



MINISTRY OF ENERGY
REPUBLIC OF KENYA

**ENVIRONMENTAL IMPACT ASSESSMENT
REPORT FOR THE PROPOSED MUNGUUVUENI
SOLAR MINI-GRID**



PROJECT: KENYA OFF-GRID SOLAR ACCESS PROJECT
SUB-PROJECT: COMPONENT 1. MINI-GRIDS FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS
LOCATION : MNAZINI SUB-LOCATION, NDERA LOCATION, GARSEN NORTH WARD, TANA DELTA SUBCOUNTY, TANA RIVER COUNTY

2023

CERTIFICATION

This Comprehensive Project Report (CPR) has been prepared by ESIA /EA Firm of Experts, **Centric Africa Ltd, Reg. No.7112 and Norken International Ltd, Reg. No.0181**. The report has been written with diligence in accordance with the World Bank Operational Procedures OP, Environmental Safeguards Standards (ESS), the EMCA 1999 (*Amended, 2015*) and the Environmental and Social Impact Assessment and Audit Regulations, 2003 to bring out the true nature of the intended development. The report was prepared based on the information provided by various stakeholders and village elders at Munguvueni village, Mnazini sub-location in Tana River County as well as from primary and secondary sources. It is therefore, issued without any prejudice.

We the undersigned, certify that the particulars in this CPR are correct and righteous to the best of our knowledge.

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LIST OF ACRONYMS

ACRONYM	DEFINITION
ADR	Alternative Dispute Resolution
AoI	Area of Influence
CBOs	Community Based Organizations
CoK	Constitution of Kenya
CDI	County Development Index
CEMP	Construction Environmental Management Plan
CGRCs	County Grievance Redress Committees
CRA	Commission on Revenue Allocation
CSR	Customer Social Responsibility
CIDP	County Integrated Development Plan
CPS	Country Partnerships Strategy
DOSHS	Directorate of Occupational Safety and Health Services
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EPRA	Energy Petroleum Regulatory Authority
EPT	Energy and Petroleum Tribunal
EPRA	Energy and Petroleum Regulatory Authority
ESI	Electrical Supply Industry
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESMS	Environmental and Social Management Systems
EMCA	Environmental Management and Coordination Act
EMF	Electromagnetic Field
FGD	Focus Group Discussions
GDC	Geothermal Development Company
GoK	Government of Kenya
HDPE	High Density Poly Ethylene
IAs	Implementing Agencies
IPPs	Independent Power Procedures
IEC	International Electrotechnical Commission
IPs	Indigenous Peoples
JV	Joint Venture
KETRACO	Kenya Electricity Transmission Company
KII	Key Informant Interviews
KOSAP	Kenya Off-Grid Solar Access Project
KPLC	Kenya Power and Lighting Company
LEP	Labour and Employment Plan
LGRCs	Local Grievance Redress committee
MGs	Mini Grids
MOE	Ministry of Energy
MSDS	Material Safety Datasheet
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organizations

NLC	National Land Commission
NTSA	National Transport and Safety Authority
OHS	Occupational Health and Safety
OM	Operation and Maintenance
OP	Operational Policies
PAD	Project Appraisal Document
PAPs	Project Affected Persons
PCU	Project Co-ordination Unit
PPAs	Power Purchase Agreements
PPEs	Personal Protective Equipment
PV	Photo-voltaic
REREC	Rural Electrification and Renewable Energy Corporation
RPF	Resettlement Policy Framework
SA	Social Assessment
SEA	Strategic Environmental Assessment
SHS	Solar Home Systems
SIA	Social Impact Assessment
SOP	Safe Operation Procedure
STDs	Sexually Transmitted Diseases
STI	Science, technology and innovation
SMMP	Social Management and Monitoring Plan
ToR	Terms of Reference
VMGF	Vulnerable and Marginalised Groups Framework
VMGs	Vulnerable and marginalized groups
VMGP	Vulnerable and Marginalised Group Plan
WB	World Bank
WMP	Waste Management Plan
WRA	Water Resources Authority

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EXECUTIVE SUMMARY

E-1- Introduction and Project Brief

The Ministry of Energy (MOE) hereinafter refer to as proponent is implementing the Kenya Off-Grid Solar Access Project (KOSAP) in 14 underserved counties in Kenya. The aim of the project is to provide clean and modern energy services through off-grid solar solutions. The Proponent is coordinating the implementation of the project through the implementing agencies; Kenya Power (KP) and the Rural Electrification and Renewable Emergency Corporation (REREC). The project is funded by the World Bank Group with \$150 million and a \$5 million grant from the Carbon Initiative for Development. The goal of the project is to bring electricity to around 250,000 households, 476 community facilities, and 380 boreholes in the target counties, benefiting low-income groups. It also includes the sale and installation of 150,000 efficient cook stoves. The project focuses on marginalized areas based on the County Development Index (CDI) and aims to address infrastructure deficits, lack of access to roads, electricity, water, and social services in these underserved counties. To ensure sustainability, the project relies on public funding, local community participation, and the institutional capacity of KP, REREC, and the MOE.

The KOSAP consists of four main components. The first component, focuses on the implementation of mini-grids to provide electricity to community facilities, enterprises, and households in areas where mini-grids are the most cost-effective option. The second component, aims to electrify households through standalone solar systems in areas without load clusters where standalone systems are the best technical and financial solution. The third component, supports the electrification of public institutions and community facilities using standalone solar systems. It also includes the installation of solar PV-powered water pumps for consumptive purposes. Lastly, the fourth component, provides funding for implementation support, technical assistance, and capacity building activities to ensure the sustainability and impact assessment of the interventions carried out under the other components of KOSAP.

In Tana River County, one of the target counties, the Proponent is proposing to develop 19 No. mini grid facilities including Munguvueni Mini Grid discussed in this report. In order to adhere to both national and donor requirements, the Proponent engaged the services to the consortium of Norken International Limited and Centric Africa Limited to undertake the ESIA. The ESIA has been conducted following the requirements outlined in the Environmental Management and Coordination Act (EMCA) 1999 and its amendments, as well as international environmental and social policies such as the World Bank's OP 4.01 on environmental assessment.

E-2- Project Categorization and Justification

In the World Bank context, there have been several projects supported by the organization that aim to provide electricity to communities located far from the national grid. These projects utilize off-grid approaches, meaning they are independent of a national or regional grid. The experience gained from these projects provides valuable guidance for designing sustainable off-grid electrification initiatives, particularly those targeting dispersed and economically disadvantaged communities. The Munguvueni proposed site aligns with this category of projects that the World Bank has been involved in.

In the Kenyan context, the Environmental Management and Coordination Act (EMCA) of 1999, as amended in April 2019 through Legal Notice No. 31, classifies solar power farms and plants as medium risk projects.

This categorization provides a framework for assessing and managing the potential environmental and social impacts associated with such projects. By categorizing the Munguvueni site as a solar power facility, it falls within the medium risk project category as per the Kenyan legislative framework.

E-3 Approach and Methodology

The Environmental and Social Impact Assessment (ESIA) for the proposed project followed a structured process, beginning with kick-off meetings and online discussions involving the Proponent, Implementing agencies, and the World Bank Environmental and Social Safeguard Team. These consultations were instrumental in establishing the project's scope, deliverables, timeline, and methodology. Subsequently, screening and scoping exercises were conducted to evaluate potential social and environmental risks. A thorough desk-based review was also undertaken to assess existing project documentation, legal requirements, and relevant plans.

The study employed a comprehensive approach to gather primary and secondary data for the project. Both qualitative and quantitative methods were utilized, with secondary data obtained through literature reviews. Primary data collection involved various techniques, including physical observations, photography, interviews, and stakeholder consultations. This comprehensive approach enabled a comprehensive examination of the project's environmental and social aspects, ensuring a holistic understanding of its potential impacts.

The study further involved the identification and assessment of potential impacts throughout the project's life cycle. Key areas of evaluation included land use, water resources, biodiversity, air quality, noise levels, community health and safety, and socio-economic conditions. To mitigate adverse effects, the study developed environmental and social management and monitoring plan, aiming to address both positive and negative impacts that may arise from the project. These measures aimed to ensure the project's sustainability and enhance its overall environmental and social performance.

E-4 Legislative Regulatory Framework

The evaluation, planning, and implementation of the proposed project is guided by the World Bank's Environmental and Social Framework, the national legislative framework, and the project's safeguard instruments. These measures aim to ensure environmental sustainability, protect the rights and needs of indigenous peoples and marginalized groups, and minimize adverse impacts through effective management and mitigation measures.

The Government of Kenya established the Environmental Management and Coordination Act (EMCA) in 1999, providing a legal framework for environmental management. EMCA takes precedence over other sectoral laws related to the environment. In 2013, the government formulated a national Environmental Policy with the goal of promoting sustainable management and use of the environment.

Collaboration and consultation among government agencies and stakeholders are essential for coordinating environmental management effectively. Key institutions in Kenya responsible for environmental issues include the National Environment Management Authority (NEMA), County Environment Committees, National Environmental Complaints Committee, National Environment Action Plan Committee, Standards and Enforcement Review Committee, National Environment Tribunal, and National Environment Council (NEC).

The project also adheres to the World Bank Safeguard Policies, which aim to improve decision-making processes, promote sustainable project options, and involve affected people in consultations. The applicable operational policies for this project include Environment Assessment, Natural Habitats, Indigenous Peoples,

and Involuntary Resettlement. The Environmental and Social Impact Assessment (ESIA) considers these policies and addresses potential environmental and social concerns.

Additionally, the ESIA references other Safeguard Instruments prepared under the Kenya Off-Grid Solar Access Project (KOSAP), including the Environmental and Social Management Framework (ESMF), Resettlement Policy Framework (RPF), and Vulnerable and Marginalized Groups Framework (VMGF). These instruments provide procedures and guidelines for assessing and managing environmental and social aspects specific to the proposed subprojects under KOSAP.

E-5 Environmental Setting

The proposed Project site is located on public land belonging to the county government at Munguvueni village in Mnazini Sub-Location, Ndera location, Garsen North Ward, Tana Delta Subcounty, Tana River County at GPS coordinates of Latitude 2°01'04.9" S and Longitude 40°09'06.2" E. The nearest town is Garsen town approximately 30kms south of the project area. Munguvueni village is located at an elevation of None meters (0 feet) above sea level and has a subtropical steppe climate with temperatures at approximately 29.46°C, 6.96% higher than Kenya's averages. Munguvueni typically receives about 57.69 millimeters of precipitation and has 77.79 rainy days (21.31% of the time) annually. February is the warmest month with temperatures of about 37.27°C and the coldest month is July with 22.33°C. June is the driest month with precipitation at about 1.63mm while November is the wettest month with 231.11mm precipitation as shown in the map below.

The proposed project site is currently undeveloped with grass, shrubs, and bushland with general surrounding having a few mature trees. The project site neighbours Mumbuji Primary School to the immediate East, Munguvueni center to the North East approximately 200m away, shrubs and bushland to the immediate North, West and south. River Tana is located approximately 500m East of the proposed site.

E-6 Project Description

The Munguvueni Mini Grid project aims to provide electricity to approximately 553 residential and 6 nonresidential consumers in Munguvueni Village at Munguvueni Sub-Location, Kotaruk Location, Loima Sub-County In Tana River County. The project will utilize solar photovoltaic panels, a Battery Energy Storage System, and a Diesel Generator to generate electricity. A Low Voltage Power Distribution Network will be established to distribute the power to customers. The estimated cost of the project is around USD 323,710, although this amount may change as more detailed plans are developed.

The project utilizes solar panels with a total capacity of 53 kWp to harness solar energy. Solar power is a clean and renewable energy source that will provide a significant portion of the electricity needed for the project. A 171 kWh Battery Energy Storage System is incorporated to store excess solar energy during the day, ensuring a consistent power supply even during cloudy or nighttime conditions. A 50 kVA diesel generator is included to serve as a backup power source for periods of low solar generation or in case of battery depletion. It provides reliability and backup in the event of extended periods of cloudy weather or high demand. A 2,000-liter fuel tank is provided to store diesel fuel for the generator, ensuring continuous operation during extended periods of low solar or high demand. Additionally, PV Inverter: A 44 kW solar PV inverter is used to convert the direct current (DC) electricity generated by the solar panels into alternating current (AC) electricity suitable for consumer use.

The proposed minigrid site has a circuit distribution length of 3km.

The project consists of two main components: Hybrid Mini-Grids and power line reticulation lines. The Hybrid Mini-Grids will combine solar panels and diesel power generation. These energy sources will be integrated through a centralized photovoltaic plant connected to a 3-phase AC busbar line. The configuration is designed to prioritize direct supply from the solar generator during daylight hours, reducing reliance on battery storage. The battery storage will primarily be used when solar generation is low, or

demand is high. The construction of power line reticulation lines will ensure the efficient distribution of electricity to residential, commercial, and other consumers, ensuring a reliable and efficient power supply.

To develop the Munguvueni Mini Grid approximately 1.3416 hectares of land will be acquired from the community in line with the national laws and World Bank provisions. In accordance with the World Bank's Operation Policy (OP) 4.12 on Involuntary Resettlement, an abbreviated Resettlement Action Plan (A-RAP) was prepared, outlining the principles and procedures for land acquisition and compensation. This plan is annexed to this ESIA.

E-7 Project Alternatives

Solar energy is identified as a non-polluting and site-specific option, and the proposed site for Munguvueni MG is chosen as the most suitable location for the mini grid based on factors such as sunlight availability and the community's lack of grid connectivity. The use of wind power, thermal power, fossil fuels, and power import from neighboring countries are considered as alternative methods of power generation but are found to have limitations or environmental concerns. Solar energy is favored due to its low production costs, versatility, clean nature, and economic savings. The "No Project" alternative is deemed unfavorable as it would maintain the current lack of electricity access and hinder socio-economic development. The project will be constructed using modern materials and technology, with a focus on public health, safety, security, and environmental requirements. The technology will involve a Battery Energy Storage System.

E-8 Stakeholder Engagement

It is important to highlight that two forms of stakeholder engagement were carried out for the project. The first form as noted earlier, focused on the acquisition of land for the project and involved the Proponent and the implementing agency (REREC). The second form of engagement was conducted specifically for the Environmental and Social Impact Assessment (ESIA) study.

For the ESIA study, various methods were employed to engage stakeholders, taking into consideration their different categories. Face-to-face discussions were held with government officials and key stakeholders, while separate focused group discussions were conducted with men, women, and youth. Additionally, a public baraza or meeting was organized to allow community members to participate.

During the ESIA stakeholder engagement public meeting, which took place on 10th February 2021, a total of 34 stakeholders attended. The meeting provided an opportunity to discuss project details, including the preliminary design, positive and negative impacts, and mitigation measures. Stakeholders were encouraged to share their views and provide feedback on the project as elaborated in table 0-1 below.

Table 0-1: key issues discussed

No.	Summary of Issues Discussed	Response
1	Accidents from electrocution and fire safety caused by exposure to uninsulated cables. The community suggested the locals be sensitized on safety precautions to be take and the wiring works be done by qualified experts	Electric specialist to be involved in the project will ensure that proper protocols are followed to minimize such risks. Further wiring of the households will be done at the cost of the owner and it is advised that an electric specialist is engaged.
2	Delayed commencement of the project	Project implementation will commence once all approvals are acquired

The local community has agreed to a compensation in kind arrangement for the land acquired in Munguvueni; the community has requested for the establishment of two classrooms, a library and a

maternity wing in a dispensary in the area. However, the community prioritized establishment of two classrooms at Mumbuji primary school.

E-9 – Impacts and Mitigation Measures

The Environmental and Social Impact Assessment (ESIA) for the proposed Solar Mini-grid project has identified both positive and negative impacts across its different phases: pre-construction, construction, operation, and decommissioning. In the construction phase, positive impacts include local employment opportunities, boosting local businesses, and sourcing materials locally. During the operation phase, positive impacts encompass reliable power supply, economic improvement, education, health benefits, improved living standards, and enhanced security and communication. Similarly, the decommissioning phase offers positive impacts such as local employment and sourcing.

On the negative side, the pre-construction phase involves minor impacts like land acquisition, while the construction phase encompasses various minor to moderate impacts such as vegetation clearance, soil erosion, dust emissions, and occupational health and safety concerns. Challenges related to stakeholder engagement, labor influx, child labor, and exclusion of vulnerable individuals are also anticipated. In the operation phase, negative impacts include waste generation, increased oil consumption, fire outbreaks, occupational health and safety concerns, and inadequate stakeholder engagement. Issues of exclusion, inadequate grievance management, and public health concerns may arise as well.

During the decommissioning phase, negative impacts primarily relate to solid waste generation, noise and vibration, and challenges in stakeholder engagement, labor influx, child labor, gender-based violence, and exclusion of vulnerable individuals and households.

Tables 0-2 to 0-5 below present summaries of anticipated impacts and their corresponding levels of significance, both pre- and post-mitigation.

Table 0-2: Summary of Pre-construction Impacts

Impact	Significance Of Impact (Pre-Mitigation)	Residual Impacts (Post-Mitigation)
Land acquisition	Minor	Negligible
Way leaves	Minor	Negligible
Stakeholder identification and consultations	Major	Minor

Table 0-3: Summary of Construction and Decommissioning Phases Impacts

Impact	Pre-construction	Construction phase	Decommissioning phase
Impacts on Local Economy and Employment	Not Applicable	Positive	Positive
Change in land use	Not Applicable	Moderate	Positive
Site rehabilitation	Not Applicable	Not Applicable	Positive
Topography	Not Applicable	Minor	Not Applicable
Soil environment	Not Applicable	Minor	Minor
Air Quality	Not Applicable	Moderate	Moderate
Ambient noise	Not Applicable	Minor	Minor
Visual intrusion and change in landscape	Not Applicable	Minor	Positive
Waste generation and soil contamination	Not Applicable	Minor	Minor
Impact on water environment	Not Applicable	Minor	Not Applicable
Impacts from hazardous materials	Not Applicable	Minor	Not Applicable
Fire hazards	Not Applicable	Moderate	Minor
Impacts of construction material sourcing	Not Applicable	Moderate	Not Applicable
Energy consumption	Not Applicable	Negligible	Not Applicable
Occupational safety and health	Not Applicable	Moderate	Moderate
Community safety and health	Not Applicable	Moderate	Moderate
Labor influx	Not Applicable	Minor	Minor
Child labor	Not Applicable	Minor	Negligible
Cultural heritage	Not Applicable	Minor	Not Applicable
Gender based violence, SEA and SH	Not Applicable	Minor	Minor
Exclusion of VMGs, Vulnerable individuals and households	Not Applicable	Major	Major
Risk of communicable diseases	Not Applicable	Minor	Minor
Increased water demand		Negligible	Negligible
Forced labor		Minor	Negligible

Table 0-4: Summary of Operation Phase Impacts

Impact	Significance Of Impact (Pre-Mitigation)	Residual Impacts (Post-Mitigation)
Impact On Economy and Employment	Positive	Positive
Quality, reliable power supply	Positive	Positive
Reduction of pollution associated with thermal power generation, kerosine and wood fuel usage	Positive	Positive
Education	Positive	Positive
Health benefits	Positive	Positive
Improved standard of living	Positive	Positive

Impact	Significance Of Impact (Pre-Mitigation)	Residual Impacts (Post-Mitigation)
Security	Positive	Positive
Communication	Positive	Positive
Soil environment	Minor	Negligible
Waste generation and management	Minor	Negligible
Water environment	Negligible	Negligible
Landscape and visual impacts	Minor	Negligible
Increased oil consumption	Minor	Negligible
Increased storm water flow	Minor	Negligible
Fire outbreaks	Moderate	Minor
Water demand	Negligible	Negligible
Sanitary waste	Negligible	Negligible
Flooding	Negligible	Negligible
Noise and Vibration	Negligible	Negligible
Electric and magnetic fields (EMFs)	Negligible	Negligible
Dust Emission	Negligible	Negligible
Vehicle Exhaust emission	Minor	Negligible
Collision and electrical hazards from distribution infrastructure	Minor	Negligible
Occupational safety and health	Moderate	Minor
Community safety and health	Moderate	Minor
Gender based violence, SEA and SH	Minor	Negligible
Exclusion of VMGs, Vulnerable individuals and households	Major	Minor
Risk of communicable diseases	Minor	Negligible
Shocks and electrocution to the beneficiaries	Moderate	Minor
Risks related to poor and inadequate stakeholder engagement (conflict)	Minor	Negligible

E-10 Environmental and Social Management and Monitoring Plan

A comprehensive set of mitigation measures in the form of an Environmental and Social Management and Monitoring Plan (ESMMP) have been prepared for the project. The ESMMP serves as a comprehensive framework for the integrated management of all environmental and social impacts throughout the project's lifecycle. It has been prepared to ensure that the social and environmental impacts and risks identified during the Environmental and Social Impact Assessment (ESIA) process are appropriately managed during the construction, operations, and decommissioning phases of the project. It specifies the mitigation and management measures that the project proponent and contractor are committed to implementing and outlines how organizational capacity and resources will be mobilized to achieve these measures. The ESMMP also ensures compliance with the relevant laws, regulations within Kenya, as well as the environmental and social sustainability requirements of the World Bank's Operational Policies (OPs).

These measures emphasize a proactive approach, prioritizing prevention rather than reaction. They encompass various aspects such as proper waste handling and disposal to prevent pollution, engaging

stakeholders to address grievances, providing personal protective equipment (PPE) for workers, ensuring adequate supervision, and emphasizing good workmanship from the contractor. Specific plans are also outlined to address specific issues that may arise. The ESMMP also highlights environmental performance indicators that should be regularly monitored. Monitoring serves as a means to detect and draw attention to any changes or problems in environmental quality. It involves continuous or periodic reviews of the ESMMP implementation progress, allowing for adjustments and improvements as necessary.

While accommodating the recommended mitigation measures to the extent practical and economically viable, the project proponent and contractor should ensure that the measures do not compromise the economic viability of the project or have long-lasting adverse impacts on the environment.

For the mitigation measures to be successful, it is imperative that the REREC allocates sufficient resources for the implementation of the ESMMP. Adequate resources will enable the proper execution of the proposed measures and ensure their effectiveness in minimizing the identified negative impacts.

Following the project's commissioning, it is mandatory to conduct statutory Environmental and Safety Audits in accordance with national legal requirements. These audits serve to evaluate the environmental performance of the site operations and assess their compliance with the recommended mitigation measures.

E- 11 Conclusion

Based on the assessment findings, the consultant concludes that there are no substantial reasons to hinder the proposed project from progressing to the next stage of planning and development. However, this progression is conditional upon the implementation of the recommended mitigations and the monitoring of potential environmental and socio-economic impacts as outlined in the ESMMP.

It is in the opinion of the Environmental expert that the anticipated negative impacts can readily and effectively be mitigated and on the whole the proposed project does not pose any significant threat to the Environment and may be licensed to proceed

1 INTRODUCTION

The energy sector plays a critical role in the socio-economic development of a country. Kenya is committed to universal access to modern forms of energy by year 2030, as articulated in the national economic development blueprint, the Vision 2030 (the Vision). The goal of the Vision is to make Kenya a middle-income country enjoying a high quality of life by the year 2030. The objectives of the Vision have been adopted as GoK's national development objectives. Under this Vision, Kenya expects to achieve an economic growth rate of 10 % and above. Energy is identified as a critical enabler of this vision. Currently, only 45% of the households (4.3million), have electricity access from the national grid or mini-grids. The electrification rate is planned to be increased to 70 % by 2017 and 100 % by 2030. To attain these goals, policy and regulatory frameworks have been articulated for the energy sector through energy policy (Sessional Paper No.4 of 2004) and the Energy Act of 2006. A draft Energy Bill 2013 is under consideration. The government has strategies to accelerate access to modern energy services through public and private initiatives. The government, with support from development partners, has allocated substantial resources for development of energy infrastructure including exploitation, transmission and distribution.

The Ministry of Energy (MOE) Kenya is coordinating the implementation of the Kenya Off-Grid Solar Access Project (KOSAP) to provide access to clean and modern energy services through off-grid solar to 14 underserved counties. Tana River County was identified as one of the underserved Counties and others include Mandera, Narok, Garissa, Tana River, Samburu, Isiolo, Marsabit, West Pokot, Turkana, Taita Taveta, Kwale, Kilifi and Lamu.

Driven by the imperative to provide equal opportunities across the entire Kenyan territory as key to achieving Kenya's Vision 2030, and the National target of achieving universal access to electricity by 2020, the GoK now seeks to close the access gap by providing electricity services to remote, low density, and traditionally underserved areas of the country. The World Bank's (WB) Country Partnerships Strategy (CPS) for Kenya (2014-18) also recognizes the access to basic electricity, as a key developmental issue. The Strategy sets at improving core infrastructure as one of the Projects the WB will be engaged in. It also emphasizes the importance of mobilizing concessional funding to expand the sector including electricity generation, transmission, and distribution to meet the Government's economic growth targets.

KOSAP directly promotes the achievement of these objectives by supporting the use of solar and clean cooking Solutions to drive electrification of households (including host communities), enterprises, community facilities, and water pumps in Tana River County as one of the counties in Kenya that have been defined as "marginalized areas" based on the County Development Index (CDI) by the Commission on Revenue Allocation (CRA). According to the CRA as the communities in the marginalized areas have been excluded from social and economic life of Kenya for different reasons" (CRA, 2013).

Tana River County and other identified underserved counties, collectively represent 72% of the Country's total land area and 20% of the Country's population, including historically nomadic societies that even today continue to rely on pastoralism. The population in Tana River County is highly dispersed, at a density four times lower than the national average. They present profound infrastructure deficits, including lack of access to roads, electricity, water, and social services. There is also significant insecurity in certain areas, giving rise to substantial numbers of displaced persons and livelihood adaptations that further undermine economic prosperity.

1.1 Context

This ESIA report has been prepared based on Site visit baseline survey, desktop survey, documentation review, consultation with stakeholders and in accordance Environmental Management and Coordination (Amendment) Act, 2015 and World Bank's Environmental and Social Safeguards. The study has also assessed the requirement of the project with respect to the local and national regulations relevant to the project.

Norken International Limited in Joint Venture with Centric Africa Limited were appointed by Ministry of Energy to undertake consultancy services for the Environmental and Social Impact Assessment (ESIA),

Social Assessment (SA) and Vulnerable and Marginalized Groups Plan (VMGP) as per the standard TOR and NEMA and WB ESS. As reported, land acquisition has not resulted in any economic or physical displacement and no resettlement is envisaged for the proposed project.

Due to the remoteness and sometimes dispersed nature of the target populations and considering the lifestyles and socio-economic status of those residing in underserved Counties, the Project is designed to address low affordability of the potential users, and sustainability of service provision. Therefore, sustainability of the proposed approach to energy access expansion beyond the Nationally owned power network is predicated on two primary factors - public funding, local community participation; and institutional capacity of Kenya Power and, Rural Electrification and Renewable Energy Corporation (RREC) and the Ministry of Energy (MOE) as the implementing agencies.

The project components are:

- Component 1- US\$40M: Mini-grids for Community Facilities, Enterprises, and Households -This component will support electrification of areas where electricity supply through mini-grids represents the least cost option from a country perspective. A total of 151 mini-grids will be constructed throughout 12 of the 14 Counties. The mini-grids will then be used to provide electricity to community facilities, enterprises and households. The mini-grids will be constructed in areas that have a minimum population of 100 households and sufficient existing or potential business and institutional loads.
- Component 2- US\$48M: Stand-alone Solar Systems and Clean Cooking Solutions for Households; This component will support electrification of households using standalone solar systems in areas where load clusters do not exist, and the best technical and financial solution is standalone solar systems. Under this component the Project aims to establish sustainable supply chains for marketing and sales of solar home systems in KOSAP Counties. While the Private Sector Actors have penetrated the solar market in other parts of the country, they have not made the same in-roads in the 14 Counties. The Project has established a Results Based Financing and Debt Facility (RBF) which will provide incentives to solar businesses to extend and expand their reach in the 14 Counties. Under this component the project aims to deliver 250,000 Stand-alone Solar home Systems and 150,000 high tier clean cooking solutions.
- Component 3- US\$40M: Stand-alone Solar Systems and Solar Water Pumps for Community Facilities; This component will support electrification of public institutions and community facilities using standalone systems. This component will also support the installation of solar PV-powered water pumps for consumptive purposes. *Under 3A:* Community facilities developed by the Ministry of Health, Ministry of Education and the Ministry of Interior will be supplied with power for optimum performance. To achieve this, a private sector contractor will be procured by KPLC for each service territory to supply, install and maintain stand-alone solar systems in community facilities. *Under 3B:* About 380 boreholes associated with community facilities in the 14 Counties will benefit from the installation of solar powered water pumps. This will increase sustainable access to water supply by equipping new boreholes and retrofitting existing diesel –powered boreholes. The Rural Electrification Agency and Renewable Energy (RREC) which is in charge of implementing this aspect of the project will hire private sector contractor to supply, install and maintain stand-alone solar systems for the community facilities. This will enhance the sustainability of these facilities as operational cost associated with diesel-based systems will be avoided.
- Component 4- US\$22M: Implementation Support and Capacity Building; This component will finance various technical assistance and capacity building activities to ensure the sustainability and measure the impact of the interventions devised and implemented within the other components of KOSAP. Trainings under KOSAP is aimed at enhancing the capacity of the targeted county governments. The County government's role in the energy sector is defined under the Constitution as "county planning and development, including-electricity and gas reticulation and energy regulation." Given that the County Governments have been in existence for less than six years, there is need to enhance their Capacity in order to undertake this function effectively. Trainings for the County Government are focused on Energy Management, Renewable Energy and

Sustainable Resource Management, Tariff Rates and Cost Recovery Requirements, Environmental and Social Management, among others.

The MOE provides overall coordination of the project as well as lead in the implementation of components 2 and 4. Components 1 and 3(a&b) will be implemented by the Kenya Power and Lighting Company (KPLC) and the Rural Electrification and Renewable Energy Corporation (RREC), respectively.

1.2 Project Overview

The project is located approximately 30km South of Garsen town in near Mumbuji primary school at Munguveni village, Mnazini Sub-Location, Ndera Location, Garsen North Ward in Tana Delta Subcounty, Tana River County at coordinates of Latitude 2°01'04.9" S and Longitude 40°09'06.2" E. The nearest water body is located approximately 500m from Munguveni area and Tana River approximately 3kms away. The proposed project site is currently undeveloped, consisting of grass, shrubs, and bushland.



The proposed solar mini grid will be located on unregistered communal land. This component supports the electrification of areas where electricity supply through mini-grids represents the least cost option from a country perspective, as underpinned by the geospatial plan. Depending on the number of users to be supplied, and the service level defined for each type of user (households, businesses, community facilities, etc.), the generation system of each specific mini-grid will combine solar PV, battery storage and thermal units running on diesel Mini-grids. The component will be implemented in approximately 151 locations throughout the 14 target counties, typically in Mini-grids supplying 100-700 prospective users, with approximate total demand of 20-300kW. These potential sites, capturing approximately 27,000 consumers in total, have preliminarily been identified as part of the geospatial plan.

The solar mini grid will contain Solar panels, batteries, invertors, perimeter fence and length of transmission line to cover a circuit distance of approximately 3km.

1.3 Purpose and Scope of Work

This report discusses the environmental and social baseline within which the proposed solar power project is commissioned and assesses the potential adverse and beneficial impacts that the project could have, along with suitable mitigation measures and an Environmental and Social Management Plan (ESMP) for the project. The report also evaluates the environmental and social risks associated with the project and implements mitigation measures to avoid adverse impacts for the remainder of the project's lifecycle. The

project must comply with international standards (World Bank Environmental and Social Safeguards) along with applicable national, state, and local regulations.

Specific objectives of the study included;

- Present an outline of the project background,
- Establish the environmental baseline conditions of the project area and review all available information and data related to the project,
- Identify key areas for environmental, social, health and safety concerns as well as the anticipated impacts associated with the proposed project implementation and commissioning,
- Undertake public consultations with the potentially affected peoples and other interested parties
- Establish a comprehensive environmental management plan covering the construction, operation and decommissioning phases of the project,
- Preparation of a comprehensive Project Report in accordance with the local environmental legislation and submission to NEMA for further instructions and/or approval.

The ESIA scope largely covered the following areas:

a) Baseline Conditions:

- Environmental setting (climate, topography, geology, hydrology, ecology, water resources, sensitive areas, baseline information etc.)
- Socio-economic activities in the surrounding areas (land use, human settlements, economic activities, institutional aspects, water demand and use, health and safety, public amenities, etc.),
- Infrastructural issues (roads, water supplies, drainage systems, power supplies, etc.).

b) Legal and policy framework:

Focusing on the relevant national environmental laws, regulations and by-laws and other laws and policies focusing on allied activities relative to the project in question.

c) Interactive approach was adopted for the immediate neighbourhood in discussing relevant issues including among others: land use aspects, project acceptability, social, cultural and economic aspects,

d) Identification of Environmental impacts namely physical impacts, biological impacts and Legal Compliance.

1.4 Terms of Reference (ToR) for the ESIA Process

The Experts were assigned the task of carrying out Environmental and Social Impact Assessment of the proposed solar Mini-grid. The scope covered various activities related to; project planning activities, construction works of the proposed development which included all works of civil, mechanical, electrical or other nature necessary to construct, commission and decommissioning of the project. The output of this work is a comprehensive Environmental Impact Assessment project which will aid NEMA in deciding on the project. The report is also in compliance to Environmental and Social Safeguard Policies of the proponent's development partners.

The ESIA experts conducted the study guided by the following terms of reference:

1. Establish the suitability of the proposed site/location to set up a solar Mini-grid.
2. A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
3. A description of the technology, procedures and processes to be used, in the implementation of the project.
4. A description of materials to be used in the construction and implementation of the project, the products, by-products and waste to be generated by the project.
5. A description of the potentially affected environment/social economic and cultural setting of the project area.
6. Identification and consultation with stakeholders including the proposed project beneficiaries.

7. A description of positive and negative impacts of the project on the environmental, health, safety and social cultural aspects of the community
8. Analysis of alternatives including project site, design and technologies
9. Identification of the most appropriate mitigation measures/interventions against negative impacts during construction, operation and decommissioning
10. Development of an Environmental, Health, Safety and Social Management Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.

1.5 ESIA Study Team

Below is the list of the planning and field team for the study:

Table 1-1 Study Team

NAME	INSTITUTION	POSITION
Lavina Omondi	Norken International Ltd	Sociologist
Sharon Waritiri	Norken International Ltd	Environmentalist
Daniel Chumo	Centric Africa Ltd	Environmentalist
Bubicha Mohamed	Centric Africa Ltd	Environmentalist
CLIENT REPRESENTATIVES		
Roseline Njeru	KPLC Nairobi	Environmentalist
Vincent Nyamweya	Tana River County Government	Tana River County Planner
Jackbed Mugo	Tana River County Government	CREO

1.6 Project Justification for the ESIA

This Environmental and Social Impact Assessment on the proposed solar Mini-grid in Munguveni was commissioned in order to examine its impacts on the environment and community prior to its construction. The purpose of the study was to determine the positive and negative effects of the mini-grid and to suggest ways to minimize the negative effects and maximize the positive effects. The ESIA was conducted in accordance with Section 58 of Environmental Legislation, EMCA 1999, and its 2015 Amendment and the Environmental Impact Assessment and Auditing Regulations (ESIA/EA) of 2003. Further, international environmental and social policies have been adhered to in this report especially the World Bank OP4.01 (Environmental assessment). In addition, appropriate sectoral legal provisions relevant to this project have also been referred to for the necessary considerations during the construction, commissioning, operation and decommissioning of the project.

This Assessment has identified both positive and negative impacts of the proposed project to the environment and community. The report proposes mitigation measures in the Environmental and Social Management and Monitoring Plan (ESMMP) developed to mitigate the negative impacts and enhance positive impacts thus ensuring sustainability of the project.

1.7 Approach and Methodology

This Environmental & Social Impact Assessment (ESIA) has been conducted in compliance with the Environmental Impact Assessment Regulation as outlined under the Gazette Notice No. 56 of 2003 established under the Environmental Management and Coordination Act (EMCA) 2015 and EMSF and provisions of the World Bank OP 4.01. The ESIA is expected to achieve the following:

- Identify all potential significant environmental and social impacts of the proposed Project and recommend measures for mitigation.
- Assess and predict the potential impacts during site preparation, construction and operational and decommissioning phases of the Project.
- Guide compliance with project ESMF, WB OP. 4.01 and the national environmental and social regulations.
- Generate baseline data for monitoring and evaluating how well the mitigation measures are being implemented during the Project cycle.
- Promote stakeholders' engagement and public participation.
- Design an Environmental and Social Management Plan to avoid, mitigate and where not possible, offset the identified impacts so as to ensure sustainability of the proposed Projects.
- Recommend feasible, cost effective and culturally appropriate measures to be implemented to mitigate against the potential negative impacts while ameliorating the positive ones.

The assessment involved an understanding of the Project background, the Project designs and the implementation plan as well as Project commissioning. In addition, the baseline information was obtained through physical investigation of the site and the surrounding areas, interviews with surrounding community members through local administration and County structures, stakeholder mapping, photography and most importantly, discussions with the Client and the Project Design Team.

The following are the key activities undertaken during the study:

- Physical inspections of the proposed project area
- Literature review of relevant documents
- Stakeholder consultations with different stakeholders and project affected persons and beneficiaries
- Gathering environmental and socio-economic data of the area by use of check list
- Continuous discussions with the stakeholders and accessing other sources of information on the proposed project details, the site planning and implementation plan,
- Photography, and interviews with people in the immediate neighborhood.
- Evaluation of the activities around the site and the environmental setting of the wider area.

