traffic requirements.
- The Contractor shall provide temporary legible and reflective road signs to indicate ongoing works and turnings to the site to guide motorists.
- The Contractor shall implement traffic controls to avoid congestion and accidents on the road.
- For the site traffic the Contractor shall ensure that drivers:
  - ✓ Only Park in designated parking areas;
  - ✓ Do not block pedestrian routes;
  - ✓ Do not block traffic routes;
  - ✓ Obey the speed limit;
  - ✓ Follow the instructions of the traffic marshals.
- The Project Supervisor shall ensure that the Contractor:
  - ✓ Introduces and enforces speed limits particularly in the congested areas;
  - ✓ Reduces the need for reversing vehicles, by introducing a one-way system;
  - ✓ Uses a qualified banksman to control deliveries and reversing vehicles;
  - ✓ Designates loading/unloading areas.
- Drivers and equipment operators sign the code of conduct and drive safely within the project area.

### *7.4.15.4 Significance of Impact*

Traffic impacts will be felt at the Bamburi-Mtamboni Road where contractor vehicles will be turning into the Bamburi private road that leads to the site. The impact magnitude is considered medium-high but if mitigation measures are implemented the significance of impact will be low.

| Impact | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impact of Increased Traffic | Without Mitigation | Short Term | Local | Medium | Medium-High | Medium | Medium-High |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.16 Community Health and Safety During Construction

#### *7.4.16.1 Baseline status of the project area*

The project site is located within the private land belonging to Bamburi Cement Company. However, to access the site, the public road (Bamburi-Mtamboni Road) has to be used to be able to access the site. Due to the high population using this road, the project area community is exposed to traffic accidents. Further special attention will be required when the Transmission Line construction activities are being carried out across this road into the Bamburi Cement Factory where the sub-station is located.

#### *7.4.16.2 Impact Assessment of Potential Safety Risks to Community*

The exposures of community members to safety risks will arise from the following activities/sources:

- Potential accidents occurring when contractor vehicles using the Bamburi-Mtamboni Road attempt to turn into the access road leading to the site.
- When the Transmission Line construction activities reach the Bamburi-Mtamboni Road area so as to cross into Bamburi Cement Factory Ground where the sub-station is located.
- Construction activities and excavation, materials delivery, construction tvehicles will generate fugitive dust and exhaust emissions that may affect the respiratory system of the community members within the site and those outside the site.
- The Contractor will be able to absorb a significant number of community members to offer services as unskilled workers or skilled workers during the TL construction. Many of these workers will not have had a chance of getting safety training hence exposure to physical injury and accidents is much higher.

**Table 57: Community Health and Safety During Construction**

| Impact | Community Health and Safety During Construction | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |

| | | | | | | |
|---|---|---|---|---|---|---|
| Impact Magnitude | Insignificant | Low | Medium High | Medium High | High | Very High |
| | The impact magnitude is considered Medium-Low since the safety risk of community members is largely occurring at the section where the vehicles turn off into the private road and also when the TL construction activities will be crossing the Bamburi-Mtamboni Road into the Bamburi Cement Factory Ground where the sub station is located. | | | | | |
| Impact Significance | Negligible | Low | Medium-High | Medium-High | High | |
| | The impact significance is considered Medium-high since the safety risk is occurring along the turn-off from Bamburi-Mtamboni Road to the private road that leads to the site which is 1.8km away. Safety risks will also be heightened when the TL is being constructed across this road into the Bamburi Cement Factory Ground where the substation is situated. | | | | | |

#### *7.4.16.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on the Community Health and Safety from construction activities include:

- Carrying out meetings with community members on safety issues at the project area
- Prepare an Implementation Plan to ensure Health and Safety of Community Members when the Transmission Line construction activities will be crossing the Bamburi-Mtamboni Road to enter the Bamburi Cement Factory where the sub-station is located.
- Preparation and implementation of a Community Engagement Plan
- Through the Community Engagement Plan enhance frequent communication with the community through their representatives to ensure quick resolution to issues.
- Fence off the site with security to avoid unauthorized access to the site
- Carry out regular monitoring and assessment of community health and safety issues with a view to improve on performance
- Contractor to assess travelling routes outside the Bamburi Private area and identify any areas of high risk and post traffic marshals to direct traffic appropriately to avoid any accidents.
- Provide guidance to drivers on speed limits and good driving practices.

#### *7.4.16.4 Significance of Impact*

The impacts may be serious if an accident were to occur involving workers or community members. If mitigation measures are not implemented, the impact magnitude shall be medium-high. However, if mitigation measures are implemented the impact magnitude shall be low and the impact significance shall remain low

| Impact | Scenario | Duration | Extent | Severity | Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Community Health and Safety During Construction | Without Mitigation | Short Term | Local | Medium | Medium-High | Medium | Medium-High |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.17 Physical Cultural Resources

**Baseline status of the project area**

Archaeological and Cultural Heritage impact assessment has been undertaken to identify and ensure the protection of archaeological and cultural heritage assets associated with the project footprint area/sites to ensure that effective management and mitigation controls are in place.

### *7.4.17.1 Impact Assessment*

The field survey of the TL Corridor established that a section of the proposed site (western side of Block A) was previously mined for raw materials for the factory and undergoing restoration while the rest of the TL corridor is in a modified area that abuts the unpaved murram road to the Bamburi Cement Factory. The stratigraphy of these two sections is disturbed hence very unlikely to contain any archaeological cultural heritage resources. No archaeological features were seen on the surface. A "Chance Find Procedure" has been provided for use by the contractor in the event he comes across any artefact.

**Table 58: Impact on Physical Cultural Resources**

| **Impact** | **Impact on Physical Cultural Resources** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | Negative | Neutral | | |
| Impact Type | No Physical Cultural Resources present at the site hence no impact | | | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | None | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| | Evaluation done for the project site | | | | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | None | | | | |
| Impact Magnitude | None | Low | Medium Low | Medium High | High | Very High |
| Impact Significance | None | | | | |

### *7.4.17.2Mitigation Measures*

No mitigations required for the site on physical Cultural resources. However, the following Chance Find Procedure has been provided to be used by the Contractor in the event that he comes across any artifact.

***Chance Find Procedures***

*The Contractor will be expected to apply the following chance find procedure to protect any cultural artefacts that could be encountered during construction.*

*In cases where culturally valuable materials are uncovered during excavation:*

- *Stop work immediately following the discovery of any materials with possible archaeological, historical, paleontological, or other cultural value;*
- *The artefact shall not be moved from where it has been found, unless supervised by an Archaeologist;*
- *Prevent and penalize any unauthorized access to the artefacts;*
- *Announce findings to project manager and notify relevant authorities;*

- *Protect artefacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artefacts;*
- *The Archaeologist together with the contractor and project manager, will undertake an inspection of the cultural heritage site;*
- *In consultation with the project manager and Contractor, the Archaeologist will determine the appropriate course of action to take;*
- *Sensitive sites defined in the Chance Finds Report shall be marked off with hazard tape, detour signs and if necessary, the site secured as detailed in the chance finds report. The site will be secured to prevent any damage or loss of removable object;*
- *Restart construction works only after obtaining authorization from the relevant authorities.*

### 7.4.18 Employment Opportunities

#### *7.4.18.1Status of Job Opportunities in Bamburi Area*

The Transmission Line project is located in Kisauni Sub-County, Mombasa County. The area is a commercial/Industrial (Bamburi Cement Company) and residential area. This has attracted a large number of people to migrate from other areas to Bamburi to seek for job opportunities. Majority of them get opportunities to work as unskilled workers therefore earning low wages.

During construction, the project will have clear benefits with regard to local employment opportunities. The project will additionally require various skills and services which may not be available at the local level but certainly on the regional level. The increase in employment opportunities will temporarily lead to an overall increase of income directly and indirectly (through increased demand of other local services). Consequently, food vendors will have new opportunities to sell their commodities to the construction workers. The workers that will be absorbed as employees of the construction company will earn regular income and be able to sustain their families. They also gain in the learning of new skills/transfer of skills while working in the project.

#### *7.4.18.2 Assessment of Positive Impacts of Job Opportunities*

The project construction is bound to attract labour from Bamburi and its environs. In addition, business opportunities may present themselves attracting businessmen and women locally and far away from the site. This will lead to competition with the community for the available employment opportunities presented by the project. The contractor will have to priorities employment of the locals to avoid conflicts between in migrants and local communities. The influx of people from other areas will increase completion and create

**Table 59: Employment Opportunities**

| **Impact** | **Employment Opportunities** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| | The employment opportunities are both direct and indirect | | | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| | Due to the high demand for jobs, the opportunity to offer job opportunities will have a huge positive impact to the community | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | Medium | High | | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | Due to the high demand for jobs the positive impact is considered high | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | Due to the high demand for jobs the positive impact is considered high | | | | |

#### *7.4.18.3 Mitigation Measures*

The contractor will be encouraged to apply the following mitigation measures to enhance the positive impact on job opportunities:

- The local community shall be given preference and there shall be gender parity in the issuance of jobs for unskilled workers to the extent possible;
- Local service providers shall be given priority when looking for subcontractors or suppliers for locally available construction materials;
- Preference for job opportunities shall be given to the vulnerable population in the project area of influence (AoI);
- The Proponent shall establish a mechanism of auditing the project to confirm that job and service provision opportunities for subcontractors have been fairly given out so the local labour and resources are used as much as possible.

#### *7.4.18.4 Significance of Impact*

By offering job opportunities and absorbing local contractors as subcontractors, the project will be positively impacting the community.

### 7.4.19 HIV AIDS and Communicable Diseases

#### *7.4.19.1 Baseline Status*

Bamburi area where the project is located falls within Kisauni Sub-County. The HIV prevalence in Kisauni Sub-County is 2.3% against 7.4% for Mombasa and a national figure of 6%. The HIV Other communicable diseases are also present.

#### *7.4.19.2 Impact Assessment of HIV AIDS and Communicable Diseases*

Migration of people from other areas may lead to behavioural influences including prostitution which may increase the spread of communicable diseases such as STIs, HIV/AIDS.

**Table 60: HIV AIDS and Communicable Diseases**

| Impact | HIV AIDS and Communicable Diseases | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Medium-High due to the probable chance of occurrence | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact significance is considered Medium-High due to the probable chance of occurrence | | | | |

### *7.4.19.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on the community from construction activities include:

- The Contractor should prepare and implement a HIV/AIDS and Communicable Diseases Management Plan
- Arrange on-site clinic to provide VCT services to construction crew and provision of ARVs for vulnerable community members
- The construction workers may have communicable diseases like TB and HIV which they can transmit to the local community
- Convergence of a significant population seeking jobs is likely to lead to an increase in behavioural change and rise in cases of request for sexual favours resulting in the spread of communicable diseases such as TB, HIV/AIDS and other sexually transmitted diseases
- Sensitize workers and the project area communities on awareness, prevention and management of HIV/AIDS through staff and community training programmes, awareness campaigns, multimedia, and seminars/workshops and during community Barazas.
- Include issues of sexual offences in the code of conduct for workers to protect women and girls of the project host community.
- Ensure workers are regularly reminded about the code of conduct and the potential consequences if not adhered to.

#### *7.4.19.4 Significance of Impact*

The impacts can cause long term effects to the women and girls if mitigation measures are not implemented hence the impact magnitude shall remain high. However, if mitigation measures are implemented the impact magnitude shall be low and the impact significance shall remain low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| HIV AIDS and Communicable Diseases | Without Mitigation | Short-Term | Local | High | Medium-High | Medium | Medium-High |
| | With Mitigation | Short-Term | Local | Low | Low | Low | Low |

### 7.4.20 Labour Influx and Impacts of Construction Camps

#### *7.4.20.1 Baseline Status*

The presence of Bamburi Cement Company has made the Bamburi Town to grow including other commercial enterprises. The population has also grown over the years. The project will require both skilled and unskilled labour during construction and operation phases of the project.

#### *7.4.20.2 Impact Assessment of Labour Influx*

The project construction is bound to attract labour from surrounding areas including Mombasa Town, Mtwapa and Kilifi. In addition, business opportunities may present themselves attracting businessmen and women from surrounding areas. There will be competition for job opportunities. This may heighten animosity among project area population and in-migrants

The project is likely to exacerbate any of the various forms of GBV including Rape, SEA, Sexual Harassment and Violence Against Children (VAC). if precautions are not put in place. Project workers may also perpetuate GBV by promising jobs or promotion in exchange for sexual favours. There may be increase in crime perpetrated by dissatisfied and disgruntled members of the public who miss job opportunities.

**Table 61: Impacts of Labour Influx**

| **Impact** | **Impacts of Labour Influx** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |

| | | | | | | |
|---|---|---|---|---|---|---|
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered medium-high due to the large population of low-income workers looking for job opportunities | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered medium-high due to the large population of low income workers looking for job opportunities | | | | | |

### *7.4.20.3 Mitigation Measures*

The mitigation measures to minimise the potential labour influx impacts on the project area The Contractor should prepare and implement a Labour Influx Management Plan to manage labour influx.