Report writing and submission

1.7.1 Screening and Scoping

1.7.1.1 Screening Methodology

The proposed project was evaluated during this stage, which was guided by EMCA (1999), the EMCA (amended) Act of 2015, and the Environmental and Social Management Framework (ESMF) of 2015. Electricity development activities are listed as projects requiring EIA prior to commencement in Schedule 2 of the EMCA, 1999. World Banks Social safeguards underpin and demonstrate this commitment. Other factors considered during the screening process included, among others, the physical site location, zoning, nature of the immediate neighborhood, sensitivity of the areas surrounding the site, and socioeconomic activities in the area. Following this screening, the project was subjected to scoping (to produce this Project report) as part of the ESIA process, based on the project category.

The scoping study covered the physical, biological, socio-economic and cultural environment within the Project proposed areas within Munguveni. The scoping study identified significant environmental and social issues associated with the proposed Works as well as sensitive receptors likely to be impacted by the Project Activities. The main aim of this is to enhance positive social opportunities and benefits as well as ensure that adverse social and environmental risks and impacts are avoided, minimized, and mitigated.

The below steps were followed.

1.7.1.2 Kick-off Meeting

Norken and Centric team had a brief kick-off meeting with the Proponent on 12th July 2021 followed by subsequent online meetings and discussion on various aspects of the project up to 10th February, 2022. The meetings addressed varied deliverables and thresholds to be achieved and maintained during this assessment in terms of scope of work, deliverables, timeline and the methodology. All communication and meetings were done online.

1.7.1.3 Desk based review and baseline assessment

A critical literature review of secondary data was done to establish the following:

- Relevant legislations and institutional framework governing the proposed project
- Licenses and permits requirements and conditions;
- Baseline information of the project area
- Types of waste likely to be generated

Documentation review was a continuous exercise that involved a study of available documents on the project. A comprehensive description of the KOSAP Component 1: project includes a desktop review of all the existing project documentation including the Project Appraisal Document and the four main safeguard framework documents prepared under KOSAP- these are Social Assessment, Vulnerable and Marginalized Group Framework, Resettlement Policy Framework and the Environmental and Social Management Framework.

1.7.2 Project Description

With the background obtained from the site investigation, discussions held, and the documentation review, the proposed project was evaluated and an assessment made on the potential environmental and social impacts. The consultant firm has concisely described the project location including its geographical, ecological and the general layout of associated infrastructure including maps at an appropriate scale where necessary. Location of all projects related development sites, including proximal offsite investments; general layout; flow diagrams/drawings of facilities/operation design basis, size, capacity, flow-through of unit operations, including pollution control technology included if any; pre-construction activities and construction activities; construction schedule; staffing size and support; facilities and services around; commissioning, operation and maintenance activities and plan.

1.7.3 Baseline Condition

This entails description and collection of relevant primary data within the project site's bio-physical, socio-economic, and cultural profile with respect to the biodiversity profile, land use types, cultural heritage and practices, social and economic issues likely to be affected, expected project activities to be involved during the design, construction, and operation of the proposed facility. The information also includes description of the community social structure, employment and labour market, sources and distribution of income, cultural/religious sites and properties, vulnerable groups, and indigenous populations. This also covers description of the sites' physical environment including their topography, land cover, geology, climate and meteorology, air quality and hydrology. This entails use of secondary data sources and for some specific environmental parameters the deployment of specialized equipment to measure and record the environmental readings as primary data for analysis and inclusion in the ESIA CPR report. The ecological and biophysical environment will focus on describing the *flora* and *fauna* resident in the Tana River County at the mini-grid site level. This will be based on ecological surveys, KPIs on local indigenous knowledge on historical and status of rare, endemic, and endangered plant and animal species known to occur in these localities. Vegetation assessment was done to gain an understanding of the mini-grid sites habitat type. This has provided for an in-depth description of existing land use type and their linked socio-economic activities.

1.7.4 Impact Assessment Prediction

The anticipated impacts generated by the project, and subsequent evaluation of their significance is provided by this report. A suite of field data collection methods was deployed including public forums

discussions, Focus Group Discussions, Key Informant Interviews incorporating questionnaires for social risks assessment. Based on the outcome of the evaluation, the need for emphasis on critical areas was discussed. To accomplish this task an initial listing of the range of all issues and concerns identified during the study has been undertaken subsequently followed by analysis of the identified potential environmental and social impacts in terms of type (direct, indirect, cumulative, positive, negative), magnitude (local, widespread, random, severity) and duration (temporary, permanent, long term, short term). Consequently, an evaluation system will be used to categorize these impacts and evaluate them. This aided in determining the significance of the identified potential impacts in relation to established criteria or standards, geographic extent of effects, cumulative nature of the impact, community tolerance and preferences, etc. This culminated into generation of a short list of the most critical issues in terms of environmental, ecological, and social impacts both positive and negative associated which the different phases of the project activities that are likely to affect the baseline environmental and social conditions presently occurring at the mini-grid sites.

Socio-cultural risks linked to Component 1 of KOSAP were identified during the assessment. These include, Labour influx, Gender Based Violence, Sexual Exploitation and Abuse, workplace Sexual Harassment, Spread of HIV/AIDS, STDs & other communicable diseases, Gender biases and inequality exclusion of vulnerable and marginalized groups (VMGs) and vulnerable individuals and households from accessing project decision making and governance structures, engagement processes, opportunities, and benefits. The vulnerable individuals and households will include the poor, elderly persons, PWDs, the sick, poor women, poor single mothers, child-headed households. The VMG's include ethnic minority communities that are present at Munguveni village.

The impacts and risks were identified in relation to free, prior, and informed comprehensive stakeholder consultations on land acquisition for construction of mini-grid, contractor's facilities e.g., yard and workers camp site, way leave acquisition for the powerline distribution network; restricted access to farming lands, water resources, soils and tree resources, economic/livelihoods displacement etc.

1.7.5 Environmental and Social Management Plan (ESMMP)

The ESMMP as the implementation instrument of the ESIA has captured all the parameters that need to be monitored on a routine basis. The parameters as indicated in an Environmental and Social Management and Monitoring Plan (ESMMP) matrix, a detailed description of the implementation and monitoring program. The ESMMP has a detailed arrangement of responsibilities for managing and monitoring the implementation of mitigation measures and the impacts of the project during construction, operation, and decommissioning. This include: a description of monitoring methodology, specific operations, and features to be monitored, monitoring reporting relationships and arrangements to ensure that monitoring is effective. Simple and straightforward monitoring processes established for ease of implementation through the project cycle. This plan follows through a description of the impacts and areas affected, key mitigation measures, monitorable indicators, timeframe, responsibilities, and budget implications.

The ESMMP include an implementation schedule and budget cost estimates for the mitigation measures both capital and recurrent costs estimates and the financing entity. It also describes institutional arrangements regarding the implementation of the ESMMP among the implementing agencies, and the mini-grid contractor(s). This has specific responsibilities, procedures and resources required by each institutional actor engaged in implementing the ESMMP.

The "Chance Find Procedures" has also been included in the ESMMP as part of prevention and mitigation measures that will be implemented in the event physical cultural resources are encountered during subproject implementation.

Additionally, the ESMMP has a component on contracting management that will ensure the implementation of the ESMMP by all contractors and subcontractors. A contracting mechanism is included in the ESMMP to incentivize contractors and their subcontractors to comply with the ESMMP or alternatively penalize them for failure to comply with the ESMPP. It also includes contractor clauses that will cover worksite health and

safety, the environmental and social management of construction sites; labour camps/out of area workers, HIV/AIDS, and other Sexually Transmitted Diseases (STDs), stakeholder engagement plans, grievance redress mechanism, child protection, gender equity and sexual harassment, labor rights and the employment of community members. The ESMP also have a budget to guide the contractor on resources required for the implementation and monitoring of the ESMP.

Figure 3 is a summary of the methodology the firm will adopt in undertaking environmental and social impacts assessment for the proposed KOSAP project

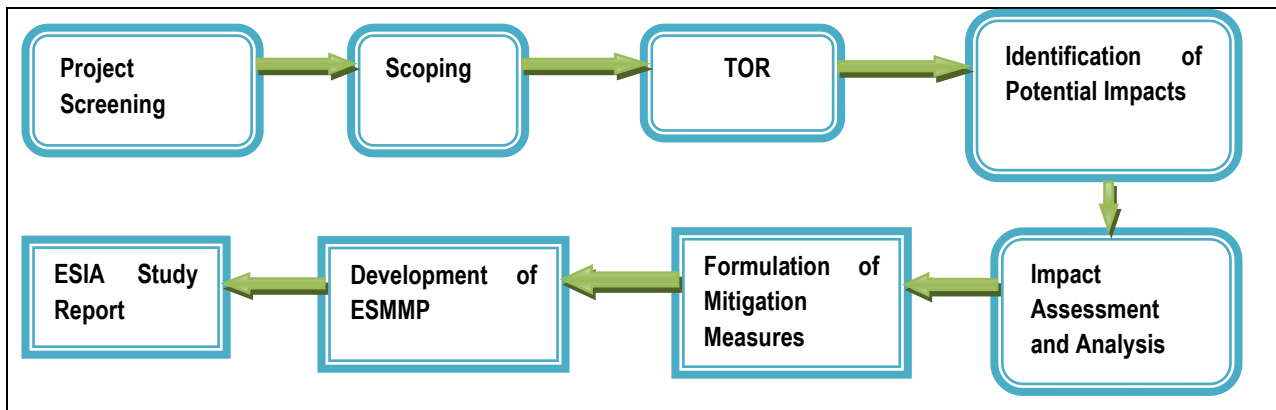


Figure 2: Summary of Environmental and Social Impact Assessment Methodology

1.7.6 Stakeholder Consultations and Participation

Section 17 of the Environmental (Impact Assessment and Audit) Regulations of 2003, requires that all ESIA Studies undertake Public Consultation (PC) as part of the study. The aim of the PC is to ensure that all stakeholders interested in a proposed project such as project beneficiaries, government officers and the general public in the vicinity of the proposed project be identified and their opinion considered during project planning, design, construction, operation and decommissioning phases. Consequently, public consultations were carried out in the project area in a bid to inform the public and other interested parties on the proposed project and obtain their views on the same. The consultations also presented an opportunity for the community to raise issues and concerns pertaining to the project.

This assessment recognizes that consultation is an ongoing process throughout Project implementation phases. Under this Project consultation was undertaken during the ESIA process and will continue during the construction operational and decommissioning phases of the project. A suite of field data collection methods was deployed including public forums discussions, Focus Group Discussions, Key Informant Interviews incorporating questionnaires for social risks assessment with an aim of giving the community a platform to express their environmental and social concerns in relation to the project.

Prior to the community engagement meetings, a two weeks' notice was done/issued to inform the community members of the meeting. This was done by the county renewable energy officer (CREO). The officer called the Chief of the area where the meeting was to take place and requested him to inform the people of the meeting in regard to KOSAP community engagement forums. The chief then informed the people about the meeting through announcement by word of mouth given by the local leaders' key among them was village administrator and village elders in Munguvueni.

The public (local community members, Laboure's and VMG's at the Munguvueni village) were consulted through a public baraza held at Munguvueni Baraza park on 10th February 2022 where 18 males and 16

women were in attendance including the area senior assistant chief as well as villages elders were engaged through face-to-face discussions as well as engagement walks on the proposed project site. The meetings were well attended by all people including men, women, youth and persons with special needs.

Interactive approach was adopted for the immediate neighborhood in discussing relevant information key among them being;

- Land use aspects,
- Neighborhood issues,
- Project acceptability,
- Social, cultural and economic aspects,
 - Environmental Impacts (Physical impacts, biological impacts and, Legal Compliance.)

The meeting was held in accordance with the requirements of NEMA and the WB OP. 4.01 policy and guidelines for conducting an ESIA. The specific objectives of this public consultation were to: Disseminate information on the proposed project to the community members; Collect views and issues to be considered in the ESIA; Evaluate perceptions about positive and negative impacts of the project and; Receive concerns about environmental and social impacts and other implementation challenges.

1.7.7 Approach to Mitigation Measures

The ESIA includes a description of the measures envisaged to prevent, reduce and where possible offset any significant adverse impacts on the environment. The identification of such measures is an iterative process which needs to be undertaken in parallel with the design to aid the incorporation of measures into the design during project development. Early adoption of appropriate mitigation will help reduce significant environmental impacts to a practicable minimum.

As part of the ESIA approach, the contractors to be hired will develop project specific Environmental and Social Management Plan (ESMP). These plans essentially set the framework for the Environmental and Social Management System for the Project moving forward. The assessment of the significance of impacts and identification of residual impacts has taken account of any incorporated mitigation measures adopted by the Project and is largely dependent on the extent and duration of change, the number of people or size of the resource affected and their sensitivity to the change. The criteria for determining significance are specific for each environmental and social aspect and are reported within each impact assessment chapter but generally for each impact the magnitude is defined (quantitatively where possible) and the sensitivity of the receptor is defined

1.8 Target Group for the ESIA Report

The ESIA Report has been prepared for use by different stakeholders to be involved in the construction and operation of the proposed solar mini-grid site. This report contains useful information on policies and procedures to be adhered to, implementation modalities, analysis of potential environmental and social impacts and suggested mitigation measures at various stages of project activities. The information will be useful in planning, implementation, management and maintenance of the plant. In this regard, the report is useful to the following stakeholders:

- Funding agencies and donors;
- Relevant government ministries and agencies;
- Affected and Interested persons;
- Planners and Engineers to be involved in preparation of designs and plans
- Contractors to be engaged in the construction works

1.9 Assumptions

The Experts made the following assumptions in preparing this ESIA

- All the technical data and information provided by the proponent, implementing and the specialists are accurate and up-to-date
- The design features will be put in place to minimize risks from external factors which could threaten the integrity of the facility which include: risks from landslides and other natural calamities; measures to minimize threats or damage from third parties e.g., terrorist attack
- The public involvement process has been sufficiently effective in identifying the critical issues that needed to be addressed
- The Proponent and the Contractor will implement the measures in the proposed ESMMP.
- The Proponent will undertake monitoring to track the implementation of the ESMMP to ensure that management measures are effective to avoid, minimize and mitigate impacts and that corrective action will be undertaken to address shortcomings and/or non-performances.

1.10 Uncertainties in Compiling Information

Uncertainty arises from a variety of aspects in any development, and for this particular study report has emanated from the following:

- The changes that may occur in baseline conditions, due to external factors over the lifetime of the project;
- Uncertainty related to Proponent's policy initiatives that might influence the assessment of future baseline and post-development conditions;
- Uncertainty in design information which should be dealt with by the definition of design parameters for the development by the Contractor and Proponent;
- Uncertainty in relation to project planning and implementation as the detailed program and means of construction may be influenced by the choice of Contractor and the detailed design of the development; and
- Uncertainty in the understanding of who the VMGs are, and their population.

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

Step 1: Project Concepts

The project details regarding; scope, design, implementation, tests, commissioning were first analysed.

Step 2: Terms of Reference (ToR)

The terms of Reference were developed guided by EMCA 1999 and The Environmental Impact Assessment/Audit regulations 2003. Any new developments out of character with their surrounding must have an ESIA undertaken; for review, Approval and Licensing by NEMA.

Step 3: Project Screening

Details about baseline conditions and potential environmental and social impacts were collected through desktop study, stakeholder consultations, site visits, photography, and inductive methods.

Step 4: Identification of Potential Environmental and Social Impacts

The Potential Environmental impacts were identified, Classified and magnitude determined.

Step 5: Impact Assessment and Consultations

The Environmental and Social Impacts were analysed, assessed and discussed in details involving consultations with the KPLC and other stakeholders.

Step 6: Formulation of Mitigation measures

Mitigation measures to ameliorate or minimize the potential Environmental and Socio – economic impacts were formulated for the entire project life.

Step 7: Development of an Environmental & Social Management and Monitoring Plan:

An E&SMMP for the project life was developed indicating parameters to be monitored, persons responsible, timing and costs involved.

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

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

1.11 Layout of the Report

Table 1-2: Structure of the ESIA Report

SECTION	TITLE	DESCRIPTION
Section 1	Introduction	(<i>This section</i>) Introduction to the Project and ESIA scope and methodology adopted.
Section 2	Project Description	Technical description of the Project & related infrastructure and activities.
Section 3	Baseline Settings- Environmental, Ecology and Social	Outlines Environmental, Ecology and Social Baseline status in the study area of the Project
Section 4	Analysis of Alternatives and project justification	Provides information on site selection, power scenario within the project area and gives an analysis of Alternative
Section 5	Policy and Legislative Framework	Discusses the applicable environmental and social regulatory framework and its relevance for the Project. (The world bank safeguards and EMCA and environmental regulations)
Section 6	Stakeholder Engagement	Provides an overview of the stakeholder engagement activities undertaken during the ESIA, stakeholder categorization and profiling
Section 7	Grievance Redress Mechanism	It details the provision of Grievance Redress Mechanism for the project
Section 8	Impact Assessment and Mitigation Measures	This section includes details of identified environmental impacts and associated risks due to Project activities, assessment of significance of impacts and presents mitigation measures for minimizing and /or offsetting adverse impacts identified.
Section 9	Environmental and Social Management and Monitoring Plan	Outline of the ESMP considering identified impacts and planned mitigation measures and monitoring requirements.
Section 10	Impact Summary and Conclusion	Summary of impacts identified for the Project and conclusion of the study.

2 PROJECT DESCRIPTION

2.1 Introduction

This section provides a description of the project in terms of location, facilities and associated project infrastructure and activities during the project lifecycle and facilitates identification of the potential impacts on resources and receptors that could result from project activities during the pre-construction, construction, operation, and decommissioning stages.

This will entail generation of electricity from solar, distribution of power using wooden or concrete poles and retailing the same to the community. The total length of LV distribution network will be 3 Km. The community members will pay a connection fee of KES. 1000 once they apply for electricity

The components of the proposed solar mini grid are provided as follows.

Table 2-1. Component of the proposed Solar Mini-grid

S/NO.	PARTICULARS	DESCRIPTION
1.	Project location	The proposed project is located at Munguvueni village in Mnazini Sub-Location, Garsen North Ward, Tana Delta Subcounty, Tana River County approximately 30km south of Garsen town. Geographically, the site is located on Latitude 2°01'04.9" S and Longitude 40°09'06.2" E.
2.	Land Size/Tenure	The proposed solar mini grid will be located on public land belonging to the county government of Tana River East of Mumbuji primary school at Munguvueni village in Mnazini sub-location, Ndera location.
3.	Mini-grid Power	44kW PV Inverter; 171kWh Battery; 20kVA peak demand
4.	Distribution line	LV Circuit of 3km
5.	Target Consumers	209 (204 Residential and 5 Non-Residential)
6.	Climatic condition	The region has a hot and dry climate within ecological zones ranging from III (in the very high grounds) to VII (in the plains or lowlands). Average annual temperatures are about 30°C with the highest being 41°C around January-March and the lowest being 20.6°C around June-July. Rainfall is low, bimodal, erratic and conventional in nature. The total annual rainfall ranges between 280 mm and 900 mm with long rains occurring in April and May, short rains in October and November with November being the wettest month. The Inter Tropical Conventional Zone (ITCZ), which influences the wind and non-seasonal air pattern for the river Tana, determines the amount of rainfall along the river line. The dry climate in the hinterland can only support nomadic pastoralism. Climatic conditions within Munguvueni. support agricultural activities including farming.
8.	Site Conditions	The side is generally in open area with minimal and scarce <i>fauna</i> and <i>flora</i> .
9.	Road Accessibility	Earth road joining Garsen and Munguvueni. The road condition is very poor
10.	Nearest Airport	Garsen Airport at 30kms and Hola Airstrip at about 60km
11.	River/canal/nallah/ pond present in project footprint	Munguvueni village is within Tana Delta region
12.	Protected areas (National Park/ Sanctuary)/ Forest	Omora gulo forest.

S/NO.	PARTICULARS	DESCRIPTION
	land within 10 kms	

2.2 Project Location

The project site is located at Munguvueni village near Mumbuji primary school in Mnazini Sub-Location, Ndera Location, Garsen North Ward, Tana Delta Subcounty, Tana River County at coordinates of 2°01'04.9" S and Longitude 40°09'06.2" E.

Tana Delta area is comprised of sedimentary rocks from the tertiary and quaternary periods, made up of clayey soils intercalated with marine, deltaic, fluviatile, lacustrine and coastal- lacustrine sands, silts and clays which give rise to relatively flat topography. On higher areas there are reddish brown soils while in low-lying areas; rich clays and silt are found. The project site is approximately 25km South of Garsen town.



Plate 1 : Proposed site for the Munguvuini Solar Mini-grid project and surrounding vegetation

2.3 Project site setting

The proposed Munguvuini mini grid is in Tana River County. It falls under cluster 3 and lot 4 which has a total of 23 mini-grids. Geographically, Munguvuini site falls on coordinates; latitude 2°01'04.9" S and Longitude 40°09'06.2" E.

Figure 3: % indicates funding allocation per Service Territory under component 2&3

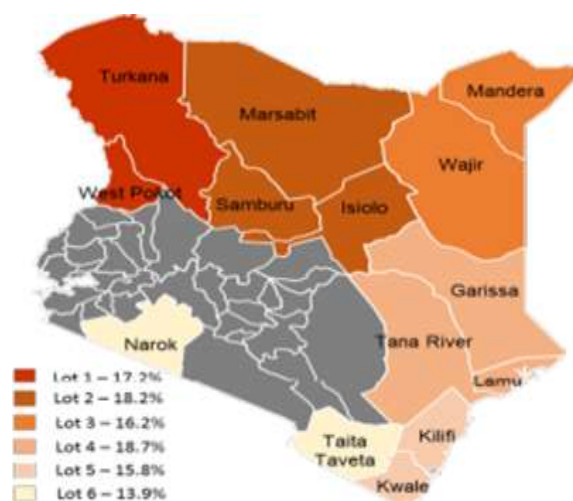


Table 2-2: KOSAP Funding Allocation and Solutions per Lot/Service Territory

LOT/Service Territory	County	Mini-Grid Sites	Solar Systems				Solar Pumping systems	Cook Stoves
			Homes	Secondary schools	Level 2&3 Health clinics	ACC Offices		
1 Northwest	West Pokot Turkana	26	42,953	42	165	25	62	34,018
2 North	Marsabit Samburu Isiolo	29	45,432	28	133	17	69	35,982
3 Northeast	Mandera Wajir	32	40,537	23	112	23	62	20,066
4 East	Garissa Tana river Lamu	23	46,695	15	127	22	71	23,114
5 Southeast	Kilifi Kwale	1	39,568	52	104	5	60	19,586
6 South	Taita Taveta Narok	10	34,815	47	143	17	52	17,233
	Total	121	250,000	207	784	106	380	150,000

2.3.1 Land Requirement and Procurement Process

The land on which the proposed Munguvueni mini-grid will be constructed is public land.

2.3.1.1 Land Tenure

The site is on public land belonging to the county government of Tana River. Compulsory land acquisition will be done for the 1.3416 hectares that will be used for the generation assets, with compensation in kind for the land taken to the community. An A-RAP applies where affected persons are not physically displaced, and less than 10% of their productive assets are lost, or fewer than 200 people are displaced. In the case of KOSAP sub-projects, there is no physical displacement of affected persons, and the foreseen impacts on livelihoods such as grazing occasioned by mini-grid construction, wayleaves acquisition, and implementation of community projects are considered minor. A-RAPs will be implemented for sub-project sites on registered and unregistered community land/group ranches.

2.3.1.2 Compensation Details

Compensation for the land taken will be in kind by doing a community project in health, education or water sector; the value of the project will be equivalent to the value of the land taken and informed by the National Lands Commission (NLC) Valuation criteria.

The projects proposed by the community in Munguvueni included Construction of a maternity wing in Mnazini Dispensary approximately 5kms away, construction of two class rooms and a library at Mumbuji primary school. However, the community Prioritized development of two classrooms in Mumbuji primary school.

2.4 Description of Project Facilities, Components and Activities

The proposed project will be having two components in one that is a Hybrid Mini-Grids (PV- and Diesel) and construction of Power line reticulation lines. The following sections are explanations for each of the components that will be implemented.

2.4.1 PV Hybrid Mini-Grid Sizing

The power system has been sized based on the energy parameters. These are:

Residential Users (No.)	204
Non-Residential Users (No.)	5
PV Capacity (kWp)	53
Battery Capacity (kWh)	171
PV Inverter (kW)	44
Generator Capacity (kVA)	50
Fuel Tank for diesel generator (Litres)	2,000
LV Network (km)	3

The system will be modular, so that it can be upgraded easily to meet future demand needs. The proposed power plant will be configured as AC coupled due to the significant portion of daytime loads that can be fed directly from the solar PV generator without intermediate battery storage. This will include:

- PV modules with PV inverters,
- Diesel Genset,
- Deep-cycle lead-acid electrochemical batteries with liquid electrolyte (largely used in off-grid applications thanks to its well proven technology at baseline costs compared with other types of batteries).

The proponent will be required to apply for a NEMA ESIA variation of the license, during the design changes over the project lifespan.

Key Components of the Project:

Power Generation Sources:

Solar Photovoltaic Panels: The project utilizes solar panels with a total capacity of 53 kWp to harness solar energy. Solar power is a clean and renewable energy source that will provide a significant portion of the electricity needed for the project.

Battery Energy Storage System: A 171 kWh Battery Energy Storage System is incorporated to store excess solar energy during the day, ensuring a consistent power supply even during cloudy or nighttime conditions.

Diesel Generator: A 50 kVA diesel generator is included to serve as a backup power source for periods of low solar generation or in case of battery depletion. It provides reliability and backup in the event of extended periods of cloudy weather or high demand.

Fuel Tank for Diesel Generator: A 2,000-liter fuel tank is provided to store diesel fuel for the generator, ensuring continuous operation during extended periods of low solar or high demand.

Inverters and Chargers:

PV Inverter: A 44 kW solar PV inverter is used to convert the direct current (DC) electricity generated by the solar panels into alternating current (AC) electricity suitable for consumer use.

Battery Inverter Charger: A 34 kW battery inverter charger is employed to manage the energy flow to and from the battery storage system. It ensures efficient charging and discharging of the battery, maximizing the system's overall performance.

Low Voltage Power Distribution Network:

A 3-kilometer Low Voltage (LV) power distribution network is established to distribute the generated electricity to the residential and nonresidential consumers. The LV network is designed to efficiently transmit power while minimizing losses, ensuring a stable supply to the customers.

Project Metrics:

Monthly Energy Demand: The project is expected to meet a total monthly energy demand of 5,352 kWh.

Daily Energy Demand: The average daily energy demand is approximately 178 kWh, ensuring a consistent supply for the consumers.

Peak Demand: The peak demand of the system is 20 kW, which is the maximum power requirement during any given moment.

PV Capacity: The solar photovoltaic panels have a total capacity of 53 kWp.

2.4.2 Architecture and Basic Design Specifications

This hybrid power generation site is projected to generate 53 (kWp) and is meant to serve approximately 209 households (customers). The proposed mini-grid installations will be built to comply the International Electro technical Commission (IEC) standards. It will have an installation of solar panels of with a capacity of 53 (kWp) and battery house with 171 kWh. The solar panels will have a connection to the batteries through underground cables. The standby generator will also be connected to the system as a backup.

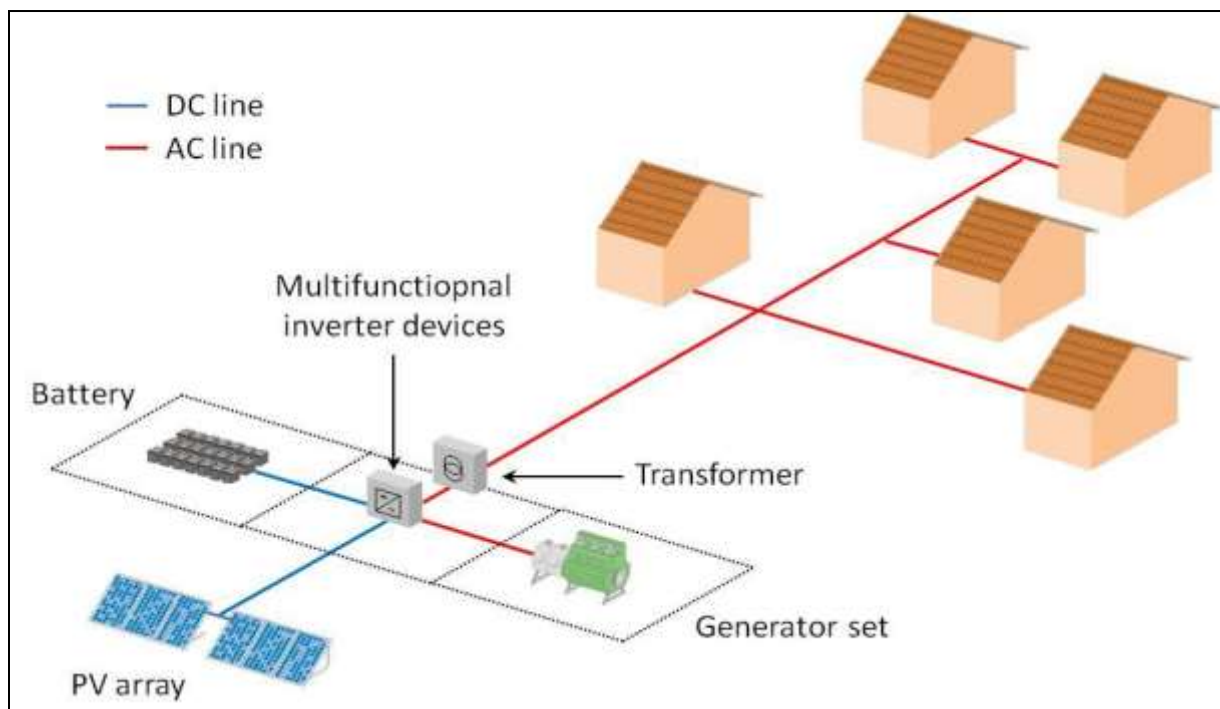
This generator will be a capacity of 50 kVA capacity with a fuel tank. To optimize this hybrid system the HOMER software will be used. The goal of the hybridization of diesel systems is to reduce fuel consumption by switching off diesel generator set(s) for several hours a day, in order to reach a PV energy, share in the final mix of at least 60% or more. The power will be distributed to the customers by overhead lines. The project site is expected to serve clients within a radius of 6km from the site (generation source).

The PV plant and the battery capacity have been sized accordingly to the daily demand and the solar resources. In addition to this Design architecture, the project site shall have a site office that shall also have a Control Room adjacent as well as a guard house. The guard house shall be constructed using concrete and masonry works whereas the control room and office can also be a containerized facility.

The Solar PV hybrid system is based on a centralized photovoltaic plant connected to a 3-phase 415V AC busbar line, where the multi-mode battery inverter and the diesel generator are also connected.

The plant is configured such that a significant portion of daytime loads is fed directly from the solar generator (grid-tie inverter) without intermediate battery storage usage. The solar PV power plant is also equipped with a Diesel Generator, which is normally used as reserve power. The diesel generator switches on automatically whenever the battery state of charge reaches a certain defined DOD (Depth of Discharge). The diesel generator comprises of 50 kVA unit in three-phase operation and it's equipped with automatic startup function controlled by the battery inverter charger. The figure 5 below illustrates the preliminary data for the mini-grid in Munguvueni.

Figure 4: Illustration sketch of the proposed design of the proposed project



2.4.3 PV Generator

The PV modules should comply with the norms IEC 61215 and IEC 61730. The outside junction box with the positive and negative terminals shall incorporate bypass diodes that have the function of preventing any possibility of the electrical circuit inside the module being broken due to the partial shading of a cell and shall be at least IP 65 and UV resistant.

The module support structure shall be ground-mounted on arid soil with a base made of concrete. The support shall have a tilt angle between 10° - 15° from the horizontal. No soil tests have been performed, at this stage of the proposed project design, but from the site inspection during the pre-feasibility study, ramming or screw foundations could be used. The support frame shall be of either lightweight aluminum or galvanized steel and it shall be easy for installation, maintenance and disassembly at the end-of-life cycle. These materials will be possibly sourced locally or from abroad and shipped to Mombasa port and transported via road to the site town.

Cables used within the PV generator shall have a voltage rating of at least 1,2 VOC; have a temperature rating higher than 40°C above ambient temperature; they will be UV-resistant; water resistant and it is recommended that they be flexible (multithreaded) to allow for thermal/wind movement of modules. The PV inverter shall be of type current source grid-tied to convert DC to an AC Sinusoidal current. String inverters shall be installed indoors or outdoors with a cover and suitable for desert conditions with high ambient temperatures and dust.

The project will use PV Array (DC-kW) polycrystalline silicon modules with three strings connected in series. Each string will have five sets of panels connected in series, with output converged at the six-way combiners. The life expectancy of the PV modules is estimated at 25-30 years.

2.4.4 Battery

- **Battery Energy Storage Systems**

The Battery Energy Storage System (BESS) will comprise of Lithium-ion Battery pack that conforms to IEC standards with warranty of 10 years, 3,000 cycles minimum. The Lithium-ion Battery Power Packs will be used to cater for required energy capacity, or equivalent as per approved design, minimum 80% DOD for Lithium-Ion. Batteries will be capable of at least C/4 charge and discharge rate. Batteries will be charged by Battery Inverter / Charger. The project will use 171kwh batteries.

- **Battery Inverters/Chargers**

The Inverters/charges shall be designed for nominal voltage of 415 Vac which will be continuous, reliable power supply as per specification and shall have internal protection arrangement against any sustained fault in the feeder line and against lightning strikes in the feeder line. The inverters shall be capable of complete automatic operation including wake-up, synchronization & shut down independently & automatically. The inverter shall be 3-phase multi-mode (DC to AC and AC to DC), bi-directional, four-quadrant capability.

- **Battery Rating**

The battery nominal voltage does not need to be established at this stage and different technology providers may offer different solutions on this issue. Nevertheless, it must be noted that the voltage class, either ELV or LV, will determine the electrical isolation and accessibility requirements of the battery room. The battery shall have at least the rated capacity of 2.16V at the C10 discharge rate according to DIN 43539-9.

- **Battery Performance**

The battery shall have a self-discharge when new of less than 5% per month (at 25°C and fully charged) of its rated capacity and shall have a Coulombic efficiency of at least 85% and energy conversion efficiency of at least 85% when new and charged to more than 50% of capacity. The battery cycle life for discharge/charge regular cycles down to 80% DOD shall be more than 1500 cycles (According to IEC 896-1).

- **Lifetime**

The design lifetime of the batteries shall be of at least 8 years without losing more than 10% of the rated C10 capacity. When the batteries get damaged, they will be stored separately at the site and then transported to Nairobi for proper disposal.

- **Battery Cabling and Protections**

The battery connection point shall be as close as possible to the Multi-mode Inverter. Cables used to connect the battery shall have a temperature rating higher than 20°C above ambient temperature. It is recommended that they be flexible (multithreaded) to allow for easy installation and maintenance. Fuses in cables that connect components to the battery shall be rated for D.C. use, be installed separately as

close as possible to the battery terminals and rated to interrupt high fault currents from the battery. A neutralization kit will be provided at the site to manage any battery acid spills that may occur.

2.4.5 Multi-mode Inverter

The multi-mode inverter (or inverter set) for this application is a bidirectional sinusoidal inverter. It can operate in autonomous mode as well as grid-tied mode. The efficiency curve shall be always above 80% in all cases, adjusting it at the load demand curve (base load, partial load or maximum load). A priority function of the Multi-Mode Inverter is to adjust the instantaneous power consumed from the source according to the battery voltage. The operation of the solar priority function shall be done with an automatic adjustment algorithm of the input limit current. The input limit current is decreased, if there is enough energy available at the DC side, from the initial value.

2.4.6 Diesel Genset

The Diesel Generator Set shall have a capacity of 50 kVA. The Diesel Generator Set should include a highly corrosion resistant enclosure, control panel and monitoring, fuel tank and circuit breaker protections. The Diesel Genset shall be suitable for indoor or outdoor installation and shall perform accordingly with Multi-mode Inverter and the mentioned architecture model. The Diesel Genset shall be working in a fully automatic manner with the above stated components. The diesel gensets will have base mounted fuel tanks that will be factory tested for leaks. There will also be an external reserve fuel tank with a capacity of 2,000 liters. The proponent, through the operating entity will have regular inspection by the manufacturer. The noise rating for the generator set will be 75dBA @ 1 meter at 75% load under free field conditions. The generator sets will have a high-quality noise absorbent and fire-retardant grade acoustic insulation material complying to IS 8183.

2.4.7 Powerhouse

The Battery, Multi-mode inverter and all monitoring equipment will be installed indoors with adequate air ventilation accordingly to the manufacturer's recommendations. Thus, a powerhouse or a containerized solution, considering the equipment manufacturer's recommendations shall be installed. All electrical boards and LV protections will also be installed indoors. The batteries will be installed in the powerhouse in a separate room, specifically for their use and meeting the electrical safety requirements according to its voltage class.

2.4.8 Distribution lines and Energy meters

The site will have a distribution line circuit of 3km in total. Supply of concrete poles for the distribution lines will be based on detailed survey and accessories like phase plates, circuit plates, number plates, danger plates, anti-climbing devices as per KPLC requirements/specifications. Erection of the Poles, fixing of insulator strings, stringing of conductor and earth wires along with all necessary line accessories and earthing will be as per KPLC requirements/specifications.

The electricity distribution from the generation plant to the end consumers will be done by means of a distribution line formed by low voltage (LV) line at 415V for three phase and 240V for single phase. All lines shall be over-head mounted on concrete poles or eco poles. The project implementing agency and KPLC

will seek way leaves for the LV lines which will run along road reserves and boundaries within the supply area.