- Reduce labour influx by tapping into the local workforce as a priority. Depending on the size and the skill level of the local workforce, a share of the workers required for the project may be recruited locally. This may be easier for unskilled workmen. Specialised workmen may be hired from elsewhere. Local workers may also be trained especially if they are required for the operation of the project.
- Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx. Depending on the risk factor, appropriate mitigation measures may be deployed. These may range from engagement with a local community liaison to the use of the District and National Government Authorities in regulating labour issues.
- The works Contractor should be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national law as well as to the World Bank Code of Conduct guidelines as a best practice, where applicable.
- The contractor should prepare and implement a Gender Action Plan, to include at minimum:
  - ✓ Gender mainstreaming in employment at the worksite with opportunities provided for females to work, in consonance with local laws and customs
  - ✓ Gender sensitization of workers (this could be done by the HIV/AIDS services provider;
  - ✓ Provision of gender disaggregated bathing, changing, sanitation facilities
  - ✓ Grievance redress mechanisms including non-retaliation.
- The EPC contractor shall be required to have a community engagement and strong grievance mechanisms on matters related to labour.
- All workers to sign employment contract including Code of Conduct
- Sensitize workers on community based social behaviour and conduct.
- Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrates by the community
- Contractor shall monitor and report on the implementation and effectiveness of the labour influx related mitigation measure.

### *7.4.20.4Significance of Impact*

The labour influx may create a crisis at the project site if quick management action is not taken to manage the situation. If mitigation measures are not implemented; the impact magnitude shall be medium-high and impact significance shall remain medium-high. However, if mitigation measures are implemented the impact magnitude shall be low and the impact significance shall become low.

| Impact | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Labour Influx | Without Mitigation | Long Term | Local | Medium | Medium-High | Medium | Medium-High |
| | With Mitigation | Long Term | Local | Low | Low | Low | Low |

### 7.4.21 Risk of Child Exploitation

#### *7.4.21.1 Baseline Status on Child Labour*

Here in Kenya, data from the Kenya National Bureau of Statistics (KNBS) shows that 8.5 percent of children, or 1.3 million, are engaged in child labour. The highest child labour rates, at more than 30 percent, are in the arid and semi-arid land (ASAL) counties. Due to the Covid 19 impact, in April 2020, KNBS reported that around 1.72 million people in Kenya had lost their jobs since the start of the pandemic. With this significant loss of income, a growing number of families may resort to sending their children out to work.

#### *7.4.21.2 Impact Assessment of Child Labour*

**Employment Act 2007, 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.

**Children Act 2001 Section 10**. Protection from child labour and armed conflict

(1) Every child shall be protected from economic exploitation and any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development.

The Contractor will be required to observe the requirements of these Acts when recruiting workers in the project

**Table 62: Risk of Child Exploitation**

| Impact | Risk of Child Exploitation | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |

| | | | | | |
|---|---|---|---|---|---|
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Low since awareness of the law requirements is much better among urban residents | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact significance is considered Low since awareness of the law requirements is much better among urban residents | | | | |

#### *7.4.21.3Mitigation Measures*

The mitigation measures to minimise the potential impacts on child labour from construction activities include:

- Provide and implement a Child Protection Strategy.
- Ensure no children are employed on site in accordance with Children Act, 2001.
- Carry out proper age verification before engaging anyone for a job at the plant
- Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the Authorities
- Carry out workers and Community sensitization on child protection, requirements of Children Act, 2001 and eradication of child labour.

#### *7.4.21.4Significance of Impact*

The impacts can cause long term effects to the children if mitigation measures are not implemented However, vigilance is much better in urban areas hence impact significance is considered low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Child Labour | Without Mitigation | Short Term | Local | Low | Low | Low | Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.4.22 Gender Based Violence-Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH)

#### *7.4.22.1Baseline Status on Gender*

Gender-based violence is a problem in Kenya whose nature is multi-faceted. Results from KDHS 2008/2009, revealed that 39 percent of married, divorced or separated women aged 15 to 49 years reported to have suffered some form of violence during their lifetime. Gender-based violence identified as a significant driver of HIV/AIDS. Findings show an increased risk of HIV acquisition among victims of gender-based violence and a positive HIV status being a risk factor for violence.

### *7.4.22.2 Potential Causes of Gender Impacts*

Mombasa county is leading in the region with the highest number of Gender Based Violence (GBV) cases reported at the Coast of Kenya, this is according to Healthcare Assistance Kenya (HAK). The research carried out by the organisation between 2007 and March 2017, shows that a total of 433 cases have been reported in Mombasa, out of the total 17,224 cases of GBV reported in Kenya during this period. According to the data on Gender Based Violence in Kenya by HAK, out of the 433 cases of GBV in Mombasa, women cases are leading with 199, followed by girls 123, boys-64 and finally men 47

### *7.4.22.3Impact Assessment of Gender Impacts*

There will be job opportunities for skilled and unskilled workers during construction of the Transmission Line that will evacuate power from the solar power plant to the sub station located at the Bamburi Cement Factory. Due to the significant discrimination against women, there are chances that women may lose out in the opportunities. Children may also be exploited due to low-income levels of the households.

Some women may also suffer sexual harassment and request for sexual favours in order to be offered a job. A large influx of male labourers may also lead to an increase in exploitative sexual relationships and human trafficking whereby women and girls are forced into sex work. This predisposes the women and girls to SEA. Potential high labour influx may cause GBV and Violence Against Children (VAC). The gender impacts are noted to be very likely, hence the significance is medium-high.

**Table 63: Gender Impacts**

| Impact | Gender Impacts | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Medium-High due to the probable chance of occurrence | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered Medium-High due to the probable chance of occurrence | | | | | |

### *7.4.22.4 Mitigation Measures*

The mitigation measures to minimise the potential gender impacts during construction activities include:

- The Contractor should prepare a Harassment/Sexual Exploitation and Hazard and Risk Assessment and Management Plan. This will assist in prevention and tackling the issues of GBV, SEA, SH and VAC.
- The Contractor shall be required to ensure clear human resource policy against Gender-based violence that is aligned with national law and best practice;
- Integrate provisions related to GBV in the employees' Code of Conduct; (CoC)
- The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in construction works to individually sign and comply with CoC with specific provisions on protection from GBV;
- The contractor will implement provisions that ensure that GBV at the community level is not triggered by the Project;
- The contractor shall develop a specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment; etc
- The contractor will ensure adequate referral mechanisms are in place should a case of GBV at the community level is reported related to project implementation.
- Gender sensitization of workers
- The Contractor shall be required, under its contract, to prepare and enforce a No Sexual Harassment and Non-Discrimination Policy, in accordance with national law where applicable.
- The Contractor should popularize /put in place safe, ethical and confidential mechanisms and hotlines for reporting SEA/SH/GBV cases.
- The Contractor shall observe labour requirements to safeguard the exploitation of children
- Strategies such as male involvement shall be employed in preventing and responding to GBV/SEA and sexual harassment.
- The Contractor should establish partnerships with relevant government agencies, GBV Service Providers and NGOs to ensure survivors of GBV and sexual offences access survivor centred services such as medical care, psychosocial support, legal redress, safety, etc as and when necessary.
- The Contractor should provide gender disaggregated facilities - separate bathing, changing, sanitation facilities for men and women.
- The Contractor should ensure there is a Grievance Redress Mechanisms that has specific procedures for GBV including confidential reporting with safe, and ethical documenting of GBV cases shall be set up for the workers and community.

### *7.4.22.5 Significance of Impact*

The impacts can cause long term effects to the women and children if mitigation measures are not implemented hence the impact magnitude shall remain medium-high. However, if mitigation measures are implemented the impact magnitude shall be low and the impact significance shall become low

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Gender Based Violence | Without Mitigation | Long Term | Local | High | Medium-High | Medium | Medium-High |
| | With Mitigation | Long Term | Local | Low | Low | Low | Low |

### 7.4.23 Security Risk

#### *7.4.23.1 Baseline Status*

The Contractor will mobilize expensive machinery and equipment to the project site. The machinery and materials may attract thieves, Employee misconduct in the host communities can also occur. The project may not be able to absorb all the migrant workers looking for job opportunities resulting into animosity and security risk to project workers.

#### *7.4.23.2 Impact Assessment*

Due to the possibility that equipment and materials may attract thieves to the project site an evaluation of the level of security threat is required. The labour influx may cause some job seekers who have not been given a job to become a source security threat to the hired workers and project property.

**Table 64: Impact of Security Risks**

| **Impact** | **Impact of Security Risks** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Medium-low since the site I within a guarded private and access is controlled | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered Medium-low since the site I within a guarded private premises and access is controlled | | | | | |

#### *7.4.23.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on security risk include:

- The Contractor should prepare Security Risk Management Plan
- Contractor should recruit qualified security coordinator to coordinate and manage security risks
- The Contractors camp containing equipment and machinery is going to be securely fenced off.
- The Contractor's team should work with security agencies to provide security within the site in addition to the Contractor's own security.

- Any employee who persists in any misconduct or lack of care, carries out duties incompetently or negligently, fails to conform to any provisions of the contract, or persists in any conduct which is prejudicial to safety, health, or the protection of the environment shall be removed.
- All reasonable precautions should be taken to prevent unlawful, riotous or disorderly conduct by or amongst the contractor's personnel, and to preserve peace and protection of persons and property on and near the site.
- Alcohol, drugs, arms, and ammunition on the worksite among personnel will be prohibited.
- The contractor and Project Supervisor shall register in a log all events of a criminal nature that occur at the worksite or are associated with the civil works activities.
- The contractor and Project Supervisor shall report all activities of a criminal nature on the worksite or by the contractor's employees (whether on or off the worksite) to the police and undertake the necessary follow-up. Crime reports shall include nature of the offense, location, date, time, and all other pertinent details.
- The Contractor shall ensure that all of his staff sign a written code of conduct to govern employee behaviour on/off site.
- The Contractor should consider installing and making use of CCTV cameras to monitor security within the site. In collaboration with the national police on security matters, the Contractor shall place alarms around the project and establish emergency preparedness and response procedures (EPRP).
- Security agencies providing armed security to the project shall sign Codes of Conduct aligned to the International Good Practices including the World Bank Good Practice Note on Assessing and Managing the Risks and Impacts of the Use of Security Personnel.
  In compliance with the requirements of IFC PS4, paragraph 12, when hiring of security personnel, the contractor shall ensure the following is fulfilled:
  - ✓ Assess risks posed by its security arrangements to those within and outside the project site
  - ✓ In the process of hiring security personnel the Contractor shall be guided by the principles of proportionality and good international practice3 in relation to hiring, rules of conduct, training, equipping, and monitoring of such workers, and by applicable law
  - ✓ The Contractor shall make reasonable inquiries to ensure that those providing security are not implicated in past abuses; they will be adequately trained in the use of force (and where applicable, firearms), and the security personnel will have appropriate conduct toward workers and Affected Communities; and they will be expected to act within the applicable Law of Kenya
  - ✓ The Contractor shall not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat.
  - ✓ The Contractor will provide a grievance mechanism for Affected Communities to express concerns about the security arrangements and acts of security personnel.

### *7.4.23.4. Significance of Impact*

The mitigation measures provided are intended to eliminate/minimise impacts on security issues arising from the project. If the mitigation measures are not implemented, the magnitude of impact would remain Medium-Low. However, with the proposed mitigation measures in place, the impact on project operations would be significantly reduced and the impact significance would be reduced to low. It is therefore important that the proposed mitigations are implemented by the Contractor.

| Impact | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Security Risk | Without Mitigation | Short Term | Regional | Medium | Medium-Low | Medium | Medium-Low |
| | With Mitigation | Short Term | Regional | Low | Low | Low | Low |

## 7.5 Environmental Impacts and Mitigation Measures – Operation Phase

### 7.5.1 Transmission Line Impacts on Avifauna and Herpetofauna

#### *7.5.1.1 Background of Impacts on Avifauna and Herpetofauna*

Bamburi Cement PLC has been restoring areas where it has carried out mining activities through ground leveling, planting of trees and other vegetation and reintroducing fauna to enrich the biodiversity of the area. The area has mammals, avifauna, herpetofauna and invertebrates. Large trees are critical habitats for arboreal herpetofauna. Unfortunately, such tress are often primary targets for removal to pave way for erecting transmission lines thereby leading to direct impact on reptiles and amphibians.

#### *7.5.1.2 Impact Assessment*

**Avifauna Collision and Electrocution by Transmission Lines**
Big birds are prone to collisions with thin power cables due to low maneuverability. Migrating species have been affected by transmission lines erected across their fly ways where they are either killed by electrocution.

**Herpetofauna electrocution by Transmission Lines**: Reptiles are particularly adapted to climbing for foraging and resting activities. Artificial structures such as poles and transmission cables often form attractive environments for a number of species which might lead to deaths.

**Table 65: Transmission Line Impacts on Avifauna and Herpetofauna**

| Impact | Transmission Line Impacts on Avifauna and Herpetofauna | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| | The impact severity is medium since species of birds that can collide with TLs are found in the area | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |

| | | | | | | |
|---|---|---|---|---|---|---|
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is medium-high since species of birds that can collide with TLs are found in the area | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is medium-high since species of birds that can collide with TLs are found in the area | | | | | |

#### *7.5.1.3 Mitigation Measures*

***Avifauna***

- Consider using underground cabling
- Where transmission is on electric poles, high voltage transmission lines should be fitted with flight diverters and markers typically flappers, balls or spirals to alert birds on flight
- Where overhead transmission lines are used, attach bird flight diverters (typically flappers, balls or spirals) to transmission grounding wires to increase their visibility

***Herpetofauna***

The mitigation measures to minimise the potential impacts on Herpetofauna include:

- Use proper insulation and mounting techniques (e.g., concrete underground tunnels).

#### *7.5.1.4 Significance of Impact*

During operations, there are potential collision and electrocution impacts on Avifauna and Herpetofauna by transmission Line conductors. The impact magnitude and significance is considered medium-high if mitigation measures are not implemented. However, mitigations are applied the impact will be significantly reduced and the impact significance will become low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Impact on Fauna (Birds) | Without Mitigation | Long Term | Local | Medium | Medium-High | Medium | Medium-High |
| | With Mitigation | Long Term | Local | Low | Low | Low | Low |

### 7.5.2 Occupational Health and Safety Risks During Operation

The Transmission Line infrastructure will require regular inspection to ensure the poles are still in place and there are no conductors that have been cut. There will also be the need to carry out regular routine maintenance.