2.4.9 Project cost

Munguvuveni solar project cost is estimated at **USD. 323,710**

2.5 Project Phases and Activities

The main project activities include site clearance and leveling, civil works and construction of utilities and structures for the facilities, installation, and connection of the power plant.

2.5.1 Pre-Construction/Project Design

As part of the pre-construction stage, the Project is implemented jointly by the Ministry of Energy, Kenya Power and Lighting (KPLC) as well as Rural Electrification and Renewable Energy Corporation (REREC) who have conducted a feasibility study aiming at providing universal access to electricity in Kenya by 2022, universal access to modern energy services for cooking by 2030, as well as the impetus for growth in achieving Vision 2030. A conceptual design has been developed and will be taken forward for detailed design and implementation including the projects described in the previous section. This ESIA report forms part of the feasibility study.

The MOE is currently applying for various permits and licenses including land acquisition for generation assets, wayleaves, contractor facilities and worker's camps. The procurement of various goods and services and contracting of private sector contractors and other consultants will begin after completion of the EIA process.

2.5.2 Construction Activities

2.5.2.1 Construction Procedures

The project will be constructed based on applicable standards of Kenya, environmental guidelines and health and safety measures in line with OSHA Act 2007.

The project inputs will include the following.

- Construction of raw materials will include solar modules, inverter, wires, metals, among others. All these will be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies.
- Construction machines will include machinery such as trucks, and other relevant construction equipment. These will be used for the transportation of materials, clearing of resulting construction debris.
- A construction labour force of both skilled and non-skilled workers will be required.

Construction activities will include the following:

- Contractor mobilization.
- Site Preparation.
- Procurement of construction material from approved dealers and transport to the site.
- Storage of PV modules delivery and their installation.

- Laying of internal electrical connections.
- Installation of inverters, Battery Energy storage system and transformers.
- Post construction clean-up, restoration and landscaping of site
- Load testing
- Remedying of defects after functional tests
- Solid waste collection and commissioning of the plant

2.5.2.2 Soil Excavation

Soil will be excavated to pave way for the construction of the Solar Mini-grid. Soil excavation process shall be done with utmost care to ensure that the excavated soil is not improperly heaped or not carried away by any surface flows to any nearby surface waters causing siltation. The excavated soil will be used to backfill, and any remainder shall be disposed appropriately in accordance with the environmental management plan. Company safety and environmental policy and other established local environmental protection regulations/standards shall guide the contractor. This will include appropriate safety wear at all times and the contractor will appoint a safety officer on site during all construction activities.

2.5.2.3 Construction Supervision and Safety

Throughout the construction phase, supervision shall be carried out by the KPLC to ensure:

- Workers use personal protective equipment (such as hand gloves, helmets, safety shoes ear muffs, overalls and dust coats) at all times as is appropriate
- Motorized equipment are checked to ensure that they are in good working condition, safe to use and produce minimal noise levels and reduced smoke emission.
- Provision of first aid kit and firefighting equipment (portable cylinders) and placement at strategic positions for access
- Proper disposal of waste material and toilet facilities are provided for construction workers
- Emergency response procedures are in place and all workers are aware of them like in case of fire.
- Any work involving deep excavations, elevated heights and lifting heavy loads, poses a number of risks to personnel. The contractor shall develop a worksite plan before commencement of each of the construction. This will ensure that personnel are equipped with the correct protective clothing and equipment and are ready to work safely while also safeguarding the environment.
- Workers shall be provided ablutions facilities and changing rooms

2.5.2.4 Mini-Grid Components

The following components are planned to be constructed and operated on site. The same will need to undergo regular maintenance during the operation phase.

1. Technician Room
2. Battery Room
3. Generator Room
4. PV Array/Panels
5. Distribution network
6. Guard house.

2.5.2.5 Land Tenure

The proposed site is on public land. The community has since offered the land to the project proponent establishment of the proposed project.

2.5.2.6 Compensation Details

Compensation for the land for the proposed project will be in kind; The MOE will pay compensation in kind through implementation of projects in either water, education and health sectors.

2.5.3 Operational Activities

The Solar Mini-grid will be operated and maintained by the Operations and Maintenance contractor for a period of seven years and then handed over to KPLC, the activities will include periodic switching and periodical maintenance works. During operation phase of the project, no unauthorized person shall access the Solar Mini-grid site. This is in line with company policy to ensure safety of staff and the public. Routine maintenance is to be done under supervision by authorized staff. Throughout the project life, the KPLC shall adhere to all requirements of National Environmental Management Authority (NEMA) and any other applicable legislation regarding environmental and socio – economic impacts.

2.5.4 Project's Decommissioning Activities

Kenya Power shall submit a decommissioning plan to NEMA in good time prior to decommissioning. The decommissioning plan should include a restoration plan.

At the decommissioning/demolition phase, the following activities will take place;

- Removal of Solar Mini-grid panels and Diesel Generator and their associated switching equipment's
- Removal of electrical fittings, bus bars and steel poles/structures
- Demolish and carefully handle components that contain oil and fuels like the Diesel generators
- Ensure proper handling of the demolished materials and have an authorized and guided transportation and disposal away from human settlement, water bodies and wildlife conservation area in line with NEMA requirements for safe disposal
- Demolish and remove all the concrete works

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

- Approved and appropriate landscaping methodology.
- Planting of vegetation.
- Removal of any soils that may have been impacted by oils or fuels for offsite (away from the project area) remediation.

2.6 Resource Requirement

2.6.1 Workforce Requirement

The size and the composition of the workforce will be at the discretion of the contractor(s). The contractors will adhere to the Employment Act of 2007 in the recruitment and management of the employees. It is recommended that the contractor seeks unskilled labor from the surrounding areas. During the operating phase, the following people will be needed: operations and maintenance heads, engineers, and technicians. Unskilled workers will mow the grass and clean the modules as needed during the project's operation period. Trained security guards will also be employed during the operations phase.

2.6.2 Water Requirement and Source

Water is key in the construction of this project. Water will be required for potable use and in the construction of the foundations for the control room, guard house and any other works. The contractor will source water from elsewhere rather than the community dam because water may not be enough for the community for use during construction and operation.

2.6.2.1 Construction Phase

Civil works during construction stage will require water; an estimated 50,000 liters of water will be used daily throughout the construction phase. Further, water will be required for workers at project site. However, this quantity of water requirement will vary depending upon the mobilization of construction workers at site. The water for the construction phase will be sourced from the boreholes and wells at Munguvuveni village.

2.6.2.2 Operation Phase

The water required during operation phase of the project will be mainly for washing the face of the solar modules, Minimal water will be used for this purpose. Water requirement during operational phase of the project will be met from the water vendors in the area.

As previously stated, employees (direct and contractual) will be employed to work during the operation phase. For this workforce, approximately 5,000 Liters of water will be required weekly for domestic consumption.

2.6.3 Raw Material Requirement

2.6.3.1 Construction Phase

The major raw materials required for the construction phase will be solar modules, fencing materials, construction materials like cement, sand, and aggregate. The fencing materials and the construction materials will be sourced from the local hardware facilities. Solar Modules for the project along with associated structures will be obtained from appropriate sources within or outside the country.

- **Input Materials and Equipment and Machinery**

Works and construction activities are expected to use quality construction materials and procedures to ensure quality work, occupational and public safety and environmental protection. The following inputs and equipment will be required for construction:

Lorry	Concrete mixers
Plumbing equipment	Welding machines, wheelbarrows
Electrical equipment	Excavators
Raw construction materials (Sand, cement, natural building stone blocks, hard core, gravel, concrete among others).	Paints, solvents, whitewash, etc.,
Timber (e.g., doors and frames, fixed furniture, etc.),	Labor force (of both skilled and unskilled workers).
Generator Sets and Fuels (Diesel)	Bus bars, Switch gears, Circuit breakers
Lightning arrestors and Steel structure members	Water
Solar panels	Poles
Conductors	Meters

Hardcore	Glass
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2.6.3.2 Operation Phase

There will not be major requirement of raw materials during operation phase. Only maintenance spares will be required at this phase.

2.6.4 Power Requirement

Power requirement during the construction phase will be met through Diesel Generators sets. The exact number of Diesel Generator sets to be used, as well as the quantity of fuel, will be ascertained once the project is in the implementation stage.

2.6.5 Road Access Requirement

Existing roads will be utilized as far as possible during the construction and operational periods. No new road will be constructed because there is an existing road to the Solar Mini-grid. The flow of traffic to the site during the construction period will increase and management of traffic will be paramount. During operations there will be virtually very low traffic considering because once operational the Solar Mini-grid will require minimal maintenance.

2.6.6 Fire Safety, Fencing and Security

2.6.6.1 Construction Phase

Appropriate firefighting system and equipment shall be provided throughout the construction period. The fire extinguishers will be well distributed according to the fire risks and will be available in areas such as the site office, installation of a shut-off switch to disconnect the solar panels from the electrical system, security area, storage yard etc. A comprehensive emergency response plan with all the emergency numbers will be well displayed at the site and on the fence. Signage, danger plates and name plates will also be displayed at the site.

2.6.6.2 Operation Phase

- **Site security**

The proposed site is within Munguvueni. The site is in an area that is basically open and in close proximity to residential and public facilities. This calls for proper security measures to be put in place to protect both human and domestic animals from accessing the Solar Mini-grid site. Therefore, the Mini-grid will have a chain link fence to keep off the electrical installation away from access by unauthorized persons or animals. A gate will be constructed at the entrance to the site which will be locked at all times. The Mini-grid will be lit at night, and a photocell will be used to automatically switch on the lights at a set time each evening. The Mini-grid will also be guarded at all times by two security guards during the day and two guards at night.

- **Fire safety**

Suitable fire protection and fighting systems that will include portable fire extinguishers, automatic fire detection system and means of fire communication will be made available at the entire PV array area, inverter stations, main control room and switchyard.

The systems and equipment's will align to the Kenyan Fire Reduction Rules of 2007. The Fire protection and fighting systems will be maintained and serviced after every 6 months.

Because off-the-grid systems generally involve an underground wiring system, they are much less prone

to weather accidents that lead to fires. They are also much smaller than the typical power grid, so if a fire were to start (against all odds), it would remain contained in a small area. The maintenance contractor using a Vegetation Management Program with mechanical methods will help provide effective vegetation control during the dry season.

An effective grounding system will be installed during power wiring for protection against lightning damage. In addition, lighting arrestors and surge protectors will be installed. To reduce hotspot effects, the contractor will ensure that panels are installed without obstructions. This means they won't be too close or in the shade of anything else, as this will cause shadows on each other.

Physical barriers consisting of conduits and short circuit withstanding capacity will be part of the design to prevent rodents from gnawing on a cable during the operation phase. To ensure the workers are not exposed to occupational hazards from contact with live power lines and cables during maintenance, and operation activities will ensure they: employ prevention and control safety measures associated with live power lines; employ measures to prevent, minimize, and control injuries related to electric shock; all electrical installations should be performed by certified personnel and supervised by a certified person; ensure that there are no equipment, appliances and machinery with unsafe electrical conditions. No equipment or machinery with worn-out or un-insulated wires and conductors; and ensure all electric installations and cables are properly labeled.

To prevent and avoid hotspots and their negative effect on solar panels, the panel design will take hotspot problems into consideration without obstructions of vegetation or building. Vegetation undergrowth will be controlled through regular slashing and cleaning up of the project site.

2.7 Pollution Streams during Construction Phase

2.7.1 Solid Waste Generation

2.7.1.1 Construction Phase

The key solid waste that is expected to be generated during construction phase include. Broken solar panels and PV Modules, Hazardous waste like waste oil, lubricants, oil contaminated rags and Domestic soil from the temporary site office.

The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and secondary containment. The storage containers/ bins/ drum will be clearly marked, and color coded for their hazards. The waste will then be collected by a NEMA approved waste handler.

Any broken solar panels or PV Modules will be sent back to the vendor as part of buyback arrangement. Alternatively, the e-waste will be disposed by licensed waste handlers in sites that are licensed by NEMA and local authorities to dump e-waste. All the other domestic solid waste will be disposed at the nearest municipality dumpsite.

2.7.1.2 Operation Phase

During operation phase, waste generated from the project will include domestic waste at site office, scrap materials like scrap tools, damaged PPEs etc.; hazardous waste like waste oil, lubricants, used transformer oil; damaged batteries; electronic waste like damaged PV modules etc.

The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and secondary containment. The storage containers/ bins/ drum will be clearly marked, and color coded for their hazards. The waste will then be collected by a NEMA approved waste handler.

Any broken solar panels or PV Modules will be sent back to the vendor as part of buyback arrangement. Alternatively, the e-waste will be disposed by licensed waste handlers in sites that are licensed by NEMA and local authorities to dump e-waste. All the other domestic solid waste will be disposed at the nearest municipality dumpsite.

The operations of this site will consist of a Battery Energy Storage System (BESS) comprising of Lithium-ion Battery pack. Expired lithium batteries are hazardous; sometimes leakages from these batteries are possible. Procedures for the management and disposal of the lithium batteries, including temporary storage, transport and final disposal will be implemented.

Any solar panels or batteries removed from the array for disposal will first be collected and stored in the covered 10ft container provided by the Contractor and for final disposal; the Contractor will ensure hazardous items are shipped offshore to a facility licensed to handle hazardous waste.

2.7.2 Air Emissions

2.7.2.1 Construction Phase

Air quality will be impacted due to onsite construction activities. The likely emissions from construction activities would include the following:

- Dust emissions from the dusty roads leading to the site.
- Increased vehicular emissions due to the high traffic of vehicles transporting construction materials, PV Modules, and accessories.
- Dust emissions from site clearing, material handling, piling and use of the construction machinery.
- Exhaust emissions from the diesel generator.

The high dust emissions arising from various activities such as piling, transportation of material (loading and unloading), vehicular movement (on unpaved roads) should be minimized through sprinkling of water and maintaining vehicular speed to 10-15 km/hr.

All the vehicles and the Diesel generator should be well maintained and serviced to reduce the rate of exhaust emissions.

2.7.2.2 Operation Phase

It is expected that the normal operations of the site will produce minimal gaseous emissions from all the operating areas. The minimal gaseous and fugitive dust emissions will be attributed to the in and out movement of the maintenance vehicles. It will be ensured that well maintained vehicles are used for maintenance purposes.

2.7.3 Liquid Waste Generation

2.7.3.1 Construction Phase

The liquid effluents generated during the construction phase will include domestic sewage from temporary site offices, kitchen and washing areas. As part of the site preparation stage, septic tank will be constructed for the camp and site office. Sewage disposal trucks should be used to periodically remove the sludge/sewage from the septic tank.

2.7.3.2 Operation Phase

The operational phase will have negligible wastewater generation at site office. Septic tank and soak pits will be provided at the site office for disposal of sewage.

2.7.4 Noise Emissions

2.7.4.1 Construction Phase

Noise emissions will be generated from piling, movement of vehicle and other construction machinery and operation of the Diesel Generator. The main noise receptors will be the neighboring settlements and the construction workers. Noise from Diesel Generators will be minimized through provision of acoustic enclosures and occasional maintenance of the generator. Every single noise generating activity will be restricted to Day time only.

2.7.4.2 Operation Phase

Under normal operations, none of the activities of solar power plant will generate noise. The only noise that can be generated at this phase is during the maintenance works and it will be restricted to daytime only. However, during cloudy periods and when solar energy is low, the backup generator that will be utilised will produce noise. Mufflers and silencers will be installed so as to minimize noise pollution from the backup generator. Noise rating for the generator and inverter will not exceed 75dBA at one meter at 75% load under free field conditions.

2.8 Safety of the Facility

As is with other projects, the proposed project is prone to both natural and man-made disasters. However, it is difficult to prevent the occurrence of natural disasters, but the consequences could be reduced by engineering measures. Man-made disasters on the other are preventable. The following safety concerns will be addressed in the proposed project.

a) Natural Disasters

In order to reduce the impacts of any potential natural disaster, the proposed project will be designed according to acceptable standards and code and shall be able to reasonably withstand any impacts which may arise as a result of the worst credible seismic event.

b) Malicious Damage or Theft

The proposed project could be prone to malicious damage such as terrorist attack or theft. To prevent the occurrence of such events, the following measures will be taken:

- Regular monitoring and inspection of the project and its associated infrastructure.
- 24-hour guard of the premises/office block

c) Hazard Risk Assessment

An emergency response procedure will be prepared by the KPLC and be communicated to the contractor. As a minimum requirement, the emergency management plan will cover the following aspects:

- Safety regulations
- Scope of the safety emergency plan
- Notification of local authorities
- Details of the proposed project
- Aim of the safety emergency plan
- Objectives of the study emergency plan
- Emergency arrangements, procedures and plans
- Roles and responsibilities in the event of an emergency
- Evacuation of people
- The role of local communities
- Regular testing of the safety emergency plan
- The risk assessment will include as a minimum:
 - A general process of the project being investigated
 - A description of the potential major incidents associated with that type of installation and the consequences of such incidents
 - An estimation of the probability of a major incident
 - A copy of the site emergency plan
 - An estimation of the damages in the case of an explosion or fire
 - An estimation of the effects of toxic gas releases.
 - The potential effect of an incident on the project or part thereof or an adjacent project or part thereof.
 - The potential effect of a major incident on any other installations, members of the public and residential areas.
 - Meteorological tendencies
 - The suitability of existing emergency procedures for the risks identified.
 - Any requirements laid down in the OSHA 2007 and EMCA 1999.
 - Recommendations regarding any organizational measures.

3 ANALYSIS OF ALTERNATIVES AND PROJECT JUSTIFICATION

This section analyses the project alternatives in terms of site and technology. Solar projects are non-polluting energy generation projects which are site specific and dependent on the availability of solar irradiance resource. The current site selected is a high solar power potential site with high irradiation and consistent sunny days throughout the year.

3.1 Present Power Supply Position

Munguvueni village has an estimate of 400 number of people with approximately 80 households within the area. The proposed solar off grid project is estimated to cover up to 204 residential and 5 non-residential consumers within the area. This will reach out to over 50% of the population within the area.

Majority of the population in the county (87.5%) use wood fuel for cooking and 78.2 per cent use kerosene for lighting. Only 0.9 per cent of the households are connected with electricity. There is a lot of potential for the exploitation of renewable energy sources such as solar and wind, and expansion of electricity transmission in the county through the main grid. The proposed project area is not connected to the national grid however the area has a potential for solar energy.

The existing sources of energy at Mnazini sub location include solar powered appliances supplied by private enterprises such as D-light. The current energy availability provided by the solar appliances is insufficient and does not meet the objective of the aim of project. Solar energy and torches are mainly utilized for lighting and charging mobile phones. Whereas, firewood and charcoal are utilized for cooking, heating water and providing for warmth. Access to power especially within public amenities is poor including the health centres with at Munguvueni village.

The use of firewood and charcoal contributes to massive environmental degradation, increased health risks (indoor air quality pollution causing chronic and fatal respiratory diseases) and additional workload for women and girls, and increased emissions of carbon content. Moreover, low enrollment, retention and transition for girls is partly attributed to increased workload related to energy search (firewood).

Failure to construct and operate the mini-grid in Munguvueni will lead to the failure of achieving one of the Kenya's national long-term development policies that aims to transform Kenya into a newly industrializing, middle-income country, by providing a high quality of life to all its citizens by 2030 in a clean and secure environment. Beneficiaries will be households, public and community institutions, enterprises and community facilities that cannot access electricity through the national grid and whose use of electricity will replace wood fuel and other fuels for lighting and other activities like pumping water

3.2 Alternate Location for Project Site

In determining the most appropriate site for the establishment of the minigrid, several options were explored. This site selection process considered the following criteria:

- i. Geophysical Factors-Proximity to Hills-Shade effect, Soil erosion, Drainage of the area, Flooding etc.
- ii. Land identified is free from any dispute on ownership or any other encumbrances

- iii. Proximity to public utilities-Schools, Dispensaries, Places of worship and community settlements
- iv. No squatters, encroachers or other claims to the land
- v. The Size of the Minigrid to be constructed and the optimal coverage of a Minigrid in terms of the number of people to be reached.
- vi. The Land identified should be on spaces set aside for public use within the community centres.

The land was identified by the beneficiary communities and confirmed by technical staff to be suitable for the sub-project and free from any environmental or health risks. The impacts on the Community will be marginal and will not result in displacement of households or cause loss of household's incomes and livelihood.

The site identified was considered against the criteria highlighted above and was found suitable for Minigrid construction.

3.3 Analysis of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. The materials will include all consumables, tools, testing instruments or any other equipment required for successful commissioning of the project. These may not be desirable from a cost and durability perspective. The technology to be adopted will be the most economical and one sensitive to the environment. The technology will involve a Battery Energy Storage System (including battery Inverter and charger).

3.4 Alternate Sources of Energy

Harnessing solar energy is an eco-friendly process, with an inexhaustible solar resource and minimal pollution. There are minimal fuel requirements for operational activities. Solar energy has a short development timeframe, more predictable energy output and low maintenance costs as compared to some other forms of renewable energy sources.

The possible alternatives to solar energy include;

- Wind power: shortfalls associated with wind power includes; lack of time series data of wind, trained human resources to intricate design of wind power etc, providing wind power for Munguvueni residents is technically and financially challenging, expensive to install, dependent on wind pattern. However, generation is cheap, low emissions & insignificant pollution levels.
- Thermal power: High fossil consumption, high emissions levels, high water consumption levels (water highly scarce in Munguvueni). Besides coal and petroleum products used in thermal power processing are not readily available within Munguvueni area and may have to be sourced from far locations. Therefore, thermal power option based on coal and petroleum products is not a viable option for Munguvueni. It however has high distribution and large-scale production potential
- Nuclear power: disadvantages include; use of other fuel sources, has hazards associated with radioactive materials, expensive disposal of waste, high cost of project and long gestation period. The mode however does not emit smoke particles, low fuel cost, low emission levels and continuous electricity production.
- Wood fuel/ Firewood: The use of firewood and solid waste for electricity generation using thermal technology is another option. But the issue of air pollution and destruction of vegetative cover

through firewood harvesting and charcoal burning already are environmental problems of serious concern which will further aggravate the natural environment. For these reasons, the wood fuel options evaluated above seem inappropriate for Munguvueni on environmental as well as economic grounds

- Fossil fuel

Solar energy was a desirable option because:

- It has low energy-production costs
- The project is environment friendly with minimal greenhouse gas emissions
- Versatile installation
- It is a clean source of energy hence minimal impact on the environment air quality
- Economic savings.

3.5 Technology Alternatives

The technology to be adopted will be the most economical and one sensitive to the environment. The technology will involve a Battery Energy Storage System (including battery Inverter and charger).

There are three main PV technologies groups available in the market today; below is a brief introduction to each of these technology groups and a summary of their current market status.

- **Crystalline Silicon:** Crystalline silicon (c-Si) technologies are mainly represented by mono-crystalline (m-Si) and multi or poly-crystalline (p-Si) technologies. The mono-crystalline cells are made from very pure monocrystalline silicon.
- **Thin Film:** In these processes, photoactive semiconductors are applied in thin layers to a low cost substrate (in most cases glass). Among other technologies are Cadmium-Telluride (CdTe) is dominating the thin-film market.
- **Hybrid HIT Cells:** The HIT solar cell is a combination of a crystalline and a thin-film solar cell. HIT (hetero junction with intrinsic thin layer) refers to the structure of these hybrid solar cells. This structure comprises crystalline and amorphous silicon, which is bonded with an additional un-doped thin-film (intrinsic thin layer).

The technology selected for the project will be polycrystalline silicon (p-Si). The final selection of technology will however be decided based on the bids presented during the tendering process after consideration of economic as well as performance characteristics of each technology. In the past, the higher efficiencies of c-Si modules compared to thin film modules has been a decisive criterion where space is limited as they tend to yield a greater power output capacity per unit area. A better yield (kWh produced per kWp installed) can be expected from thin-film technologies at locations with low irradiation conditions (high diffuse component of the GHI) or in areas of high ambient temperatures.

The main difference between mono crystalline silicon (mono c-Si) and poly crystalline silicon (poly c-Si) cells is the manufacturing process, their specific technical characteristics and price. Mono c-Si ingots grow uniformly from an initial crystal (seed), leading to an almost perfect crystalline structure. Poly c-Si is manufactured from the discharge of molten silicon into a module; this means that the crystalline structure is not uniform and the electrical conversion or efficiency of poly c-Si cells is typically lower than that of mono c-Si cells what explains its difference in price.

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. The materials will include

all consumables, tools, testing instruments or any other equipment required for successful commissioning of the project.

3.6 Solid Waste Management Alternatives

A lot of solid wastes will be generated from the proposed project site. An integrated solid waste management system is recommendable. First, the proponent will give priority to reduction at source of the materials. This option will demand a solid waste management awareness program in the management and the staff. Recycling and reuse options of the waste will be the second alternative in priority. This will call for a source separation program to be put in place. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. In this regard, a NEMA registered solid waste handler would have to be engaged. This is the most practical and feasible option for solid waste management considering the delineated options.

3.7 Power distribution line Alternatives

The project requires the distribution of generated power into the settlement points within Munguvueni through optimal access points, therefore all possible options for power distribution have been assessed.

The identified viable option for power distribution within Munguvueni village for the solar mini-grid project is overhead distribution lines. Although other alternatives, such as underground lines and passing the power lines off established community public access routes, may have been considered, they are not feasible for this specific project due to technical and practical reasons. A mini-grid connection with enough capacity and material was recommended due to the anticipated increasing demand for connections. This eliminates the need to overhaul the proposed mini-grid connection when the population increases in Munguvueni.

Underground distribution lines involve the installation of power cables beneath the ground, typically in trenches or conduits. While this option may be visually appealing and minimize the impact on the environment, it presents challenges in terms of cost, maintenance, and accessibility. Excavation for underground lines can be difficult and costly in Munguvueni village due to challenging terrain, and maintenance and repair of underground lines may require specialized equipment and labour. Additionally, accessing underground lines for routine maintenance, fault detection, and repairs can be challenging, especially in remote or inaccessible areas of the area. Furthermore, scalability and flexibility may be limited with underground lines, making future expansions or changes in power demand more complicated and costly.

Passing the power lines off established community public access routes may not be practical in Munguvueni village due to community settlement patterns, existing infrastructure, and environmental considerations. Establishing new routes or modifying existing ones to accommodate power lines may require significant resources, land acquisition, and community consultations, which can be time-consuming and costly.

Additionally, the appropriateness of potential mini-grid site identified by the Proponent was also assessed in terms of various suitability criteria and technical restrictions as outlined below:

Parameter	Comment
Seismicity	According to the Seismic Distribution Map by WHO (2010), generally Tana River county's seismic hazard is categorized as "Very Low". It is however recommended that the civil and structural infrastructure for the project should be designed in compliance with the national seismic regulation embedded within the Building Code
Land Use	The parcel of land earmarked for the project is community land with vegetative cover being natural trees and bushes. At present, the land is unutilized.
Terrain	Consideration is given to the topography of potential sites whereby flat or gently sloping topography is preferred. An ideal gradient for the natural ground is 1:100. A gentle slope facilitates surface drainage and movement of vehicles and people on site during construction. A steep slope requires costly leveling (cut and fill) for the construction of the solar mini-grid and increases the potential for environmental impacts during construction as well as operations i.e. steeper slopes have higher surface water flow rates and therefore higher erosive potential. The proposed site is slightly slopy and cost-effective during construction. The proposed site and distribution alignment does not exhibit significant slopes that may impact on the construction/installation activities.
Hydrology	Consideration is given to the proximity of potential sites to adjacent water courses and wetlands where there may be potential impacts in terms of erosion and siltation of water courses, as well as implications associated with storm-water control at the solar mini-grid site. The site is not close to water resources or wetland and so there will be no impact to water sources through siltation.
Geology and soils	Consideration is given to the soil type present within the potential site whereby stable soil and founding conditions are preferable. Less stable soils, i.e. shallow, dispersive soils and soils with poor drainage present an erosion hazard if not managed correctly, and also require the installment of additional, costly foundation infrastructure. The site has sandy soil which drain more readily than other types of soils.
Flora and Fauna	The potential sites need to be assessed in terms of their ecological value at both a macro and micro scale i.e. within the site and the environment surrounding the site to ensure the protection of endemic and red data species and their habitat, should they be present. The proposed site is not of a high ecological value.

Visibility	Highly visible sites i.e. on a ridge / elevated terrain are considered less favorable in that they have a high visual impact on the surrounding landscape. Sites that are hidden or out of site e.g. behind a hill, may be considered more suitable. The proposed site is on flat and may not create sharp visual impact because it is not on an elevated point.
Accessibility	The proposed site is accessible by existing public roads which will avoid the need for construction of new access roads. Access is also important particularly as it relates to the transportation of the solar panels, batteries and generator to the site, which are heavy weights. As such the site should not be located in an area that has excessively steep inclines or declines that could hinder access particularly during periods of heavy rainfall.

Considering these technical and practical challenges, the identified option of overhead distribution lines along Munguvueni access routes is the most feasible for the solar mini-grid project in Munguvueni village. Overhead lines, which involve the installation of power cables on poles, are more cost-effective, easier to maintain, and provide greater flexibility for future expansion. Proper design, installation, and adherence to safety and environmental standards can ensure reliable and efficient power distribution to the consumers on the area, making overhead distribution.

3.8 Do Nothing Alternative

This option involves remaining on the status quo. The no construct/no project alternative will not achieve the objectives of the project since the listed benefits will not be achieved.

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

Kenya Vision 2030 is the country's development blueprint covering the period 2008-2030. It aims to transform Kenya into a newly industrialized, *'middle income' country providing a high-quality life to all its citizens by the year 2030.*

Vision 2030 is based on three key pillars namely: Economic, Social, and Political.

This policy recognizes that infrastructure, and in particular, a reliable power supply is vital in sparking economic growth. The challenges facing the power sector in Kenya include weak transmission and distribution infrastructure, high cost of power, low per capita power consumption, and low electricity access countrywide.

The county government of Tana River needs to invest in solar power which remains a sustainable option for lighting up rural and remote areas of the country and that the sector has the potential to drive economic development in the county. With an arid climate and a vast desert landmass, Tana River is geographically optimal for harnessing the solar power.

Failure to construct and operate the minigrid will lead to the failure of achieving one of the Kenya's national long-term development policies that aims to transform Kenya into a newly industrializing, middle-income country, by providing a high quality of life to all its citizens by 2030 in a clean and secure

environment.

Project Affected Persons (PAPs) will be households, public and community institutions, enterprises and community facilities that cannot access electricity through the national grid and whose use of electricity will replace kerosene and other fuels for lighting and other activities like pumping water.

This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will, however, involve several losses both to Munguvueni area and Tana River county as a whole. The village and the surrounding area will continue to have no electricity, and this will not help in maximizing and utilizing the area facilities. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of the local people would remain unchanged.
- The local community members will not benefit socially from the employment opportunities and improved security.
- Continued aggravation of environmental degradation by use of firewood and charcoal as sources of energy
- Improved service delivery in the existing institutions i.e. school, dispensary, business center will not be actualized
- The exploration and use of solar power will provide opportunities for women to engage in some of the productive and sale activities. Releasing women from looking for firewood would increase their opportunities for caregiving and time for their businesses

3.9 Conclusion

The proposed project should be upheld to support the local community.

4 APPLICABLE LEGAL AND REGULATORY FRAMEWORK

4.1 Introduction

This Chapter outlines the existing national and international environmental and social legislation, policies and institutions applicable to energy generation that guide the development of the Project.

As Kenya is a signatory to various international conventions and laws, national projects need to be aligned with their requirements; relevant international conventions and laws are therefore presented in this chapter.

Finally, a summary of the World Bank (WB) Environmental and Social operational policies. relevant to this Project are presented.

4.2 KENYA ELECTRICITY SUPPLY INDUSTRY (ESI)

The Kenya Electricity Supply Industry (ESI) is one of the sub-sectors in the energy sector which the Ministry of Energy and Petroleum oversees on behalf of the Government of Kenya (GoK). Relevant stakeholders in the ESI are briefly described below.

- **Kenya Power Company:** responsible for distribution and retail supply of electrical energy to end users. Kenya Power purchases power in bulk from the Kenya Electricity Generating Company Limited (KenGen) and the Independent Power Producers (IPPs) through bilateral contracts or Power Purchase Agreements (PPAs) approved by the Energy and Petroleum Regulatory Authority (EPRA).

KP will be responsible for implementing the project, construction of the generation systems and distribution network for the Munguvueni site. Supply of power will be through KP and same tariffs will be charged for each category.

- **The Energy and Petroleum Regulatory Authority (EPRA):** established by the Energy Act of 2019. The EPRA's mandate extends beyond electricity and includes natural gas (including petroleum), renewables and all other forms of energy. The generation, distribution, distribution, supply, import and export of electricity can only be carried out by parties in possession of a license or a permit issued by the EPRA. In the event that the capacity involved is for own use and less than 1 MW, authorization is not required. Although the generated electricity is expected to be less than 1 MW (0.3 – 1 MW), the fact that the generated electricity is intended for use in a factory and there is a possibility for connection to the national grid and sale of excess power to the government, the project requires a license from the EPRC to generate electricity as stipulated in the Energy Act, 2019.

The Energy and Petroleum Regulatory Authority (Authority) together with industry stakeholders have developed the Draft Energy (Mini-Grid) Regulations, 2022 (the 'Regulations'). The Regulations have been developed within provisions 10, 11 and 208 of the Energy Act, 2019 (the 'Act') and shall constitute Regulations to the Act. The Regulations will amongst others, provide guidance to mini-grid developers and other stakeholders on the tariff approval and licensing requirements. This will be directly applicable to the Munguvueni site.

- **Ministry of Energy and Petroleum:** aims to facilitate provision of clean, sustainable, affordable, reliable, and secure energy services for national development while protecting the environment.

The ministry will be responsible for not only implementing the community projects like water and cooking solutions from the proposed but also the overall coordination of project implementation and oversight.

4.3 ENVIRONMENTAL ADMINISTRATIVE / INSTITUTIONAL FRAMEWORK

The multi-faceted nature of the environment and the need to integrate environmental considerations in all development planning and activities calls for cooperation and consultation among responsible government agencies and stakeholders at all levels. At present there are several institutions and departments which deal with environmental issues in Kenya.

Some of the key institutions include:

4.3.1 National Environment Management Authority (NEMA).

The objective and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. However, NEMA's mandate is designated to the following committees.

4.3.2 The County Environment Committees.

The Governor, by notice in the Gazette, is required by EMCA (Amendment) Act 2015 to constitute a County Environment Committee of the County of the Authority in respect of every County respectively. The County Environment Committees is responsible for the proper management of the Environment within the County in respect of which they are appointed. They are also to perform such additional functions as are prescribed by the Act or as may, from time to time be assigned by the Minister by notice in the gazette. The decisions of these committees are legal and it is an offence not to implement them.

4.3.3 National Environmental Complaints Committee.

The Committee performs the following functions:

- a) To investigate any allegations or complaints against any person or against the Authority in relation to the condition of the environment in Kenya, on its own motion, any suspected case of environmental degradation, and to make a report of its findings together with its recommendation thereon to the Council;
- b) To prepare and submit to the Council, periodic reports of its activities which report shall form part of the annual report on the state of the environment under section 9 (3); and
- c) To perform such other functions and exercise such powers as may be assigned to it by the Council

4.3.4 National Environment Action Plan Committee.

This Committee is responsible for the development of a 5-year Environment Action Plan among other things. The National Environment Action Plan shall:

- Contain an analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and transmission quantity over time.
- Contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.
- Recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.
- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for the planning and management of the environment and natural resources.

- Identify actual or likely problems as may affect the natural resources and the broader environment context in which they exist.
- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment, and strategies for the amelioration of their negative impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.
- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritize areas of environmental research and outline methods of using such research findings.
- Without prejudice to the foregoing, be reviewed and modified from time to time to incorporate emerging knowledge and realities and;
- Be binding on all persons and all government departments, agencies, States Corporation or other organ of government upon adoption by the national assembly.

4.3.5 National Environment Tribunal

This tribunal guides the handling the cases related to environmental offences in the Republic of Kenya.

4.3.6 Standards and Enforcement Review Committee

This is a technical Committee responsible for environmental standards formulation methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures.

4.3.7 National Environment Council (NEC)

EMCA 1999 No. 8 part III section 4 outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for purposes of EMCA; set national goals and objectives and determines policies and priorities for the protection of the environment and promote co-operation among public departments, local authorities, private sector, non-governmental organizations and such other organizations engaged in environmental protection programmes.

The project proponent will adhere to any directive issued by the above institutions that are relevant to the project.

4.4 National Legal Framework

The applicable legal framework is illustrated in table 7 below.

Table 4-1: Legal framework National

S.No.	Legislation/ Guidelines	Description of the Legislation/Guidelines	Relevance of the legislation/Guidelines
POLICY			
1	Vision 2030	Kenya Vision 2030 is the current national blueprint for development from its inception in 2008 until the milestone year of 2030. This plan is the national long-term development policy that aims to transform Kenya into a newly industrialized, middle-income country by 2030. The Vision is comprised of three key pillars (economic, social, and political), two of which are projected to be positively affected by project implementation.	Under Vision 2030, Energy is identified as one of the key sectors that form the foundation for socio-political and economic growth. Promoting equal opportunities across the entire Kenyan territory and enhancing access to competitively priced, reliable, quality, safe and sustainable energy is essential to the achievement of this vision.
2	The Poverty Reduction Strategy Paper (PRSP) of 2001	The PRSP has the twin objectives of poverty reduction and enhancing economic growth. The paper articulates Kenya 's commitment and approach to fighting poverty; with the basic rationale that the war against poverty cannot be won without the participation of the poor themselves.	The proposed project aims at provision and access of renewable electricity geared towards improved economic performance and thus will contribute to poverty alleviation in the project area.
3	National Environmental Action Plan (NEAP) of 1994	The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy whose main effort is to integrate environmental considerations into the country 's economic and social development. The integration process was to be achieved through multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural	The NEMA does not approve a development project unless the impacts of the proposed project are evaluated and mitigation measures proposed for incorporation in the project 's development plan, which is in line with the requirements of the NEAP. The project will be reviewed by NEMA for approval before implementation.

		resources forms an integral part of societal decision-making.	
4	Environmental and Development Policy (Session Paper No.6 1999)	As a follow-up to the foregoing, the goal of this policy is to harmonize environmental and developmental goals to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development.	The proponent: • Is undertaking an Environmental Impact Assessment, Social Impact Assessment and Public participation as part of the planning and approval of infrastructural projects. • Will ensure that periodic Environmental Audits are carried out for the project
5	The Gender and Development Policy (Sessional paper no.2 2019)	The overall goal of this policy is to achieve gender equality by creating a just society where women, men, boys, and girls have equal access to opportunities in the political, economic, cultural, and social spheres of life.	In the absence of appropriate measures, the project can exacerbate gender inequalities and sexual and gender-based violence. In adherence to this policy, measures will be put in place to: • ensure gender inclusivity in decision making, employment opportunity and access to the energy generated from the Mini-Grid • mitigate social risks including sexual and gender-based violence, and any form of discriminations
6	The HIV/ AIDS Policy 2009	In summary, the policy aims at: i. Establishing and promoting programmes to ensure non-discrimination and non- stigmatization of the infected. ii. Contributing to national efforts to minimize the spread and mitigate against the impact of HIV and AIDS. iii. Ensuring adequate allocation of resources to HIV and AIDS interventions;	The proposed project is to be implemented in the rural setting at Munguvueni area. The area is not economically empowered hence few HIV/AIDS prevention resources are available. This policy shall provide a framework to both the project proponent and contractor to address issues related to HIV/AIDS during the entire project phase.
National Laws			

1	The Constitution of Kenya, 2010	The Constitution of Kenya promulgated in 2010 is the supreme law of the republic and binds all persons and all State organs at all levels of government. The Constitution provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn.	The proposed project complies with the Constitution by proposing a structure in its ESIA on how to deal with Social, Health, safety and environmental issues for sustainable development.
2	Environmental Management and Coordination Act, 1999 (And the Amendments Of 2015)	The EMCA is a framework environmental law in Kenya. This Act (assented to on January 14, 2000) provides a structured approach to environmental management in Kenya. With the EMCA coming into effect, the environmental provisions within the sectoral laws were not superseded; instead, the environmental provisions within those laws were reinforced to better manage Kenya's ailing environment.	The proposed project will be undertaken in accordance with relevant sections of the EMCA, specifically Clauses 58 – 63. These sections of the Act are operationalized by subsidiary legislation promulgated under the Act and specifically Legal Notice (L.N.) 101: Environment (Impact Assessment and Audit) Regulations, 2003.
3	L.N. 101: EIA/EA Regulations, 2003 And 2016 Amendments	These regulations provide the framework for undertaking EIAs and EAs in Kenya by NEMA licensed Lead Experts and Firms of Experts. An EIA or EA Study in Kenya is to be undertaken by a firm duly licensed by the NEMA. The EIA/EA Regulations also provide information to project proponents on the requirements of either an EIA or EA as required by the EMCA.	The proposed project is subject to relevant provisions of these regulations and subsequently, the ESIA has been undertaken in accordance with the requirements.
4	L.N. 120: Water Quality Regulations, 2006	This regulation provides for the sustainable management of water used for various purposes in Kenya. The regulation contains discharge limits for various environmental parameters into public sewers and the environment.	The contractor will be required to properly manage the effluent from construction activities in accordance with the above regulations prior to discharge into the environment.

5	L.N. 121: Waste Management Regulations, 2006	Generally, it is a requirement under the regulations that a waste generator segregates waste (hazardous and non-hazardous) by type and then disposes them in an environmentally acceptable manner.	Waste to be disposed in accordance with these regulations.
6	L.N. 61: Noise and Excessive Vibration Control Regulations, 2009	The general prohibition of these regulations states that no person shall make or cause to be made any loud, unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures, or endangers the comfort, repose, health, or safety of others and the environment.	Rules 13 and 14 of the regulations define the permissible noise levels for construction sites. These noise limits will be applicable to the proposed project.
7	Environmental Management and Coordination, (Conservation of Biological Diversity) (BD) Regulations 2006	These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84, December 2006. These regulations apply to conservation of biodiversity which includes conservation of threatened species, inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties. Additionally, this regulation provides for the local enforcement of the International Convention on Biological Diversity (CBD).	The proposed project will impact biodiversity through clearance of vegetation on the proposed site. This will be done in strict adherence to ESMP and revegetation of degraded site will be done as spelt out in the ESMP
8	Environmental Management and Coordination, (Fossil Fuel Emission Control) Regulations 2006	These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement No. 74, October 2006. These regulations include internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnership to control fossil fuel emissions. The proposed project will generate fuel	This legislation gives caution to proponent on proper handling and management of fuels. KP will adhere to the ESMP while handling and managing the fuels

		emissions linked to the back-up generator. This will only happen when the sun rays are poor.	
9	Licenses and Permits Required Under The EMCA	The subsidiary legislations under the EMCA are partially monitored using permits and licenses. Subsequently all licenses and permits required during the construction phase shall be the responsibility of the individual contractors and their agents. During the operational phase, all permits, and licenses required to operate the project will be the responsibility of the proponent.	The following permits to be available for inspection during the construction and operational phases of the project: ✓ Waste Transport License under Legal Notice 121: The Environment Management and Coordination (Waste Management) Regulations 2006 for disposal of all types of wastes; and ✓ Noise Permit under Legal Notice 61: The Environment Management and Coordination (Noise and Excessive Vibration Control) Regulations, 2009.
10	Occupational Health and Safety Act, 2007	The Occupational Safety and Health Act (OSHA) was enacted to provide for the health, safety and welfare of persons employed in workplaces, and for matters incidental thereto and connected therewith.	The contractors will be required to fully comply with Legal Notice 40 titled: Building Operations and Works of Engineering Construction Rules, 1984 (BOWEC). Each contractor will develop and implement a formal construction health and safety plan.
11	L.N. 31: The Safety and Health Committee Rules, 2004	These rules came into effect on April 28, 2004, and require that an Occupier formalize a S&H Committee if there is a minimum of 20 persons employed in the workplace. The size of the S&H Committee will depend on the number of workers employed at the place of work	The contractor will be required to constitute Health and Safety Committee to oversee safety and health at the construction site
12	L.N. 24: Medical Examination Rules, 2005	These rules provide for Occupiers to mandatorily undertake pre-employment, periodic, and termination medical evaluations of workers whose occupations are stipulated in the Eighth Schedule to the OSHA and the First Schedule to this Rules. Workers that fall under the above two schedules are required to undergo medical evaluations by a	The contractor should that the workers exposed to hazards and or accidents undergo requisite medical examinations as required by these rules

		registered medical health practitioner duly registered by the DOSHS.	
13	L.N. 25: Noise Prevention and Control Rules, 2005	The rules set the permissible level for occupational noise in any workplace (which includes construction sites) The Proponent is to ensure that • any equipment brought to the site for use shall be designed or have built-in noise reduction devices that do not exceed 90 dB(A). • those employees that may be exposed to continuous noise levels of 85 dB(A) are medically examined as indicated in Regulation 16. If found unfit, the occupational hearing loss to the worker will be compensated as an occupational disease.	The contractor to ensure that equipment is serviced properly and/or use equipment that complies with the threshold noise values provided in the act. Alternatively, each contractor will be required to develop and implement a written hearing conservation programme during the construction phase.
14	L.N. 59: Fire Risk Reduction Rules, 2007	Several sections of the rules apply to the proposed project as enumerated below. - Regulation 16 requires Proponents to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system. It is also a requirement that all electrical equipment is inspected every six months by a competent person and the Proponent is required to keep records of such inspections. - Regulation 22 provides a description of the functions of a fire-fighting team. - Regulation 23 requires Proponents to mandatorily undertake fire drills at least once a year.	The proponent is expected to comply with the requirements of L.N. 59: Fire Risk Reduction Rules, 2007 by i. Carrying out, and record, a fire risk assessment identifying any possible dangers and risks. ii. Reducing, or where possible remove, the risk of fire and take precautions to deal with the remaining risks. iii. Developing an emergency plan should a fire occur which includes evacuation procedures etc.

		- Regulation 34 requires Proponents to develop and implement a comprehensive written Fire Safety Policy - Regulation 35 requires a Proponent to notify the nearest Occupational S&H area office of a fire incident within 24 hours of its occurrence and a written report sent to the Director of DOSHS within 7 days.	
15	The Energy Act, 2019	The Energy Act of 2019 deals with all matters relating to all forms of energy including the generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes. The Act also established the Energy and Petroleum Regulatory Authority (EPRA).	The proponent is in line with the Energy act regulations in the following ways. • The proponent has identified an available site • Alignment of the Mini-Grid Project to County development plans. • The Mini-Grid proponent has the technical and financial capability to conduct the project • The proponent has conducted the necessary engagement with the community.
16	Water Act, 2016	Part 2 section one of the Act notes that every water resource is vested in and held by the national government in trust for the people of Kenya. Section 143 (1) notes that; A person shall not, without authority conferred under this Act- (a) Willfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or (b) Throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near	All construction, operation and decommissioning phases will take caution to refrain from polluting any water resource and will endeavor to prevent pollution in line with the ESMP.

		to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.	
17	The Energy (Solar Photovoltaic Systems) Regulations, 2012	These regulations shall apply to a solar PV system manufacturer, importer, vendor, technician, contractor, system owner, a solar PV system installation and consumer devices. The Regulations prohibits any person from designing or installing any solar PV system unless he/she is licensed by EPRA.	The Regulations regulates the design and installation of PV systems. The persons engaged in the designing and installation of the Mini-Grid shall be licensed by EPRA
18	The Public Health Act (Cap. 242)	The Act prohibits the proponents from engaging in activities that cause environmental nuisance or those that cause danger, discomfort or annoyance to inhabitants or is hazardous to human and environmental health and safety.	The proponent will be in line with the regulations of this act and will ensure suppression of infectious diseases and maintain proper sanitation during all the phases of the project.
19	The Standards Act Cap 496	The Act is meant to promote the standardization of the specification of commodities, and code of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. The KP will ensure that commodities and codes of practice utilized in the proposed project adhere to the provisions of this Act.	All materials and spares used to construct the project will comply with the standardized specifications and certification.
20	Penal Code Act (Cap.63)	Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or	The KP shall observe the guidelines as set out in the environmental management and monitoring plan laid out in this report as well as the recommendation provided for mitigation/minimization/avoidance of adverse impacts arising from the project activities.

		business premises in the neighbourhood or those passing along public way, commits an offence.	
21	The Land Act, 2012	An Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources, and for connected purposes Forms of Tenure. 5. (1) There shall be the following forms of land tenure- (a) freehold; (b) leasehold; (c) such forms of partial interest as may be defined under this Act and other law, including but not limited to easements; and (d) customary land rights, where consistent with the Constitution. Methods of acquisition of title to land. 7. Title to land may be acquired through— (a) allocation; (b) land adjudication process; (c) compulsory acquisition; (d) prescription; (e) settlement programs; (f) transmissions; (g) transfers; (h) long term leases exceeding twenty-one years created out of private land; or (i) any other manner prescribed in an Act of Parliament. Conversion of land. 9. (1) Any land may be converted from one category to another in accordance with the provisions of this Act or any other written law. (d) Community land may be converted to either private or public land in accordance with the law relating to community land enacted pursuant to Article 63(5) of the Constitution.	Land in Munguvueni is community land whose tenure falls under customary land rights. KP will observe all the relevant provisions of the Act including conversion from community land to public land as will be deemed appropriate

22	Community Land Act, 2016	This Act is critical for the proposed project is within community land. Section 6(1) of the Act provides that 'county governments shall hold in trust all unregistered community land on behalf of the communities for which it is held'. Furthermore, Section 6(2) maintains that 'the respective county government shall hold in trust for a community any monies payable as compensation for compulsory acquisition of any unregistered community land'. Section 30(1) states that 'Every member of the community has a right to equal benefit from community land'. Section 26(1) provides that 'a community may set aside part of the registered community land for public purposes and Sub-section (2) holds that 'where land is set aside for public purposes under Sub-section (1), the (Land) Commission shall gazette such parcel of land as public land'. These provisions offer a window for the proposed project to acquire land for project works legally for communities as necessary and to convert the same into public land. This is useful for the project as once done powerful groups will not have opportunity to exclude them on account of their socio-economic statuses. In any event, Section 35 holds that, 'subject to any other law, natural resources found in community land shall be used and managed- (a) Sustainably and productively. (b) For the benefit of the whole community including future generations.	- The proposed project site falls on unregistered Community land which is owned by the Munguvueni community. The community has since offered the land in kind for project use. The establishment of the mini-grid will convert communal land to generation and distribution of electric energy for long term. Further, based on community need assessment the proponent will undertake in kind development project to support the community water needs.
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		(c) With transparency and accountability; and (d) On the basis of equitable sharing of accruing benefits. The concept of community land has been defined broadly enough to include VMGs. Women, children, old people, and future generations have been thought of as Project Affected Persons (PAPs) and thus their rights secured in this Act	
23	Land Registration Act, 2012	Section 27 (2) provides that a transfer without valuable consideration shall have the same effect as a transfer for valuable consideration when registered.	Once the KOSAP PIU finalizes stakeholder engagements in all the identified counties, the transfer process shall be commenced to ensure that the land rights are secured. This gives the project the required land security to allow project implementation, which is in compliance with this legal requirement.
24	Land value amendment Act 2019	It aims at standardizing the value of land in Kenya for the primary purpose of enhancing efficiency and expediting the compulsory land acquisition process for public projects. It introduces Section 107A into the Land Act, which provides the criteria for the valuation of freehold and community land that is the subject of compulsory acquisition. Community Land, like freehold land, shall be valued based on the criteria outlined in Section 107A and the Land Value Index which will be jointly developed by the national government and county government. Section 5 introduces a list of the forms in which compensation can be made.	Land in Munguvuani is community land. The 1.3416 hectares allocated by the community for the proposed mini-grid will be acquired for the project. The MOEP will pay compensation in kind through implementation of projects in water, education and health sectors.
25	The Environment and Land Court Act 2011	This is an Act of Parliament intended to give effect of article 162(2) b of the constitution; to establish a	The project will have a grievance redress mechanism with a committee. The work of the committee will be to receive and

		superior Court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land and to make provision for its Jurisdiction functions and powers, and for connected purposes. The principal objective of this Act is to enable the Court to facilitate the just and expeditious, proportionate and accessible resolution of disputes governed by this Act.	respond to all the grievances raised. As explained in chapter five of this report, an aggrieved party will turn to the legal system after exhausting the GRM levels of resolution set. In the event any disputes on land and environment are not resolved through the project GRM, this court will provide a forum for timely resolution of such grievances.
26	The Physical and Land Use Planning Act, 2019	This Act of Parliament makes provision for the planning, use, regulation, and development of land and for connected purposes.	The proposed site is not in contravention of any Zoning regulations. The project site is within unregistered community land; necessary county approvals will be sought by the proponent e.g., Project design approval and change of use. The approvals shall be issued by the Physical planner in the department of Lands, Housing and Urban Development – Tana River County.
27	The Employment Act No 11 of 2007	This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the energy sector.	With the Contractor and the Project Proponent being primary employers during the construction and operational phases of the Project, respectively, they are bound by this law to abide to its stipulations on employee management and relations
28	The Work Injury Benefit Act, 2007	This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment	The Proponent and Contractor will maintain an insurance policy cover for its employees, record of accident, carryout proper accident investigations; organize for pre-employment and regular medical examinations for staff.
29	Air Quality Regulations (2014)	Regulation 3 stipulates that the objective of these Regulations is to provide for the prevention, control, and abatement of air pollution to ensure clean and healthy ambient air.	The Proponent and contractor will implement mitigation during construction to ensure neighbouring properties are not impacted by nuisance dust
31	The Traffic Act Chapter 295 Laws of Kenya	This Act consolidates the law relating to traffic on all public roads. Key sections include registration and licensing of vehicles; driving licenses; driving and	The project will observe the provisions of the Act including management of traffic of construction vehicles as guided by the ESMP

		other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other than motor vehicles and other road users. Many types of equipment and materials shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the stipulated road regulations. The Act also prohibits encroachment on and damage to roads including land reserved for roads.	
32	National Museums and Heritage Act, 2006	The Act seeks to consolidate the law relating to national museums and heritage; to provide for the establishment, control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya; to repeal the Antiquities and Monuments Act and the National Museums Act.	During implementation of the project, the Act will be followed in the event of case of chance find of cultural heritage on the proposed site
33	The Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012	This an Act of Parliament that provides for the prevention, protection and provision of assistance to internally displaced persons and affected communities and give effect to the Great Lakes Protocol on the Protection and Assistance to Internally Displaced Persons, and the United Nations Guiding Principles on Internal Displacement and for connected purposes.	According to this Act, displacement in projects should be avoided to the extent possible and implementation of KOSAP sub-projects will adhere to this requirement.
34	County Government Act, 2012	This Act makes provisions for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Part VIII of the	In complying with this requirement, the ESIA team held consultations on the project with the County Government of Tana River namely the Governor, County Executive

		act on Citizen Participation (87) (b) emphasizes on the right of citizens to participate to any development projects prior to their implementation. This Act gives guideline on planning in the County and especially the partnership in development between the National Government and other investors	Committee members for Environment, Energy and Public service and Administration. Additionally, the County government through the CEC Public service administration and the Chiefs office mobilized the communities for the consultation forums
35	The Sexual Offenses Act 2006	This is a comprehensive law that criminalizes a wide range of behaviors including rape, sexual assault, defilement, compelled or induced indecent acts with child imbeciles or adults, gang rape, child pornography, child trafficking, child sex tourism, child prostitution, exploitation of prostitution, incest by male and female persons, sexual harassment, deliberate transmission of HIV or other life threatening sexually transmitted disease, stupefying with sexual intent, forced sexual acts for cultural or religious reasons among others. The Act also has orders for medical treatment for victims including free HIV prophylaxis, emergency pregnancy pill and counselling. The Act provides stiff penalties in which most of the crimes attract minimum of ten years imprisonment which can be enhanced to life imprisonment.	Implementation of a project creates changes in a community in which it is implemented and is has potential to can cause shifts in power dynamics between community members and within households. For instance, male jealousy is a key driver of Gender Based Violence (GBV) which can be triggered by labor influx on a project when workers are believed to be interacting with community women. Hence, abusive behavior can occur not only between project-related staff and those living in and around the project site, but also within the homes of those affected by the project.
36	The Children Act, 2012	Part 2 of the Act denotes the rights of the children and their welfare shall be protected from child labor and armed conflict i.e. 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	Sensitization to the community on the need to ensure the protection of children has been done and will continue throughout the project cycle. In addition, the contractor will sensitize workers against abuse and exploitation of children.

		physical, mental, spiritual, moral or social development. The Act also notes that a shall be protected from sexual exploitation and use in prostitution, inducement or coercion to engage in any sexual activity, and exposure to obscene materials.	
37	Persons with Disability Act, Chapter 133	This Act provides for the protection of the rights of people with disabilities ensuring they are not marginalized and that they enjoy all the necessities of life without discrimination. The Act guarantees that (1) No person shall deny a person with a disability access to opportunities for suitable employment. (2) A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees. (3) An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment.	The Act will be adhered to in order to ensure that persons with disability are included in all decision making that affects their lives. This will be monitored to make sure they are not excluded from project benefits and exposed to negative impact from the project that could adversely affect them.

4.5 Project Permit and License Requirements

Table 4-2: Project Permit and License Requirements

No.	Relevant activity	Statute	Permit and License Requirement	Competent Authority	Responsible Agency for Obtaining Clearance	Date of Acquisition	Duration
Pre-Construction phase							
1	Construction and operation of the solar mini grid	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit ESIA report to obtain EIA license	NEMA	Proponent	Upon approval of ESIA report	Max 90 Days from date of submission of ESIA Report
2	Construction activities	Occupational Safety and Health Act (OSHA), 2007	Need to apply registration of premises	DOSHS	Contractor	Before commencement of construction	1 – 4 weeks
3	Setting up of construction camp sites	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to submit Project report for the Camp Sites to obtain EIA License	NEMA	Contractor	Before commencement of construction	1– 1.5 months
4	Storage, transport and disposal of ordinary domestic and office waste	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to obtain waste license through submission of Waste Management Plan	NEMA	Contractor	Before commencement of construction	1 – 1.5 months
5	Storage, transport and disposal of hazardous waste	Environmental Management and Coordination Act (EMCA) Cap 387, Rev 2018	Need to obtain hazardous waste license through submission of Waste Management Plan	NEMA	Contractor	Before commencement of construction	1 – 1.5 months

No.	Relevant activity	Statute	Permit and License Requirement	Competent Authority	Responsible Agency for Obtaining Clearance	Date of Acquisition	Duration
Construction phase							
1	Food handling in the campsite	Public Health Act	Obtain Food Handler Certificate	County Government	Contractor	Before handling of food in the campsite	6 months
2	Workplace registration	Occupational Safety and Health Act, 2007	Apply for Registration of a Workplace	DOSHS	Contractor	Before utilizing the campsite	Annual

4.6 World Bank OP applicability

The table below shows the applicability of World Bank Operational OPs to the proposed project in the project site;

S.No.	Description of World Bank OPs	Applicability to Project	Trigger for the policy
1.	OP 4.01 (Environmental and Social Impact Assessment)	OP 4.01 is applicable to the project since it is proposed for financing by the Bank. An EIA ensures that the project is environmentally sound and sustainable, and thus improve decision making.	The policy is applicable to this project because there are environmental and social concerns associated with the construction and operation of the proposed project. In response, the client has commissioned and Environmental impact assessment in order to identify and address the potential impacts to a level that is acceptable.
2.	OP 4.10 (Indigenous People)	OP 4.10 requires that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. The policy will guide the free, prior, and informed consultation with an aim of achieving results in broad community support to the project by the affected Indigenous Peoples	The policy is triggered when the project is undertaken in areas where Indigenous Peoples are present (with characteristics described in OP 4.10 para 4) in the project area.

3.	OP 4.12 (Land Acquisition and Involuntary Settlement)	The Munguvueni site does not envisage major physical or economic displacement of people. Munguvueni community have given land for project development, hence the OP 4.12 is applicable for this site. However, residents will not be resettled as there are no inhabitants on the proposed project site.	The policy is applicable for the entire project because there is land acquisition for the Mini-grid, Wayleaves, contractor facilities and worker's camps.
4.	Natural Habitats OP/BP 4.04	OP 4.04 recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The policy is applicable for Munguvueni as the project area could be affected by clearing various natural habitats to create room for pole erection and mini-grid construction. However, The project activities in K-OSAP areas will not cause conversion or degradation of natural habitats or critical natural habitats as defined by the policy.	The proposed project will not significantly affect natural habitats due to its area of coverage. Additionally, caution will be taken to ensure minimum disruptions to habitats as guided by the ESMMP.

4.7 Environmental and Social Management Framework (ESMF) for KOSAP

An Environmental & Social Management Framework (ESMF) for KOSAP was prepared by the Environment & Social Unit, Safety, Health & Environment (SHE) Department of Kenya Power in liaison with KP and MOE. The purpose of the Environmental and Social Management Framework (ESMF) was to provide a procedure for environmental and social assessment of the proposed KP, KP and MoE subprojects.

The ESMF provides guidelines for MoE, KP & REREC in determining the appropriate level of environmental and social assessment required for the sub-projects and in preparing the necessary environmental and social mitigation measures for these sub-projects.

This ESIA report for Munguvueni Project Site is guided by this KOSAP ESMF.

4.8 Resettlement Policy Framework (RPF) for KOSAP

A resettlement policy framework report was prepared following the Kenyan laws and World Bank policy (O.P 4.12) on involuntary resettlement. The RPF states that K-OSAP component 1 (Mini-grids for Community Facilities, Enterprises, and Households) which involves installation of mini-grids will require land acquisition.

The Framework seeks to avoid, manage, and/or mitigate potential risks arising out of damage to assets, disruption to work, temporary negative impacts on livelihoods and/or in the unlikely case of displacement. The RPF proposes guidelines to develop a Resettlement Action Plan and propose an implementation framework for RAP to mitigate such effects. The RPF states that involuntary resettlement and land acquisition will be avoided where feasible, or minimized or compensated where it cannot be eliminated. Where involuntary resettlement and land acquisition are unavoidable, resettlement and compensation activities will be conceived and executed as sustainable development programs, providing resources to give PAPs the opportunity to share project benefits.

The Ministry of Energy has partnered with the community who are the owners of the land and the County government of Tana River in identifying land for the proposed project. The sub-project site will be acquired compulsorily by NLC, and in-kind compensation in form of priority community projects provided to affected communities. The A-RAP will stipulate procedures and actions for acquiring land and compensating affected communities. The A-RAP will also document the land acquisition consultations undertaken with affected communities.

4.9 Vulnerable and marginalized Groups Framework (VMGF) for KOSAP

As noted above the KOSAP project triggered O.P 4.10 policy on Indigenous People and therefore a Vulnerable and Marginalized Groups Framework (VMGF) was prepared for use by the Ministry of Energy (MOE) and the implementing agencies KP and REREC and other stakeholders. The framework was prepared then because was known that IPs are present in all the 14 target project counties. However, at that stage of project preparation, the exact sub-project sites were not yet identified and the exact impacts of the project on VMGs were not yet completely known. The VMGF describes the policy requirements and planning procedures that during the preparation and implementation of components especially those identified as occurring in areas where VMGs are present.

The purpose of the VMGF is to guide management of issues related to vulnerable and marginalised groups during the development and operation of proposed sub projects and to ensure effective mitigation of potentially adverse impacts while enhancing sharing of benefits.

In regards to the Solar Mini-grid in Munguvueni, the main inhabitants - the Pokomo community- are classified as VMGs in Kenya. The ESIA did not identify any adverse impact on the Pokomo community therefore, a Vulnerable and Marginalized Group Plan (VMGP) will not be required however, elements of the VMGP such as inclusion of Pokomo in the stakeholder engagement process as well as representation on the locational grievance redress committee will be incorporated in the ESMP, to ensure that the Pokomo

access culturally appropriate project benefits and opportunities, in a gender sensitive and intergenerationally inclusive manner.

4.10 Comparison between the World Bank and Kenyan Laws to this Project

A comparison between the WB policies and the Kenyan law is presented in this section. The objective is to find out any gaps and propose a recommendation.

Comparison between the WB safeguard policies and the Kenya Legislation

World Bank safeguard Policies	Kenyan laws	Comparison	Recommendation
O.P 4.01 requires screening to determine level of environmental and social assessment to be done An ESIA is prepared before project implementation	EMCA requires screening of project to determine level of environmental and social assessment to be done An ESIA is required once determination is done	Similar both require screening	Screening has been done and the project is established as medium risk which requires and ESIA
ESIA is needed once determination had been established and should be prepared identifying all environmental and social impacts and mitigation measures proposed to address the impacts	ESIA is needed once determination had been established and should be prepared identifying all environmental and social impacts and mitigation measures proposed to address the impacts	Similar-both require ESIA depending on the project impacts	ESIA is prepared in line with EMCA /EIA regulations and makes reference to WB safeguard policies
O.P 4.12 Land Acquisition and Involuntary resettlement should be avoided wherever possible or minimized and exploring all alternatives	The Government and any other organization shall prevent internal displacement linked to development projects to the extent possible by exploring other alternatives.	Similar- displacement in projects should be avoided to the extent possible by exploring alternatives.	WB policy is more elaborate than the Kenyan Law.
O.P 4.10 on indigenous people seeks to promote the inclusion of these group in development project and especially through consultation to ensure they also share in the project benefits and ensure negative impacts do not disproportionately fall on them The policy requires these groups to be consulted separately to enhance their participation	The COK 20.10 article 56 provides for the right of marginalized communities and the importance of their input in decision making that regards them. National Gender and Equality Act and the Children's Act and Persons with disability Act seeks to promote the inclusion of these persons in all issues as they are often overlooked and left out. Emphasis is also on consulting	Similar-both seek to promote inclusion of these group so that they do can share the projects benefits and ensure that negative impacts of the project do not fall on them disproportionately	WB policy more elaborate and the two are being used to compliment

	with them	WB needs a social assessment to be conducted	
Project affected persons should be meaningfully consulted and be given opportunities to participate in planning and implementing of projects and especially where there is resettlement	EMCA requires that the project owner seeks the views of the people who are affected and explain the project information to them and especially the impacts of project and also obtain their opinions or comments	Both are similar	Consultation has been done and will be progressed in line with the two WB policy and Kenya legislation

5 BASELINE SETTINGS- ENVIRONMENT AND SOCIAL

5.1 Study Area

The project site is located near Mumbuji primary school at Munguvueni village, Mnazini Sub-Location, Ndare Location, Garsen North Ward in Tana Delta Subcounty, Tana River County. Based on the secondary information of the region, the following baseline information on environment, ecology and social has been discussed under the sections below.

5.2 Environment Baseline

5.2.1 Geology and Soil

The proposed project area is characterized by black cotton soils with clay, loam and alluvial deposits similar to soils at the Tana Delta falls within the coastal plains. The soils in this region are generally classified as Flurisolts being divided into two subgroups: eutric and vertic flurisolts. They have low or moderate fertility in the hinterland where there is no influence of flooding. The flood plains of the delta have fertile soils due to accumulation of silt or clay brought about by floods.

5.2.2 Topography

The project site area generally slopes to the South eastwards towards the Indian ocean with an altitude of zero above sea level. The nearest water body is located approximately 500m from Munguvueni village and Tana River approximately 3kms away.

The major physical features in Tana River County are an undulating plain that is interrupted in a few places by low hills at Bilibil (around Madogo) and Bura administrative sub-units which are also the highest points in the county. The land in Tana River generally slopes south eastwards with an altitude that ranges between 0m and 200m above sea level.

The most striking topographical feature is the river Tana that traverses the county from the Aberdares in the North to the Indian Ocean in the South covering a stretch of approximately 500km. Besides the river Tana, there are several seasonal rivers in the county popularly known as laggas, which flow in a west-east direction from Kitui and Makueni Counties draining into river Tana and eventually into the Indian Ocean. The river beds support livestock as well as wildlife during the dry season since they have high ability to retain water. River beds are most appropriate sites for shallow wells, sub-surface dams as well as earth pans.

5.2.3 Hydrogeology and Drainage

River Tana is the longest river in Kenya and drains the largest catchment in the country, extending to 96,000km². The river traverses the Tana Delta sub-county from the Aberdares in the North to the Indian Ocean to the south. Peak flows commonly occur in River Tana during two rainy seasons each year. These flood events follow a standard Hydrograph in which the volume of water in the river increases rapidly to a peak within a few days of the onset of heavy rains and then declines gradually over several weeks. The proposed project is located approximately 500m from the Tana delta and 3kms from Tana River. The flash floods experienced in the area during heavy rain seasons, brings havoc to the area especially to the transport network.

5.2.4 Ground Water Development

Water within at project area is main sourced from about 7 boreholes and shallow wells. Hand pumps are used access the water. While for farming purposes they rely on rainfall and Tana River. There is an extensive ground water storage in the aquifers in the lower Tana. Depending on geologic formations these aquifers have potential to provide the most strategic ground water reserves, which can be assessed through

springs, shallow wells and boreholes.

5.2.5 Ecological Conditions

Fauna

The fauna within the project area Location is determined by the harsh climate, the perennial river Tana delta and the natural vegetation found in the area. The existing fauna is classified as: Protected wildlife areas with terrestrial animals: - Gazelles, Warthogs, Columbus monkeys, Baboons, Vervets, Sykes, Bushbuck and Dik diks. Aquatic animals: -Crocodiles, Hippos, Turtles, Catfish, Tilapia, Frogs. Birds (Terrestrial)-Quails, Ostrich, Guinea fowls, Marabou stokes, Eagles, Herons, Bustards, Secretary Birds, Doves, Kites, Vultures, East coast Akalat, Tana River Cisticola, Malindi Pipit, and the Southern Banded Snake Eagle.

Flora

In general Tana River County is divided into four agro- ecological zones namely: CL3 Coconut – Cassava zone (non ASAL), CL4 Cashew nuts- Cassava zones where the main economic activity is peasantry mixed farming; CL5 Lowland Livestock zone and CL6 Lowland Ranching zones where the locals are involved in pastoral activities.

The soils range from sandy, dark clay and sandy loam to alluvial deposits. The soils are deep around the riverine environments but highly susceptible to erosion by water and wind. Soils in the hinterlands are shallow and have undergone seasons of trampling by livestock, thus are easily eroded during rainy seasons. Tana Delta area is comprised of sedimentary rocks from the tertiary and quaternary periods, made up of clayey soils intercalated with marine, deltaic, fluvial, lacustrine and coastal- lacustrine sands, silts and clays which give rise to relatively flat topography. On higher areas there are reddish brown soils while in low-lying areas; rich clays and silt are found. Alluvium deposits including gravel, sand, silt and clay cover the Tana River basin. Low to moderately fertile soils are found in the hinterland.

The Tana River Delta contains a very wide variety of habitats, including riverine forest, grassland, woodland, bushland, lakes, mangroves, dunes, beaches, estuaries and coastal waters. Small fragments of riverine forest, not nearly as extensive as the forests north of Garsen, occur along the present or former river courses. Vegetation ranges from scrubland to thorny thickets within the riverine area. Shrubs and annual grasses dominate most parts of the region. However, there are enclaves of trees and perennial grasses dominating wetter parts. An invasive tree species called *Prosopis juliflora*, commonly known in the area as 'Mathenge' has spread rapidly in the area and is threatening to replace most of the indigenous vegetation. The lowland evergreen forests are patchy, of different successional stages, and are dependent on groundwater supplied by the river. Characteristic trees include *Ficus* spp., *Phoenix reclinata*, *Acacia robusta*, *Populus ilicifolia*, *Blighia unijugata*, *Sorindeia madagascariensis*, *Diospyros mespiliformis* and *Mimusops obtusifolia*.

The local community mainly practice farming; however, there are small fractions who keep livestock. Plate 3 overleaf shows goats grazing within the bushlands in the project area.



Plate 2: Goats and sheep browsing and grazing at Munguvueni village

5.2.6 Climatic Conditions

Climatic conditions with at Munguvueni village support agricultural activities including farming and livestock keeping. The region has a hot and dry climate within ecological zones ranging from III (in the very high grounds) to VII (in the plains or lowlands). Average annual temperatures are about 30°C with the highest being 41°C around January-March and the lowest being 20.6°C around June-July.

Rainfall is low, bimodal, erratic and conventional in nature. The total annual rainfall ranges between 280 mm and 900 mm with long rains occurring in April and May, short rains in October and November with November being the wettest month. The Inter Tropical Conventional Zone (ITCZ), which influences the wind and non-seasonal air pattern for the river Tana, determines the amount of rainfall along the river line. The dry climate in the hinterland can only support nomadic pastoralism.

5.3 Socio-economic Environment

5.3.1 Community Profile

The proposed project site is at Munguvueni village near Mumbuji primary school in Mnazini Sub-Location, Ndera Location, Garsen North Ward, Tana Delta Subcounty in Tana River County. The nearest town is Garsen town located 30kms South of Munguvueni village. Munguvueni market center, located east of the proposed project site, is the main shopping center. Munguvueni village is primarily inhabited by the Pokomo community, whose primary source of income is farming. Because the area's road networks are inadequate, locals are forced to sell their products at a reduced rate to brokers at the bridge. The top community development priorities are irrigation scheme due to prolonged drought, establishment of a health facility in the village and improved road infrastructure connecting the village to other regions.

The study established that the village has been in existence since 1940 and has has a population of approximately 400 people. Houses in the community mainly composed of mud walls, iron sheet roofs and earth floors. The community receives relief support only during drought season mostly targeting the vulnerable groups. The village has one dominant ethnic group (Pokomo clan) who practice farming. Islam is the dominant religion at 100%. Vulnerable households were identified to be 2 female held households, 5 elderly members and 20 PLWDs. The table below is a summary of demographic profile of Munguvueni given during the key informative interview with the Assistant chief.

Attribute	Magnitude/Number
Approx. population	400
Households	80
Gender.	Male – 30% Female – 70%
Ave. No. per household	5 per household
Indigenous (natives)	Indigenous- 100% Settlers – 0%
Vulnerable classes	Elderly, widows, and PLWDs
Dominant ethnic group	Pokomo
Primary religion	Islam
Other groups	None
Employment (formal/Informal)	Formal – 2% Informal – 98%



Plate 3: Mud structures within Munguvuini village

Table 5-1: Demographic profile of Munguveni
(Source Author- field study)

5.3.2 Socio-economic status of Study Area

5.3.2.1 Demographic Profile

The information shared on community profile by the area sub chief (Mnazini sub-location) showed that Munguveni has a population of approximately 400, and with an estimated number of households to be 80 with an average of 7 people. Munguveni has a gender ration that is currently estimated to be about 30% male and 70% female.

5.3.2.2 Educational Infrastructure

The County has 315 ECDE centres, 152 primary schools and 13 secondary schools. Level of education in the area to be served by the project is very low. The village has one primary school - Mumbuji Primary School located east of the site. Other school in the sub location include: Mnazini primary school and Kitere secondary school. There no polytechnic institution in the region. All these educational facilities are not connected to electricity; and with connection of the area, these institutions will greatly benefit.