#### 7.5.2.1 *Sources of Occupational Health and Safety Risks*

The project workers will be exposed to occupational and accident risks during the operation phase of the project.

The sources of impact on the health and safety of workers arising from the Transmission Line during operational phase include the following.:

- Exposure to risk of falling when working at elevated positions while carrying out repairs on the transmission line
- Electric shocks for the workers carrying out maintenance,
- Sometimes high temperatures in the project area may expose workers to difficult working conditions including the temptation to remove safety gear while working in areas that require such safety precautions

***Receptors***

The receptors of occupational safety and health impacts are workers both temporary and long term. The level of exposure to risk will vary from one task to another requiring that the seriousness of mitigations also varies with the level of risk.

### 7.5.2.2 *Impact Assessment of Occupational Health and Safety Risks*

Arising from the above-mentioned activities that will take place during operation, the workers and other personnel at the solar plant will be exposed to impacts as follows:

- Risk of falling from working at heights
- Getting electrocuted when working on the conductors
- Heat stress arising from working under hot weather

The exposures could cause long term impacts if mitigation measures are not implemented hence the severity of impact has been assessed to be medium-high. However, if mitigation measures are implemented as proposed then the impact significance will be low.

**Table 66: Occupational Health and Safety Risks**

| **Impact** | **Occupational Health and Safety Risks** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered Medium-High due to high chance of injury occurring | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The impact significance is considered Medium-High due to high chance of injury occurring | | | | |

#### 7.5.2.3 *Mitigation Measures*

The mitigation measures to minimise the potential impacts on the occupational safety and health risk from construction activities include:

- Proponent and the Operations Contractor should prepare a detailed Occupational Safety and Health Management Plan (OSHMP) that will provide all the required health and safety measures to safeguard the workers during operation.
- The Proponent and the Operations Contractor should prepare an Emergency Response Plan
- The Proponent and the Operations Contractor should prepare a Code of Conduct that inter alia commits to the Implementation of the OSHMP and that also commits at individual level to compliance with OSHMP requirements and standards.
- The Proponent and the Operations Contractor should induct and train all operations workers on OHS, Fire Response and Emergency procedures
- Hold weekly (or as appropriate) tool box meetings for all workers
- Provide workers with appropriate personal protective equipment (PPE) and instil a mechanism to ensure appropriate usage; The PPE should include anti-glare glasses and Harnesses for working at heights
- Provide workers with adequate portable drinking water.
- Provide clean and adequate toilets for workers, these toilets will be to World Health Organisation standards

#### *7.5.2.4 Significance of Impact*

The impacts can cause long term impacts to the health and safety of the operational phase workers hence the severity of the project is considered medium and impact magnitude would be medium-high, however if mitigations are implemented, then the impact magnitude would be low and the impact significance would also be low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Occupational Health and Safety Risks – Operation Phase | Without Mitigation | Short Term | Project Site | Medium | Medium-High | Medium-High | Medium-High |
| | With Mitigation | Short Term | Project Site | Low | Low | Low | Low |

### 7.5.3 Generation, and Disposal of Solid and Liquid Waste During Operational Phase

#### *7.5.3.1 Sources of Solid and Liquid Wastes*

During the operational phase, the transmission line will require very little attention apart from the regular inspections to ensure that the poles are upright and the conductors are not cut. The solid and liquid waste will be very limited

#### *7.5.3.2 Impact Assessment*

The only source of waste generation will be the debris generated while maintaining the vegetation within the TL corridor.

**Table 67: Generation, Storage and Disposal of Solid and Liquid Waste**

| Impact | Generation, Storage and Disposal of Solid and Liquid Waste | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the only activity that will generate waste is clearing of vegetation along TL corridor | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact magnitude is considered low since the only activity that will generate waste is clearing of vegetation along TL corridor | | | | | |

### *7.5.3.3 Mitigation Measures*

Due to the presence of sensitive receptors within the site and also presence of community settlements and public institutions less than 400m away from the site, management of the solid and liquid wastes becomes critical.

- Only clear vegetation that must be cleared (invasive species and plants that fall within the wayleave corridor);
- Use appropriate PPE when clearing the shrubs and invasive species
- Ensure appropriate disposal is done.

### *7.5.3.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts to the site workers, If the mitigation measures are not implemented, the impact would remain Low. However, with the proposed mitigation measures in place, the impact to the ecosystem would be significantly reduced and the impact significance would be reduced to low. It is therefore important to implement the mitigation measures.

| Impact | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Generation, Storage and Disposal of Solid and Liquid Waste during Decommissioning | Without Mitigation | Long Term | Local | Low | Low | Low | Low |
| | With Mitigation | Long Term | Local | Low | Low | Low | Low |

## 7.6 Environmental Impacts and Mitigation Measures – Decommissioning Phase

Decommissioning activities shall be preceded by preparation and submission of a detailed Decommissioning Plan to NEMA and County Government 30 days prior to the date of execution for permission to proceed be granted.
It should be noted that some decommissioning activities will be carried out before the end of the lifespan of the project. This may include material source sites like:

- Borrow Pits and Quarries if they have been used to provide materials for the project
- Construction Camp for the contractor

Decommissioning of such sites should proceed as soon as their use comes to an end to avoid escalation of safety risks.

### 7.6.1 Occupational Health and Safety Risks

Risk of Respiratory Illnesses due to Air Pollution Inhalation of fumes, dust from decommissioning activities may lead to respiratory infections. Fire risks and electrocution may occur from electrical cables. Electronic equipment may also contain hazardous material harmful to human health. Safety risks may also arise from the decommissioning and removal of the poles and conductors.

#### *7.6.1.1 Sources of Occupational Health and Safety Risks*

The sources of impact on the health and safety of workers at the solar plant will arise from the following construction activities:

- Dismantling of structures
- Removal of Poles and conductors
- Excavation and removal of structure bases
- Levelling of the ground and restoration.

***Receptors***
The receptors of occupational safety and health impacts are workers carrying out the demolition works.

***The exposure***.
The level of exposure to risk will vary from one task to another requiring that the seriousness of mitigations also varies with the level of risk.

#### *7.6.1.2 Impact Assessment of Occupational Health and Safety Risks*

Arising from the above-mentioned activities that will take place during decommissioning, the workers and other personnel at the solar plant will be exposed to impacts as follows:

- Injuries associated with operation of machinery
- Injuries arising from loading, unloading and lifting heavy materials
- Health impacts arising from being exposed to fugitive dust and exhaust emissions
- Potential injury from a fall due to working at heights
- Impacts from exposure to excessive noise
- Injury from slips and fall
- Overexertion injuries/illnesses
- Injury from project vehicle accidents
- Heat stress arising from working under hot weather

The exposures could cause long term impacts if mitigation measures are not implemented hence the severity of impact has been assessed to be medium. However, if mitigation measures are implemented as proposed then the impact significance will be medium-high.

**Table 68: Occupational Health and Safety Risks**

| **Impact** | **Occupational Health and Safety Risks** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral |
| Impact Type | Direct | | | Indirect | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The magnitude impact is considered Medium-High due to high chance of injury occurring | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The significance of impact is considered High due to high chance of injury occurring | | | | |

### *7.6.1.3 Mitigation Measures*

The mitigation measures to minimise the potential impacts on the ecology from construction activities include:

- Prepare a detailed Occupational Safety and Health Management Plan (OSHMP) that will provide all the required health and safety measures to safeguard the workers.
- Prepare a Code of Conduct that inter alia commits to the Implementation of the OSHMP and that also commits at individual level to compliance to OSHMP requirements and standards.
- Carry out work assessment and identify hazardous substances and working conditions and include safety measures in the OSHMP

- Ensure that all machines and equipment are in good working conditions and to manufacturer's specifications to prevent occupational hazards.
- Appoint qualified full-time health and safety advisor and fire marshal on-site for the duration of the demolition work.
- Establish Health and Safety committee and provide first aid kits and train first aiders
- Induct and train all construction workers on OHS procedures
- Hold daily (or as appropriate) tool box meetings for all workers
- Provide workers with appropriate personal protective equipment (PPE) and instil a mechanism to ensure appropriate usage;
- Adequate training should be provided to staff on use of Personal Protection Equipment (PPE) and emergency response measures;
- Provide workers with adequate portable drinking water and breaks.
- Train workers on safety procedures/emergency response such as fire, oil and chemical spills.
- Ensure that water is sprayed in dust areas to suppress fugitive dust.
- Contractor to provide an ambulance vehicle to evacuate for emergency situations
- Prepare Emergency Response Plan
- Provide clean and adequate toilets for workers, these toilets will be to World Health Organisation standards

#### *7.6.1.4 Significance of Impact*

The impacts can cause long term effects to the health and safety of the workers hence the severity of the project is considered medium while the impact magnitude and significance remain medium-high, however if mitigations are implemented, then the magnitude of impact would be low and the impact significance would also become low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Occupational Health and Safety Risks during Demolitions | Without Mitigation | Short Term | Local | Medium | Medium-High | Medium | Medium-High |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.6.2 Generation and Disposal of Solid and Liquid Waste

#### *7.6.2.1 Sources of Solid and Liquid Wastes*

The Transmission Line will have the following sources of waste for decommissioning:

- Transmission line Poles
- Electrical conductors and accessories
- Power line poles base concrete materials
- Oils and fluids from the vehicles and machinery.

***Receptors***

The above wastes generated from demolition of the above items if not well managed may Impact on the site soil, surface water (the sensitive swamp at the site including the flora and fauna) and air.

### *7.6.2.2 Impact Assessment*

The items to be decommissioned and demolished may contain chemicals and other hazardous contents therefore handling requires care. Demission activities shall strictly follow the decommissioning plan

The items to be demolished contain concrete, metals, etc while others will be at elevations of more than 2m Appropriate PPE shall be used.

**Table 69: Generation, Storage and Disposal of Solid and Liquid Waste**

| **Impact** | **Generation, Storage and Disposal of Solid and Liquid Waste** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the activities will not generate any significant wastes | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the activities will not generate any significant wastes | | | | | |

### *7.6.2.3 Mitigation Measures*

Due to the presence of sensitive receptors within the site and also presence of community settlements and public institutions less than 400m away from the site, management of the solid and liquid wastes becomes critical.

- The Decommissioning Contractor shall prepare for use an elaborate Decommissioning Management Plan;
- The Decommissioning Contractor shall also prepare an elaborate Hazardous Waste Management Plan
- The Decommissioning Contractor shall ensure that an emergency response plan for preventing and dealing with emergencies like oil spills is put in place.
- The nearest local authority can be contracted to take the responsibility of disposing sewerage waste from the site.
- If septic tanks are used for the management of sewerage waste at the site, then then the authorities shall evacuate them before demolition

- Recovered waste debris and excavated material will be stored in a confined area to prevent spread by wind or water;
- Used or waste oil recovered from generators, vehicles, construction machinery and equipment shall be stored on a paved surface with containment in a secure location at the project site. Appropriate secondary containment capable of containing the 110 percent of the largest tank is to be provided;
- The waste oil and other hydraulic fluids, which is characterized as hazardous shall either be sold to authorized vendors at frequent intervals; or collected by authorised dealers.

#### *7.6.2.4 Significance of Impact*

The mitigation measures provided are intended to reduce impacts to the site workers, soil since spillages and leaks of oils, fuels and other chemicals can cause serious pollution during decommissioning phase. If the mitigation measures are not implemented, the impact would remain Medium-Low. However, with the proposed mitigation measures in place, the impact to the ecosystem would be significantly reduced and the impact significance would be reduced to low. It is therefore important to implement the mitigation measures.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Generation, Storage and Disposal of Solid and Liquid Waste during Decommissioning | Without Mitigation | Short Term | Local | Medium | Medium-Low | Medium | Medium-Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.6.3 Impacts of Emission of Air Pollution During Decommissioning

The site is located in an area occupied by Bamburi Cement Factory, commercial enterprises and residential houses. Bamburi Town starts 500m to the west of the TL.

#### *7.6.3.1 Potential Air Pollution During Demolition*

During decommissioning and demolition of the TL infrastructure, there will be two sources of air quality impacts namely fugitive dust and exhaust emissions from vehicles, generators and construction machines. However, the TL decommissioning activities will be very limited

***Fugitive Dust and Exhaust Emissions***

The soils of the project area are 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). These reddish brown murram soils used in maintaining the unpaved roads form fine dust that is easily aroused when there is wind or vehicles passing through. Fugitive dust will come from earthworks including excavation works, grading, levelling, movement of vehicles across unpaved roads particularly when dry and windy. Movement of trucks and others vehicles when transporting recovered materials and waste will generate fugitive dust and exhaust emissions. But these emissions will be limited due to limited activities.

### *7.6.3.2 Impact Assessment of Fugitive Dust from Demolition Activities*

The main demolition activities that will increase air pollution are:

- Excavation of power line poles
- Ground levelling during restoration
- Vehicle movements within and outside the site taking away materials and wastes

***Potential Receptors***

Majority of the potential receptors of fugitive dust are the workers and the immediate neighbours which include commercial enterprises and settlements located on the western side of the site. The settlements on the easter side of Bamburi fenced land and Bamburi Town are approx. 500m away to the east and west respectively.