5.3.2.3 Occupation and Livelihood Profile

Munguveni community is mainly agriculturalist farming along the river lines of Tana delta. Crops grown include green grams, maize, watermelons, vegetables and mango trees. Due to drought and floods food production (crop growing) is limited and contributes to food insecurity. Some of the crops grown in the village are green grams, watermelons, mangos, maize and vegetable. The community also keeps livestock cows, sheep, goats and poultry. Formal employment accounts only for 2% with the rest being in informal employment and others unemployed.

5.3.2.4 Land Use

About 90% of land in Tana River County has not been registered, and is either community land or government land. The inhabitants do not therefore have title deeds. The absence of individual or group parcels land title deeds has in some cases led to underutilization of land resources. The challenge for the county is therefore to ensure that land regimes in the county are favourable for productive activities. The land in Munguveni is mainly used for farming. Other uses include homesteads, public amenities, grazing, farming, underground water is also harnessed from the land.

5.3.2.5 Health facilities

There are no health facilities at Munguveni village. The community members seek health services from Mnazini dispensary located approximately 5kms away from the proposed site.

5.3.2.6 Social and Physical Infrastructure

Water: Water used for cooking, washing, livestock and bathing is sourced from shallow wells within the village through the use of hand pumps. During prolonged drought water is sourced from Tana River approximately 3kms away. Water used to irrigate their farms is from Tana River. Locals draw water manually for homestead use and furrow irrigation for farming

Sanitation: Private toilet facilities are provided in a few households within the area. Open defecation (OP) also practiced in the village leading into poor waste management.

Road Network: Road connectivity within the area is very poor, destroyed mainly by flash floods. The main forms of transport within the village are Motor bikes. Farm produce is transported on people's back or motorbikes to the bridge where they sell to the brokers. The community is accessed via an earth road from Garsen to Munguveni.

Mobile Network Coverage: *Safaricom* is the only Network coverage within the village and some of the community members have access to the internet services.

Power/electricity: - the community is not connected to the mains. They use mainly portable solar and Torches at the household for charging mobiles and lighting.



Plate 4: A portable solar panel charging

6 STAKEHOLDER ENGAGEMENT

This section profiles the key stakeholders of the Munguvueni mini-grid site and assesses their potential concerns and levels of influence. The process of stakeholder engagement involved;

- i. stakeholder identification and analysis
- ii. planning for the stakeholder engagement;
- iii. disclosure of information;
- iv. consultation with stakeholders
- v. addressing and responding to grievances; and
- vi. reporting to stakeholders

6.1 Stakeholder Consultation and Disclosure Requirement for the Project

The World Bank Environmental Social Safeguards 10 emphasizes on engagement in meaningful consultations with all stakeholders. The stakeholders with timely, relevant, understandable, and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination, and intimidation.

A documented record of stakeholder engagement, including a description of the stakeholders consulted, a summary of the feedback received, and a brief explanation of how the feedback was considered is in place.

6.2 LEGAL REQUIREMENT FOR STAKEHOLDER ENGAGEMENT

The overall objective and the spirit of the Kenya constitution is to involve citizens in project formulation and implementation at the local level. This is enshrined in our constitution in Article 35 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'.

Further public participation is an essential and legislative requirement for environmental authorization. The ESIA team undertook the stakeholder consultation (SC) for the proposed project in accordance with the requirements for as stipulated in the EMCA, 1999 and its 2015 amendments and ESIA/EA Regulations 2003. The main purpose of public participation is to provide project information to stakeholders and allow them the opportunity to provide input and comment on the project, including issues and alternatives that are to be investigated, thereby facilitating informed decision-making.

Therefore, public participation was a key component of the ESIA of the proposed solar Mini-grid in Munguvueni. Project information was shared with different stakeholders mainly government officers and also community/project affected persons/beneficiaries. The positive and negative views of the stakeholders on the project were sought. The exercise was conducted through a public meeting/baraza, key informant interviews. In addition, gender and intergenerational dimensions of the community members were considered and three separate focus group discussions sessions were held with the men, women and the youth.

6.3 OBJECTIVES OF PUBLIC PARTICIPATION

- a) To assess the level of stakeholder interest and support for the project
- b) To enable stakeholder's views to be considered in project design and implementation
- c) To establish and maintain constructive relationships and means for effective and inclusive engagement with project affected parties on issues that could affect them
- d) To ensure appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely and accessible matter

The purpose of stakeholder engagement/participation is to identify stakeholders and to allow such parties the opportunity to provide input and comment on the project, including issues and alternatives that are to

be investigated, thereby facilitating informed decision-making. Stakeholder participation involves both disseminating information about the project as well as gathering primary data from stakeholders regarding the project. Therefore, data collection was a key component of the EIA of the proposed project. The first source of information was literature review of project documents, site visit coupled with observations and discussion with the project engineers and other project officers. Further information and views on the project were also sought from other government officers at the county and from the target community.

Part of the key project information that was shared with the stakeholders to enable them to understand the project included; positive and negative impacts of the project including potential opportunities. The information specifically focused on; the objective, nature and scale of the project, potential risks and impacts of the project on local communities, mitigation measures to the negative impacts, need for future consultations and means of raising and addressing impacts.

The World Bank OP 4.01 Environmental Assessment - Stakeholder Engagement and Information Disclosure emphasises on engagement in meaningful consultations with all stakeholders. The stakeholders should be provided with timely, relevant, understandable, and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination, and intimidation. The ESIA report will be made available in public places that are accessible to project-affected groups and local NGOs (NEMA website and Respective NEMA County offices). The summaries of the ESIA findings will be disseminated to affected persons in languages that can be understood by all those affected, using feasible techniques such as public barazas, FGDs etc. In addition, the disclosure process will consider any mobility, disability, and literacy challenges affected persons may have. Further, information on the post-ESIA stakeholder engagement and grievance management shall be availed.

A documented record of stakeholder engagement, including a description of the stakeholders consulted, a summary of the feedback received, and a brief explanation of how the feedback was collected, has been presented below. The consultations were conducted in form of:

- Meeting with the client
- Consultation with the county commissioner and the county officials
- Key stakeholder interviews with the county officials
- Public meeting in Munguvueni
- Focus Group Discussions

6.4 Stakeholder Characterisation and Identification

A stakeholder is “a person, group, or organization that has a direct or indirect stake in a project/organization because it can affect or be affected by the Project/organization's actions, objectives, and policies” Stakeholders thus vary in terms of degree of interest, influence and control they have over the project.

6.4.1 Stakeholder Mapping

Stakeholder mapping” is a process of examining the relative influence that different individuals and groups have over a project as well as the influence of the project over them. The purpose of a stakeholder mapping is to:

- Identify each stakeholder group;
- Study their profile and the nature of the stakes;
- Understand each group's specific issues, concerns as well as expectations from the project
- Gauge their influence on the Project;

In line with the nature of the project and its setting in Munguvueni, the stakeholders have been identified and listed in the table given below;

Table 6-1: Identified Stakeholders

Stakeholder Category	Stakeholder Group	Connection to the KOSAP	Consultation tool
Project Affected Persons	Local Community	➔ Local communities to be affected either directly or indirectly by the project ➔ Vulnerable Individuals and Households ➔ Health institutions ➔ Education institutions	Public Meeting ✓ 1 public meetings was held in Munguvueni Sub-location under an acacia tree on 19/01/2022. ✓ The meeting was held with attendance of 60 people. Focus Group Discussions (FGD) ✓ The FGDs were conducted with the men, women, youth. Key Informant Interviews (KII) ✓ The KIIs for Kopeto Primary School and Kopeto Dispensary were conducted through one-on-one interviews. The chief was also interviewed on the Community Profile of Munguvueni.
Interested Parties	➔ National Government agencies ➔ National regulatory bodies	National Government are of primary importance in terms of establishing policy	Meeting A meeting was held with the Tana River County Commissioners
	County government	➔ County government are also of primary importance in county energy requirements and proposed interventions ➔ They will play an important role in implementation and sustainability of the project	

The significance of a stakeholder group is categorized considering the magnitude of impact (type, extent, duration, scale and frequency) or degree of influence (power and proximity) of a stakeholder group and urgency/likelihood of the impact/influence associated with the particular stakeholder group in the project context. The magnitude of stakeholder impact/influence is assessed taking the power/responsibility and proximity of the stakeholder group and the group is consequently categorized as negligible, small, medium or large. The urgency or likelihood of the impact on/influence by the stakeholder is assessed in a scale of low, medium and high. The overall significance of the stakeholder group is assessed as per the matrix provided in Table 5-2 below.

Table 6-2: Stakeholder Significance and Engagement Requirement

	Likelihood of Influence on/ by Stakeholder
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		Low	Medium	High
Magnitude of impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

6.5 STAKEHOLDER ANALYSIS

The Stakeholder influence and priority have both been primarily rated as:

- **High Influence:** This implies a high degree of influence of the stakeholder on the project in terms of participation and decision making or high priority to engage with the stakeholder;
- **Medium Influence:** Which implies a moderate level of influence and participation of the stakeholder in the project as well as a priority level to engage the stakeholder which is neither highly critical nor are insignificant in terms of influence; and
- **Low Influence:** This implies a low degree of influence of the stakeholder on the project in terms of participation and decision making or low priority to engage that stakeholder.

The intermediary categories of low to medium or medium to high primarily imply that their influence and importance could vary in that particular range subject to context specific conditions or also based on the responses of the project towards the community.

The coverage of stakeholders as stated above includes any person, group, institution or organization that is likely to be impacted (directly or indirectly) or may have interest/influence over project. Keeping this wide scope of inclusion in stakeholder category and the long life of project, it is difficult to identify all potential stakeholders and gauge their level of influence over project at the outset of the project. Therefore, the project proponent is advised to consider this stakeholder mapping as a live document which should be revised in a timely manner so as to make it comprehensive for any given period of time.

Table 6-3: Summary of Stakeholder Influence

Stakeholder Category	Category	Sub Category	Magnitude of Influence	Urgency/ Likelihood of Influence	Overall rating of stakeholder rating
Interested Parties	Government	- National - County	Large	High	Major
	National regulatory bodies	NEMA	Large	Medium	Major
Project affected Persons	Individuals and Households	VMGs and socially disadvantaged groups, economically disenfranchised persons	Medium	High	Major
	Institutions	Education and Health institutions	Medium	Low	Minor

6.6 MOBILIZATION FOR THE COMMUNITY MEETING

Prior to the community engagement meetings, a two weeks' notice was done/issued to inform the community members of the meeting. This was done by the county renewable energy officer (CREO). The officer called the Chief of the area where the meeting was to take place and requested him to inform the people of the meeting in regard to KOSAP community engagement forums. The chief then informed the people about the meeting through announcement by word of mouth given by the local leaders, key among them was the chief and the village elders in Munguvuveni village

Further, an initial communication was shared with the county commissioner Tana River and Chief for Mnazini location on 27th January 2022, two (2) weeks prior to the public participation meeting held on 10th February 2022 at Munguveni baraza park at Munguveni village. Background information document (BID) with project details was posted clearly on one of the shops at Munguveni village

6.7 INFORMATION SHARED TO THE COMMUNITY MEMBERS

The MoE representative assisted by the KP representative gave a description of the KOSAP projects and clarified that its objective was to electrify Munguvuveni because the area is not connected to the national grid. They also informed the community that they would access the electricity at a subsidized cost and that the public facilities such as the schools, hospitals and public boreholes would be also be connected. The environmental and social experts also shared with the community the ESIA process and discussed the potential impacts associated with the project and the proposed mitigation measures that would reduce their significance.

6.8 Stakeholder Engagement During the Land Identification Process

A Consultative meeting was held with the Munguvuveni community on 4th September, 2021, to discuss the details of the proposed mini-grid project, the project's land requirements, the impacts of the project and grievance redress. Focus Group Discussions were also carried out separately with men, women and the youth. The FGDs were to allow the groups to freely express themselves and to ensure that they understood the project.

The outcome of the community meeting and the FGDs included the following:

- The community was informed of the proposed mini-grid project and its benefits
- The environmental and social impacts of the project were discussed and the proposed mitigation measures
- There were discussions on the project's land requirements and the community's rights and entitlements for their provision of land for the minigrid project. This included the various options on land compensation i.e. payment of cash for land, land for land compensation and compensation in kind
- A locational Grievance Resolution Committee (GRC) was constituted with representation of men, women and the youth. Additionally, the implementing agency representatives were informed of the community's existing grievance redress mechanism which will be integrated with the project's redress mechanism
- Feedback in form of questions, opinions and recommendations was obtained from the community and responses were provided by the project team

In conclusion, the community resolved to provide land for the project, the GRC nominees were validated, and officials were elected to lead in the identification of project land and sign the land forms on behalf of the community.

They also proposed the following as a their preferred projects for compensation

- Desilting of waterpan
- Construction of washrooms; and
- Fencing of water pan

Minutes of the meeting are appended at the end of this report.

6.9 KEY FEEDBACK RECEIVED DURING STAKEHOLDER CONSULTATION PROCESS

A Consultative Public Participation (CPPs) session is conducted to provide project information and facts to the local community and other stakeholders' especially local government administrator thus giving them a platform to enable them to express their appreciation, concerns and fears as well as contribute ideas and opinions towards the project sustainability.

The MoE representative assisted by the KPLC representative gave a description of the KOSAP project and clarified that its objective was to electrify Munguvuveni because the area is not connected to the national grid. They also informed the community that they would access the electricity at a subsidized cost and that the public facilities such as the schools, hospitals and public boreholes would also be connected at the same cost (one thousand shillings). The environmental and social experts shared with the community the ESIA process and discussed the potential impacts associated with the project and the proposed mitigation measures that would reduce the significance of the adverse impacts.

It was also explained that compensation for the land identified by the community for the proposed project will be done in-kind; as a community project chosen from education, health or water sector. The Ministry of Energy through its implementing agency (KPLC) would undertake a project for the community in water, health or education sector up to a cost of the value of the cost of the land taken and informed by the NLC valuation criteria. The community was to choose the project of their own choice in the three sectors. Other methods compensation for community land is payment in cash and land for land.

A detailed CPP and community engagement for Munguvuveni Solar Mini Grid was held at Munguvuveni Baraza park at Munguvuveni village on 10th February 2022 chaired by the area assistant chief. The general stakeholder consultation was done in a public meeting (Baraza) organized at Munguvuveni community baraza park where 18 males and 16 women were in attendance. The meeting was chaired by the area assistant chief assisted and the community elders. Table 6-5 below summarizes the meeting details.

The feedback received during the stakeholder consultation process was positive. The community members accepted the project. No issues of concern were raised during the Baraza meeting.

Table 6-4: Schedule of Public Consultations

Date of the meeting	Meeting Venue	Participants Involved	No. of Participants and Gender Representation
10 th February 2022	Munguvuveni Baraza Park	Area Assistant Chief AG. Chief Ndera Location KPLC & KP representatives Consultant representative Residents of Munguvuveni village	Male 18 Female 16 Total =34
		Focus Group Discussions (FGD)	FGD- Male 8 FGD- Female 8 FGD- Youth/Association 7

The Project designs and Environment and Social Impact Assessment (ESIA) incorporated issues discussed and resolved in the consultative meeting as summarized below.

Table 6-5: Issues Discussed

No.	Summary of Issues Discussed	Response
1	Accidents from electrocution and fire safety caused by exposure to uninsulated cables. The community suggested the locals be sensitized on safety precautions to be take and the wiring works be done by qualified experts	Electric specialist to be involved in the project will ensure that proper protocols are followed to minimize such risks. Further wiring of the households will be done at the cost of the owner and it is advised that an electric specialist is engaged.
2	Delayed commencement of the project	Project implementation will commence once all

		approvals are acquired
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6.10 Disclosure of ESIA to the Stakeholders

The final ESIA report will be shared with the stakeholders by way of making it available to the target beneficiaries and other interested parties. The ESIA report will be shared through the county headquarters (a copy will be availed) or will be accessible through the CREO office and KP website. In addition, a copy of the ESIA should be availed by CREO to the chief's office for access by the local community and other stakeholders.

The findings of the ESIA will be shared or disseminated to the target community in a culturally appropriate format such as using local language and through public meetings and focus group discussions.

6.11 Stakeholder Engagement and Grievance Management Post ESIA

During implementation of the project or construction phase, stakeholder engagement will be progressed to ensure the community and other stakeholders are kept abreast of the progress of the project. For the target community this will take the form of meetings and focus group discussions between local community and the contractor which will also act as forums for the community to ask questions or provide feedback. Therefore, the contractor will prepare a stakeholder engagement plan to guide on the engagements with various stakeholders guided by the Stakeholder Engagement Plan prepared during ESIA

6.11.1 Objectives and Principles of Stakeholder Engagement post ESIA

Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.

In order to ensure effective engagement and consultation of all stakeholders, the contractor and the proponent will apply the following principles.

- Ensure the affected persons are provided opportunities to express their views on project risks, impacts and mitigation measures, and response provided.
- Begin consultations early even before construction begins because there is a lapse of time between ESIA consultations and implementation time. Identification of environmental and social risks and impacts should continue on an ongoing basis as risks and impacts arise.
- Consultations should continue in a manner that is transparent, objective, meaningful and allow for ease in accessing information in a culturally appropriate local language(s) and format that is understandable to affected and interested persons.
- Consultations with affected persons and interested parties should avoid manipulation, interference, coercion, or intimidation.
- Consultations should also pay attention to the needs of VMGs, vulnerable individuals and households.

The contractor shall identify the stakeholders early and consider appropriate methods for engaging them. The stakeholder engagements will be reported to KP on monthly basis alongside the construction progress reports

Public participation was a key component of the ESIA of the Proposed solar mini grid sub-project at Munguveni. The views and opinions of the Project affected persons (PAPs) and other stakeholders in terms of positive and/or negative impacts of the sub-project was sought. The exercise was conducted through interviews and Focus group discussions conducted with PAPs and other stakeholders. There was a Public Baraza for members of the community where they got a chance to air out their views in regard to the proposed project which will be implemented in their neighborhood.

7 IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 Introduction

This Section identifies and discusses both negative and positive Environmental and Social impacts the proposed micro-grid at Munguveni village may bring to the physical, biological, as well as socio-economic environments and overall trigger World Bank safeguard policies. Mini grids development just like any other development project has the potential to create a range of impacts on the environment, both negative and positive. In this chapter the potential proposed project's impacts are identified, assessed, outlined, rated and analyzed. The impacts are assessed according to each project phase, namely:

- Pre-Construction phase
- Construction Phase
- Operational Phase and
- Decommissioning Phase.

The purpose of the Impact Assessment and Mitigation is to identify and evaluate the significance of potential impacts on identified receptors and resources according to defined assessment criteria which include but not limited to world bank safeguard policies, and to develop and describe measures that will be taken to avoid or minimize any potential adverse effects and enhance potential benefits.

7.1.1 Assessment Methodology

An impact is essentially any change to a resource or receptor brought about by the presence of the Project component or by the execution of a Project related activity. In general, the assessment of impacts will proceed through an iterative process considering four key elements:

- Prediction of potential impacts and their magnitude (i.e., the consequences of the development on the natural and social environment);
- Evaluation of the importance (or significance) of potential impacts taking the sensitivity of the environmental resources or human receptors into account;
- Development of mitigation measures to avoid, reduce or manage the potential impacts or enhancement measures to increase positive impacts; and
- Assessment of residual significant impacts after the application of mitigation and enhancement measures.

Where significant residual impacts remain, further options for mitigation may be considered and impacts re-assessed until they are as low as reasonably practicable for the Project and would be deemed to be within acceptable levels.

Impacts will be defined in a number of ways, including:

- Nature of impact: positive or negative;
- Type of impact: direct, indirect, or cumulative;
- Duration of impact: temporary, short-term, national, international;
- Scale of impact: onsite, local, regional, national, international.

7.1.1.1 Prediction of Impacts

Prediction of impacts was carried out with an objective to determine what is likely to happen to the environment because of the Project and its associated activities. From the potentially significant interactions identified in scoping, the impacts to the various resources/receptors were elaborated and evaluated

7.1.1.2 Evaluation of Impacts

Each impact was described in terms of its various relevance characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is as shown in Table 23.

Table 7-1: Impact characteristic terminology

Characteristic	Definition	Designation
Type	A descriptor indicating the relationship of the impact of the project (in terms of cause and effect)	• Direct • Indirect • Induced
Extent	The 'reach' of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometers, etc.)	• Local • National • Global
Duration	The period over which a resource/receptor is affected	• Temporary • Short term • Long term • Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the	(No fixed designations; intended to be numerical value or a qualitative description)
Frequency	A measure of the constancy or periodicity of the impact	(No fixed designations; intended to be numerical value or a qualitative description)

The definitions for the type designations are given in Table 24. Definitions for the other designations are resource/receptor specific.

Table 7-2: Impact type definitions

Type	Definitions
Direct	Impacts that result from a direct interaction between the project and a resource/receptor
Indirect	Impacts that follow on from the direct interactions between the project and its environment because of subsequent interactions within the environment
Induced	Impacts that result from other activities (which are not part of the project) that happen because of the project.

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is likelihood. The likelihood of an unplanned event occurring was designated using a qualitative scale, as described in the table below.

Table 7-3: Impact qualitative scale

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions (probability less than 20%)
Possible	The event is likely to occur at some time during normal operating conditions (probability less than 20%)
Likely	The event will occur during normal operating conditions (probability greater than 50%)

Once an impact's characteristics were defined, each impact was assigned a 'magnitude'. Magnitude is typically a function of a combination (depending on the resource/receptor in question) of the following Impact characteristics:

- Extent
- Duration
- Scale
- Frequency

In case of unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that was predicted to occur in the resource/receptor because of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the descriptions for these designations vary on a resource/receptor-by-resource/receptor basis. The universal magnitude designations are:

- Positive

- Negligible
- Small
- Medium
- Large

In the case of a positive impact, no magnitude designation (aside from 'positive') was assigned. It was considered sufficient for the purpose of the IA to indicate that the Project was expected to result in a positive impact, without characterizing the exact degree of positive change likely to occur. In the case of impacts resulting from unplanned events, the same resource/ receptor-specific approach to concluding a magnitude designation was followed, but the 'likelihood' factor was considered, together with the other impact characteristics, when assigning a magnitude designation.

In addition to characterizing the magnitude of impact, the other principal impact evaluation step was definition of the sensitivity/ vulnerability/ importance of the impacted resource/receptor. There are a range of factors that was considered when defining the sensitivity/ vulnerability/ importance of the resource/receptor, which may be physical, biological, cultural, or human. Other factors were also considered when characterizing sensitivity/ vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value. The sensitivity/ vulnerability/importance designations used herein for all resources/receptors are:

- Low
- Medium
- High

Once magnitude of impact and sensitivity/ vulnerability/ importance of resource/ receptor have been characterized, the significance was assigned for each impact. Impact significance is designated using the matrix shown in table 25 Impact Significance.

Table 7-4: Impact Significance and colour scale

		Sensitivity/vulnerability/importance of resource/receptor		
		Low	Medium	High
Magnitude of impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/ vulnerability/ importance designations that enter the matrix.

Context of impact significance

An impact of **negligible significance** (negligible impact) is one where a resource/ receptor (including people) will essentially not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor significance** (minor impact) is one where a resource/ receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and well within accepted standards, and/or the resource/receptor is of low sensitivity/ vulnerability/ importance.

An impact of **moderate significance** ('Moderate impact') is one within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a

level that might be just short of breaching a legal limit. Clearly to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is ALARP (as-low-as-reasonably-possible). This does not necessarily mean that 'Moderate' impacts have to be reduced to 'Minor' impacts, but that moderate impacts are being managed effectively and efficiently.

An impact of **major significance** ('Major impact') is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of EIA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e., ALARP has been applied). It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones in coming to a decision on the Project

7.1.1.3 Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterized, the next step was to evaluate what mitigation and enhancement measures are warranted. For the purposes of this ESIA, the consultant adopted the following Mitigation Hierarchy:

- Avoid at Source, Reduce at Source: avoiding or reducing at source through the design of the Project.
- Abate on Site: add something to the design to abate the impact.
- Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site.
- Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g., agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration, or reinstatement measures.
- Compensate in Kind, Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries, access, recreation, and amenity space).

The priority in mitigation was to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

7.1.1.4 Management and Monitoring

The final stage in the IA Process is the definition of the basic management and monitoring measures that are needed to identify whether:

- a) impacts or their associated Project components remain in conformance with applicable standards/guidelines; and
- b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted. This is covered in Section 10 under Environmental and Social Management Plan (ESMP).

7.1.1.5 Impact Assessment Criteria

To this assessment the following sections define the criteria against which the impacts associated with the proposed solar project have been assessed. The impact assessment criteria are general criteria and not specifically associated with the project? Interactions that are likely to lead to significant impacts, as identified during the scoping exercise and baseline conditions are presented in **Table 27**.

Table 7-5: Interactions identified that are likely to result in significant impacts

Resource/Receptor	Potentially significant impacts
Land use	- Permanent changes in land use due to installation of the mini-grid - Temporary changes in land use due to temporary site office and material storage yard
Topography and drainage	Alteration of topography and micro drainage channel due to construction of project site approach road
Soil environment	- Decrease of soil quality due to loss of vegetation cover - Soil erosion during rainy season and windy periods - Sedimentation into nearby water bodies due to soil erosion and run-off. - Storage and handling of hazardous materials (e.g., fuel and lubricant) and waste generated from operation of construction equipment and machinery - and their maintenance may lead to soil contamination due to leaks/ spillage; and - Impact on soil and land environment due to improper management of domestic solid waste generated.
Ambient air quality	- Fugitive dust emissions due to movement of machinery and vehicles. - Fugitive emission due to operation of pile drivers; and - Air emissions due to operations of generator sets and machinery.
Water environment	- Usage of ground water for construction activities and cleaning of PV modules. - Surface and ground water contamination due to improper disposal of sewage at site; and - Surface and ground water contamination due to spillage of oil, lubricant, and hazardous waste.
Ambient noise quality	- Noise generation due to movement of vehicles and machineries. - Noise generation due to operation of pile drivers; and - Noise generation due to operation of generator set.
Occupational health and safety	- Occupational health hazards due to dust and noise pollution. - Safety risk due to wrong handling of construction machinery, working at heights; and - Exposure of workers to electromagnetic field (EMF) while working in proximity to charged electric power lines during operation and maintenance.

7.2 Key Environmental Impacts – Construction phase

7.2.1 Change in Land Use

The study area consists of public land with patches of open scrubland and bushland. The assessment of the following project activities will lead to an alteration in land use of the area during construction phase:

- Installation of PV modules.
- Establishment and operation of temporary structures such as temporary site office and store yard.

For the assessment of land use, the sensitivity and magnitude criteria in the following tables have been used respectively.

Table 7-6: Sensitivity assessment criteria for land use

Land use sensitivity	Criteria
Low	Land use not of relevant use by the Munguveni village Negligible visual change.
Medium	Land use of local use by communities e.g., grazing, agriculture, but no major dependence. Visual Change but common feature
High	Land use of regional importance. Change would impact Land use classification of the area. Land use of major dependence of local people for agriculture, livestock grazing, settlement etc. Visual Change aesthetically affecting locals.

Table 7-7: For Impact Magnitude for assessment of impact to land use

Magnitude	Criteria
Negligible	An imperceptible, barely, or rarely perceptible change in land use characteristics. The change may be short term.
Small	Subtle changes in land use character over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term to long term and is reversible.
Medium	A noticeable change in land use character, frequently perceived or continuous and over a wide area; or a clear change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.

Magnitude	Criteria
Large	A clear, frequently perceived, and continuous change in land use characteristics affecting an extensive area. The change may be long term and would not be reversible.

7.2.1.1 Embedded/In-built Control

- The construction activities will be restricted to within the allocated land and the immediate surroundings only.
- After construction work, any land taken for a temporary basis for storage of material will be restored to their original form.
- The existing earth roads at Munguveni will be used for access to the project site.

7.2.1.2 Significance of Impact

The overall impact significance will be Moderate.

7.2.1.3 Additional Mitigation Measures

- On completion of construction activities, land used for temporary facilities such as store yard should be restored to the extent possible.
- The land use in and around permanent project facilities should not be disturbed.
- Construction activities should be restricted to the designated area.

7.2.1.4 Residual Impact Significance

Direct changes in land use during construction and operation are negative in nature but temporary. Indirect changes in land use are positive in nature and permanent. The direct impacts shall be limited to project site and associated facilities. The resource receptor sensitivity is moderate. The residual impact significance will remain moderate as changes in land use will be for long term for majority of the project component (installation of mini-grid)

7.2.2 Impact on Topography

The topography of the project site is an open area gently sloping. The general slope of the surrounding areas slopes southwards into the Indian Ocean. The nearest water body that passes near the proposed project site is River Tana approximately 3km away. Typically, solar power projects do not undertake levelling of topography and since the proposed project, along with the access road, is mostly on a flat terrain the receptor sensitivity has been assessed to be low. Due to the slightly sloping terrain, study area may exhibit presence of micro drainage channels. Therefore, the impact magnitude has therefore been assessed as minor.

Table 7-8: Sensitivity assessment criteria for topography

Topography and drainage sensitivity	Criteria
Low	Flat topography
Medium	Undulating topography
High	Hilly area

Table 7-9: Topography and drainage sensitivity criteria

TOPOGRAPHY AND DRAINAGE CRITERIA SENSITIVITY	
Negligible	An imperceptible, barely, or rarely perceptible change in topographical characteristics. The change may be short term.
Small	A subtle change in topography character over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term to long term and is reversible.

TOPOGRAPHY AND DRAINAGE CRITERIA SENSITIVITY

Medium	A noticeable change in topographic character, frequently perceived or continuous and over a wide area; or a clear change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.
Large	A clear, frequently perceived, and continuous change in topographic characteristics affecting an extensive area. The change may be long term and would not be reversible.

7.2.2.1 Embedded/In built Control

The contractor will be instructed to avoid any unnecessary changes in the topography.

7.2.2.2 Significance of Impact

The overall impact significance will be minor.

7.2.2.3 Additional Mitigation Measures

No further mitigation measures are suggested as embedded/in-built control will be sufficient to reduce the impact on topography.

7.2.2.4 Residual Impact Significance

The residual impact significance will be reduced to minor after implementing above mentioned mitigation measures.

7.2.3 Impact on Soil Environment

7.2.3.1 Soil Compaction and Erosion

Soil compaction and erosion has been considered for the construction and decommissioning phases only. The receptor sensitivity has been assessed as medium because of the preponderance of agriculture as a source of livelihood in the area. The site clearance, excavation for foundation will largely affect the top layers of the soil. Loss of topsoil quality would have an impact on the productivity of the land, but the effects can be reversed over time. Further, site clearance will be restricted only in the project site. Farmland and grazing space close to the project site will not be disturbed.

The usage of existing roads by vehicles and minimal access road improvement will reduce the impact from soil compaction in the area. The impact magnitude therefore has been assessed to be small.

7.2.3.2 Project Phases and Associated Activities

For impact assessment, the following phases of the project cycles were considered for potential impacts on the soil environment. The phase wise project activities that may impact the environment are described below.

Construction Phase

- Vegetarian clearance and topsoil removal.
- Storage of oil and lubricants onsite.
- Storage of construction materials; and
- Disposal of different type of waste generated from the temporary project site.

Operation and Maintenance Phase

- Storage of oil and lubricants onsite.
- Disposal of municipal solid waste and wastewater from site office; and
- Storage of waste materials onsite.

Decommissioning Phase

- Removal of PV modules; and

- Removal of associated infrastructure.

For the assessment of soil quality, the sensitivity and magnitude criteria are as outlines in Table 32 and Table 33 respectively.

Table 7-10: Sensitivity assessment criteria for soil quality

Sensitivity criteria	Contributing criteria	
	Environments	Social
Soil quality related criteria as compaction, erosion and contamination and land use change	The extent to which the soil and its quality plays an ecosystem role in terms of supporting biodiversity. This includes its role as in supporting a lifecycle stage	The extent to which the soil and its quality provides a use (agricultural use) to the local communities and businesses, or is important in terms of national resource protection objectives, targets, and legislation
Low	The soil quality does not support diverse habitat or populations and/or supports habitat or population of low quality.	The soil quality has little or no role in provisioning of services as agricultural uses for the local community.
Medium	The soil quality supports diverse habitat or population of flora and fauna and supports habitats commonly available in the study area	The soil has local importance in terms of provisioning services as agricultural services but there is ample capacity and / or adequate opportunity for alternative sources of comparable quality i.e., ready availability across the study area.
High	The soil quality supports economically important or biologically unique species or provides essential habitat for such species.	The soil is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional level for provisioning services.

Table 7-11: Magnitude of soil criteria

Sensitivity criteria	Contributing criteria			
	Negligible	Small	Medium	Large
Magnitude Criteria				
Soil compaction and erosion	Qualitative-No perceptible or easily measurable change from baseline conditions Scale-Localized area as particular activity area Time-Short duration (few days) or one time as temporary	Perceptible change from baseline conditions but likely to easily revert to earlier stage with mitigation Scale- Project site, Activity areas and immediate vicinity not impacting any sensitive receptor short term-Only during activities or phase of the project lifecycle as civil works or construction phase (few months)	Clear (e.g., perceptible, and readily measurable) change from baseline conditions and/or likely take time to revert to earlier stage with mitigation Scale- Project site, activity areas and immediate vicinity impacting sensitive receptor/s Long term- Spread across several phases of the project lifecycle (few years)	Major (e.g., order of magnitude) change in comparison to baseline conditions and/or likely difficult or may not to revert to earlier stage with mitigation Scale- Regional or international. Permanent change
Soil contamination	Well within standards	Well within standards	Exceeds Target Value but well within Interventional Value	Exceeds Interventional Value and needs intervention.

7.2.3.3 Embedded/in-built control

Vehicles will utilize existing roads to access the site.

7.2.3.4 Significance of Impact

The overall impact significance on soil erosion and compaction has been assessed as **minor**.

7.2.3.5 Additional Mitigation Measures

Site clearance, piling and excavation will not be carried out during the windy period/season to minimize erosion and run-off.

7.2.3.6 Residual Impact Significance

The significance of residual impacts will be reduced to negligible considering the recommended mitigation measures.

7.2.4 Assessment Criteria for Impact on Water Environment

The impacts of project on the water environment are assessed due to consumption of water during project activities and contamination of water from accidental spillage of fuel, lubricant, and hazardous waste. For the assessment of water quality, the sensitivity criteria and magnitude criteria are outlined in Table 34 and Table 35 respectively have been used. Table 34 Sensitivity Assessment Criteria for Water Resources (Surface water and Ground water)

Table 7-12: Sensitivity Assessment Criteria for Water Resources (Surface & groundwater)

Sensitivity criteria	Contributing criteria	
	Environmental	Social
Water Resources - Surface water and ground water (quality/quantity related criteria)	The extent to which the water resource plays an ecosystem or amenity role in terms of supporting biodiversity either directly or indirectly, particularly with respect to dependent ecosystems.	The extent to which the water resource provides or could provide a use (drinking water, agricultural uses, washing and other domestic or industrial, use as waterways) to the local communities and businesses, or is important in terms of national resource protection objectives, targets, and legislation.
Low	The water resource does not support diverse aquatic habitat or populations or supports aquatic habitat or population that is of low quality.	- The water resource has little or no role in terms of provisioning services as agricultural water source, other domestic uses as washing, bathing, industrial use, and waterways for the local community. - The groundwater resource is not currently abstracted and used in the vicinity of the Project but is of sufficient quality and yield to be used for that purpose in the future (and there is a reasonable potential for future use).
Medium	The water resource supports diverse populations of flora and / or fauna but available in the surface water bodies in the region.	The surface water resources have local importance in terms of provisioning services but there is ample capacity and /or adequate opportunity for alternative sources of comparable quality. The groundwater resource is an important water supply, and is currently used, but there is capacity and / or adequate opportunity for alternative sources of comparable quality.
High	The water resource supports economically important or biologically unique aquatic species or provides essential habitat for such species. Technically or economically feasible alternatives, it is important at a regional or transboundary watershed level for provisioning services.	- The surface water resources are wholly relied upon locally, with no suitable - The groundwater resource is wholly relied upon locally, with no suitable technically or economically feasible alternatives. - The development stage of groundwater is critical or over exploited.

Table 7-13: Criteria for Impact Magnitude for Assessment of Impact to Surface and Groundwater Resources

Magnitude criteria	Negligible	Small	Medium	Large
General Criteria	No perceptible or readily measurable change from baseline conditions.	Perceptible change from baseline conditions but likely to be within applicable norms and standards for mode of use.	Clear (e.g., perceptible, and readily measurable) change from baseline conditions and / or likely to approach and even occasionally exceed applicable norms and	Major changes in comparison to baseline conditions and / or likely to exceed applicable norms and standards regularly or continually for mode

Magnitude criteria		Negligible	Small	Medium	Large
				standards for mode of use.	
Water (surface water)	(surface water)	There is likely to be negligible or no consumption of surface water by the Project at anytime	The Project will consume surface water, but the amounts abstracted are likely to be relatively small in comparison to the resource available at the time of use (i.e., considering seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be significant in comparison to the resource available at the time of use (i.e., considering seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be very significant in comparison to the resource available at the time of use (i.e., considering seasonal fluctuation)
Water (ground water)	(ground water)	There is likely to be negligible or no abstraction, use of or discharge to the groundwater by the Project at any time.	The Project will Consume groundwater or deliver discharge to groundwater, but the amounts abstracted / discharged are likely to be relatively small in comparison to the resource available at the time of use (i.e., considering seasonal fluctuation).	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted / discharged are likely to be significant in comparison to the resource available at the time of use (i.e., considering seasonal fluctuation).	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted / discharged are likely to be very significant in comparison to the resource available at the time of use (i.e., considering seasonal fluctuation).