**Table 70: Fugitive Dust from Construction Activities**

| **Impact** | **Fugitive Dust from Construction Activities** | | | | | |
|---|---|---|---|---|---|---|
| Impact Nature | Positive | | Negative | | Neutral | |
| Impact Type | Direct | | | Indirect | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High | |
| | The impact severity is considered low since the TL decommissioning activities will be limited | | | | | |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated | |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary | |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain | |
| Potential for Irreplaceable loss of resource | Low | | Medium | | High | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| | The impact magnitude is considered low since the fugitive dust and exhaust emissions will be limited | | | | | |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High | |
| | The impact significance is considered low since the fugitive dust and exhaust emissions will be limited | | | | | |

### *7.6.3.3 Mitigation Measures to Minimise Impact of Fugitive Dust*

The following measures shall be put in place to reduce the impacts of fugitive dust:

- The decommissioning Contractor should prepare a Decommissioning Management Plan that contains aspects on Air Pollution.
- A programme shall be put in place to regularly sprinkle water along the road section and inside the site area to suppress dust during the dry season

- Dust level shall be monitored during demolitions and transportation using potable air quality monitors
- Speed of vehicles on site and approach road will be limited to speeds of around 20km/hr. This will help in reducing fugitive dust emission from vehicle movement
- Trucks transporting soil stockpiles shall be totally covered with impervious material to suppress dust during transportation
- Soil stockpiles shall be covered or water sprinkled regularly to minimise fugitive dust emission.
- Workers on dusty at the site shall be issued with appropriate PPE such as, dust masks during dry and windy conditions
- The Decommissioning Contractor shall ensure that education and awareness creatin is done for workers and sensitization on emission reduction techniques.

#### *7.6.3.4 Significance of Impact*

The mitigation measures provided are intended to minimise impacts as low as possible. The above-mentioned mitigations can minimise impacts if applied, otherwise the significance of impact will remain low since decommission activities will be limited

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Air Pollution during Decommissioning | Without Mitigation | Short Term | Local | Low | Low | Low | Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Low |

### 7.6.4 Noise Impact During Decommissioning

#### *7.6.4.1 Baseline Status*

The site is located in an area occupied by settlements and commercial enterprises on the western side of the site fence line. Bamburi Town is located approx. 500m away on the western side.

***Potential Sources of Noise Impact***

The demolition activities that will generate noise impacts include:

- Use of machinery to demolish TL structures and conductors
- Excavation activities to remove TL poles and structure bases
- Transportation of recovered poles, conductors and other associated structures, construction material, and construction machinery
- Operation of Excavators, Graders, bulldozers, dump trucks, vibrating roller, wheel loader, rock breaker, flatbed trucks, concrete trucks, cranes, forklifts and various four-wheel drive and service vehicles.

***Potential Receptors of Noise Impacts***

Majority of the potential receptors of fugitive dust are the workers and the immediate neighbours of the TL corridor which include settlements and commercial enterprises on the western side of the TL and Bamburi Town that stars approx. 500m away on the western side.

### *7.6.4.2 Impact Assessment*

During decommissioning demolitions noise impact will emanate from the hammering and movement of vehicles within the site and outside.

**Table 71: Noise Impacts from Demolition Activities**

| **Impact** | **Noise Impacts from Demolition Activities** | | | | |
|---|---|---|---|---|---|
| Impact Nature | Positive | Negative | Neutral | | |
| Impact Type | Direct | Indirect | | | |
| Impact Severity | Insignificant | Low | Medium | High | Very High |
| Impact Duration | Short Term | Medium Term | Long Term | Permanent but mitigated | Permanent But Not Mitigated |
| Impact Extent | Project Site | Local | Regional | National | Trans Boundary |
| Likelihood of Occurrence | Unlikely | Low | Medium | High | Certain |
| Potential for Irreplaceable loss of resource | Low | Medium | High | | |
| Impact Magnitude | Insignificant | Low | Medium Low | Medium High | High | Very High |
| Impact Significance | Negligible | Low | Medium-Low | Medium-High | High |
| | The significance of impact is considered Low since the noise sources will be localized and limited | | | | |

### *7.6.4.3 Mitigation Measures to Minimise Impacts of Noise Emission*

The following mitigation measures shall be implemented to reduce potential noise impacts during the decommissioning phase of the project:

- The Decommissioning Contractor should prepare a Decommissioning Plan that contains noise management requirements.
- There shall be no discretionary use of noisy machinery within 50m of residential areas and near institutions or use of manual labour in these sections
- The Decommissioning Contractor shall consider the noise emission characteristics of equipment when selecting equipment for the project and select the least noisy machine available to perform the specific work (this is a requirement of OSHA 2007);
- Mobile noise sources such as cranes, earth moving equipment shall be routed in such a way that there is minimum disturbance to receptors;
- The Decommissioning Contractor shall restrict the night time vehicle movement through the access road to the site
- Drivers shall only use designated roads;
- The number of equipment operating simultaneously shall be reduced as far as practicable;
- Equipment known to emit noise strongly in one direction shall be orientated so that the noise is directed away from nearby community settlements;

- All loud and sudden noises shall be avoided wherever possible and fixed noise sources shall be located at least 50m away from the site boundary to minimise noises going beyond site boundary;
- The Decommissioning Contractor shall ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections. Loud noise and vibration level activities shall be performed during the day (i.e., between 8.00 am and 5.00 pm)
- Vehicles and machinery shall be well maintained and not kept idling when not in use.

#### *7.6.4.4 Significance of Impact*

The noise emissions will largely take place close to the noise source and therefore attenuate to manageable levels when going beyond the site boundary. The impact magnitude is considered low and if the mitigation measures are implemented the significance of impact will be very low.

| **Impact** | Scenario | Duration | Extent | Severity | Impact Magnitude | Potential for Irreplaceable loss of resource | Impact Significance |
|---|---|---|---|---|---|---|---|
| Noise Pollution during Decommissioning | Without Mitigation | Short Term | Local | Low | Low | Low | Low |
| | With Mitigation | Short Term | Local | Low | Low | Low | Very Low |

## 7.7 Cumulative Impacts

Cumulative impacts come about when a project activity acts together with other activities (other projects or third-party activities) to impact on the same environmental or social resource or receptor.

The IFC defines cumulative impacts as *"impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted".*

There are potential cumulative impacts that may arise since there other projects or activities that are planned for the region where this project is located. The proposed or ongoing projects that are likely to generate cumulative impacts include:

- The Planned KeNHA Road that will pass within the project area
- The ongoing Rehabilitation/Restoration activities by Bamburi Cement.

### 7.7.1 Identification of Potential Cumulative Impacts

**Table 72** provides a summary of the likely potential cumulative impacts that may result from the construction and operation of the proposed transmission line.

**Table 72: Summary of Potential Cumulative Impacts**

| Environmental Impact | Potential Cumulative Impacts | |
|---|---|---|
| | **Construction Phase** | **Operation Phase** |
| Loss of flora and fauna, proliferation of invasive species | The project area is largely a private land where Bamburi is carrying out restoration and planting of various trees and reintroducing fauna. Restoration activities by Bamburi continue.<br>Mitigation shall be implemented as provided in the ESMP to minimize impact<br>The resource sensitivity is assessed to be **medium** | If during operation of the solar project the KeNHA road will not have commenced and Bamburi activities are related to restoration and conservation then the resource sensitivity is assessed to be low<br>Mitigation shall be implemented as provided in the ESMP to minimize impact. The resource sensitivity is assessed to be **low** |
| Change in Land Use | The land area is not changing much apart from the planned KeNHA road that will pass through the project area. The solar plant has taken up Block A and small part of Block B and the road will take up a small area. The projects are taking a small area of the area under restoration. The resource sensitivity is assessed to be **medium** | Some of the degraded areas will be rejuvenated. The resource sensitivity is assessed to be **medium** |
| Increased Traffic | Potential cumulative impacts are anticipated with use of construction vehicles and heavy machinery during construction. Implementation of mitigations measures including operationalizing traffic management plans will ensure the impact is low. The resource sensitivity is assessed to be **medium** | Given that traffic volumes will reduce. The design and proposed ESMP mitigation measures will ensure the impact is low. The resource sensitivity is assessed to be l**ow** |
| Road Safety | Potential cumulative impacts on road safety are anticipated given the area remoteness and little knowledge on traffic regulations traffic Implementing of road safety awareness initiatives will ensure the impact is low. The resource sensitivity is assessed to be **low** | Anticipated during operational phase is low traffic Implementing community road safety awareness initiatives will ensure the impact is **low.** |
| Community Health and Safety | The project is within a private land belonging to Bamburi Cement hence there are no community members within. However, since community members will be employed and trucks that will be working at the facility will passing through areas occupied by the community there will be some cumulative impacts. ESMP has provided appropriate mitigations The resource sensitivity is assessed to be **low** | Since activities that heighten the impacts on Community Health and Safety will be very low during operation, The resource sensitivity is assessed to be **low** |
| Visual Impact | The project area is largely forested from restoration by Bamburi Cement. ESMP will be implemented to ensure visual impact from project activities kept low. The resource sensitivity is assessed to be **low** | There will be minimal impact from the TL infrastructure due existence of tall trees within the project area. The visual impact will be **low** |
| Water Resources | Potential cumulative impacts are likely to occur during construction period in relation to abstraction of water from ground water sources due to demand for construction, and potential contamination from oil spills and waste. The proposed mitigation measures will suffice and will require continuous monitoring. The resource sensitivity is assessed to be **low** | Potential cumulative impacts are likely to occur during operation period in relation to high demand for operations ESMP has prohibited use of water resources from site and alternative external water source will have to be sourced as mentioned in the ESMP. On the ground visual impact will be **low** |
| Air Quality | Cumulative impacts will only occur during the construction phase if the construction of the KeNHA road takes place at the same time<br>Impact will arise during the construction as well as decommissioning phases as a result of the following activities:<br>• Fugitive dust emissions from site clearing, excavation work, material handling etc.;<br>• Fugitive dust emission from traffic movement; | Fewer and Efficient vehicular movement arising from a multiplicity of improvement initiatives will effectively lead to a reduction in emissions, especially $CO_2$. Cumulatively, the initiatives will contribute to Climate Change mitigation. The resource sensitivity is assessed to be **low** |

| Environmental Impact | Potential Cumulative Impacts | |
|---|---|---|
| | **Construction Phase** | **Operation Phase** |
| | • Exhaust emission from operation of machineries like earth movers, trucks;<br>• Point source emission from diesel generator.<br>Since the road project is not expected to take of soon, Bamburi activities lowkey the only impacts will be from the solar project. If this is the case, even greater attention should be paid to the ESMP outlined and monitoring to ensure the cumulative impact remain minimum<br>The resource sensitivity is assessed to be **low** | |
| Ambient Noise | The impacts arising due to high noise levels are confined to the construction and decommissioning phases. The noises will arise from:<br>• Construction activities including site preparation, construction of ancillary facilities;<br>• Transportation of construction materials, machinery<br>• Demolition activities during decommissioning phase<br>Given that the KeNHA project may not take off soon and this is the only project being implement the ESMP provided will keep the impacts to a minimum. The resource sensitivity is assessed to be **low** | Noise levels during the O&M phase are negligible and may only arise during the maintenance phase of the solar plant. The resource sensitivity is assessed to be **low** |
| Social Impacts including:<br>• Labour influx,<br>• Crime,<br>• Disruption of services,<br>• Increased conflicts,<br>• Impacts on children,<br>• GBV, sexual exploitation and abuse | Cumulative impacts arising from implementation of the project among others is expected to cause influx of migrant workers into the area seeking for either skilled or unskilled employment. This may pose increased social risks with respect to among others; new cases of HIV/AIDS contraction, Gender Based Violence, drug trafficking, insecurity issues due to presence of 'strangers' (project workers) and other social challenges. The ESMP has provided mitigation measures that shall be implemented to address the vices and keep them to a minimum. The resource sensitivity is assessed to be l**ow** | The influx of migrant workers and vices arising from in migrant workers will reduce significantly reduce and impacts will be low The ESMP has provided mitigation measures to take care of the impacts The resource sensitivity is assessed to be **low** |
| Economic Impact | Positive cumulative economic Impact will occur during the construction phases of the project since there would be increased local employment benefits. The Local businesses would experience an increased demand for products and services during construction. | Job opportunities will be available for permanent employment to maintain the facility and also provided other auxiliary services. |

# 8 ENVIRONMENTAL, SOCIAL AND HEALTH MANAGEMENT AND MONITORING PLAN

## 8.1 Introduction

This ESMP has been developed to be used as a tool to manage the environmental and social impacts that the activities of the transmission line construction activities may generate. It is expected that before construction of the facility commences, the contractor will use the ESMP to generate specific implementation plans for each of the construction activities. There are certain areas of the construction activities that will generate hazardous wastes, high safety risks and adverse impacts to the environment and to the project area communities that will require specific plans that can guide the construction teams implementing the project.

## 8.2 Environmental and Social Management Plans (ESMPs)

### 8.2.1 Objectives of Establishing ESMP

The objectives of the ESMP include:

- To provide an overview of the environment, health and safety (EHS), socio-economic and cultural heritage policies, standards and legal legislation that the Project is obliged to comply with,
- To monitor the implementation of mitigation measures against potential adverse impacts of construction and operation phases of the project to ensure that they conform and comply with relevant environmental and social policies, guidelines and legislation;
- To assess for emerging non-anticipated adverse environmental and social impacts and implement relevant mitigation measures to maintain them within acceptable levels;
- To maintain best practices in environmental, social health and safety during project construction and operation phases
- To address capacity building needs within staff of the Project Implementor, Supervision Consultant, Contractor and the Government Authority under whose responsibility the project falls.
- To provide guidance on how to manage EHS risks in the construction phase of the Project in compliance with EHS policies, standards and legal regulations and to ensure that Project commitments are fulfilled,
- To determine the roles and responsibilities of the Supervising Team and Contractors to ensure compliance with EHS requirements during the construction phase of the project,
- To ensure that construction activities are properly checked to ensure that the Project is in compliance with EHS policies, standards and legal regulations;
- Ensure reporting systems are developed and streamlined to deliver EHS compliance performance;
- Enabling ongoing development and EHS compliance coverage.