7.2.5 Impact on Air Quality

The construction activities at the Mini grid sites can potentially lead to decrease in the ambient air quality due to fugitive dust emissions from site clearance, piling work, handling of construction materials, emissions due to movement of vehicles on unpaved roads and vehicular emissions and exhaust emissions from construction machinery.

The assessment with respect to air quality of the study area has been done for the following project activities:

- Fugitive emissions from site clearing, excavation work, material handling etc.
- Fugitive emission from traffic movement.
- Exhaust emission from operation of machineries like pile drivers, vehicles; and
- Point source emission from diesel generator.

The sensitivity criteria and impact magnitude criteria has been provided in Table 36 and Table 37 respectively.

Table 7-14: Sensitivity criteria for air quality

Sensitivity criteria	Contributing criteria	
	Human receptors	Ecological receptors
Low	Locations where human exposure is transient.	No
Medium	Few Receptors (settlements) within 500 m of the project site	Nationally designated sites.
High	Densely populated receptors(settlements) within 500 m of project site	Internationally designated sites.

Table 7-15: Criteria for Impact Magnitude for Assessment of Impact to Air

Magnitude criteria	Negligible	Small	Medium	Large
Air Quality	Soil type with large grain size (e.g., sand); and/or No	Soil type with large grain size (e.g., sand); and/or	Moderately dusty soil type (e.g., silt); and/or Dust	Potentially dusty soil type (e.g., clay, which will be prone to

Magnitude criteria	Negligible	Small	Medium	Large
	emissions/dust generation due to Project across all phases	Limited emissions/dust generations for short duration	generation and emissions from Projects for long duration	suspension when dry due to small particle size); and Significant process emissions from Project for the entire Project cycle.

7.2.5.1 Embedded/in-built control

Vehicle engines will be properly maintained to ensure minimization in vehicular emissions.

7.2.5.2 Significance of Impact

The significance of air quality impacts will be determined based on professional judgement considering the sensitivity of the receiving environment.

Sensitive receptors of air and emissions were identified by observation during field visit to project site. They were noted to be mainly residential and commercial in nature. The distances from a source that dust impacts can occur is highly site specific and will depend on the extent and nature of incorporated mitigation measures, prevailing wind conditions, rainfall, and the presence of natural screening. Due to the variability of the weather, it is impossible to predict what the weather conditions will be when specific construction activities are being undertaken. Therefore, the assessment of construction dust impacts is typically qualitative.

The Project will be located within Tana River County. The site area is at Munguveni village. There are three types of land in Tana River County: Private, public and Communal land. The public land is for farming and homestead. The main activities undertaken on available land area at Munguveni and the greater extents of Garsen North Ward is farming as a major livelihood while livestock keeping and business enterprises are at low scale. Sensitive receptors within 550 meters of key construction areas have been identified using observation and satellite imagery. Based on the observations made during walk through of the project area, all structures identified within this distance have been assumed to be residential or commercial.

7.2.5.3 Additional mitigation measures

- Spraying water on soil before excavation and periodic access road wetting to reduce nuisance dust levels.
- Visual inspection of dust pollution from roads and the construction site and appropriate intervention if dust levels are high.
- Speed restriction of construction vehicles to a speed of 30 km/h or less on the site and on the access roads to the site.
- Maintenance and servicing of machines and engines off-site.
- Grievance procedure for dust complaints.
- The use of appropriate Personal Protective Equipment (PPE) such as dust masks for construction workers.
- All construction materials will be transported in designated trucks which will be covered.

7.2.5.4 Residual Impact Significance

As presented above, it is evident that with the implementation of the proposed mitigation measures, it is expected that the overall significance of dust impacts will reduce further to range from low to negligible levels.

7.2.6 Assessment Criteria for Impact on Ambient Noise

The sources of noise in the construction phase include construction activities, operation of generator sets and movement of vehicles. There will also be increased noise levels because of increased anthropogenic movement in the area. Munguveni Project affected persons will most likely be affected by increasing noise

levels because of proximity to the project site and construction of the proposed access road. The receptor sensitivity is therefore considered as medium. Impact magnitude is minor to medium considering the construction period of the project to last for approximately 3 months and proximity to Munguveni village. The assessment with respect to ambient noise quality of the study area has been done for the following project activities:

- Construction activities including site preparation, piling work, construction of ancillary facilities.
- Transportation of construction materials, machinery, and personnel.
- Operation of generator sets; and
- Demolition activities during decommissioning phase.

The ambient noise levels have been assessed with respect to Noise Pollution (Regulation and Control) Rules, 2000 and WHO Guidelines as shown in Table 38 and Table 39 respectively.

Ambient noise quality standards

Table 7-16: Sensitivity criteria for ambient noise

Sensitivity Criteria	Contributing Criteria	
	Human Receptors	Ecological Receptors
Low	Industrial Use	Locally designated sites: and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team).
Medium	Residential and Recreational place	Nationally designated sites.
High	Educational/ Religious/ Medical Facilities	Internationally designated sites.

Table 7-17: Criteria for impact magnitude for assessment of impact to ambient noise

Magnitude Criteria	Negligible	Small	Medium	Large
Noise quality	Predicted noise levels are at or less than 3 dB (A) above the relevant limits / thresholds. Short term exposure (Few hours in a day and not continuous)	Predicted noise levels are 3 to less than 5 dB (A) above the relevant limits / thresholds. Long term exposure (> 6 months)	Predicted noise levels are between 5 and 10 dB (A) above the relevant limits / thresholds. Medium Term Exposure (1 to 6 months)	Predicted noise levels are more than 10 dB (A) above the relevant limits / thresholds.

7.2.6.1 Embedded/in-built control

Normal working hours of the contractor will be defined (preferable 8 am to 5pm). If work needs to be undertaken outside these hours, it will be limited to activities which do not generate noise.

7.2.6.2 Significance of Impact

The impact significance has therefore been assessed as minor to moderate.

7.2.6.3 Additional Mitigation Measures

- Only well-maintained equipment will be operated on-site.
- If it is noticed that any equipment is generating too much noise then lubricating moving parts, tightening loose parts, and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible.
- Machinery and construction equipment that may be in intermittent use will be shut down or throttled down during non-work periods; and

- Minimal use of vehicle horns and heavy engine breaking in the area needs will be encouraged.

7.2.6.4 Residual Impact Significance

Significance of residual impact is assessed to be negligible to minor taking into consideration above mentioned mitigation measures

7.2.7 Assessment Criteria for Socio-economic Impacts

For the assessment of social impacts, the sensitivity and magnitude criteria outlined in **Table 40** and **Table 41** respectively have been used.

The social impacts associated with the operations and decommissioning stages have been assessed qualitatively and, in some cases, quantitatively (subject to availability of data), using professional judgement and based on experience from similar projects.

Table 7-18: Impact Magnitude for Local Communities

Category	Extent /duration/scale/frequency
Large	Change dominates over baseline conditions. Affects most of the area or population in influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clear difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional, and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

Table 7-19: Receptor Sensitivity for Local Communities

Category	Extent /duration/scale/frequency
High	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project
Medium	Some but few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the Project
Low	Minimal vulnerability: consequently, with a high ability to adapt to changes brought by the Project and opportunities associated with it.

Based on this understanding of magnitude and sensitivity, the significance of impacts will be assessed, as depicted in the table below.

Table 7-20: Impact significance matrix

Receptor sensitivity	Impact magnitude			
	Negligible	Small	Medium	Large
Low	Negligible	Negligible	Minor	Moderate
Medium	Negligible	Minor	Moderate	Major
High	Negligible	Moderate	Major	Critical

7.2.8 Assessment Criteria for Ecological Impacts

Interactions that are likely to lead to significant impacts on ecology and biodiversity in the study area are listed in the following table and will be focus of the impact assessment.

Table 7-21: Identified interactions that are likely to result in significant impacts

#	Potential Impacts	Causes for Impacts
1	Clearance of vegetation for construction of access roads, ancillary facilities	Loss of scrub habitat that may be used by species spilling over from the nearby vegetation cover of the site; and Loss of foraging resources, shelter, and shade for resident fauna.

#	Potential Impacts	Causes for Impacts
2	Electrocution risk from increase transmission line laying in the region	Roosting on solar panels places avifauna near wiring and other electrical components of the solar module.
3	Disturbance and displacement of species due to noise, light, anthropogenic movement and traffic	Increased movement of people and vehicles can increase the stress levels of fauna that causes them to spend an increased amount of time in alert mode instead of foraging, nesting, socializing, or mating; and Noise, light and uncovered waste can attract or repel fauna to or from the solar site.
4	Mortality because of worker influx and increased hunting, trapping, and poaching of wildlife	The Project site is located near sensitive ecological areas and therefore an influx of workers to the area can result in increased human-wildlife conflicts
5	Loss of resources and barrier to Movement.	Project compound must be fenced off and therefore fauna cannot access the resources that were formerly located in the Project site. • The fenced project site acts as a barrier for animals to move along the large expanse of scrub land present at the Project site. • Solar panels mimic the reflection of water bodies that may attract avifauna that could collide with the panels. • Heat related issues on roosting avifauna that could be impacted by the reflection of the panels onto their bodies; and • Steel components of solar modules can injure faunal species that have wandered into the Project compound.

7.3 Impacts during Pre-Construction Phase

Pre-construction activities pertain mostly to land acquisition, permitting, recruitment & award of contract, project design and planning and stakeholders' engagement. Majority of these activities are done at a desktop level except during site visit and stakeholders' engagement.

7.3.1 Positive impacts at Pre-Construction phase

- Employment opportunities arising from recruitment of workers
- Skill acquisition and enhancements to locals and future workforce
- Improvement in quality of life for from the in-kind compensation agreed by the community member.

7.3.2 Negative impacts at Pre-Construction Phase

7.3.2.1 Impact on Land Acquisition

The ministry of Energy through the NLC shall acquire land for the mini-grid development and wayleaves while the contractor shall acquire land for contractor facilities such as yard and workers camp in the pre-construction phase before project begins. In addition to the land for the generation assets, way-leave consent for the distribution power-lines and other facilities like storage will also be progressed before construction.

Mitigation measures

- The Kenya Power & Lighting Company shall ensure that all land acquisition procedures align to the Resettlement Policy Framework prepared under this project.
- The project proponent will adequately compensate the community in kind for the land that will be acquired for the project.
- Community engagement to educate the public on the need to keep off the site because of the electrical installations and for public safety.
- KPLC to prepare the land acquisition and consultation report for the sub-project documenting consultation process of land acquisition for the mini-grid

7.3.2.2 Impact on Wayleaves

Supply of electricity will involve passing of low voltage (LV) lines to connect the customers to power. It is estimated that a total of 3 kms of LV circuit will be constructed mainly along the road reserve and along the boundaries to supply power. A way-leave trace of 10 meters will be required along the entire power

line network. The project contractor will use existing access roads to set up the low-voltage power distribution lines and will seek access from beneficiaries and clients in whose property they will undertake electricity connection to the power grid.

Mitigation measures

- Consultations with the community during construction of the low voltage lines
- Maintain the wayleaves along the road reserve and along the boundaries
- Community engagement to educate the public on the need to keep off the site and not to encroach way-leaves because of the electrical installations and to ensure public safety.

7.3.2.3 Stakeholder Identification and Consultation

Several risks and social impacts may be bound to occur in various stages of the project in relation to Project information disclosure and in stakeholder consultations process. These risks influence the way the project affected persons and interested parties understand the project, their roles and responsibilities and the overall sustainability of the project. The social risks include but not limited to:

1. *Inexhaustive stakeholder identification, stakeholder mapping and stakeholder information needs basis.*

Mitigation measures

- Prior to construction works, identify and map all primary and secondary stakeholders (the various segments of the subproject area community – men, women, PWDs, elders, religious leaders, etc., community level CSOs, sub-county level CSOs with interest in the subproject, county level CSOs with interest in the subproject etc.).
- Assess the interest of each stakeholder category in the subproject
- Assess each stakeholder category's subproject information needs at the various subproject phases

2. *Risks related to disclosure of appropriate information in line with the subproject phase*

Mitigation Measures

- In consultation with the identified stakeholders, prepare a stakeholder engagement plan (SEP) that is based on their locations (maps) and their information needs at the various subproject phases
- Undertake timely and prior disclosure of relevant project information to the various stakeholder categories in line with their information needs and the project phase
- Carry out robust consultations with all identified community level (primary) stakeholders in a gender, intergenerational and culturally sensitive manner, using appropriate participatory consultative techniques
- Consult with other relevant (secondary) stakeholders (as appropriate) based on their information needs, project phase and the SEP
- Document the information disclosure and stakeholder consultation processes (including venues, dates, minutes of discussions detailing consultation agenda, issues/concerns raised for each agenda item, and responses by the implementing agency)

3. *Risks related to inadequate consultations with all segments of the community and exclusion of VMGs and vulnerable individuals and households in subproject activities and implementation structures*

Mitigation measures

- Ensure adequate consultations prior to construction, and throughout the project cycle with all segments of the community and other relevant stakeholders. This should be based on the SEP, using appropriate consultation techniques
- Ensure all concerns or grievances raised are responded to in a timely manner.

4. *Risks related to establishment of subproject governance structures, e.g., selecting individuals into management or GRM committees who have not been elected by all segments of the community, or imposing people who are not trustworthy into community level leadership positions*

Mitigation measures

- Consult with all segments of the community and agree on the criteria to be used to elect leaders into the subproject governance structures
 - Facilitate each segment of the community to elect their representatives to the various governance structures based on the agreed criteria
 - Train members of the various governance structures on their roles and responsibilities
5. *Risks related to exclusion of some stakeholder categories (VMGs, minority clans, disadvantaged individuals, women, youth, PWDs) from the consultation processes and the established subproject implementation structures*

Mitigation measures

- Facilitate the various stakeholder groups to establish representative and proportionate subproject implementation structures (implementation committee, GRM Committee etc.) composed of people of integrity who have the interest of their stakeholder category at heart, while ensuring that there is no conflict of interest, e.g., one person should not represent the stakeholder category in more than one structure)
- Train the members of the implementation structures in their respective roles and responsibilities
- Sensitize the various stakeholder categories on the existence, roles and responsibilities of the various implementation structures

7.3.2.4 Other Negative Impacts

The following are possible negative impacts:

1. Delay in implementation of the project due to objections and stop orders
2. Conflicts/ community agitations arising from dissatisfaction with compensation payment, and employment issues
3. Influx of people (migrant workers, sub-contractors and suppliers) and increased pressure on existing social infrastructure
4. Community agitations over land disputes, wrong stakeholder identification, leadership tussles, etc. Issues/ dispute on memorandum of understanding with project proponent

Embedded/In-built Control

The Contractor shall:

- Ensure that all pertinent permits, certificates and licenses have been obtained prior to any activities commencing on site and are strictly enforced/ adhered to;
- Maintain a database of all pertinent permits and licenses required for the contract as a whole and for pertinent activities for the duration of the contract.
- Encourage personnel to participate in community development affairs

The proponent shall:

- Establish an efficient grievance management mechanism
- Ensure early stakeholders' engagement sessions are held, and all agreed issues properly documented, signed, and implemented in timely manner.
- Engage in due consultation with relevant groups within host community at all phases of the project
- Provide opportunities for all groups (women, men, youth/associations, elders, leaders etc) to participate in consultations and ensure that all concerns are duly addressed.

Significance of Impacts

The overall impact significance at pre-construction phase has been assessed as moderate.

Additional Mitigation measures

- The Contractor shall develop a Solid Waste Management Plan in accordance with the guidelines
- All Project staff will be trained on this plan and attendance will be recorded

- All project staff will undergo training by local services providers identified by the Project implementers on prevention of HIV/AIDS and GBV-SEA/SH
- Develop a Code of Conduct (Project Implementers) for all Workers (local and overseas) to sign detailing the expected behaviors of Project staff, ESHS requirements, Cultural respect, OHS requirements, Community Health and Safety considerations
- Contractor required to develop and implement a Construction Environmental Management Plan (CEMP) meeting the conditions set out in the environmental authorization, as well as this ESIA and World Bank requirements

Residual impact significance

The significance of residual impacts has been reduced to minimal considering the recommended mitigation measures.

7.4 Positive Impacts during Construction Phase

The positive impacts associated with the proposed solar mini-grid in Munguveni village during the construction phase are as discussed below;

7.4.1 Impact on Local Trade

Where possible, construction materials will be sourced locally in order to promote local businesses.

Thus, anticipated benefits of the Project include indirect employment generated by the procurement of goods and services for the Project; induced employment related to jobs ensuing from the expenditure of incomes. The local community is likely to benefit from the economic opportunities to be created from the following:

- Self-employment options for individuals possessing vocational or technical training skills like electricians, welders, fitters etc;
- Contracting opportunities for local's residents including men, women and youths. During the public meeting the community insisted that all the unskilled labour force must be given to the locals.
- Creation of indirect employment for local community through establishing small shops like tea stalls, supply of intermediate raw materials, repair outlets, hardware stores etc. However, these are likely to be temporary.

7.4.1.1 Impact Significance

The impact significance will be moderate due to the high impact magnitude and the low receptor sensitivity. Due to expected limited job opportunities, a few locals will get jobs at the site that will impact their lives substantially.

7.4.1.2 Enhancement Measures

- Preference should be provided to local sub-contractors or suppliers to pass on maximum economic benefit locally;
- The project proponent will establish a mechanism to audit sub-contractors and suppliers with respect to compliance of utilizing local labour and resources.

7.5 Negative Impacts during the Construction Phase

The following negative impacts are also associated with the construction of the proposed solar mini-Grid at Munguveni.

7.5.1 Impact on Employment

The construction, operation and maintenance of the mini-grids will provide employment opportunities for skilled and unskilled labour. Receptors in the Social area of Interest that may be able to make the most of the direct and indirect employment opportunities in the project are those who have some level of experience in formal employment, as well as those who have gained a basic education. This will be a source of income for the labourers.

Thus, anticipated benefits of the Project include Direct employment opportunities mainly during construction of the mini-grids. The local community is likely to benefit from the opportunities to be created from the following:

- Civil works during construction phase including, construction of solar PV module mounting area, transformer yard, inverter room, internal roads, laydown areas, labour camp, distribution line; and
- Skill transfer from the contractors to the locals that will be given opportunities during the implementation of the project.

The area is characterised by major unemployment. This has affected the community members including the youths, men and woman as reported during Focused group discussion sessions. Thus, the contractor should develop and implement an employment management plan to promote local content. This will ultimately resolve conflict which can be arise if the community feels left out in employment opportunities.

7.5.1.1 Impact Significance

The impact significance will be moderate due to the high impact magnitude and the low receptor sensitivity. Due to expected limited job opportunities, a few locals will get jobs at the site that will impact their lives substantially.

7.5.1.2 Enhancement Measures

A significant segment of labour requirement during the construction phase will be sourced locally. While, the significance of the impact on employment opportunities during the construction phase is understood to be positive, the following measures should be put in place to ensure that the local community receives maximum benefit from the presence of the project;

- Preference should be provided to local labour; and
- Preference should be provided to the vulnerable population in the Study Area.

7.5.2 Visual Intrusions and Changes in Landscape Impact

The project site is located on a gently sloping terrain to the south. There will be no significant change to visual quality of the area resulting from development or change in land use that will alter the landscape. Changes in the visual landscape will range from construction phase to commissioning of the minored and associated structures and further during operations. The solar power Project is the first major solar power Project in the vicinity of project area and the new development will have impact on the surrounding area.

The project area is primarily a rural area and with agriculture as a primary activity. Although the solar panels, inverter, transformers, generator and associated components would be manufactured off site and the construction phase would be relatively short-term in duration (less than one year), it would still require large number of equipment or infrastructure when being erected such as cranes, dumpers, transportation vehicles on site. Additionally, the presence of bare soil along the access roads would increase the potential visual impact. The significance of the visual impacts will reduce at increasing distance from the development.

The construction of the mini-grid sites may involve the site clearance of vegetation and other natural attributes. The erection of the solar PV panels and the resulting glare from the sun will make it a standout feature from the natural surroundings and this would the lower the visual appeal of the area.

Even though the Mini grid facilities will be small, their geometric and sometimes highly reflective surfaces may have visual impacts. However, being visible is not necessarily the same as being intrusive. Aesthetic issues are by their nature highly subjective.

7.5.2.1 Embedded/In-built Control

Proper siting decisions can help to avoid aesthetic impacts to the landscape.

7.5.2.2 Significance of Impact

The extent of the visual impacts will be localized. The overall impact significance change in visual landscape during construction phase is assessed as moderate.

7.5.2.3 Additional Mitigation Measures

The following mitigation measures will have to be implemented to minimize potential visual impacts during the construction phase:

- The extent of the labor camp and storage area should be limited in area to only that which is essential.
- Minimize presence of ancillary structures on the site and minimize roads disturbance; and
- After completion of construction work, areas utilized for labor camp, storage area to be restored to original form.

7.5.2.4 Residual Impact Significance

After implementation of mitigation measures, the significance of residual impacts will be reduced to minimal.

7.5.3 Change in Land Use

The study area consists of public land with patches of open scrubland and bushland. The immediate surrounding neighbours Mumbuji Primary School to immediate East and shrubland to the immediate south, north and west, to the North East approximately 200m away are shops and homesteads. The internal transmission lines will be laid by Kenya Power. Considering the land use of Munguveni, the transmission line will be located on public land. The land procured for the project site was uncultivated, and undeveloped. There is no major dependency for grazing or farming on the land procured for the project. Thus, receptor sensitivity is assessed as **low**.

During consultation, it was established that the land did belong to the Pokomo who are farmers. The community has since offered to the land in kind for project use. The establishment of the mini-grid will convert public land to industrial use for long term. Changes in land use are also envisaged for material store yard and temporary site office. However, those changes in land use will take place only during construction period. Thus, magnitude of the impact has been assessed to be **medium**.

7.5.3.1 Embedded/In-built Control

The actual area of land use impact would be limited to the footprint of public land and immediate vicinity of the mini-grid site. There will be additional land utilized for transmission line towers. After construction work, any land taken for a temporary basis for storage of material will be restored to their original form. Existing roads will be developed for access to the project site.

7.5.3.2 Significance of Impact

The overall impact significance will therefore be moderate.

7.5.3.3 Additional Mitigation Measures

- Construction activities should be restricted to designated area.
- On completion of construction activities, land used for temporary facilities such as stockyard if any should be restored to the extent possible; and
- The land use in and around permanent project facilities should not be disturbed.

7.5.3.4 Residual Impact Significance

Direct changes in land use during construction and operation are negative in nature but temporary. Indirect changes in land use are positive in nature and permanent. The direct impacts shall be limited to project site and associated facilities. The resource receptor sensitivity is moderate.

The residual impact significance will remain moderate as changes in land use will be for long term for majority of the project component (installation of mini-grid).

7.5.4 Impact on Topography

The topography of the project site is an open area gently sloping. The general slope of the surrounding areas slopes southwards into the Indian Ocean. The nearest water body that passes near the proposed project site is River Tana approximately 3km away. Typically, solar power projects do not undertake levelling of topography and since the proposed project, along with the access road, is mostly on a flat terrain the receptor sensitivity has been assessed to be low. Due to the slightly sloping terrain, study area may exhibit presence of micro drainage channels. Therefore, the impact magnitude has therefore been assessed as minor.

7.5.4.1 Embedded/In built Control

The contractor will be instructed to avoid any unnecessary changes in the topography.

7.5.4.2 Significance of Impact

Significance of impact is assessed to be minor.

7.5.4.3 Additional Mitigation Measures

No further mitigation measures are suggested as embedded/in-built control will be sufficient to reduce the impact on topography.

7.5.4.4 Residual Impact Significance

The residual impact significance will be reduced to negligible after implementing above mentioned mitigation measures

7.5.5 Impact on Soil Environment

7.5.5.1 Soil Compaction and Erosion

Soil compaction and erosion has been considered for the construction and decommissioning phases only. The receptor sensitivity has been assessed as medium because of the preponderance of agriculture as a source of livelihood in the area. The site clearance, excavation for foundation will largely affect the top layers of the soil. Loss of topsoil quality would have an impact on the productivity of the land, but the effects can be reversed over time. Further, site clearance will be restricted only in the project site. Farmland and grazing space close to the project site will not be disturbed.

The usage of existing roads by vehicles and minimal access road improvement will reduce the impact from soil compaction in the area. The impact magnitude therefore has been assessed to be small.

7.5.5.2 Embedded/in-built control

Vehicles will utilize existing roads to access the site.

7.5.5.3 Significance of Impact

The overall impact significance on soil erosion and compaction has been assessed as **minor**.

7.5.5.4 Additional Mitigation Measures

Site clearance, piling and excavation is not carried out during the windy period/season to minimize erosion and run-off.

7.5.5.5 Residual Impact Significance

The significance of residual impacts has been reduced to negligible considering the recommended mitigation measures.

7.5.6 Impacts on Waste Generation and Soil Contamination

General construction waste generated onsite will comprise of concrete, steel cuttings/filings, packaging paper or plastic etc. solid wastes consisting of food waste, plastic, glass, and wastepaper will also be generated by the construction workforce. A small proportion of the waste generated during construction phase will be hazardous and will include waste fuel, grease and waste oil containing rags. If improperly managed, solid waste could create impacts on soil quality. Therefore, the receptor sensitivity has been assessed as medium.

The impact magnitude has been assessed as minor since the proponent has managed other solar power projects as well and has effective management systems for waste and hazardous substances being generated or utilized during the project life cycle as part of their Environmental and Social Management Framework.

7.5.6.1 Embedded/in-built control

Hazardous material and waste should be properly labelled, stored onsite at a location provided with impervious surface and in a secondary containment system.

7.5.6.2 Significance of Impact

The impact significance for waste generation and soil contamination has been assessed as **minor**.

7.5.6.3 Additional Mitigation Measures

- Contractor should ensure that no unauthorized dumping of used oil and other hazardous waste is undertaken at the site.
- Designated areas should be provided for Solid Waste and daily collection and period disposal should be ensured.
- Construction and Demolition Waste should be stored separately and be periodically collected by an authorized treatment and storage facility.
- All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels.
- A logbook should be maintained for quantity and type of hazardous waste generated; and
- In case of accidental/unintended spillage, the contaminated soil should be immediately collected and stored as hazardous waste.

7.5.6.4 Residual Impact Significance

- The significance of impacts due to waste generation during the construction phase after implementation of mitigation measures has been considered as negligible.

7.5.7 Impact on Air Quality

The construction activities at the Mini grid sites can potentially lead to decrease in the ambient air quality due to fugitive dust emissions from site clearance, piling work, handling of construction materials, emissions due to movement of vehicles on unpaved roads and vehicular emissions and exhaust emissions from construction machinery.

7.5.7.1 Embedded/in-built control

Vehicle engines need to be properly maintained to ensure minimization in vehicular emissions.

7.5.7.2 Significance of Impact

The significance of air quality impacts is determined based on professional judgement considering the sensitivity of the receiving environment.

Sensitive receptors of air and emissions were identified by observation during field visit to project site. They were noted to be mainly residential and commercial in nature. The distances from a source that dust impacts can occur is highly site specific and will depend on the extent and nature of incorporated mitigation measures, prevailing wind conditions, rainfall, and the presence of natural screening. Due to the variability of the weather, it is impossible to predict what the weather conditions will be when specific construction activities are being undertaken. Therefore, the assessment of construction dust impacts is typically qualitative.

The Project will be located within Tana River County. The site area is at Munguveni village. There are three types of land in Tana River County: Private, public and Communal land. The public land is for farming and homestead. The main activities undertaken on available land area at Munguveni and the greater extents of Garsen North Ward is farming as a major livelihood while livestock keeping and business enterprises are at low scale. Sensitive receptors within 550 meters of key construction areas have been identified using

observation and satellite imagery. Based on the observations made during walk through of the project area, all structures identified within this distance have been assumed to be residential or commercial.

7.5.7.3 Additional Mitigation Measures

- Spraying water on soil before excavation and periodic access road wetting to reduce nuisance dust levels.
- Visual inspection of dust pollution from roads and the construction site and appropriate intervention if dust levels are high.
- Speed restriction of construction vehicles to a speed of 30 km/h or less on the site and on the access roads to the site.
- Maintenance and servicing of machines and engines off-site.
- Grievance procedure for dust complaints.
- The use of appropriate Personal Protective Equipment (PPE) such as dust masks for construction workers.
- All construction materials will be transported in designated trucks which will be covered.

7.5.7.4 Residual Impact Significance

As presented above, it is evident that with the implementation of the proposed mitigation measures, it is expected that the overall significance of dust impacts will reduce further to range from low to negligible levels.

7.5.8 Impact on Ambient Noise

The sources of noise in the construction phase include construction activities, operation of generator sets and movement of vehicles. There will also be increased noise levels because of increased anthropogenic movement in the area. Munguveni Project affected persons will most likely be affected by increasing noise levels because of proximity to the project site and construction of the proposed access road. The receptor sensitivity is therefore considered as medium. Impact magnitude is minor to medium considering the construction period of the project to last for approximately 3 months and proximity to Munguveni village.

7.5.8.1 Embedded/in-built control

Normal working hours of the contractor shall be defined (preferable 8 am to 5pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise.

7.5.8.2 Significance of Impact

The impact significance has therefore been assessed as minor to moderate.

7.5.8.3 Additional Mitigation Measures

- Only well-maintained equipment should be operated on-site.
- If it is noticed that any equipment is generating too much noise then lubricating moving parts, tightening loose parts, and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible.
- Machinery and construction equipment that may be in intermittent use should be shut down or throttled down during non-work periods; and
- Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.

7.5.8.4 Residual Impact Significance

Significance of residual impact is assessed to be negligible to minor taking into consideration above mentioned mitigation measures.

7.5.9 Impact on Occupational Health and Safety

The construction activities include site preparation, infrastructure utilities installation, building structures. As a result, will be potential impacts on workers' health and safety due to exposure to risks through construction activities that lead to accidents causing injuries and death. The most probable risks cause of accidental death and injury are:

- Safety risks such as: tripping; falling due to working at heights; potential fire due to hot work,

smoking, failure in electrical installations; electric shocks.

- Health risks: Injuries such as: lifting, lowering, pushing, pulling, and carrying; temporary or hearing loss which usually comes from noise generated from machinery used for excavation or piling work and from compressors and concrete mixers etc.; heat stress and working during high temperatures
- Occupational hazards due to dust and noise pollution from operating of heavy machinery and vehicular movement in the project sites.
- Safety risk due to working at heights during installation of power lines
- Exposure of workers to electro-magnetic field (EMF) during operation and maintenance of the mini grids
- Risks of road accidents during the transportation of material and equipment to the project sites owing to the poor road network and insecurity in some of the KOSAP counties.
- The mini-grid sites are in ecological zones associated with flash flooding events. This poses a risk of washing away the mini-grid infrastructure including the power storage units i.e., the batteries making it necessary factor in site design considerations to mitigate against extreme flooding events.

7.5.9.1 Embedded/in-built control

- All construction activities will be carried out during daytime hours and vigilance should be maintained for any potential accidents.
- Personal Protective Equipment (PPEs) including safety shoes, helmet, goggles, earmuffs, and face masks.
- Cranes and other lifting equipment are operated by trained and authorized persons.
- Training of the workers on climbing techniques, and rescue of fall-arrested workers.
- Excavated areas should be temporarily fenced to avoid access to outsiders and wildlife

7.5.9.2 Significance of Impacts

The impact on occupational health and safety during the construction phase is evaluated to be of minor significance, as the installation of mini-grid and erection of transmission line will be done through experienced and trained workers.

7.5.9.3 Additional mitigation measures

- All workers (regular and contracted) should be provided with training on Health and Safety management system of the contractor during construction stage and EHS policies and procedures during the operation stage.
- Obtain and check safety method statements from contractors.
- Monitor health and safety performance and have an operating audit system; and
- Permitting system should be implemented to ensure that cranes and lifting equipment is operated by trained and authorized persons only.
- Appropriate safety harnesses and lowering/raising tools should be used for working at heights.
- All equipment should be turned off and checked when not in use; and
- A safety or emergency management plan should be in place to account for natural disasters, accidents, and any emergency situations.

7.5.9.4 Residual impact significance

Significance of residual impact is assessed to be negligible considering above mentioned mitigation measures.

7.5.10 Reduction of Land-holding income

The proposed project will entail the acquisition of a land parcel for setting up the mini grid. The land acquired may also be used to develop contractor facilities, worker's camps, and other ancillary facilities e.g., storage and sanitary facilities. Loss of land used by the communities for livestock grazing and farming may trigger land disputes. New settlements may arise due to migration of people to the centers near the mini grid disrupting the existing community settlement patterns. The project proponents will use existing access roads to set up the low-voltage power distribution lines and will seek access from beneficiaries and clients in whose property they will undertake electricity connection to the power grid.

During the consultation, it was also reported that the community is not dependent on the land for income. after implementing the embedded controls, the impact magnitude is assessed to be minor.

7.5.10.1 Source of Impact and Overview of Baseline Conditions

Additional employment opportunities may also be created for the local community by the contractor. The beneficiaries will include youth, men and women.

7.5.10.2 Embedded/In-built Controls

The overall impact significance of the land procured during the planning phase is assessed as minor.

7.5.10.3 Mitigation Measures

Considering that the procurement of land will have only a minor implication on the economy of the sellers, the following additional measures may be recommended to minimize this impact:

- Providing skills-based training interventions, especially for self-employment to the young and unemployed in the families who will be selling land to project. This will enhance their employability and create potential for income generation through self-employment.
- Providing preference to members of the families who will be selling land to the project for livelihood opportunities in Construction phase.
- Procuring resources from the local sources to induce more employment in the supply chain.

7.5.10.4 Residual Impact Significance

After implementation of mitigation measures, the significance of residual impacts will be reduced to negligible.

7.5.11 Impact on local economy and employment

The construction, operation and maintenance of the mini grids will provide employment opportunities for skilled and unskilled labor. Receptors in the Social Area of Interest that may be able to make the most of the direct and indirect employment opportunities in the project are those who have some level of experience in formal employment, as well as those who have gained a basic education. This will be a source of income for the Labourers. Where possible, construction materials will be sourced locally to promote local businesses.

Thus, anticipated benefits of the Project include Direct employment opportunities mainly during construction of the mini grids; indirect employment generated by the procurement of goods and services for the Project; induced employment related to jobs ensuing from the expenditure of incomes associated with direct and indirect Project related jobs; and Direct and indirect business opportunities to the local population. Individual and small businesses are expected to benefit from selling goods and services to workers. The local community is likely to benefit from the economic opportunities to be created from the following:

- Civil works during construction phase including, construction of solar PV module mounting area, transformer yard, inverter room, internal roads, laydown areas, labor camp, transmission line,
- Self-employment options for individuals possessing vocational or technical training skills like electricians, welders, fitters etc.
- Contracting opportunities for locals possessing construction equipment which would be needed
- Creation of indirect employment for local community through establishing small shops like stalls, kiosks supply of intermediate raw materials, repair outlets, hardware stores etc. However, these are likely to be temporary.

7.5.11.1 Enhancement Measures

A significant segment of labor requirement during the construction phase will be sourced locally. While the significance of the impact on economy and employment opportunities during the construction phase is understood to be positive, the following measures should be put in place to ensure that the local community receives maximum benefit from the presence of the project:

Preference should be provided to local labor, sub-contractors, or suppliers to pass on maximum economic benefit locally.

Preference should be provided to the vulnerable population in the Study Area.

The project proponent will establish a mechanism to monitor sub-contractors and suppliers with respect to compliance of utilizing local labor and resources.

7.5.11.2 Impact Significance

The impacts have been assessed as positive due to employment opportunities for locals.

7.5.12 Community Health and Safety

The receptors for impacts on community health and safety include project site workers, settlements in the proximity of the project which will be exposed to health impacts from the project activities. The construction phase activities such as installation of solar panels, construction of transmission lines and movement of material and personnel may result in impacts on the health and safety of the community. As mentioned earlier in the report, the internal transmission line will pass through a hamlet of Munguveni village and will thus lead to significant impact on community health and safety during construction phase.

Construction activities will involve the use of heavy machinery and live transmission power lines.

Furthermore, the movement of material and personnel via the access roads may result in damage to human life or livestock due to accidents. The major community health and safety risks include structural failure of project infrastructure, life and fire safety, public accessibility, and management of emergency situations. As per WB ESS guidelines, the occupational and community health and safety hazards during the construction, operation, and decommissioning of solar power projects are generally like those of largest infrastructure projects. Based on the above analysis, the impact magnitude is assessed to be medium.

7.5.12.1 Embedded/in-built control

Consultations with the proponent team and policy review indicated that the following embedded/in built control measures will be put in place during the construction phase.

- The excavated areas will be properly fenced for safety and sign boards in local languages will be put up.
- No hazardous waste or any waste be stored within the site for long periods of time and be in contact with the soil to prevent against ground water contamination
- The truck drivers carrying construction machinery and materials will be instructed to drive within speed limits with careful consideration for village traffic.
- Movement of heavy equipment and construction materials will be regulated during peak hours (09:00 AM to 06:00 PM).

7.5.12.2 Significance of Impact

The impact to community health and safety during the construction phase is evaluated to be of minor to moderate significance due to proximity of transmission line to the nearest homesteads. However, the significance of impact decreases because the Project site consists of low density of population and most of the unskilled labour will be engaged from the local habitation.

7.5.12.3 Additional Mitigation Measures

The following risk mitigation measures are suggested to minimize the risks/ hazards of construction activities onsite.

- Developing an onsite ESMS and EHS Policy by the contractor.
- Ensuring that the sub-contractor agreements that the contractor enters require all contractors to possess an EHS plan with provisions for monitoring of the EHS performance of contractors and their workers.
- As part of the stakeholder engagement and information disclosure process, providing an understanding to the community concerning the activities proposed to be undertaken and the

- precautions being adopted for safety; and
- Developing a grievance redress mechanism.

7.5.12.4 Residual Impact Significance

- After the implementation of the above mitigation measures, the residual impact significance.

7.5.13 Impacts related to Labour Influx

The nature of the project will require technical skills that may not be all available in the project areas. This will require movement of construction workers into the project community. With an increase in population of the project area, the social set up may be affected resulting to different negative social impacts such as competition for resources, illicit behaviour and crime (including prostitution, theft and substance abuse), sexual exploitation and abuse of community members by project workers, and sexual harassment at the work place. In addition, labour influx into this project area could be source of conflict between workers and the local population. Further, the influx of skilled labour into the project area will positively impact the local community through transfer of skills and improved economy of the local area.

7.5.13.1 Significance of Impact

The significance of labour influx is considered to be minor because the receptor sensitivity will be medium and the impact magnitude is low. However, except for the technically skilled personnel, most of the labour is expected to be sourced locally.

7.5.13.2 Additional Mitigation measures

- The contractor to develop & implement a Labour Influx Management Plan as part of C-ESMP and monitor all mitigation measures.
- Effective community engagement and strong grievance mechanisms on matters related to labour through Grievance Redress Mechanism (GRM) Provided.
- The contractor to prioritize local employment to reduce labour influx.
- In contract documents for the Contractor, MOE/KPLC should make explicit reference to the need to abide by Kenyan law, international best practice and the ratified ILO conventions and MOE's policies in relation to health and safety, labour and welfare standards.
- In selection of a Contractor, MOE/KPLC should refer to past performance in similar assignments as an indicator of future performance with respect to worker management, worker rights, health and safety as outlined in Kenyan law and international standards.
- Regular checks by MOE/KPLC should be undertaken to ensure the relevant labour laws and occupational health and safety plans are adhered to at all times.
- All project workers should, as part of their induction, receive training on health and safety.
- The contractor should put in place mechanism to ensure no employee or job applicant is not discriminated against on the basis of his or her gender, marital status, nationality, ethnicity, age, religion or sexual orientation.
- All workers will have contracts which clearly state the terms and conditions of their employment and their legal rights. Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand the provisions. Contracts must be in place prior to workers reporting to duty for the first time. The contract document will be enhanced by the Code of Conduct that will be provided by the Proponent. In addition to the code of conduct, induct workers on GBV-SEA/SH.
- The Contractor will put in place a worker grievance redress mechanism accessible to all workers, whether permanent or casual, directly or indirectly employed. The Proponent worker grievance mechanism shall be open to the Contractor workforce in the event that their grievance is not adequately resolved by their direct employer. The Proponent will then have the authority to act to resolve this grievance.
- All project workers should have access to training on communicable diseases and STDs and community interactions in general. This training will be developed in collaboration with local health

institutions.

- Sensitize workers and the surrounding communities on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff training, awareness campaigns, multimedia and workshops and during community Barazas.
- Promote use of existing clinics to provide voluntary counselling and testing (VCT) services to construction crew.
- Carry out surveillance to ensure that no children are employed in the project, and to the extent possible by third parties related to the project and primary suppliers where such risk may exist.
- Proper records of labour force on site while avoiding child and forced labour
- Effective contractual obligations for the contractor to adhere to the mitigation of risks against labour influx, including sexual exploitation and abuse and sexual harassment.
- Fair treatment, non-discrimination and equal opportunity of workers.
- Comply to provisions of Labour Relations Act 2012 and Work Place Injuries and Benefits Act (WIBA 2007) and Employment Act Cap 222 of 2007
- The contractor shall comply with the International Labour Organization Standards ratified in Kenya which include but not limited to: Prohibition of forced labour (ILO No 29) and Abolition of forced labour (ILO No 159).
- The contractor shall prohibit servitude, forced and bonded labour, Equal remuneration ILO No 100 and Discrimination (Employment and Occupation) and Freedom of Association and Right to collective Bargaining Convention No 98.
- The contractor shall comply with affirmative action that it will employ persons and make employment-related decisions without regard to an individual's race, colour, religion, sex, age, creed, ancestry, marital status, sexual orientation, gender identity, disability, medical condition, genetic information, or any other characteristic protected by law.
- The contractor shall ensure compliance with the Kenya's persons with disabilities PWDs Act. The company will make reasonable accommodations for qualified individuals with known disabilities. This policy governs all aspects of employment, including selection, job assignment, compensation, discipline, termination and access to benefits and training.
- The contractor responsibility to provide all employees with a workplace free of harassment, intimidation, coercion and retaliation as provided by Kenya's Employment Act Cap 226 of 2007
- All employees, officers and directors are responsible for conducting themselves so that their actions are not considered sexually harassing, demeaning or intimidating.
- Any employee(s) who witness or believe they have been subject to discrimination, harassment, retaliation is encouraged to notify their supervisor.

7.5.14 Spread of communicable diseases and HIV/AIDS

The influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), or the incoming workers may be exposed to diseases to which they have low resistance.

7.5.14.1 Mitigation Measures

- The contractor at the time of Project implementation will develop appropriate training on potential spread and awareness materials for Information, Education and sensitisation of workers during project construction phase.
- Develop an intervention strategy compatible with the construction programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with other stakeholders; and
- Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs
- Access to Contractor's Workforce Camps by outsiders to be controlled

7.5.15 Gender Inequality, Gender Based violence and sexual harassment

The proposed project will create direct employment opportunities particularly unskilled labour and skilled labour to the local community members. Gender equality should be promoted in all aspects of economic growth, particularly in the equitable distribution of project benefits to men and women. The Contractor must comply with the following to respect gender equality principles:

- Ensure equitable distribution of employment opportunities between men and women
- Mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule and National Gender and Equality Commission Act 2011.
- Ensure safe employment for women, including training for all staff, regular consultation with female employees and other measure to ensure physical safety and dignity of female employees

Sexual harassment can occur between workers, particularly male workers against female workers, when there is insufficient sensitization of workers against prohibitions for sexual harassment, as well as the absence of reporting and disciplinary measures. This impact is triggered during Project Construction Phase due to the potential of the Contractor's failure to comply with the following provisions;

1. Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule.
2. Failure to protect Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights, and interfering with Labour Rights

7.5.15.1 Mitigation Measures

- Ensure clear human resources policy against sexual harassment that is aligned with national law
- Integrate provisions related to sexual harassment in the employee Code of Conduct (COC)
- Ensure appointed human resources personnel to manage reports of sexual harassment according to policy
- The Contractor shall require his employees, sub-contractors, sub-consultants, and any personnel thereof engaged in construction works to individually sign and comply with a Code of Conduct with specific provisions on protection from sexual exploitation and abuse
- The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including:
 - effective and on-going community engagement and consultation, particularly with women and girls;
 - review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; etc.
- The contractor shall develop 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 if a case of GBV at the community level is reported related to project implementation

7.5.16 Child Abuse

The possibility of the contractor triggering child abuse is through hiring of child labour, also labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV and AIDS. The contractor will undertake the below listed mitigation measures.

7.5.16.1 Mitigation measures

- The contractor will develop and implement a Children Protection Strategy that will ensures minors are protected against negative impacts associated by the Project including SEA.

- All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour
- Children under the age of 18years **should not** be hired on site as provided by Child Rights Act (Amendment Bill) 2014
- Wherever possible, ensure that another adult is present when working in the proximity of children.
- Not invite unaccompanied children to workers' homes, unless they are at immediate risk of injury or in physical danger.
- Refrain from physical punishment or discipline of children
- Refrain from hiring children for domestic or other labour, which is inappropriate given their age, or developmental stage, which interferes with their time available for education and recreational activities, or which places them at significant risk of injury.
- Comply with all relevant local legislation, including labour laws in relation to child labour specifically provisions of Kenya's Employment Act Cap 226 of 2007 Part VII on protection of children against exploitation

7.5.17 Sexual Exploitation and Abuse

This impact refers to sexual exploitation and abuse committed by Project staff against communities and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project.

7.5.17.1 Mitigation Measures

- Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018)
- The SEA action plan will include how the project will ensure necessary steps are in place for:
 - *Prevention of SEA:* including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance;
 - *Response to SEA:* including survivor-centered coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management;
 - *Engagement with the community:* including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of the Project Sexual Exploitation Action (PSEA) awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights;
 - *Management and Coordination:* including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.

7.5.18 Gender based violence at the community level

This impact refers to gender-based violence that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of solar mini-grid

projects that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services.

7.5.18.1 Mitigation Measures

- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including:
 - effective and on-going community engagement and consultation, particularly with women and girls;
 - review of specific project components that are known to heighten GBV risk at the community level, e.g., compensation schemes; employment schemes for women; delivery of power supplies; etc.
 - Specific plan for mitigating these known risks, e.g., sensitization around gender-equitable approaches to compensation and employment; power services; etc.
- Ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation

7.5.19 Risk related to Inadequate Stakeholder Engagement

Lack of timely and adequate stakeholder engagement during construction is a recipe for dissatisfaction among stakeholders affected and can result to grievances which may turn to conflicts and delays in project construction. With the implementation of the mitigation measures the impact significance is minor.

Mitigation measures;

- The contractor will design and implement a stakeholder engagement schedule to ensure various stakeholders are engaged at and informed about the project on a timely basis and respond to issues that the stakeholders may require.
- The contractor will also prepare and implement a grievance redress mechanism to deal with grievances. The grievance redress mechanism committee of this GRM should also include representatives from the community.

7.5.20 Forced Labour

During construction of the mini-grid the risk of forced labour is likely to occur and precaution is needed to safeguard the community from being subjected to forced labour. The impact significance is rated minor, based on low sensitivity of the receptor and medium magnitude of the impact.

Mitigation Measures

- Contractor must adhere to the employment Act which outlaws any form of forced labour
- Community to report any form of forced labour at the site
- Contractor to ensure that all workers have a national ID card or documentation to show they are adults (above 18 years).

7.6 Positive Impacts during Operational Phase

7.6.1 Impact on Local Economy and Employment

Community consultations and observations made during the site visit suggest that the existing scenario of the agriculture in the study area is not capable enough to meet requirements of the people who are solely dependent upon it; especially due to limited water availability and growing population.

During the operations phase, the requirement for unskilled and semi-skilled labour is expected to reduce to 5 and 15 respectively. The locally procured services will include maintenance work of the facility, 24-hour security, bush and undergrowth cleaning and housekeeping activities. In addition to this, the community will improve their livelihood and businesses by using the electricity from the project.

7.6.1.1 Significance of Impact

The overall impact significance of the impact on economy and employment during the operations phase is Major, the receptor sensitivity will be medium and the impact magnitude will be high.

7.6.1.2 Enhancement Measures

While, the significance of the impact on economy and employment opportunities during the operations phase is understood to be positive, the following measures should be put in place to ensure that the local community receives maximum benefit from the presence of the project:

- Priority should be provided to local labour or suppliers to pass on maximum economic benefit locally;
- Opportunities should be provided to the vulnerable population in the Study Area.

7.6.2 Improvement of Local and National Economy

The mini-grid project will ensure supply of a stable power that will reduce damage to the electronics and this will result in promotion of businesses both in the formal and informal sectors. Availability of power will enable businessmen to scale up their businesses while making it is possible to set up businesses such as salons, barber shops, photocopying machines, cyber cafes, welding, refrigeration of drinks among others. This will result in income improvements at the individual level and for the national economy. More customers will be connected and retail of reliable electricity by the power utility firm will attract increased tax revenues to the government.

7.6.2.1 Impact Significance

The impact significance is low as it will buy few materials over a long period of time

7.6.2.2 Mitigation Measures

- KP should ensure that their contractors/suppliers remit taxes and have a tax compliance certificate;
- Priorities local purchases over imports;
- Remit taxes on behalf of employees.

7.6.3 Education

Access to electricity at the household level and schools will create opportunities for children be able to study even for longer hours. Additionally, children in households can also access education programs being aired through different radio and T.V. channels. Schools will be able to take advantage of information technology and communication that are becoming a way of life in education sector and learning in general.'

7.6.3.1 Significance of impact

The impact significance is high as it will provide power to schools over a long period for additional study time in the night and morning

7.6.3.2 Enhancement Measures

- KP should consider having the transmission lines are closer to schools for them to benefit from the power supply;
- Kenya Power should consider partnering with the county government in providing street lighting to improve security for children and teachers leaving for school early or leaving late for home.

7.6.4 Health Benefits of the Project

Solar energy for lighting is better than kerosene lamps that are in use currently. This is because kerosene lamps emit particles that cause air pollution. The health risks posed by this indoor air pollution mainly include acute lower respiratory infections. Additionally, insufficient illumination (low light) conditions can cause some degree of eye strain and reading in these conditions over long periods of time may have the potential to increase the development of nearsightedness in children and adults.

7.6.4.1 Significance of impact

The project will result in many families replacing kerosene lamps for lighting with electricity there-by reducing chances of the afore mentioned disease incidences hence the impact significance will be high.

7.6.4.2 Enhancement Measures

- Kenya power should ensure that electricity is always available, reliable and affordable to Munguvuveni residence.

7.6.5 Improved Standard of Living

Availability of power will result in lifestyle changes through improved night lighting, pumping of water instead of manual pumping and refrigeration to maintain food safety and quality.

7.6.5.1 Significance of impact

Impact significance will be high due to improved living standards.

7.6.5.2 Enhancement Measures

- KP should consider providing reliable of solar energy in Munguvuveni area.

7.6.6 Security

The area will benefit from improved security since houses, businesses and public institutions will be well lit using electricity. This is as a result of more security flood lights bulbs which helps keep off opportunistic crimes including gender-based violence.

7.6.6.1 Significance of impact

The impact significance is high as the project will improve security situation of Munguvuveni area.

7.6.6.2 Enhancement Measures

- KP should consider partnering with the county government in providing street lighting to improve security of the area.

7.6.7 Communications

Access to electricity will lead to improved communication. This will be enabled by the fact that charging of mobile phones will be easier and cheaper. Access to mass media like radio and T.V will provide opportunity for the households to access a wide range of information which is useful for decision making.

7.6.7.1 Significance of impact

The impact significance is high since Munguvuveni community will have access to information cheaply.

7.6.7.2 Enhancement Measures

- KP should partner with other network service provider to improve the network situation of Munguvuveni area.

7.7 Negative Impacts during Operational Phase

The operation phase will have potential negative impacts; these impacts are less significant and can be easily mitigated. The following negative impacts are associated with the Operational of the proposed solar mini-Grid at Munguvuveni.

7.7.1 Impact on Soil

In the operation phase, soil compaction and erosion may occur due to vehicle movement, which only happens during the occasional maintenance activities. Soil compaction for the operation phase will be therefore been infrequent and low. Since the chances of soil compaction and erosion during the O&M phase are less, the impact magnitude is assessed to be small.

7.7.1.1.1 Embedded/in-built control

Vehicles will utilize the existing access road to undertake maintenance activities at the solar plant.

7.7.1.1.2 Significance of Impact

The overall impact significance on soil erosion and compaction has been assessed as negligible.

7.7.1.1.3 Additional Mitigation Measures

No further mitigation measures are suggested as embedded/in-built control will be sufficient to reduce the impact on soil environment.

7.7.1.1.4 Residual Impact Significance

The significance of residual impacts has been reduced to negligible considering the recommended mitigation measures.

7.7.2 Waste Generation and Soil Contamination

During operation phase, the waste generated from project includes domestic solid waste building and mini-grid and hazardous waste like waste oil and lubricants and oil containing jutes and rags will be generated during maintenance activities.

The quantity of hazardous waste generated will be much lesser quantity than during the construction phase. Therefore, receptor sensitivity has been assessed as low.

The quantity of municipal and hazardous waste generated will be much lesser in quantity in operation phase than during the construction phase. Thus, the Impact magnitude has been assessed too small.

7.7.2.1.1 Embedded/in-built control

The waste generated will be disposed of through approved NEMA waste handlers. The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and disposed through NEMA approved hazardous waste handler.

During operation phase, the quantity of municipal waste and hazardous waste generated is less and probability of the hazardous waste generation is only during plant maintenance and therefore occasional. The waste generated would be routed through proper collection and containment.

7.7.2.1.2 Embedded/in-built control

Additionally, the following steps must be undertaken to avoid soil contamination:

- Ensure oil/ lubricants are stored on impervious floor in the storage area having secondary containment.
- Use of spill control kits to contain and clean small spills and leaks during O&M activities; and
- The guidelines and procedures shall be prepared and followed for immediate clean-up actions following any spillages.

7.7.2.1.3 Significance of Impact

The overall impact significance on land due to waste disposal during O&M phase has been assessed as minor.

7.7.2.1.4 Additional Mitigation Measures

- Municipal domestic waste generated at site to be segregated onsite.
- Ensure hazardous waste containers are properly labelled and stored onsite provided with impervious surface, shed and secondary containment system.
- Ensure routinely disposal of hazardous waste through NEMA approved waste Handlers and records are properly documented; and
- The overall impact significance on land due to waste disposal during O&M phase has been assessed as minor.
- Disposal of hazardous wastes shall be done strictly as per the conditions of authorization granted by NEMA.
- Ensure hazardous waste is properly labelled, stored onsite at a location provided with impervious surface, shed and secondary containment system.

7.7.2.1.5 Residual Impact Significance

The significance of residual impacts will be negligible post implementation of recommended mitigation measures.

7.7.3 Fire Outbreaks

Carelessness and negligence both at the solar mini-grid and by the beneficiaries of electricity may cause fires.

7.7.3.1 Significance of Impact

With the mitigation measures in place the impact is evaluated to be of moderate significance due to high sensitivity and low magnitude.

7.7.3.2 Mitigation Measures

- The power plant must contain firefighting equipment (Portable fire extinguishers) of recommended standards and in key strategic points;
 - Detection/alarm systems that can detect fire should be considered and installed;
 - A fire risk assessment and evacuation plan should be prepared and posted at strategic points and should include procedures to take when a fire is reported;
 - Workers especially operators of the plant must be trained on firefighting and management;
- 'No smoking' signs shall be posted within the Mini-grid

7.7.4 Impact on Water quality and demand

Water is required during operation phase to meet domestic requirements of O&M staff and for cleaning solar panels. Water will be obtained from the local water point sand borehole. During operation phase, there will be no wastewater generation from the power generation process. Therefore, the receptor sensitivity is assessed to be **low**.

Discussions with the Project affected persons in Munguveni confirmed that water is a major concern in the area. Since the project is likely to generate very little or negligible amount of wastewater during the O&M phase, the impact magnitude has been assessed to be small.

7.7.4.1.1 Embedded/in-built control

Planning of toilets and waste collection areas should be away from natural drainage channels (*lag gas*).

7.7.4.1.2 Significance of Impact

The overall significance of impacts is assessed to be **minor**.

7.7.4.1.3 Additional Mitigation Measures

- Ensure proper cover and stacking of loose construction material to prevent surface runoff and contamination of receiving water point.
- The workforce will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and random disposal of sewage shall be strictly restricted.
- Construction labor deputed onsite to be sensitized about water conservation and encouraged for optimal use of water.
- Regular inspection for identification of water leakages and preventing wastage of water from water supply tankers.
- Recycling/reusing to the extent possible.
- The contractor should provide portable/mobile toilets for use on site

7.7.4.1.4 Residual Impact Significance

The residual impact significance is envisaged to be negligible upon application of embedded controls and additional mitigation measures.

7.7.5 Increased Oil Consumption

The proposed Mini-grid shall consume fuel/oil in the process of backing up the solar energy required. The fuel is produced mainly through non-renewable resources, implying this will have adverse impacts on these non-renewable resources base and their sustainability.

7.7.5.1 Significance of Impact

The impact will be of minor significance.

7.7.5.2 Mitigation Measures

To ensure efficient energy consumption during the operation phase of the project, the contractor to install an energy-efficient lighting system at the project site facilities. This will contribute immensely to energy saving during the operational phase of the project. In addition, the plant operators will be sensitized to ensure energy efficiently in their daily operations.

7.7.6 Increased Storm Water Flow

The panels, building roofs and pavements of the proposed Mini-grid will lead to increased volume and velocity of storm water or run-off flowing across the area covered by the solar panels during operation phase. This will lead to increased amounts of storm water entering the drainage systems.

7.7.6.1 Significance of the impact

The impact will be of minor significance.

7.7.6.2 Mitigation Measures

- Construct the drainage system in a way to follow natural drain of the water;
- Concrete only the required area and leave the rest of the land with vegetation like grass;
- Construct rain harvesting system on the control buildings/office and harness into storage tanks for use.

7.7.7 Noise, Vibration and EMF

Negligible noise and vibration will be produced during operation phase of the project and would be from the backup generator. Electric magnetic fields are only anticipated during operation period, but these are negligible.

7.7.7.1 Significance of Impacts

Impact significance of noise and vibration will be negligible if the generator will be serviced regularly.

The exposure to would be little EMFs is highly negligible because the EMFs produced by the electrical installation are low. Consequently, the study does not anticipate impacts of EMFs.

7.7.7.2 Mitigation Measures

The generator room should be made sound proof to ensure no noise of a nuisance level will be produced. The contractor should also monitor noise levels by taking tests and putting in appropriate measures.

7.7.8 Landscape and Visual Impacts

The solar panels will be spread over a horizontal form with maximum height of 2m above the ground level. In addition, the entire facility will be fenced with a stone wall with height of approximately above 2 meters, hence may not be visible to the passers or moving traffic.

The current use of land surrounding site is mixed commercial and residential. The permanent change of current landscape to area spread with solar panels will have potential visual impact for nearest habitations and passers.

7.7.8.1 Significance of Impacts

It is important to note that whether the visual impact is seen as positive or negative is highly subjective, and people's attitude towards and perception of the visual impacts associated with the any project including solar power project. The project and its surrounding area are new for such developmental project and will have visual impacts during initial period of Project and the same will disappear over a period.

Based on the above, significance of visual impact on landscape during operation phase of the project has been assessed as moderate.

7.7.8.2 Suggested mitigation measures

Following mitigation measures are proposed to reduce the visual impacts on the surroundings during operational phase:

- Signage related to the mini-grid must be discrete and confined to entrance gates.
- The footprint of the operations and maintenance facilities, as well as parking and vehicular circulation, should be clearly defined, and not be allowed to spill over into other areas of the site.
- Construction of fencing or compound wall around the project boundary.
- Landscape development around the solar farm site with the participation of the local community.

7.7.8.3 Residual impact significance

After implementation of mitigation measures, the significance of residual impacts will reduce to minor.

7.7.9 Collisions, Electrical hazards and Magnetic Fields (EMFs) from Transmission Infrastructure

Loose hanging electrical lines pose electrocution hazard to the local community; power surges in homes can damage electronics and may lead to fire out breaks compromising the local community safety. Further, several bird's species were identified during the impact assessment. The transmission lines and poles can potentially constitute an electrocution from collision. Some birds also utilize the transmission towers for nesting.

Electricity is a hazard and safety precautions must be adhered to and properly used. Within the household electric shocks are likely in case of poor handling of electricity such as using wet hands, poor wiring and overloading of sockets. Electrical hazard can also result from loose hanging electrical lines, power surges. Electric magnetic fields are only anticipated during operation period, but these are negligible. The exposure to would be little EMFs is highly negligible because the EMFs produced by the electrical installation are low. Consequently, the study does not anticipate impacts of EMFs

Embedded/ in-built Control

There are no embedded controls to prevent birds from roosting/nesting on transmission poles and colliding with transmission wires.

Additional Mitigation Measures

The following mitigation measures will further reduce the impact significance on avifaunal species:

- Design of transmission towers and transformers should be such to minimize the risks of electrocution of birds.
- The transmission poles should be raised with suspended insulators to reduce the electrocution of bird species; and
- Marking overhead cables using bird-flight deterrents and avoiding use in areas of high bird concentrations of species vulnerable to collision.

Residual Impact Significance

After implementation of mitigation measures, the significance of residual impacts will be **Minor**.

7.7.10 Dust emissions

During operation phase not much dust will be generated from the facility but wind and dust storms are potential impacts.

7.7.10.1 Significance of Impacts

This impact will be negligible because there will be no activities on site that will have the potential to generate dust.

7.7.10.2 Mitigation Measures

- Trees can be planted around the plant/facility provided they do not cast shadows to the solar panels to act as wind breakers and hence decrease dust pollution;
- Ensure planting of grass around and within the facility compound.

7.7.11 Vehicle exhaust emissions

Exhaust emissions are likely to be generated by the vehicles coming to the facility though on a low risk.

7.7.11.1 Impact significance

Due to the low magnitude of the impact and the low sensitivity, the significance will be minor.

7.7.11.2 Mitigation Measures

- Drivers of the vehicles must be sensitized so that they do not leave vehicles idling so that exhaust emissions are lowered;
- Company vehicles should be well maintained.

7.7.12 Workers Occupation Health and Safety

Working within the Mini-grid poses potential health hazards and accidents to workers. Therefore, caution must be taken to ensure that the Mini-grid does not pose a health and safety risks to workers. Because the maintenance activities will be conducted less frequently, the impact magnitude on occupational Safety and Health will be low. Considering that the accidents may result in injuries and death, the sensitivity is considered to be High. Therefore, the significance is Moderate.

Mitigation Measures

- Ensure only qualified staff are employed to work in the facility
- All workers operating the Mini-grid must be equipped with appropriate and adequate person protective equipment (PPE) such as; safety footwear, helmet among others.
- Operators must be skilled on firefighting management
- Annual environmental audits should be done
- WIBA cover for staff is mandatory

7.7.13 Impact on Community Safety and Health

The receptors for impacts on community health and safety include settlements in the close proximity of the project which will be exposed to health impacts from the project activities. The operation phase activities that involve maintenance of the mini-grid components may result in impacts on the health and safety of the community.

The major community health and safety risks include electrocution, structural failure of project infrastructure e.g., power line, fire safety and management of emergency situations.

7.7.13.1 Embedded/in-built control

Consultations with the proponent team and policy review indicated that the following embedded/in built control measures will be put in place during the construction phase;

- The mini-grid site will be properly fenced for safety and sign boards in local languages will be put up.

7.7.13.2 Significance of Impact

Impact significance is rated as moderate considering the high impact magnitude and low receptor sensitivity.

7.7.13.3 Additional Mitigation Measures

The following risk mitigation measures are suggested to minimize the risks/ hazards of operation activities;

- Implementing the existing grievance redress mechanism;
- The local community recommended that a technical operator should be stationed within or near the

site in order to handle emergencies in the event that they occur.

7.7.14 Gender Based Violence, SEA & SH

Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) may be committed against the communities by the staff during the operation and maintenance of the mini-grids. Incidences of Sexual Harassment (SH) may occur among the staff during operation and phase of the project. During the FGD with the women, they made it clear that they do experience GBV within their community, the most common form of GBV being Intimate partner GBV. This may exacerbate during project operation while the women are searching for jobs and those giving the jobs may ask for sexual favours.

7.7.14.1 Significance of Impact

Thus, the significance of this impact is considered to be Major but if the mitigation measures will be put in place, the magnitude of the impact will be moderate to low.

7.7.14.2 Mitigation measures

- Prepare an Awareness Raising Strategy, which describes how the staff and local communities will be sensitized to GBV risks, and the staff's responsibilities;
- Identify GBV Services Providers to which GBV survivors will be referred, and the services which will be available;
- Elaborate GBV Allegation Procedures i.e. How the project will provide information to employees and the community on how to report cases of GBV breaches to the GRM.
- An Accountability and Response Framework, to be finalized with input from the contractor, should include at minimum:
 - GBV Allegation Procedures to report GBV issues to service providers, and internally for case accountability procedures which should clearly lay out confidentiality requirements for dealing with cases; and,
 - A Response Framework which has:
 - Mechanisms to hold accountable alleged perpetrators associated to the project;
 - The GRM process for capturing disclosure of GBV;
 - A referral pathway to refer survivors to appropriate support services.

7.7.15 Risks related to poor or inadequate stakeholder engagement (Conflict)

During operation of the project there are grievances that may arise from community and other stakeholders related to poor or inadequate engagement of stakeholders and other need for information or challenges in using power by the community. Therefore, the contractor will design and implement a grievance redress mechanism to deal with grievances. The grievance redress mechanism committee should also include representatives from the community. With the implementation of the mitigation measures the impact significance is minor to negligible.

Mitigation measures

- Employ from the community to the extent possible
- Engage the community members and other stakeholders in a timely manner
- Work closely with the GRM committee members in solving the conflicts
- Solve all conflicts/grievances at the earliest time possible
- Ensure all grievances are logged and closed
- Monitoring the pattern of grievances to come up will long term measures

7.7.16 Exclusion of VMGs, Vulnerable Individuals and Households

A significant risk associated with this project is the potential for the exclusion of Vulnerable and Marginalized Groups (VMGs), vulnerable individuals and households including the elderly, PLWDs, widows, widowers, orphan-led households, minority clans/sub-clans from participating and or benefiting from the mini-grids

project. VMGs participation and inclusion could be disadvantaged based on social identity, which may be across dimensions of gender, age, location, occupation, race, ethnicity, disability, sexual orientation and religion. There is potential risk of lack of intentional actions by the mini-grids contractor(s) and implementing agencies for the inclusion of VMGs in the project activities and benefits. This potentially leads to the exclusion of VMGS from the benefits and opportunities derived from the proposed mini-grid facilities.

There is a high likelihood that the targeted beneficiaries of the new electricity connections to the mini-grids network will be dominated by the local elites. This may lead to the exclusion of those without the financial resources to connect to the mini-grid electricity distribution network. This could result in a situation where a majority persons or households with adequate financial resources in the project area will be able to take advantage of the provision to connect to the electricity grid. This will negate a key objective of the project of overcoming energy poverty.

7.7.16.1 Significance of Impact

Considering the high sensitivity of the VMGs identified in the project and high magnitude, the impact significance is considered to be major.

7.7.16.2 Mitigation measures

- Participation will be through meetings with the different groups of the vulnerable people identified primarily to ensure that;
 - The VMGs are aware of the project and its impacts
 - The VMGs are Aware of any restrictions and negative impacts
 - Provide support to VMG participation arrangements in the project
- Commit to open and transparent communication and engagement from the beginning and have a considered approach in place
- Ensure that all representatives of the contractor and Proponent staff carrying out the specific sub project investment including third party subcontractors and agents are well briefed on local customs, history and legal status, and understand the need for cultural sensitivity
- Regularly monitor performance in engagement
- Enlist the services of reputable advisers with good local knowledge
- Implement the existing grievance redress mechanism

7.7.17 Risk of Communicable Diseases

The operation and maintenance phase of the mini-grids will lead to increased migration of labour into the mini-grid sites. Local communities can be exposed to increased risk of communicable diseases such as HIV/AIDS, STIs and COVID-19 through risky behaviours involving job seekers and people employed on the project.

7.7.17.1 Significance of Impact

Based on the fact that the receptor sensitivity will be medium and the impact magnitude low, the impact significance will be Moderate pre-mitigation.

7.7.17.2 Mitigation measures

- The Contractor should develop and implement pre-employment screening measures for workers, which should include communicable diseases. Individuals found to be suffering from these diseases will need to be sensitized on prevention of transmission to others and management of the disease prior to mobilisation to site.
- The Contractor should develop and implement a Communicable Diseases Policy and an information document for all workers directly related to the Project. The document should address factual health issues as well as behaviour change issues around the transmission and infection of diseases.

- The Contractor will make condoms available to employees
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities.
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty.
- Sensitize all community segments and project workers on Covid 19 and precautionary measures that need to be observed;
- Restrict site access to only Authorised persons; and
- Continuously adhere to the MoH, WHO and World Bank guidelines on Covid-19 management.

7.8 Positive Impacts during Decommissioning Phase

The following positive impacts are associated with the proposed Solar Mini-Grids at Munguveni during the decommissioning phase:

1. Site Rehabilitation

Following the decommissioning of the proposed site, rehabilitation of the project site will be carried out in order to restore the site to its original status or to a better state than it was previously. This will include topsoil replacement and re-vegetation, which will result in the restoration of the area's visual quality.

2. Employment Opportunities

Several people will be involved in order for demolition to take place properly and on time. As a result, temporary job opportunities for demolition staff will be created during the demolition phase. The effect will be immediate, temporary, and minor.

7.9 Negative Impacts during Decommissioning Phase

The following negative impacts discussed below are associated with the proposed solar Mini-Grids during its decommissioning phase.

In the event of decommissioning of the project, it is likely that any potential impacts would be like those in the construction phase, as broadly similar activities would be required and therefore impacts on the physical environment associated with this phase.

In the event of decommissioning of the project, it is likely that any potential impacts would be like those in the construction phase, as broadly similar activities would be required and therefore impacts on the physical environment associated with this phase as follows:

7.9.1 Noise and Vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise from demolition works. The impact significance has been assessed minor due to the fact that the impact magnitude is low and the receptor sensitivity is medium.

Mitigation Measures

Significant impacts on the acoustic environment will be mitigated by the KPLC who will put in place several measures that will mitigate noise pollution. The following noise-suppression techniques will be employed to minimize the impact of temporary noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e., equipment designed with noise control elements).

7.9.2 Waste Generation

Demolition of the Mini-grid and related infrastructure will result in generation of solid waste. The waste will contain the materials used in construction including concrete, metal, wood, glass, paints, adhesives, sealants and fasteners, conductors, poles solar panels and batteries. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. The impact will be of major significance due to high magnitude and medium receptor sensitivity. The batteries and panels need to be disposed in a specific way, in accordance to the manufacturer's guidelines and relevant regulations.

Mitigation Measures

- Demolition contractor to adhere to the various manufacturer's guidelines and requirements regarding demolition and disposal
- Segregation of waste in order to separate hazardous waste from nonhazardous waste and other streams of waste
- Provision of facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements
- Adequate collection and storage of waste on site
- Safe transportation to the disposal sites / designated area
- Hazardous waste must be disposed by NEMA approved waste handler

7.9.3 Air Pollution

Some dust will be generated during demolition works. This will affect demolition staff as well as the neighbors. The impact will be of minor significance.

Mitigation Measures

High levels of dust concentration resulting from demolition or dismantling works will be minimized as follows:

- Watering all active demolition areas to kill dust.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard

7.9.4 Impact on Economy and Employment

The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, including their families. However, the impacts are likely to be limited due to relatively small number of permanent employees that includes guards, technical experts and maintenance engineers who will be affected. Other associated impacts would be improper disposal of construction waste and debris from deconstruction of storage area, etc. will lead to contamination of soil and discontentment with the immediate villages in the local surrounding communities.

Impact magnitude is small considering the decommissioning period to last for a short duration.

7.9.4.1 Significance of Impact

The overall impact significance is envisaged to be **Minor**.

7.9.4.2 Additional Mitigation Measures

The decommissioning phase will require removal of machinery, workers, and other temporary structures. The mitigation measures for decommissioning shall include the following:

- The proponent should ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the plant is decommissioned.
- The contractor shall inform the workers and local community about the duration of work.
- Reduction of worker will be done phase wise and corresponding to completion of each activity; and
- All waste generated from demobilization shall be collected and disposed of at the nearest designated disposal site.

7.9.4.3 Residual Impact Significance

Significance of residual impact is assessed to be negligible upon incorporation of the above mentioned mitigation measures.

7.9.5 Impact on Occupational Health and Safety

There will be potential impacts on workers' health and safety due to exposure to risks through demolition activities that lead to accidents causing injuries and death. The most probable risks cause of accidental death and injury are:

- Safety risks such as: tripping; falling due to working at heights; potential fire due to hot work, smoking, failure in electrical installations; electric shocks.
- Health risks: Injuries such as: lifting, lowering, pushing, pulling and carrying; temporary or hearing loss which usually comes from noise generated from machinery used for demolition; heat stress and working during high temperatures
- Occupational hazards due to dust and noise pollution from operating of heavy machinery and vehicular movement in the project sites;
- Risks of road accidents during the transportation of material and equipment to and from the project sites.

7.9.5.1 Embedded/in-built control

- All demolition activities will be carried out during daytime hours and vigilance should be maintained for any potential accidents;
- Personal Protective Equipment (PPEs) including safety shoes, helmet, goggles, ear muffs and face masks;

7.9.5.2 Significance of Impacts

The impact on occupational health and safety during the decommissioning phase is evaluated to be of moderate significance. All the construction activities will be confined at the project site hence high sensitivity and low magnitude.

7.9.5.3 Additional mitigation measures

- All workers (regular and contracted) should be provided with training on Health and Safety management system of the contractor during decommissioning stage and EHS policies and procedures during the operation stage;
- Obtain and check safety method statements from contractors;
- Monitor health and safety performance and have an operating audit system; and
- Permitting system should be implemented to ensure that lifting equipment are operated by trained and authorized persons only;
- Appropriate safety harnesses and lowering/raising tools should be used for working at heights;
- All equipment should be turned off and checked when not in use; and
- A safety or emergency management plan should be in place to account for natural disasters, accidents and any emergency situations.

7.9.6 Child labour

Decommissioning of the Munguvueni mini grid could lead to increased opportunities for the host communities to sell goods and services to the incoming workers. This can lead to child labour to produce and deliver these goods and services, which in turn can lead to increased cases of school truancy and dropout.

7.9.6.1 Significance of Impact

The impact is rated minor. This is based on low sensitivity of the receptor and medium magnitude of the impact.

7.9.6.2 Mitigation measures

- The contractor should develop a code of conduct to ensure children are protected from any negative impact from the construction works.
- The contractor should strictly hire people who are above 18yrs and ensure they provide their Identity Cards.
- The contractor shall ensure " No Jobs for children under 18 years" signage is at the project site.
- The contractor shall ensure every worker under their jurisdiction signs a document committing themselves to the protection of the area children.

7.9.7 Gender Based Violence, SEA & SH

Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) may be committed against the communities by the workers. Incidences of Sexual Harassment (SH) may occur among the staff during decommissioning phases of the project. This may be experienced while the women are searching for jobs and those giving the jobs may ask for sexual favours.