### 8.2.2 Scope of the ESMPs

The ESMP has been prepared with the aim of defining and meeting the requirements of the project sponsors and local environmental regulations regarding the following aspects:

- Consideration of the Project Phases;
- Identification of Positive and Negative Impacts;
- Mitigation Measures and Enhancement programs;
- Responsible Institutions and Professionals;

- Monitoring programs;
- Consultations;
- Estimated costs;
- Implementation schedules and reporting.

### 8.2.3 Grievance Management/Redress Mechanism

A Grievance Redress Mechanism GRM shall be established to receive and facilitate resolution of complainants (project affected people, local community and workers) concerns and grievances regarding the project's performance during the construction, operation and decommissioning phases of the project. The mechanism should be able to address the concerns and complaints in a timely fashion by using an easy to understand, transparent and effective grievance redress process that is readily accessible to all segments of the project area population including workers and community members **Figure 16** below provides a chart showing some of the main steps that the GRM shall follow in solving grievances.

This GRM has been developed with the intention of providing an effective tool for early identification, evaluation and resolving of grievances during the full cycle of the project. The range of issues that are likely to arise requiring this process include:

- Unfair or biased job allocations;
- Poor management of construction activities;
- Compensation payment for services rendered or damages to property,
- Failure to fulfil commitments;
- Interference with public utilities;
- Accidents due to inappropriate planning of vehicle movement;
- Conflicts between migrant workers and local communities;
- Disturbance due to excessive noise or other nuisance during construction or operation;
- Unfair treatment of workers or unsafe working conditions;
- Issues related to Gender (GBV, SEA and VAC).

Since the range of issues is diverse, the GRM should be comprehensive enough to tackle complaints without any costs and also provide privacy to complainants especially gender issues.

An effective GRM should have the following:

- Identification of personnel (Grievance Officer who will be receiving and recording grievances at the site level);
- Process of evaluating grievances and determining which process to follow;
- Process of making decisions on providing resolutions;
- Notification procedures;
- Timeframes within which issues are to be resolved;
- Procedure for escalation of issues that cannot be resolved at the site level;

#### *8.2.3.1 Publicizing of the GRM*

The developed GRM should be publicized to ensure that all stakeholders (workers, community members, contractor, project management etc) are aware of the existence of the GRM and how it shall be used to resolve grievances.

#### *8.2.3.2 Grievance Redress Committee (GRC) and Meeting Calendar*

***The GRC***

The developer shall facilitate the formation of a Grievance Redress Committee (GRC). This committee shall comprise of the following representatives:

- Administration Officer;
- Site Supervisor;
- Grievance Officer – Responsible for receiving and recording grievances;
- EHS Manager;
- A Representative from the Community.

***GRC Meeting Calendar***

The GRC shall roll out its meeting calendar to the stakeholders so that they are aware of when to expect their issues resolved. It should endevour to meet as often as possible so that grievances do not remain unresolved for a long period. Other than the issues that the GRC Officer will be able to provide immediate solutions to when the complainants are registered, complaints will take 2 weeks or more. It is therefore suggested that the GRC meets every 2 weeks or as dictated by any registered urgent grievance.

#### *8.2.3.3 Special Representatives in the Committee*

The developer to consider having special interest representatives in the grievance committee (Female, Youth and Elderly Members) who can deliberate and resolve grievances touching on gender issues like sexual harassment, rape etc). This will help in safeguarding privacy of victims of rape and sexual harassment. It will also provide confidence to victims to come forth and register their complaints no matter how personal.

The Committee shall have the following functions:

- To keep a live register of all grievances lodged by complainants;
- To provide support to affected parties on issues arising from environmental or social impacts;
- To record grievances of the affected community by categorizing and prioritizing them, and providing solutions within a stipulated time period;
- To report to the aggrieved parties regularly and in a timely fashion, developments regarding their grievances and decisions of the GRC.
- To escalate any unresolved issues to the management in a timely fashion so that solutions are reached in good time.

#### *8.2.3.4 Training Workshop*

The project developer shall hold a training workshop for stakeholders (workers and community members) to educate and sensitise them regarding the operations of the GRM. This training shall be carried out before rolling it out so that the team is ready to receive and resolve grievances immediately stakeholders get to know of its existence.

#### *8.2.3.5 Receiving and Recording of Grievances*

The Grievance Officer shall receive anonymously record the grievance in a grievance form and assess the type of grievance. If it is an issue that can be resolved immediately then a solution shall be provided by the Grievance Officer. If it requires deliberation of the GRC then the Grievance Officer shall indicate the timeframe when the complainant should expect the issues to be resolved.

The Grievance form that shall be used to record grievances shall contain the following information:

- Unique Serial number of the complaint;
- Date and time of receipt of the complaint;
- Particulars of the complainant (Name, Address, Contact details);
- Nature of Complaint (Subject of the complaint, Brief description of the complaint, where the issue occurred and when.
- Suggestion from the complainant the expectations or what they want done for them.

#### *8.2.3.6 GRC Reports*

The GRC shall prepare detailed monthly reports that shall be submitted to the management. The reports shall contain the following among other issues:

- The grievances recorded during the reporting period;
- The resolutions provided to the complainants;
- The period taken to resolve each of the issues;
- The response received from the complainant after receiving resolution from the GRC;
- List of grievances that have been escalated to the management and the timeframe taken to provide solution;
- Classification and Analysis of the grievances for lessons learnt and improvement of project operations;
- Minutes of all the meetings of the GRC.

#### *8.2.3.7 Monitoring by Management*

The Project Management shall carry out monitoring review (Quarterly) of the GRC Reports in order to establish the effectiveness of the grievance mechanism and whether there are any unresolved issues. The GRC shall ensure timely submission of the monthly reports to the Management. Feedback from the Management shall be forwarded to the GRC for improvement.

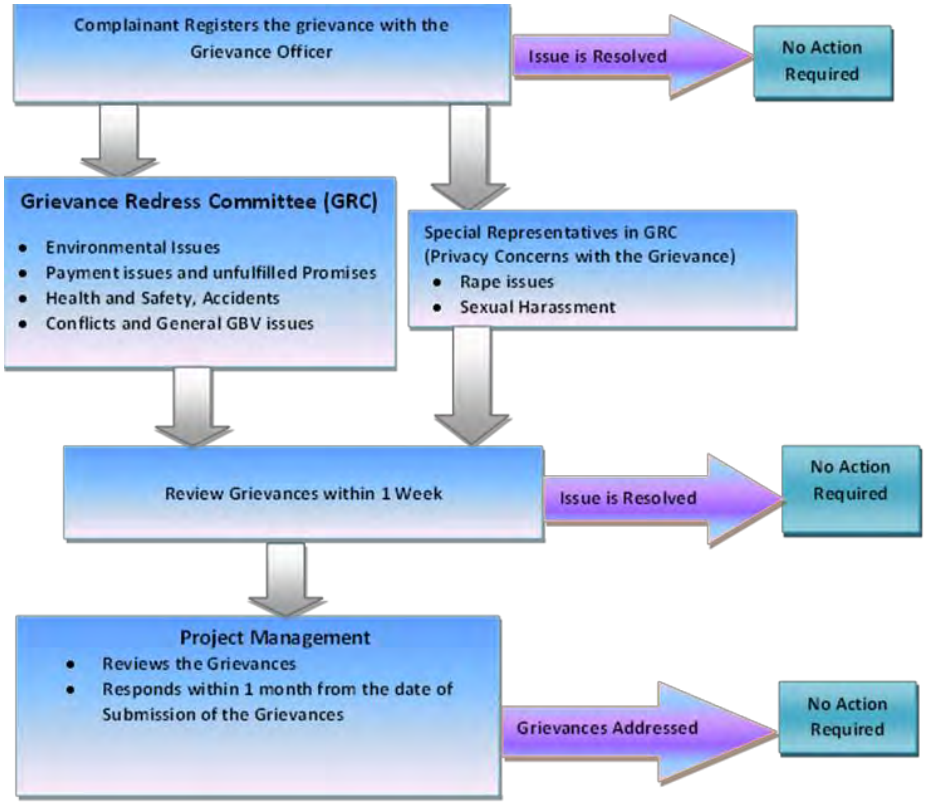



**Figure 16: Chart Showing Grievance Redress Mechanism**

## 8.3 Environmental and Social Management Plan during Construction Phase

The impacts, mitigation measures, responsible party, monitoring indicator and allocation of costs pertaining to prevention, reduction and monitoring of significant negative impacts and maximization of positive impacts associated with the construction, operation and decommissioning phases of the proposed project are outlined in **Table 75.**

## 8.4 Framework for Implementation of the ESMP

The Contractor will be expected to address all aspects of the construction activities in compliance with all laws and regulations, approvals, licenses and permits which are applicable to the proposed project. The Contractor shall ensure that he is familiar with the ESMP for the project. He shall prepare the work plan and strategy taking into account the relevant provisions of the ESMP. The prepared Management plans shall be reviewed and approved by Environment and Social Safeguards Officer of the project implementor.

The Contractor will also be expected to evaluate the construction activities/components and prepare appropriate project implementation management plans including:

1) Construction Environment and Social Management Plan;
2) Waste Management Plan;
3) Biodiversity Management Plan
4) Hazardous Waste and Materials Management Plan;
5) Occupational Safety and Health Management Plan (OSHMP) ;
6) Traffic Management Plan;
7) Water Management Plan

8) Air Quality Management Plan
9) Noise Management Plan
10) Community Engagement Plan;
11) Child Protection Strategy;
12) Workers Code of Conduct;
13) HIV and AIDS Management Plan;
14) Communication and Stakeholder Engagement Plan;
15) Labour Recruitment and Migrant Labour Management Plan;
16) Grievance Redress Mechanism;
17) Security Management Plan;
18) Worker Accommodation;
19) Quarry and Borrow Pit Management Plan;
20) Prevention and Protection Against GBV and Sexual Exploitation;
21) Whistle-blower Protection Strategy.

### 8.4.1 Organization Roles and Responsibilities

The Contractor will be expected to engage the following safeguards officers on a full-time basis for the period of the project.

- Grievance Officer (Sociologist);
- EHS Expert (Environmentalist);
- CLO (Community Liaison Officer – Community Representative).

Before commencement of construction process, the Contractor will be expected to show familiarity with the methodology on the implementation of Environmental and Social Safeguards.
The above officers will have the responsibility of assisting the Contractor to comply with the safeguard's requirements. Among other duties, the safeguards officers will be responsible for carrying out roles as listed in **Table 73.**

The Safeguards Team will be reporting to the Project Supervisor on Safeguards achievements, issues and challenges on regular basis.

**Table 73: Roles of Safeguards Officers Engaged by the Contractor**

| No | Title/Designation | Duties/Roles |
|---|---|---|
| 1 | EHS Officer | • Assist the Contractor to Develop CESMPs<br>• Ensure the Contractor has applied and obtained all the necessary Approvals, Permits and Licenses as elaborated in Table 10 of this report.<br>• Supervision of Health and safety and implementation of Tool Box Talks<br>• Implement Environmental Safeguards in the project to protect people and the environment<br>• Prepare Sub-Project ESHIA Reports for various independent subprojects like borrow pits etc and obtained approvals/Permits<br>• Coordinate environmental compliance in the project<br>• Oversight waste management<br>• Ensure environmental information reaches team leaders<br>• Prepare environmental safeguards reports<br>• Carry out surveillance on safety issues and safety training<br>• Preparation of Environmental, Health and Safety Reports |

| No | Title/Designation | Duties/Roles |
|---|---|---|
| 3 | Grievance Officer (Sociologist) | • Interface between the Contractor and the workers and Community<br>• Support the Contractor on social safeguards and helps mobilize and organize Community and other stakeholder meetings.<br>• Record incidences taking place during construction work and liaises with the Project Supervisor to address the emerging issues.<br>• Record Grievances |
| 3 | Community Liaison Officer (CLO) | • Assist the Grievance and EHS Officers with communicating safeguards issues to the community<br>• Attend Grievance Redress Committee (GRC) Meetings |

### 8.4.2 Training, Education and Competency

Site Supervisor shall ensure that every employee/worker (direct or contractual) is aware of the EHS risks associated with the work being carried out at the site and is trained and competent in the relevant work practices and maintenance procedures. Training needs shall be identified and executed to ensure all staff are provided with adequate safety training for all levels of employees. The safety training should provide staff with the knowledge and skills necessary for organizing and managing occupational safety and health programmes. The team leaders with leadership skills and knowledge to lead should be supported to implement and apply occupational safety and health activities. Workers with the knowledge, skills and right attitudes should be encouraged/supported to enable them to work safely.

Areas that could be considered for training of various cadres of workers are:
- HSE Policy and how it applies to the workplace;
- Hazards/Risks and Emergency Response Procedures;
- Importance of Safety Induction and Toolbox Talks;
- Appropriate use of Personal Protective Equipment (PPE).

The above inductions and trainings will improve on competency of the workers and lower incidence of injury and improvement on working safely.

### 8.4.3 Assessment and Improvement

It is noted that often projects collect data on environment, safety and social aspects of the project however this data is never evaluated for improvement on the implementation of the ESMP.

Data on injury incidences should periodically analysed considering source of injury, frequency of occurrence and whether any safety measures were overlooked so that improvements can be made on lessons learnt.

### 8.4.4 Incident Management

All incidences occurring within the project shall be managed through the incident management procedure that has been put in place and conforms with DOSHS. Every team that is carrying out a task must have a person appointed to be in charge. The officer in charge shall be familiar with all incident management protocols All the procedures for different occurrences shall be documented using appropriate forms as guided by DOSHS. Team leaders shall be sensitized on the use of the forms and the required protocols of reporting incidences and timeframe in which all incidences must be reported. The incident reporting forms must always be within reach of the team leader or EHS Officer.

### 8.4.5 Reporting

It should be ensured that provisions for reporting incidents, accidents and dangerous occurrences during construction are promptly done using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO). The team leader or Officer in charge of a Task Team shall be inducted on the reporting protocols and requirements. The training or induction shall include:

- Procedure of making a report on incidences;
- The protocol to be followed and reporting hierarchy;
- How the forms should be filled (without errors or omissions);
- Reporting timeframe.

### 8.4.6 Management Review

The project Environmental and social Management and Incident reports shall be prepared and submitted on a monthly basis. Review by management shall be done on a quarterly basis and feedback given to the safeguard's teams.

### 8.4.7 Liaison and Communication to Stakeholders

A Stakeholder Engagement Plan shall be prepared to guide the process of engaging with stakeholders. The Stakeholder Engagement Plan is a crucial component of the Social Management Plans that will be implemented. Regular transparent communication between the project and the community and other stakeholders and vice versa is critical in building a good understanding between the parties involved. This good understanding shall be very important in managing unexpected situations that might arise during project implementation. The Stakeholder Engagement Plan shall include some community liaison measures for the operation phase as well. Communication to stakeholders has been carried out using different strategies as elaborated in **Table 74**.

**Table 74: Liaison and Communication to Stakeholders**

| No | Stakeholder | Mode of Communication with Stakeholder | Activity |
|---|---|---|---|
| 1 | Key Stakeholders | Visit to their individual offices | • Key informant Interview regarding project<br>• Filled in ESHIA Questionnaire |
| 2 | • Local Community<br>• Key Stakeholders<br>• Other Members | • Local Administration – PCM Posters<br>• Radio Advert | Convened Public Consultation Meeting (PCM) to provide project information and potential impacts |
| 3 | Local Community | Local Administration | Administration of Socioeconomic Questionnaire |
| 4 | • Local Community<br>• Key Stakeholders<br>• Other Member of the public | • Local Administration – PCM Posters<br>• Radio Advert | ESHIA Study to disclose Findings of the ESHIA Study – TBD |

## 8.5 Environmental and Social Management Plan during Construction Phase

The impacts, mitigation measures, responsible party, monitoring indicator and allocation of costs pertaining to prevention, reduction and monitoring of significant negative impacts and maximization of positive impacts associated with the construction, operation and decommissioning phases of the proposed project are outlined in **Table 75.**

**Table 75: Environmental and Social Management Plan**

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| **Construction Phase** | | | | | |
| 1 | Change in Land Use | • Construction activities should be restricted to the project footprint<br>• Restoration of the land to original stage after project life cycle | • EHS Officer<br>• Contractor | • Final Design showing project footprint | Contractors BOQ |
| 2 | Loss of trees and vegetation | • Tree Planting activities should be enhanced in affected areas without interfering with the transmission line<br>• Only cut down tree that must be cut | • EHS Officer<br>• Contractor | • Report of Tree Planting Exercise | 100,000/= pa |
| 3 | Solid Waste Generation | • Identify and pave waste collection points<br>• Engage a NEMA approved was disposal firm for waste management<br>• Contractor to prepare a detailed Waste Management Plan for the management of solid waste at the site<br>• Provision of waste bins on site | • EHS Officer<br>• Contractor | • Availability of Solid Waste Management Plan<br>• Contract of NEMA Registered Solid Waste Management Firm | 100,000/= pa |
| 4 | Soil Erosion and Storm Water Run-off | • Provide adequate drainage facilities to allow water to flow from one side to the other<br>• Do not heap excavated soil for long periods | • EHS Officer<br>• Contractor | • Design Report on drainages provided<br>• Regular report on status | Contractors BOQ |
| 5 | Labour influx (Migrant Workers) into the project area | • The contractor to develop & implement a Labour Influx (Migrant Workers) Management Plan and Workers' Camp & Accommodation Management Plans as part of C-ESMP<br>• Monitor all mitigation measures, including codes of conduct signed by all with physical presence on site, prioritization of local recruitment, induction of workers on GBV- SEA/SH, GRM for staff., avoid child and forced labour and enforce sub-contractor compliance of the same. | • EHS Officer<br>• Contractor<br>• Site Supervisor<br>• Grievance Officer | • Labour Influx Management Plan<br>• Monitoring reports | 200,000/= pa |
| 7 | Occupational Health and Safety | • Contractor to prepare a detailed Occupational Safety and Health Management Plan (OSHMP) that will provide all the required health and safety measures needed for the project activities<br>• Workers to be provided with appropriate PPE | • EHS Officer<br>• Contractor<br>• Site Supervisor | • Availability of detailed Occupational Safety Management Plan | 200,000/= pa |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| | | • All workers to undergo health and safety induction before embarking on any work<br>• Contractor to provide for regular toolbox talks on environmental protection and safety<br>• Provide adequate and appropriately stocked First Aid Kits for site workers<br>• Contractor to ensure that every team carrying out tasks where exposure to accidents exist has a competent certified First Aider. | | • Programme and records of Safety induction and Toolbox Talk | |
| 8 | Community Health and Safety | • Contractor to prepare a detailed Community Safety and Health Management Plan (OSHMP) that will provide all the required health and safety measures needed for the project activities<br>• Employed Community members to be sensitized on safety issues induction before embarking on any work<br>• Community members are sensitised on traffic movement within community areas. This includes:<br>✓ Vehicles movement programme<br>✓ What is expected of the community with regards with their safety and those of their children<br>✓ Incident reporting protocol<br>✓ Whistle blower protection | • EHS Officer<br>• Contractor<br>• Site Supervisor<br>• Grievance Officer | • Availability of detailed Community Safety Management Plan<br>• Programme and records of Safety induction and Toolbox Talk | 200,000/= pa |
| 9 | Impacts on soil | • Store hazardous chemicals on paved surfaces with containment<br>• Use well maintained vehicles and machinery that do not leak oils or hydraulic fluids<br>• Carry out soil analysis to establish status<br>• Incident response procedure<br>• Staff induction on incident prevention and response procedures to be followed when such an occurrence takes place. | • EHS Officer<br>• Contractor | • Provision of Hazardous Waste Chain of Custody Forms<br>• Soil Monitoring Report where impacts are recorded<br>• Availability of incident response procedure at various working places where such incidences are likely to occur | 200/000/= pa |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| 10 | Impacts on soil, surface and shallow ground water | ***Drainage Pattern***<br>• Design and construct drainage systems within the facility so that storm water generated during construction does not end up on channels leading to streams or rivers within the project area<br>• River Mtopanga traverses the TL corridor<br>***Other Contaminants like oils and chemicals***<br>• Service vehicles and machinery on paved areas with containment<br>• Store oils, hydraulic fluids and other chemicals on paved areas with containments<br>• Monitor machinery and vehicles for any signs of oil leaks on a daily basis and immediately withdraw the services of such vehicles/machinery from the site<br>• Monitor the quality of water at the nearest borehole/existing water pond near site during the construction phase and record any changes in water quality<br>• Carry out water analysis quarterly to establish status. | • EHS Officer<br>• Contractor | • Design showing drainage<br>• Water Quality monitoring report<br>• Incident Reports | 100,000/= pa |
| 11 | Fugitive Dust from Construction Activities | • Dust suppression by use of water<br>• Instructing excavator machine operators to maintain low speeds<br>• Monitor Air Quality on a regular basis<br>• Provide workers with dust masks | • EHS Officer<br>• Contractor | • Air Quality Monitoring Report<br>• Reports on induction of drivers on site operation requirements | 150,000/= pa |
| 12 | Fugitive Dust Generated by Vehicles driving in the project area | • Dust suppression by use of water<br>• Instruct drivers to maintain low speeds<br>• Monitor Air Quality on a regular basis<br>• Provide workers with dust masks | • EHS Officer<br>• Contractor | • Air Quality Monitoring Reports<br>• Reports on induction of drivers on speed limits | 150/000/= pa |
| 13 | Excess Noise from Vehicles and Machinery | • Instruct drivers to reduce speed of vehicles and minimize raving of engines<br>• Drivers to minimise unnecessary hooting<br>• Provide workers with ear muffs<br>• Service vehicles and machinery regularly | • EHS Officer<br>• Contractor | • Noise Monitoring Reports<br>• Reports on induction of drivers on speed limits | 150,000/= pa |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| | | • Effect regular noise level monitoring | | | |
| 14 | Exhaust Emissions | • Service vehicle and Machinery regularly<br>• Provide workers with nose masks to guard against inhalation of exhaust gases<br>• Carry out regular maintenance of vehicles and machinery<br>• Carry out Air Quality Monitoring | • EHS Officer<br>• Contractor | • Air Quality Monitoring Reports<br>• Rerecords of Service of Vehicles and Machinery | 100,000/= pa |
| 15 | Hazardous Material Spillage (Hydraulic fluids, engine oils and ither chemicals) | • Store hazardous materials in a secured area for proper management<br>• Provide the storage area with a paved surface with containment<br>• Maintain a chain of custody form for each hazardous material for accountability<br>• Provide regular reports (quarterly) on stock balance records of such hazardous materials. When significant disparities are noted, reasons must be provided in the quarterly reports and proposed action | • EHS Officer<br>• Contractor | • Report on contained storage of hazardous materials<br>• Completed Chain of custody forms | 200,000/= pa |
| 16 | Social Vices GBV, VAC and SEA | • Contractor to develop and implement a GBV- SEA (Sexual Exploitation and Abuse and workplace Sexual Harassment (SH) Management Plan, (including plans for prevention, response on GRM)<br>• Contractor to ensure that a code of conduct is developed and signed by all with physical presence on site<br>• Contractor to train and create awareness to local communities and workers on GBV<br>• Contractor to ensure that the project GRM provides confidential reporting, safe and ethical documenting of GBV cases.<br>• Contractor to ensure that the project does not trigger or exacerbate other forms of GBV at the community level by reviewing specific project components that are known to heighten GBV risk, and ensure effective and on-going | • EHS Officer<br>• Grievance Officer<br>• Contractor | • Reports on sensitisation initiatives conducted<br>• GRM Records<br>• Employment records showing employment and disabled persons | 300,000/= pa |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| | | community engagement and consultation, particularly with women and girls, among others.<br>• Contractor can refer to the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018) for further guidance.<br>• Establish sensitization initiatives /programs targeting locals e.g., on HIV/AIDS prevention<br>• Establish a grievance redress mechanism (GRM) for the project and to ensure effective management of emerging issues especially with women and girls<br>• Mainstream issues of gender, persons with disability into the overall project framework.<br>• Prioritise employment of local labour where possible | | | |
| 17 | Potential Traffic Accident Risk | • Prepare a comprehensive Traffic Management Plan and execute it to safeguard project personnel and community<br>• All drivers to be thoroughly inducted on driving safely when entering and exiting the site and when passing through community areas<br>• Contractor to provide traffic marshals at areas identified in the Traffic Management Plan as high risk | • EHS Officer<br>• Contractor | • Records of induction of Drivers on safe driving skills<br>• Presence of traffic Marshals at the entrance to the site | 500,000/= pa |
| 18 | Impacts on Ecology | • Prepare a Biodiversity Management Plan<br>• The Plan should take care of the following issues among others:<br>✓ Existing fauna are protected from accidents;<br>✓ Noise within the project area is minimised;<br>✓ Operations at night that might interfere with animals is avoided;<br>• Use existing roads for transportation of materials and constriction activities<br>• Establish tree nurseries of the key for restoration in other areas to avoid complete loss of rare species | • EHS Officer<br>• Contractor<br>• Site Supervisor | • Biodiversity Management Plan<br>• Reports on programme to implement recommendations | 400,000/= pa |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| | | • Control of invasive species should be done promptly to avoid their population explosions which in turn destabilize the growth of indigenous species<br>• Vehicles and machinery entering the project site should be subjected to one off cleaning upon arrival to avoid introducing invasive species from other regions. Upon completion of work they should also be cleaned again so that they don't spread such species elsewhere.<br>• Unnecessary soil and vegetation disturbance should be avoided<br>• An invasive species management programme should be developed by Bamburi's Lafarge Ecosystems experts for monitoring and control of the species<br>• Waste disposal bins with secure lids shall be availed on site<br>• Construction waste should be sorted and properly stored before proper disposal<br>• Restore other areas in Bamburi where mining of cement construction materials has been decommissioned to help compensate for lost habitat to mammals<br>• Where overhead transmission lines are used, attach bird flight diverters (typically flappers, balls or spirals) to transmission grounding wires to increase their visibility<br>• Reptiles and amphibians are expected to move between habitats. The fence type should include under-passes that allow movement of crawling animals<br>• Ensuring there is a good drainage system to avoid collection of water that may cause invertebrate assemblages | | | |
| 19 | Covid 19 | • Provide facemasks to workers as appropriate and a bin for temporary facemasks disposal on site | • EHS Officer<br>• Grievance Officer<br>• Contractor | • Availability of Covid 19 Sanitation equipment (digital thermometer | 400,000/= pa |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| | | • The bin should be emptied and disposed as infectious hazardous waste according to NEMA guidelines on Covid-19 waste disposal.<br>• Hand wash facility with clean water should be provided.<br>• Ensure all workers undergo mandatory temperature test every morning.<br>• Ensure that conveniently accessible, clean, orderly, adequate and suitable sanitary facilities are provided and maintained within the site<br>• Ensure employees keep distance when working<br>• Anybody with flu like symptoms should be taken for further management at the clinic or dispensary<br>• There should be strict observance of social distancing during transportation to work places | | • Presence of trained Officer at entrance to monitor temperatures and sanitize those entering premises | |
| 20 | Grievances Redress Mechanism | • Contractor to develop an effective project GRM to ensure every grievance is registered, documented, fully addressed and closed out. GRM to ascertain anonymity and confidentiality.<br>• GRM shall endeavour to take care of privacy of women and girls regarding GBV, SEA, SH and VAC issues in as far recording, deliberation on solutions and relay of feedback to victims/ | • Grievance Officer<br>• Contractor | • Availability of an effective Grievance Redress Mechanism<br>• Set up a Grievance Redress Committee | 200,000/= pa |
| 21 | Spread of communicable diseases, HIV/ AIDs and other sexually transmitted diseases | • Contractor to develop and implement a STD/HIV/AIDS awareness plan on prevention and mitigation<br>• Sensitise workers and community on communicable diseases<br>• Make condoms readily available and sensitise workers and community on importance using condoms to protect oneself from infection with sexually transmitted diseases (STIs) | • EHS Officer<br>• Grievance Officer<br>• Contractor | • STD/HIV/AIDS awareness plan | 200,000/= |
| **Operation Phase** | | | | | |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| 1 | Solid Waste | • Ensuring efficient solid waste management<br>• Provision of waste bins with secure lids | • Bamburi Cement<br>• Site Manager | • Solid Waste Management Plan<br>• Availability of Waste Bins | 20,000/= pa |
| 2 | Storm Drainage Water at the site | • The proponent to ensure there is adequate means for handling storm water at project site.<br>• A well-planned drainage system that will allow growth of and for diverting storm water runoff<br>• Thorough inspection of the site after heavy rain to take of any damages caused rapid drainage of water surface runoff | • Bamburi Cement<br>• Site Manager | • Drainage Infrastructure Reports | 50,000/= pa |
| 3 | Occupational Health and Safety of Workers | Workers to be provided with appropriate PPE including:<br>• Appropriate PPE to guard against electric shocks<br>• Harnesses or appropriate equipment for working at heights | • Bamburi Cement<br>• Site Manager | • Availability of PPE<br>• Availability of appropriate PPE and equipment for carrying out maintenance | 200,000/= pa |
| 4 | Mortality of Birds and other animals | Daily monitoring of the Transmission line by the site manager for any birds or other animals that may have been killed by the facility and recording the following:<br>• Taking photos<br>• Recording the site location, date and time when the incident was noted (leave the site untouched until the Biodiversity Experts assess the incident)<br>• Reporting the incident to Bamburi for Biodiversity Experts to come to the site to assess the incident and prepare a report.<br>• Preparation of quarterly reports of mortality rates at the site | • Bamburi Cement<br>• Site Manager | • Availability of daily records from site<br>• Availability of Quarterly Reports on Birds and other Animal Mortality | 300,000/= pa |
| **Decommissioning Phase** | | | | | |
| 1 | Solid Waste Management | • Provision of waste handling bins<br>• Appropriate Segregation of waste for proper disposal and reuse of other materials<br>• Involvement of a NEMA Registered Firm for Hazardous materials | • Bamburi Cement<br>• Site Manager<br>• Decommissioning Contractor | • Approved Decommissioning Plan | 200,000/= |

| No | Impact | Mitigation Measure | Responsible Party | Monitoring Indicator | Cost (KShs) |
|---|---|---|---|---|---|
| 2 | Fugitive Dust Management | • Dust suppression by use of water<br>• Instructing machine operators to maintain low speeds<br>• Monitor Air Quality on a regular basis<br>• Provide decommissioning workers with dust masks | • Bamburi Cement<br>• Site Manager<br>• Decommissioning Contractor | • Air Quality Monitoring Reports during decommissioning | 100,000/= |
| 3 | Exhaust Emissions | • Service vehicle and Machinery regularly<br>• Provide workers with nose masks to guard against inhalation of exhaust gases<br>• Carry out regular maintenance of vehicles and machinery | • Bamburi Cement<br>• Site Manager<br>• Decommissioning Contractor | • Air Quality Monitoring Reports during decommissioning | 100,000/= |
| 4 | Excess Noise from Vehicles and Machinery | • Instruct drivers to reduce speed of vehicles and minimize raving of engines<br>• Minimise hooting unnecessarily<br>• Provide workers with ear muffs<br>• Service vehicles and machinery regularly | • Bamburi Cement<br>• Site Manager<br>• Decommissioning Contractor | • Noise Monitoring Reports during decommissioning | 100,000/= |
| 5 | Restoration of site | • Site revegetation through planting of indigenous trees | • Bamburi Cement<br>• Site Manager<br>• Decommissioning Contractor | • Restoration Plan | 100,000/= |

### 8.5.1 Biodiversity Management Plan

The biodiversity management plan (ESHMP subset) for flora and fauna in Bamburi site is presented in **Table 76** below. This matrix provides recommended management and monitoring activities based on the mitigation measure proposed above counteract the probable impacts. It provides management actions, monitoring indicators and identifies the responsible persons/organization for the implementation.

**Table 76: Biodiversity Management Plan for Mombasa Solar Power Plant Site**

| Biodiversity component | Aspect/ Indicator | Goal | Action | Monitoring frequency | Responsible | Cost (KShs) |
|---|---|---|---|---|---|---|
| Flora | Habitat loss and fragmentation | To minimise vegetation loss and conduct botanical monitoring within the Mombasa Solar Plant. To assess how species are re-establishing themselves after habitat loss and fragmentation | Establish plant nurseries of indigenous species for species restoration in undeveloped areas within the project site and its environs | Quarterly | Momnai Energy | 200,000 |
| Flora | Proliferation of Invasive species | To retain natural integrity of Mombasa Solar plant and the AOI | i) Monitoring and physical removal of invasive species as they germinate<br><br>ii) Vehicles and machinery entering the project site should be subjected to one off cleaning upon arrival to avoid introducing invasive species from other regions. Upon completion of work they should also be cleaned again so that they don't spread such species elsewhere. | Quarterly | Momnai Energy | 200,000 |
| Flora | Waste accumulation | To evaluate possible loss of species due to waste pollution | i) Conduct staff induction on best waste management practices<br>ii) Garbage bin should be provided at convenient points within the project area<br>iii) Garbage bins should be regularly emptied and lids | Monthly | Momnai Energy | 1.5M |

| Biodiversity component | Aspect/ Indicator | Goal | Action | Monitoring frequency | Responsible | Cost (KShs) |
|---|---|---|---|---|---|---|
| | | | properly secured to avoid waste spillage by animals | | | |
| Fauna - Birds, mammals, reptiles, amphibians, and invertebrates | Safeguarding survival of the fauna whose habitat is lost due to vegetation clearing | To monitor and rescue fauna that may appear stranded after the habitat loss | ii) Vegetation clearing should be done in a way that drives animals towards safe natural habitats<br>ii) Capture and relocate any slow-moving animals e.g. snakes found on the project area during clearing or at any other time to secure natural habitats | Daily | Momnai Energy | 150,000 |
| Fauna - mammals, reptiles, amphibians, and invertebrates | Ecological barriers and mortality of less mobile species | To monitor distribution of fauna within the project AOI in Bamburi | Document inter- and intra-species movement patterns | Quarterly | Momnai Energy | 1.2M |
| Fauna - Birds, mammals, reptiles, amphibians, and invertebrates | Decline or loss of species | To understand the general trends of various flora and fauna taxa during the project tenure | Document species trends and status in the project AOI | Annually | Momnai Energy | 2 M |

| Biodiversity component | Aspect/ Indicator | Goal | Action | Monitoring frequency | Responsible | Cost (KShs) |
|---|---|---|---|---|---|---|
| Fauna - Birds, Invertebrates, bats | Light pollution | To minimise the amount of artificial light that negatively affects the activity of nocturnal species | Document and monitor cases of birds and bats disorientation and risks due to effects of light | Daily | Momnai Energy | 1M |
| Fauna - Birds, mammals, reptiles, amphibians, and invertebrates | Dust pollution | To understand the impact of fugitive dust during construction phase on flora and fauna | Assess layer of dust accumulated on plant leaves in project surrounding area | Monthly | Momnai Energy | 150,000 |
| Fauna – Birds, mammals, reptiles, amphibians, and invertebrates | Solid & liquid waste pollution | To assess and monitor negative impacts of waste discharge on fauna | i) Document incidents of species poisoning or die offs<br>ii) Document the formation of new microhabitats<br>iii) Document species trends in terms of abundance and diversity | Weekly | Momnai Energy | 300,000 |
| Animal electrocution by transmission lines | Monitor and document number of electrocution cases by species | To assess and monitor negative impacts on Animals | Proper insulation of all aerial cables<br>Consider using underground cabling<br>Attach bird flight diverters on overhead transmission lines. | Daily | Momnai Energy | 300,000 |
| Herpetofauna | Loss/modification of critical microhabitats | To monitor reptile and amphibian activity patterns and spatial occurrence | Document amphibian and reptile breeding or feeding sites and hatchlings | Monthly | Momnai Energy | 150,000 |
| Herpetofauna, mammals, invertebrates | Loss of dispersal corridors | Monitor species movements and habitat utilization within the TL corridor and surrounding areas | Report on reptile, amphibian, mammal and invertebrate occurrence records within the project area | Monthly | Momnai Energy | 400,000 |

## 8.6 Environmental and Social Monitoring Plan

### 8.6.1 Monitoring Framework

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 should at least include the following parameters:

- Collection and analysis of relevant environmental and social data of the site including:
  - ✓ Evaluation of the site vegetation cover that is to be cleared before construction
  - ✓ 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 noise generation during construction and comparison with baseline measurements
  - ✓ Monitoring of dust generation during construction and comparison with baseline measurements
  - ✓ Monitoring to ensure to prevent invasion by exotic species;
  - ✓ Monitoring of health and safety issues (accidents and injuries and causes) and carrying out analysis to see trends and use them corrective action
  - ✓ Evaluation of noise generation and duration during construction activities and comparison with baseline measurements;
  - ✓ The amount of water consumed during the construction and operation phases;
  - ✓ Monitoring of diseases within the workforce;
- Identification of unexpected environmental and social impacts;
- Formulation of counter-measures to mitigate unexpected negative impacts and comparing them with actual impacts as identified during the assessment.

Internal Monitoring of the project activities will be carried out as follows:

Safeguards officers (EHS and Grievance Officer are to carry out daily monitoring of safeguards compliance by Contractor. They are to convene regular safeguards meetings (weekly) to discuss environmental, social and OHS issues and performance . They are to ensure Contractor organises brief daily toolbox talks on Health and Safety.

- Incident/accident notification and reports are to be prepared and submitted within 24 hours
- Safegurds Reports (Environmental, Social and OHS) to be submitted on a monthly basis
- Monitoring of environmental parameters are to be carried out as stipulated in the monitoring plan and reports prepared and submitted to the Site Supervisor for onward transmission to the Project Management Team.

**Table 77** provides safeguards monitoring activities to be carried by different project implementation offices.

**Table 77: Internal Environmental and Social Monitoring of Project Activities**

| Officers | Activity | Aspects/Parameters | Output |
|---|---|---|---|
| EHS Officer | Carry out environmental safeguards inspection of construction | • Carry out daily supervision and monitoring of the ESMP Compliance by Contractor | • Daily records of inspection findings |

| Officers | Activity | Aspects/Parameters | Output |
|---|---|---|---|
| | activities on a daily basis | • Carry out daily supervision and monitoring Monitoring of OHS compliance by Contractor<br>• Review of includig CESMPs, permits, safety induction, meetings and tool box talks<br>• Inspection of waste management at the camp and construction sites<br>• Inspection of Environmental protection (Garage, Workshop, field etc)<br>• Inspection of traffic management and signages<br>• Inspect[on of PPE use by workers<br>• Facilitation of monitoring of environmental aspects (air, noise at high risk areas daily during work session and water from the nearest groundwater and pond on a quaterly basis)<br>• preparation of incident records and reports | • Preparation of environmental safeguards monthly reports |
| Grievance Officer (Sociologist) | Carry out social safeguards inspection of the construction activities | • Review social safeguards documents<br>• Facilitation of GRM performance<br>• Facilitation of Stakeholder/ Community Engagement/Meetings<br>• Facilitation of involvment of disdvantaged groups (women and girls) in project activities<br>• Review labour influx and its impact on VMGs<br>• Review of GBV and Violence Against Children (VAC)<br>• Facilitation of monitoring of social aspects<br>• Providision of guiidance on non-compliance to Contractor | Preparation of social safeguards monthly reports |

The ESHIA study has revealed that the proposed project will generate some impacts that require mitigation measures during construction period. These potential impacts are not very significant but require close monitoring during construction and post construction period they do not become of serious concern to the project.

Monitoring will involve measurements, observations, evaluations, assessment and reporting on various variables during construction and operation.

### 8.6.2 Monitoring Plan

Arising from the study, the aspects to be monitored are given in **Table 78.**

**Table 78: Environmental and Social Monitoring Plan (Monitoring Plan)**

| Location | Environmental/ Social Component | Monitoring Requirements | Performance Indicators | Frequency of monitoring/ Duration | Responsibility |
|---|---|---|---|---|---|
| **1. Construction** | | | | | |
| Contractor's Camp | Public health and safety | • Reports from Community<br>• Physical inspection<br>• EHS records<br>• Incident logs maintained by Contractor | • Provision of condoms, contraceptives and mosquito nets.<br>• No of campaign meetings on transmission of diseases like HIV/AIDS and other STDs.<br>• Availability of adequate solid waste bins and waste disposal procedures<br>• Availability of first aid facilities.<br>• Outpatient attendance registers.<br>• Prevalence rates of common diseases.<br>• Compliance with the Occupational Safety and Health<br>• Compliance with Public Health Act. | Monthly | • EHS Officer<br>• Grievance Officer<br>• Contractor |
| | Solid and liquid wastes from Offices and Residential areas | • Physical inspection of Camp<br>• Physical inspection of sewage system<br>• Number of complaints | • Presence of scattered litter.<br>• Confirm records of waste disposal<br>• Signs of obstruction of water courses.<br>• Evidence of engaging a NEMA registered waste disposal firm | Monthly | • EHS Officer<br>• Contractor |
| | Hazardous/Chemical waste (Used Oil, Oil filters, hydraulic fluids and Lubricants) | • Physical inspection of Garage and workshops<br>• Records of hazardous waste handling and disposal | • Presence of oil spillage<br>• Chain of custody forms for handling, storage and transportation for disposal by NEMA registered firm<br>• Contract of NEMA Registered Firm | Weekly | • EHS Officer<br>• Grievance Officer<br>• Contractor |
| | HIV&AIDS | • Inspection of HIV/AIDS prevention services in the project<br>• Number of condoms, ARVs provided. | • Number campaign meetings on transmission of diseases like HIV/AIDS and other STDs.<br>• Number of condom dispensers within the site.<br>• Number of ARVs provided to vulnerable persons | Quarterly | • EHS Officer<br>• Grievance Officer<br>• Contractor |

| Location | Environmental/ Social Component | Monitoring Requirements | Performance Indicators | Frequency of monitoring/ Duration | Responsibility |
|---|---|---|---|---|---|
| Material Sites (Quarry, Borrow Pits) | Solid and liquid wastes | • Physical inspection<br>• Number of complaints | • Scattered litter<br>• Signs of obstruction of water ways.<br>• Flow of wastewater on the ground surface.<br>• Provision of sanitary facilities to the construction crews. | Monthly | • EHS Officer<br>• Contractor |
| | Noise | • Documentation on complaints about noise<br>• Carry out noise daily measurements<br>• Zone out elevated noise areas for mandatory use of PPE (ear muffs) | • Level of noise generated.at site during construction, quarry/borrow pit<br>• Provision of PPE.<br>• Compliance with existing noise standard issued by NEMA.<br>a) **Health, Educational facility**<br>*109 dB(C) Max*<br>b) **Residential, Commercial Facilities**<br>*114dB(C)* | • Use of portable equipment to monitor noise levels on regular and adhoc basis<br>• Monitor daily during active operation | • EHS Officer<br>• Contractor |
| | Air Pollution<br>• Exhaust emissions<br>• Fugitive dust | • Physical inspection<br>• Interview residents including workers<br>• Liaise with other stakeholders<br>• Carry out daily air quality measurements ($SO_x$, $NO_x$, $PM_{10}$ and HC) | • Level of dust generated.<br>• Provision of PPE.<br>• Compliance with existing air quality standards issued by NEMA<br>- Sulphur Oxides ($SO_x$) - 60µg/$m^3$<br>- Oxides of Nitrogen ($NO_x$) - 60µg/$m^3$<br>- Respirable Particulate Matter (RPM) -50µg/$m^3$<br>- Total Volatile Organic Compound (VOC) - 600µg/$m^3$ | • Use of portable equipment to monitor air pollution on regular and adhoc basis<br>• Monitor daily on active operation | • EHS<br>• Contractor |
| | Rock Blasting causing damage to structures | • Physical inspection<br>• Field determination of area of influence | • Area of influence of the rock blasting<br>• Baseline status of nearby structures | After every blast | • EHS<br>• Grievance Officer<br>• Contractor |
| Site Construction Activities | Vibration causing damage to neighboring structures | • Physical Inspection<br>• Field measurement of vibration level and distance of influence. | • Establish baseline of existing structures neighboring the road<br>• Compliance with existing noise standard issued by NEMA. | Monthly | • EHS<br>• Contractor |

| Location | Environmental/ Social Component | Monitoring Requirements | Performance Indicators | Frequency of monitoring/ Duration | Responsibility |
|---|---|---|---|---|---|
| | Air Pollution<br>• Exhaust emissions<br>• Fugitive dust | • Physical inspection<br>• Interview residents including workers<br>• Liaise with other stakeholders<br>• Carry daily out air quality measurements ($SO_x$, $NO_x$, $PM_{10}$ and HC) | • Level of dust generated.<br>• Compliance with existing air quality standards issued by NEMA<br>- Sulphur Oxides ($SO_x$) - 60µg/$m^3$<br>- Oxides of Nitrogen ($NO_x$) - 60µg/$m^3$<br>- Respirable Particulate Matter (RPM) -50µg/$m^3$<br>- Total Volatile Organic Compound (VOC) - 600µg/$m^3$ | • Use of portable equipment to monitor air pollution on regular and adhoc basis.<br>• Monitor 3 times a week near settlement centres and institutions like mosques, hospitals and schools | • EHS<br>• Contractor |
| | Traffic Management during the day | • Physical inspection of the road under construction to ensure flagmen are active and road signs are in place<br>• Maintaining low speeds | • Incident records<br>• Accidents<br>• Compliance with approved traffic management plan | Daily | • EHS<br>• Contractor |
| | Traffic Management at night | • Installation of retro-reflective road signs near site turning<br>• Physical Inspection of signs | • Incident records<br>• Accidents | Daily | • EHS<br>• Contractor |
| | Drainage Discharge causing damage | • Physical inspection of water drainage discharge routes<br>• Reports from Community<br>• Damage caused | • Registered complaints of damages<br>• Records of damage caused | Weekly during the rainy season when drainages contain water | • EHS<br>• Contractor |
| | Noise | • Documentation on complaints about noise<br>• Carry out daily<br>• noise measurements<br>• Zone out elevated noise areas for mandatory use of PPE (ear muffs) | • Level of noise generated.<br>• Provision of PPE.<br>• Compliance with existing noise standard issued by NEMA.<br>a) **Residential Outdoor**<br>*Day - 50 dB(A), Night – 35 dB(A)*<br>b) **Place of Worship**<br>*Day – 40dB(A), Night - 35dB(A)* | • Use of portable equipment to monitor noise levels on regular and adhoc basis<br>• Monitor daily during active operation | • EHS<br>• Grievance Officer<br>• |

| Location | Environmental/ Social Component | Monitoring Requirements | Performance Indicators | Frequency of monitoring/ Duration | Responsibility |
|---|---|---|---|---|---|
| | Flora and Fauna | • Records of uprooted trees<br>• Physical observation | • Amount of vegetation removed<br>• Change in animal behavioral pattern | Quarterly | • Environmental Supervisor |
| | Gender Empowerment | • Review of company staff records.<br>• Physical Inspection | • Number of female employees<br>• Number of male and female toilets | Quarterly | • Grievance Officer |
| | Crime Management and security | • Review of records<br>• Interviews with staff and local community | • Number of reported crimes<br>• Number of complaints | Monthly | • EHS<br>• Grievance Officer |
| | Impacts on Children Violence Against Children (VAC) | • Review of records<br>• Interviews with staff and local community | • Record of employees including IDs | Monthly | • Grievance Officer |
| | GBV, Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) | • Review of grievance redress forms.<br>• Interviews with local community | • Number of complaints | Monthly | • Grievance Officer |
| | Loss of Life, Injury and Damage to Private property | • Interviews with staff and local community.<br>• Review of records | • Record of accidents and damages done<br>• Records of reprieve actions | Monthly | • EHS Officer<br>• Contractor<br>• Grievance Officer |
| | Labour Influx | • Interviews with local administration on influx and conflicts<br>• Complaints log<br>• Interviews with grievance committee members | • Number of grievances<br>• Incidences of conflicts | Monthly | • Grievance Officer |

| Location | Environmental/ Social Component | Monitoring Requirements | Performance Indicators | Frequency of monitoring/ Duration | Responsibility |
|---|---|---|---|---|---|
| | Increased Conflicts | • Police incidence reports<br>• Information from Local Administration<br>• Grievance/Complaints logs | • Records of conflicts with local administration<br>• Number of grievances<br>• Complaints logs | Monthly | • Grievance Officer |
| **Operation** | | | | | |
| Operational Transmission Line | Mortality of Birds and other Animals | • Inventory of birds and other animals killed by transmission line infrastructure | • No of birds<br>• Species<br>• Frequency of occurrence | Daily | Site Maintenance Officer |
| | Drainage damages | • Damaged areas | • Records of damages including dates and locations<br>• Records of complains from Community | Rainy Season | Site Maintenance Officer |

***Source:*** *ESHIA Study, 2021*

# 9 COMMUNITY DEVELOPMENT ACTION/FRAMEWORK

Corporate Social Responsibility (CSR) is a management concept whereby organizations integrate social and environmental concerns in their business operations and interactions with their stakeholders. CSR generally is the way through which a company achieves a balance of economic, environmental and social imperatives ("Triple-Bottom-Line- Approach"), while at the same time addressing the expectations of shareholders and stakeholders.

Promoting the uptake of CSR amongst a community requires approaches that fit the respective needs and capacities of these communities and do not adversely affect their economic, social and environmental viability. It is an attempt to align private enterprises to the goal of sustainable global development by providing them with a more comprehensive set of working objectives than just profit alone. The perspective taken is that for an organization to be sustainable, it must be financially secure, minimize (or ideally eliminate) its negative environmental impacts and act in conformity with societal expectations.

Key CSR issues: environmental management, eco-efficiency, responsible sourcing, stakeholder engagement, labour standards and working conditions, employee and community relations, social equity, gender balance, human rights, good governance, and anti-corruption measures.

## 9.1 Need for Community Action Plan and CSR

The Consultant engaged with the local community and from these consultations, certain socio-economic areas were found to be inadequate. The community suggested areas of interest to them.

### 9.1.1 Proposed Activities

The following activities were identified as inadequate in the area and the communit6y would appreciate if the proponent would assist in implementing all or some.

- Lack of employment opportunities;
- Provision of subsidized power;
- Maintenance of Bamburi road which floods during the rainy season;
- Bamburi Cement to open up the Bamburi Road and repair the Timboni-Shanzu Road
- Scholarships for community members' children.

### 9.1.2 Implementation Plan

The above requests from stakeholders and communities have been shared with the project proponent for follow-up and appropriate action.

# 10 CONCLUSIONS AND RECOMMENDATIONS

## 10.1 Introduction

The conclusions and recommendations have been provided here to highlight the key findings and recommendations. Data related to the Study have been provided in the main report and Appendices of this report.

## 10.2 Conclusions

The environmental, social and Health Impact Assessment (ESHIA) of the proposed Transmission Line at Bamburi Cement Mombasa Site has been conducted in accordance with national legislative requirement, the World Bank Policies, IFC's Performance Standards and World Bank's Environmental Health and Safety (EHS) Guidelines, EIB Environmental and Social Standard and International Labour Organization (ILO) Convention. The ESHIA study has been carried out based on the site visit, baseline environmental and social condition survey including Specialized Ecological Study on biodiversity, stakeholder consultation, analysis of the possible project intervention. The experts identified and evaluated potential environmental impacts associated with all aspects of the proposed project.

The proposed project is going to be developed on a parcel of land located within an area that was previously excavated for raw materials and access road construction. The land is privately owned by Bamburi Cement.

The key potential environmental impacts due to the project construction as established by the ESHIA study are change on land use, some loss of vegetation, drainage pattern change, moderate loss of habitat for some mammals, insects and amphibians, solid waste generation and disposal, increase in traffic and occupational health and safety. The economic opportunities in terms of local employment and provision of services during construction and operation phases are assessed as positive impacts. During the operation of the proposed project, the key issues related to the environment has been identified from the ESHIA study are ecological, visual impact and occupational health and safety.

The Environmental and Social Management Plan (ESMP) has described mitigation measures for impacts specific to the project activities and also discuss implementation mechanism for recommended mitigation measures along with a monitoring plan. Implementation of the ESMP will help the developer to comply with the national regulatory framework as well as to meet IFC Performance Standard requirements.

## 10.3 Recommendations

The Transmission Line Project can be implemented at the proposed site. All the mitigation measures provided in the ESMP and the Monitoring Plan need to be implemented as indicated to safeguard the biodiversity and physical environment of the project area. Health and Safety of the workers and community members have also been identified as key areas that require dedicated observance. This is of particular importance since workers will be working at heights when erecting the electrical poles and stringing the cables.

Implementation of the proposed ESMP will take care of the identified impacts and ensure the transmission line is installed and operated sustainably and the affected biodiversity restored and improved. Environmental, Social and Health issues of the project will need to be monitored and data analysed and used to improve the safeguards performance of the project.

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# 11 COLOPHON

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| Client | : Momnai Energy Ltd |
| Project | : Environmental, Social & Health Impact Assessment (ESHIA) for 33kV Transmission Line at Bamburi, Mombasa County |
| File | : Environment, Social Assessment & Resettlement |
| Length of report | : 205 pages |
| Author | : PANAFCON Ltd. |
| Date | : 11 May 2022 |