7.9.7.1 Significance of Impact

The significance of this impact is considered to be Minor considering low sensitivity of the receptor and low magnitude of the impact.

7.9.7.2 Mitigation Measures

- Prepare an Awareness Raising Strategy, which describes how workers and local communities will be sensitized to GBV risks, and the worker's responsibilities;
- Identify GBV Services Providers to which GBV survivors will be referred, and the services which will be available;
- Elaborate GBV Allegation Procedures i.e. How the project will provide information to employees and the community on how to report cases of GBV breaches to the GRM.
- An Accountability and Response Framework, to be finalized with input from the contractor, should include at minimum:
 - GBV Allegation Procedures to report GBV issues to service providers, and internally for case accountability procedures which should clearly lay out confidentiality requirements for dealing with cases; and,
 - A Response Framework which has:
 - Mechanisms to hold accountable alleged perpetrators associated to the project;
 - The GRM process for capturing disclosure of GBV;
 - A referral pathway to refer survivors to appropriate support services.

7.9.8 Exclusion of VMGs, Vulnerable Individuals and Households

A significant risk associated with this project is the potential for the exclusion of Vulnerable and Marginalized Groups (VMGs), vulnerable individuals and households including the elderly, PLWDs, widows, widowers, orphan-led households, minority clans/sub-clans from participating and or benefiting from the mini-grids project. VMGs participation and inclusion could be disadvantaged based on social identity, which may be across dimensions of gender, age, location, occupation, race, ethnicity, disability, sexual orientation and religion. There is potential risk of lack of intentional actions by the mini-grids contractor(s) and implementing agencies for the inclusion of VMGs in the project activities and benefits. This potentially leads to the exclusion of VMGS from the benefits and opportunities during the decommissioning phase.

7.9.8.1 Significance of Impact

Considering the high sensitivity of the VMGs identified in the project and high magnitude, the impact significance is considered to be major.

7.9.8.2 Mitigation Measures

- Participation will be through meetings with the different groups of the vulnerable people identified primarily to ensure that;
 - The VMGs are Aware of any restrictions and negative impacts
 - Provide support to VMG participation arrangements in the project
- Commit to open and transparent communication and engagement from the beginning and have a considered approach in place
- Ensure that all representatives of the contractor and Proponent staff carrying out the specific sub project investment including third party subcontractors and agents are well briefed on local customs, history and legal status, and understand the need for cultural sensitivity
- Monitor performance in engagement
- Enlist the services of reputable advisers with good local knowledge
- Implement the existing grievance redress mechanism

7.9.9 Risk of Communicable Diseases

The decommissioning of the mini-grid may lead to increased migration of labour into the mini-grid site. Local communities can be exposed to increased risk of communicable diseases such as HIV/AIDS, STIs and COVID-19 through risky behaviours involving job seekers and people employed on the decommissioning of the project.

7.9.9.1 Significance of Impact

Based on the fact that the receptor sensitivity will be medium and the impact magnitude low, the impact significance will be Moderate pre-mitigation.

7.9.9.2 Mitigation Measures

- The Contractor should develop and implement pre-employment screening measures for workers, which should include communicable diseases. Individuals found to be suffering from these diseases will need to be sensitized on prevention of transmission to others and management of the disease prior to mobilisation to site.
- The Contractor should develop and implement a Communicable Diseases Policy and an information document for all workers directly related to the Project. The document should address factual health issues as well as behaviour change issues around the transmission and infection of diseases.
- The Contractor will make condoms available to employees and communities neighbouring the site during decommissioning.
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities.
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty.
- Sensitize all community segments and project workers on Covid 19 and precautionary measures that need to be observed;
- Restrict site access to only Authorised persons; and

Continuously adhere to the MoH, WHO and World Bank guidelines on Covid-19 management

1.1.1 Impacts related to labour influx

During project decommissioning phase, technical skills that may not be all available in the project areas. This will require movement of construction workers into the project community. With an increase in population of the project area, the social set up may be affected resulting to different negative social impacts such as illicit behaviour and crime (including prostitution, theft and substance abuse).

1.1.1.1 Significance of Impact

The significance of this impact is considered to be minor because the receptor sensitivity will be medium and the impact magnitude is low. However, except for the technically skilled personnel, most of the labour is expected to be sourced locally.

1.1.1.2 Additional Mitigation measures

- In contract documents for the Contractor, MOE/KP should make explicit reference to the need to abide by Kenyan law, international best practice and the ratified ILO conventions and MOE's policies in relation to health and safety, labour and welfare standards;
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities;
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty;
- In selection of a Contractor, MOE/KP should refer to past performance in similar assignments as an indicator of future performance with respect to worker management, worker rights, health and safety as outlined in Kenyan law and international standards;
- Regular checks by MOE/KP should be undertaken to ensure the relevant labour laws and occupational health and safety plans are adhered to at all times;

7.10 Cumulative Impacts

7.10.1 Cumulative Impact Assessment

It was observed during the site reconnaissance survey that there are no other similar solar projects within the projects site. Therefore, it is assumed that there will be no cumulative impacts from the above-mentioned projects on the local soil, water, land, air, and ambient noise environment.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Introduction

Environmental and Social Management and Monitoring Plan (ESMMP) for development projects provides a logical framework within which identified negative environmental and socio-economic impacts can be mitigated and monitored. The ESMMP has been developed to be used as tool to manage the environmental and social impacts that the activities of the proposed project will cause. The contractor before construction will make reference to this ESMMP and develop specific implementation plans. In addition, the ESMMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done.

The key objectives of the ESMMP are:

- ❖ 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 practice in environmental, social health and safety during project construction and operation

The ESMMP outlined below addresses the identified potential negative impacts and mitigation measures of the proposed Mini-grid during pre-construction, construction, operational and decommissioning phases, based on the chapter of Environmental Impacts and Mitigation Measures of the potential negative impacts.

8.2 Monitoring

Monitoring denotes a systematic process of collecting, analyzing and using information to track the progress of implementation of the ESMMP including coming up with measures to address any emerging issues. Monitoring of the ESMMP will involve recording information to track performance and recommendations to keep implementation of ESMMP on track. Reporting is a key component of the monitoring exercise.

The proposed ESMMP will be subjected to monitoring. Monitoring will have two elements: routine monitoring against standards or performance criteria; and periodic review or evaluation. Monitoring will often focus on the effectiveness and impact of the ESMMP as a whole.

During construction phase, the Implementing agency (KP) shall monitor the contractor's activities in order to verify that the management measures/procedures/specifications are implemented as contained in the ESMMP. Compliance will mean that the contractor is fulfilling their contractual obligation.

During operation phase, KP will monitor facility's operations to ensure compliance with management measures in the ESMMP and operation procedures. As part of this monitoring, the proponent will undertake or statutory initial environmental audit as required by the ESIA/EA Regulations, 2003 and subsequent annual environmental audits.

8.3 Plan Monitoring

All of the management plans make provision for monitoring and evaluation. Special attention should be given to the monitoring arrangements relating to biophysical impacts, occupational health and safety, social risks, facility operational and emergency response.

During the construction phase of the project, the contractor's Environmental Health and Safety Officer (EHSO) shall report on the implementation of the ESMMP i.e., all environmental, safety and health impacts

as well as accidents and incidents to the implementing agency. The social specialist of the contractor will report on implementation of the social measures as spelt out in the ESMMP.

The reported impacts and incidents will be captured on a database to ascertain trends and track progress in the implementation of preventive and corrective actions, and benchmarking against other, similar operations.

During operation, the implementing agency – KP will monitor the health and safety of personnel and contractors, in compliance with legislative requirements. Emergency incidents should be reported to the relevant authorities. The reported impacts and incidents will be captured on a database to identify weakness in the emergency response plan and track progress in the implementation of preventative and corrective and benchmarking against other similar operations.

The Environmental and Social Management and Monitoring Plan (*ESMMP*) will provide the basis for monitoring of potential Environmental, social and health Impacts associated with the project. The ESMMP provides effective observation and documentation of monitorable parameters that will help in analyzing the effectiveness of the proposed mitigation measures with the advantages of improving operational efficiency, promoting competitive advantage, improving risk management, reducing liabilities and improving business performance. The ESMMP has been provide in **Error! Reference source not found.** below.

8.4 Environmental and Social Monitoring by Contractors

KP will require that contractors monitor, keep records and report on the following environmental, health and social issues of the proposed project.

1. *Safety*: hours worked, recordable incidents and corresponding root cause analysis (lost time incidents, medical treatment cases), first aid cases, high potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training, and so forth).
2. *Environmental incidents and near misses*: environmental incidents and high potential near misses and how they have been addressed, what is outstanding, and lessons learned.
3. *Major works*: those undertaken and completed, progress against project schedule, and key work fronts (work areas).
4. *E&S requirements*: noncompliance incidents with permits and national law (legal noncompliance), project commitments, or other E&S requirements.
5. *E&S inspections and audits*: to include date, inspector or auditor name, and records reviewed, major findings, and actions recommended and implemented.
6. *Workers*: number of workers, indication of origin (expatriate, local, nonlocal nationals), gender, age and skill level (unskilled, skilled, supervisory, professional, management).
7. *Training on E&S issues*: including dates, number of trainees, and topics.
8. *Footprint management*: details of any work outside boundaries or major off-site impacts caused by ongoing construction—to include date, location, impacts, and actions taken.
9. *External stakeholder engagement*: highlights, including number of formal and informal meetings, and information disclosure and dissemination—to include a breakdown of women and men consulted and themes coming from various stakeholder groups, including vulnerable groups (e.g., disabled, elderly, children, etc.).
10. *Details of any security risks*: details of risks the contractor may be exposed to while performing its work—the threats may come from third parties external to the project.
11. *Worker grievances*: details including occurrence date, grievance, and date submitted; actions taken and dates; resolution (if any) and date; and follow-up yet to be taken—grievances listed should include those received since the preceding report and those that were unresolved at the time of that report.
12. *External stakeholder e.g., community grievances*: grievance and date submitted, action(s) taken and date(s), resolution (if any) and date, and follow-up yet to be taken—grievances listed should include

those received since the preceding report and those that were unresolved at the time of that report. Grievance data should be age and gender-disaggregated.

13. Major changes to contractor's environmental and social practices.
14. *Deficiency and performance management*: actions taken in response to previous notices of deficiency or observations regarding E&S performance and/or plans for actions to be taken—these should continue to be reported until KP determines the issue is resolved satisfactorily.

Table 8-1: Environmental and Social Monitoring and Management Plan

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Local employment	-Prioritize hire of locals for all unskilled labour. -Implement a local recruitment plan that is fair and transparent (including recruitment processes that ensure inclusivity of both men and women, vulnerable individuals, minority clans, ethnic groups and VMGs. -Adhere to labour laws, and labour management practices (timely remuneration, equitable compensation for both genders for equal work etc.) -Create awareness to workers and the community on worker and project grievance redress mechanisms.	Construction Operations Decommissioning	Construction Contractor Operations & Maintenance Contractor KPLC	-Fair and transparent local recruitment plan in place. -Recruitment processes (job adverts, interviews, selection etc.). -Number of locals employed based on gender, vulnerability, ethnic group, clan etc. -Type of employment (skilled, semi-skilled and unskilled). -Grievances raised, those aggrieved, status of resolution.	Quarterly	Contractor's cost
Local Sourcing	-Source materials from local businesses/communities, and where necessary give opportunities to businesses owned or operated by vulnerable individuals.	Construction Decommissioning		-Number and types of businesses sourced from, businesses owned and operated by vulnerable individuals, types and quantities of materials etc.	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Land acquisition and compensation for land and assets on land	In line with the RPF provisions; -Prepare and implement an Abbreviated Resettlement Action Plan (A-RAP) to guide land acquisition for the mini-grid, wayleaves for power distribution. Further, the proponent will fast-track A-RAP preparation to ensure that land acquisition and contractor mobilization to the site is undertaken after the A-RAP is finalized, cleared, and disclosed. -The contractor will implement and adhere to agreements for temporal use of land and restoration of land after use. -Compensate affected communities in-kind (priority F) for the loss of land. -The construction activities will be restricted to within the allocated land and the immediate surroundings only. -After construction work, any land taken for a temporary basis for storage of material will be restored to their original form. -Consultations with the community on the low voltage lines.	Pre- Construction	Contractor- <i>(contractors' facilities, workers camps)</i> Proponent- <i>(project land for generation assets)</i>	-Land Acquisition and consultation report (consultation (minutes and lists of participants). -Type and amount of compensation paid to affected persons. - Priority community project implemented and handed over to affected communities. -Signed agreements with communities on the use and restoration of their land.	Quarterly	Value of compensation in kind project will be equivalent to the value of land acquired as per NLC

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Labor Influx and related impacts (SEA/SH, HIV/AIDs and other STIs)	-Tap into the local workforce to the extent possible to reduce labor influx. -Recruit local workforce to the extent possible especially for unskilled and semi-skilled jobs. -Consult with and involve local community in project planning and other phases of the project. -Raise awareness among local community and workers on the need to have a good /cordial working relation -Sensitize workers regarding engagement with local community. -Make provision to provide resources needed by the workers if the need for such resources may result to competition e.g., water. -Establish and operationalize an effective Grievance Redress Mechanism accessible to community members. -The contractor and the project/community grievance redress committee to work closely address complains raised on time.	Construction Decommissioning	Proponent, Contractor	-Records of employees/updated employee register. -Number of local community employees and external employees/ updated employee register.	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	-Include gender considerations in employment opportunities. -Provide appropriate compensation for work done. -Respect for community values/culture. -Prompt payment of workers as per the contractual agreements/terms.					
Child labor	-Employ workers who are 18 years and above, and with a valid national ID at the time of hire. -Implement and monitor the employment register regularly. Compliance with the national labor laws and labour management practices. -Put visible signage on site "No Jobs for children" -Do not allow children at the project site.	Construction Decommissioning	Contractor, Proponent	-Updated employment register indicating locals employed, their ages, national identification numbers etc. -Grievances raised, aggrieved persons and status on resolution etc.	Quarterly	20,000.00
GBV- SEA and SH	-Prepare an SEA/SH Prevention and Response Action Plan, to manage the SEA/SH risks. -The Action Plan to be proportionate to potential SEA/SH risks, and to include measures such as awareness creation for communities and workers; identification of referral services	Construction Operations Decommissioning	Construction Contractor Operations & Maintenance Contractor KPLC	-Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. -Code of conduct signed by all those with physical	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	for survivors and a GRM that ensures confidential reporting of GBV cases. -Implement a code of conduct signed by all those with physical presence on site.			presence on site. -GRM that ensures confidentiality of GBV cases in place. Documented referral services for survivors. -Grievances raised, aggrieved persons and status on resolution etc		
Forced Labor	-Adhere to the Employment Act which outlaws any form of forced labor. -Report any form of forced labor at the site. -Ensure that all workers have a national ID card or documentation to show they are adults (above 18 years).	Construction Decommissioning	Contractor Proponent	-Number of reported cases of forced labor.	Quarterly	20,000.00
Risks related to Inadequate stakeholder engagement	-Prepare a stakeholder engagement/consultation plan (SEP) that is proportionate to the subproject and the identified stakeholders. -Timely and prior disclosure of project all project information, including project instruments, the full rights and entitlements of project affected persons, sub-	Construction Operations Decommissioning	Construction Contractor Operations & Maintenance Contractor KPLC	-Availability of and implementation of the Stakeholder Engagement Plan. -# of stakeholder consultations held -Record of stakeholder consultations held (minutes of meetings and list of participants).	Quarterly	30,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	project positive and negative impacts and opportunities, proposed subproject budget. -In line with the SEP, undertake adequate consultations prior to construction and throughout the project cycle with all segments of the community and other relevant stakeholders. -Prepare and implement a grievance redress mechanism to deal with grievances. -The grievance redress committee to include representatives from the community. -Sensitize stakeholders on SEP and GRM.			-Information disclosed, to whom it was disclosed (men women, PWD, youth, vulnerable individuals and households etc., methods and languages used in the disclosure (culturally appropriate and accessible), grievances raised and status on resolution etc. -Concerns raised and actions raised.		
Exclusion of VMGs and vulnerable individuals and households	In line with the provisions of the ESMF, VMGF and Social Assessment ensure the following. • Early identification and inclusion of VMGs and disadvantaged groups. • Meaningful consultation to effectively participate in the project.	Pre-Construction Construction Operations Decommissioning	Construction Contractor Operations & Maintenance Contractor KPLC	Minutes of consultative meetings with all community segments including VMGs and vulnerable individuals and households, grievances raised and status on	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	- Timely and prior disclosure of relevant project information to VMGs and disadvantaged groups. - Adequate and ongoing consultations with VMGs and disadvantaged groups in line with the SEP. - All concerns or grievances raised are fully resolved in a timely manner. - Access to culturally appropriate project benefits and opportunities.			resolution etc.		
Inaccessibility of project benefits to VMGs and other vulnerable individuals due to affordability challenges	-Consult VMGs and Vulnerable individuals and households on charges for sub project services, and put in place specific interventions to ensure the vulnerable equally access project benefits.	Operations	Operations Contractor KPLC	-Interventions to enable those vulnerable access project benefits. -Number of complaints raised by VMGs/vulnerable individuals regarding access to project services. -GRM that is culturally appropriate and accessible. Grievances raised	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
				and status on resolution etc		
Inadequate grievances management	-Constitute a Local Grievances Committee in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. -Implement a workers grievances mechanism. -Awareness on the culturally appropriate and accessible GRM to all community segments including VMGs, vulnerable individuals and households and CSOs -All reported grievances are logged, dated, processed, resolved and closed out in a timely manner. -Proportionate representation of VMGs and vulnerable individuals in the local grievances committee. -GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.	Construction Operations Decommissioning	Construction Contractor Operations & Maintenance Contractor KPLC	-Local Grievances Committee in place, composition of committee, awareness of community and workers on project and worker GRMs, updated GRM logs, types of grievances -Availability of grievance redress process -Number of grievances reported -Number of grievances resolved in a timely manner -Number of grievances escalated to national courts and the World Bank Grievances Redress Service and Inspection Panel.	Quarterly	No additional cost
Environmental Impacts						

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Vegetation clearance	1. Clear only the necessary areas 2. Ensure proper demarcation and delineation of the project area to be affected by construction works. 3. Specify locations for vehicles and equipment, and areas of the site which should be kept free of traffic, equipment, and storage. 4. Designate access routes and parking areas 5. Re-vegetation including planting of trees around the plant/facility	Construction	Contractor	-Number of trees cleared -Planted trees	Once off	50,000.00
Soil erosion	1. Avoid groundbreaking during the seasons of high rainfall to avoid erosion. 2. Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. 3. Construction related impacts like erosion and cut slope destabilizing should be addressed through landscaping and grassing, carting away and proper	Construction	Contractor	Assess size of rills or Gulleys forming from accelerated run off from compacted areas	Quarterly	Part of contractor's fee

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	disposal of construction materials 4. Use silt traps where necessary 5. Cover soil stock piles 6. Landscaping with grass on areas without electrical installation (lower areas) 7. Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled.					
Contamination of soil from fossil fuels	1. Ensure waste water generated is discharged or drained into approved drainage facilities 2. Construction vehicles must be maintained in good state and proper servicing to ensure no oils are likely to leak 3. Care must be exercised not to spill any fossil fuels 4. Any contaminated soil shall be scooped and disposed-off appropriately. 5. No servicing vehicles on site	Construction	Contractor	Records of any leakages from construction equipment/ vehicles.	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Dust emissions	1. The construction area should be fenced off to reduce dust to the public 2. Suppress dust during dry periods by use of water sprays; 3. Stockpiles of excavated soil should be enclosed/covered/watered during dry or windy conditions to reduce dust emissions. 4. Burning of woody debris & construction waste to be prohibited 5. Use of personnel protective equipment (PPE) -masks should be provided to all personnel in areas prone to dust emissions 6. Restrict speed on loose surface roads during dry or dusty conditions 7. Keep stockpiles and exposed soils compacted and re-vegetate as soon as possible. 8. Construction trucks moving materials to site, delivering sand and cement to the site should be covered to prevent	Construction	Contractor	-Visual Observation of dust -Provision of PPEs especially masks	Daily	100,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	material dust emissions into the surrounding areas 9. Plant short trees to break speed of wind					
Vehicle exhaust and emissions from Generator	1. Drivers of construction vehicles must be sensitized so that they do not leave vehicles idling so that exhaust emissions are lowered. 2. Maintain all machinery and equipment in good working order to ensure minimum emissions of carbon monoxide, NO_x, SO_x and suspended particulate matter 3. Maintain equipment in good running condition – no vehicles to be used that generate excessive black smoke 4. Use of diesel which is Sulphur- free to run the power producing generators to be encouraged 5. The stack chimney of the generators will be increased from its normal height of 3 meters to 6 meters	Construction	Contractor	-Engine maintenance records - inspection of stacks	Quarterly	100,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Solid waste generation	1. Ensure spoil from excavations is arranged according to the various soil layers. This soil can then be returned during landscaping and then rehabilitation, in the correct order which they were removed that is top soil last; 2. Segregate waste 3. Provide litter collection facilities such as bins 4. Contractor to put in place and comply with a site waste management plan 5. The contractor should comply with the requirement of OSHA ACT 2007 and Building rules on storage of construction materials 6. Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time 7. Recovery of materials remains and return to stores 8. Re-use of materials where possible 9. Proper budgeting to avoid waste generation 10. Proper disposal of waste in line with solid waste regulation	Construction	Contractor	Presence of well-maintained receptacles and centralized collection points	Quarterly	100,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	6. Construction wastes to be managed in accordance with construction standards in Kenya					
Impacts on Water Resources and Water Quality	1. Clear the necessary areas only. 2. Appropriate remedial measures shall be implemented by the contractor in the event of erosion. 3. Infrastructure shall be designed to ensure that contaminated run-off does not reach water source i.e., earth dam. 4. Contractor to develop an oil-spill containment plan as part of the emergency response plan. In the event of an oil spill the procedures contained in the emergency response plan of the contractor will come into effect. 5. No vehicle maintenance and service shall be done at project site 7. Ensure that potential sources of petro-chemical pollution are handled in such a way to	Construction	Contractor	-Oil spill containment plan. -Provision of fuel/oil drip and spill trays	Quarterly	150,000

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	reduce chances of spills and leaks.					

Noise & vibration	1. Construction activities to avoid any unchanneled flow of water at the site 2. Storage areas that contain hazardous substances should be bunded with an approved impermeable liner and provision for a pit to be made in case of oil spill. 3. The excavation and use of rubbish pits during construction should be strictly prohibited. 4. A waste disposal area should be designated within the active construction area and this should be equipped with suitable containers i.e., skips or bins of sufficient capacity and designed to contain and prevent refuse from being blown by wind, 11. Areas contaminated by spilled concrete and/or fuels and oils leaking from vehicles and machinery should be cleaned immediately	Construction	Contractor	<u>Noise levels</u> -Records of noise measurements done by contractor within the project area and at distances of 30m from the Solar mini-grid	Quarterly	150,000.00
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Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Impacts from Hazardous materials -	1. Maintenance of construction vehicles will not be done on site 2. All hazardous products and waste should be labeled and handled properly to avoid contact with the ground 3. Dispose hazardous waste through a NEMA approved waste handler	Construction	Contractor	Presence of well-maintained receptacles and centralized collection points	Quarterly	100,000.00
Accidental Oil Spills or Leaks	1. In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately. 2. Refueling and maintenance of vehicles will not take place at the construction site. 3. Create awareness for the employees on site on procedures of dealing with spills and leaks 4. Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks. 5. In case of spillage the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials	Construction	Contractor	Records of all accidental spills and number of liters	Quarterly	150,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	and/or other materials approved by materials. 6. All chemicals should be stored within the bunded areas and clearly labeled detailing the nature and quantity of chemicals within individual containers.					
Fire Hazards	1. Create awareness to the construction workers on potential fire hazards 2. Provision of firefighting equipment on site during construction. 3. No smoking shall be done on construction site 4. 'No smoking' signs shall be posted at the construction site 5. A fire risk assessment and evacuation plan should be prepared and must be posted in various points of the construction site including procedures to take when a fire is reported. 6. Designate an assembly point	Construction	Contractor	-Records of any Fire incidences -Fire equipment and evacuation plan	Quarterly	100,000.00
Impacts of construction material	1. Source all building materials such as stone, sand, ballast	Construction	Contractor	Sources of raw materials (from local community)	Quarterly	Part of contractor's cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
sourcing (e.g., quarrying)	- and hard core from NEMA approved sites. 2. Ensure accurate budgeting and estimation of actual construction materials to avoid wastage. 3. Reuse of construction materials where possible.					
Increased water demand	1. Prudent use of available water 2. Consultations with the project local committee on use of water in the community to avoid conflicts with the community 3. Source and utilize a sustainable and reliable water supply for both construction and operation phase.	Construction	Contractor	Water usage records	Quarterly	Part of contractor's cost
Energy Consumption	1. Ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. 2. Proper planning of transportation of materials will ensure that fossil fuels	Construction	Contractor	Energy consumption records	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	(diesel, petrol) are not consumed in excessive amounts. 3. Complementary to these measures, they monitor energy use during construction and set targets for reduction of energy use.					
Occupational Health and safety Impacts	1. Use skilled personnel for activities which demand skills/technical tasks 2. Awareness creation/Tool box talks on safety to workers while at construction site 3. Workers coming to the site should be knowledgeable on safety precautions to take 4. Appropriate PPE (helmet, safety harness, boots, masks, climbing irons) 5. Proper general house keeping 6. Close supervision of workers 7. Risk assessment by contractor of the construction activities and implement mitigation measures appropriately 8. Adherence to occupational Safety and Health Act 2007	Construction	Contractor	Records of any near misses, incident, and accidents. Records of corrective actions implemented if there was an accident.	Quarterly	1,000,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	9. Availability of equipped first aid box on site 10. Provide safe drinking water for workers 11. Engagement of trained first aider on site 12. Ensure the WIBA cover is taken for the staff 13. Establish safety committees					
Community safety –access	1. Proper barricading 2. Hazard communication. 3. Controlled access to the site by designated personnel 4. Maintain records of any person who comes to site	Construction	Contractor	Presence of a controlled access and records of every person accessing the site	Daily	20,000.00
Public Health Impacts	1. Sensitize workers and the community on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff training, awareness campaigns and community <i>Barazas</i> . 2. Awareness creation and consultations with local communities prior and during construction on the dangers of these diseases	Construction	Contractor	Number of awareness creation sessions conducted. -Availability of and distribution of condoms	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	3. Informing workers on local cultural values and health matters. 4. Provision of condoms to workers 5. Allowing migrant workers time to be with their families 6. The contractor is impressed upon not to set a construction camp on site. 7. The contractor will provide public education/information about HIV/AIDS transmission and prevention measures. 8. Ensure equal treatment of workers 9. Provide all appropriate COVID-19 preventive measures including campaign to maintain individual measures at the workplace.					
Sanitary waste	1. Construct/ install pit latrines for both genders clearly labelled	Construction	Contractor	Presence of separate and clean washrooms for both the gents and ladies	Quarterly	300,000.00
Solid Waste Generation	1. Provide waste handling facilities such as labeled waste bins 2. Emphasis on prudent waste generation and give priority to reduction at source	Operations	Operations & Maintenance Contractor KPLC	Presence of well-maintained receptacles and centralized collection points	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	3. Solid waste management awareness to operators 4. Operator to contract a NEMA licensed waste handler to collect and dispose solid waste					
Liquid Waste/Oils Generation	1. Proper storage of the oil is required to ensure no leakages 2. Frequent inspection and maintenance of the generator to minimize leakages. 3. No vehicles should be serviced or maintained at the Mini-grid area. 4. The waste oil or used oil must be disposed-off appropriately. 5. Proper training for the handling and use of fuels for the operators of the Mini-grid. 6. In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately.	Operations	Operations & Maintenance Contractor KPLC	-Engine maintenance records -Oil spill containment plan	Quarterly	200,000.00
Increased oil Consumption	1. Efficient energy consumption 2. Install an energy-efficient lighting system	Operations	Operations & Maintenance Contractor KPLC	Energy consumption records	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Increased storm water flow	1. Construct the drainage system in a way to follow natural drain of the water 2. Concrete only the required area and leave the rest of the land with vegetation like grass 3. Construct rain water harvesting system on the control buildings/office and harness into storage tanks for use	Operations	Operations & Maintenance Contractor KPLC	Provision of a drainage system and a rain water harvesting system	Quarterly inspections	200,000.00
Fire Outbreaks	1. The power plant must contain firefighting equipment (Portable fire extinguishers) of recommended standards and in key strategic points 2. Detection/alarm systems that can detect fire should be and installed 3. A fire evacuation plan should be prepared and posted at strategic points and should include procedures to take when a fire is reported.	Operations	Operations & Maintenance Contractor KPLC	-Provision of serviced fire equipment, evacuation plan and safety signages -Records of fire safety training	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	4. Workers especially operators of the plant must be trained on fire management 5. 'No smoking' signs shall be posted within the Mini-grid area 6. A fire Assembly point should be identified and marked					
Visual Impacts	1. Fence round the solar Mini-grid to keep off/screen the solar panels.	Operations	Operations & Maintenance Contractor KPLC	Presence of a perimeter fence	Quarterly inspections	No additional cost
Water demand	1. Ensure prudent use of water. 2. Install water-conserving automatic taps. 3. Any water leaks through damaged pipes and faulty taps should be fixed promptly.	Operations	Operations & Maintenance Contractor KPLC	Water usage records	Quarterly	20,000.00
Sanitary waste	1. Provide sanitary waste facilities for both genders clearly marked 2. Disposal of waste through septic tanks	Operations	Operations & Maintenance Contractor KPLC	Presence of separate and clean washrooms for both the gents and ladies	Quarterly	No additional cost
Flooding	1. Ensure drainage channels are free of any obstruction at all times i.e., not blocked 2. Construct more channels and or expand existing ones	Operations	Operations & Maintenance Contractor KPLC	-Provision of drainage system -Raised foundations for the structures	Quarterly	100,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	3. Raise foundations of the solar panels and ensure a proper and from concrete base 4. Create flooding diversions and or spill ways to divert water from getting into the solar power facility					
Occupation health and Safety	1. Ensure only qualified staff are employed to work in the facility 2. All workers operating the Mini-grid must be equipped with appropriate and adequate person protective equipment (PPE) such as; safety footwear, helmet among others. 3. Operators must be skilled on firefighting management 4. Annual environmental audits should be done 5. WIBA cover for staff is mandatory	Operations	Operations & Maintenance Contractor KPLC	-Provision of PPEs and WIBA cover -Environmental audit reports	Quarterly	100,000.00
Hazardous waste-damaged panels	1. Segregation from other waste streams 2. Proper disposal through a NEMA approved/licensed handler	Operations	Operations & Maintenance Contractor KPLC	Presence of well-maintained receptacles and centralized collection	Quarterly	200,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Noise and Vibration	1. Generator room should be sound proof to ensure no noise of a nuisance level will be produced. 2. Monitor noise levels	Operations	Operations & Maintenance Contractor KPLC	<u>Noise levels</u> -Records of noise measurements done by contractor within the project area and at distances of 30m from the Solar mini-grid	Quarterly	Part of contractor's cost
Shocks and electrocutions	1. Inspect the wiring of the houses before connecting power 2. Safety awareness campaigns to the community before connection of power on safety precautions such as: ○ Require community to engage a certified technician to do wiring in the premises ○ Use of quality materials while wiring ○ Refraining from individual illegal extensions of power lines to other houses ○ Observing safety measures while using electricity such as not touching sockets and switches with wet hands or wiping with wet cloths ○ Keeping off all electricity	Operations	Operations & Maintenance Contractor KPLC	-Records of awareness sessions conducted -Incidences report	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	infrastructure e.g., not tying livestock on electric poles, no cutting earth wires that run along some electric poles, not interfering with sockets or switches ○ Reporting any electric wire/conductors if found fallen on the ground ○ Report any incident regarding electricity at the local office –staff in charge of operating the Mini-grid					
Community Safety- Access to site by general public	1. Fencing off the facility to keep of community members, children and livestock from entering into the facility 2. Controlled access to the site only with prior approval 3. Maintain records of any person who comes to site	Operations	Operations & Maintenance Contractor KPLC	Presence of a controlled access and records of every person accessing the site	Daily	Part of contractor's cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Risks related to poor or inadequate stakeholder engagement (Conflict)	1. Employ from the community to the extent possible 2. Engage the community members and other stakeholders in a timely manner 3. Work closely with the GRM committee members in solving the conflicts 4. Solve all conflicts/grievances at the earliest time possible 5. Ensure all grievances are logged and closed 6. Monitoring the pattern of grievances to come up will long term measures	Operations	Operations & Maintenance Contractor KPLC	Grievance records	Quarterly	20,000.00
Gender Based Violence –SEA and SH	To manage GBV risks, the contractor will prepare a SEA/SH Prevention and Response Action Plan that will include a GRM that ensures confidentiality. The plan will include the necessary measures for prevention and response and must ensure survivor-based approach	Operations	Operations & Maintenance Contractor KPLC	-SEA/SH Prevention and Response Action Plan -Grievance records	Quarterly	20,000.00
Public Health Impacts – HIV/AIDS	1. Sensitize workers and the community on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff awareness and awareness campaigns for the community	Operations	Operations & Maintenance Contractor KPLC	Number of awareness creation sessions conducted. -Availability of and distribution of condoms		20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	2. Provision of condoms to workers 3. Allowing migrant workers time to be with their families					
Public health Impacts -Covid 19 disease	1. Social distance must be observed 2. Provision of hand wash facilities before access 3. Temperature check and monitoring of the temperature of workers and any other person coming to site 4. Enforce wearing of masks 5. Make provision for testing and treating especially of workers 6. Provision of contact numbers for the nearest health facility for testing and treatment 7. Adhering to any other measures from the ministry of health which may be issued from time to time	Operations	Operations & Maintenance Contractor KPLC	Availability of hand washing facilities Utilization of hand washing facilities Number of Covid-19 cases reported	Quarterly	30,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Dust Emission	1. Trees can be planted around the plant/facility provided they do not cast shadows to the solar panels to act as wind breakers and hence decrease dust pollution 2. Ensure planting of grass around and within the facility compound	Operations	Operations & Maintenance Contractor KPLC	Visual inspection	Quarterly	50,000.00
Vehicle Exhaust Emissions	1. Drivers of the vehicles must be sensitized so that they do not leave vehicles idling so that exhaust emissions are lowered. 2. Company vehicles should be well maintained	Operations	Operations & Maintenance Contractor KPLC	Engine maintenance records	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Noise and Vibration	1. Install portable barriers to shield compressors and other small stationary equipment where necessary. 2. Use quiet equipment (i.e., equipment designed with noise control elements). 3. Co-ordinate with relevant agencies in case the noise produced will require a license. 4. Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible. 5. Demolish mainly during the day when most of the neighbors are out working.	Decommissioning	Contractor	Noise levels-Records of noise measurements done by contractor within the project area and at distances of 30m from the Solar mini-grid	Once off	20,000.00
Solid Waste Generation	1. Demolition contractor to adhere to the various manufacturer's guidelines and requirements regarding demolition and disposal 2. Segregation of waste in order to separate hazardous waste from nonhazardous waste and other streams of waste	Decommissioning	Contractor	Presence of well-maintained receptacles and centralized collection points	Daily	700,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	3. Provision of facilities for proper handling and storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements 4. Adequate collection and storage of waste on site 5. Safe transportation to the disposal sites / designated area 6. Hazardous waste must be disposed by NEMA approved waste handler					
Dust Emissions	1. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard	Decommissioning	Contractor	Visual inspection	Daily	20,000.00
Public Health-HIV/AIDS	The project will sensitize workers and the surrounding communities on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff training and awareness campaigns/ to the community.	Decommissioning	Contractor	Records of awareness creation sessions conducted. -Availability of and distribution of condoms	Once off	20,000.00
	Total					4,380,000.00

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
Impacts on Land use changes - Permanent and temporary changes in land use.	- Construction activities should be restricted to designated project area. - The land use in and around permanent project facilities should not be disturbed. - On completion of construction activities, land used for temporary facilities such as store yard should be restored to the extent possible. - The existing earth roads at Munguvueni will be used for access to the project site.	Preconstruction	Contractor	Daily inspection	Construction activities restricted to designated project area.	No additional costs
Impacts on Topography - Change in Local topography	- Appropriate number of cross drainage channels should be provided during construction to maintain flow in existing natural channels. - Disruption/alteration of micro-watershed drainage pattern should be minimized to the extent possible. - The contractor to ensure no noticeable changes in topography done.	Preconstruction	Contractor	Weekly inspection	Monitoring Topography	No additional cost

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
Impacts on Soil environment - Soil contamination, effect on soil composition and soil erosion	- Vehicles will utilize the existing roads to access the site; - No unauthorized dumping of used oil and other hazardous waste should be undertaken at site; - All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels; - Solid waste should be Segregated in color coded waste receptacles. - In case of accidental/unintended spillage on small area, the contaminated soil should be immediately collected and stored as hazardous waste; - Compacting of loose soil in excavated areas. - Enclose the construction site and protect the soil to prevent the waste soils and other debris from being washed away by surface runoff and wind. - All dug up soil that is not needed on-site to be	- Preconstruction - Construction - Operation - Decommissioning	Contractor, proponent and Licensed NEMA Waste Collector.	Daily site inspections	Provisions for waste separation; site clear of contamination	Part of contractor's fee

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	removed promptly and disposed of to appropriate areas. • Re-use the dug-up soil in backfilling and landscaping. • Any soil potentially contaminated by chemicals, oils, fuels to be collected and disposed of by a NEMA authorized waste handler. • Maintain all the waste tracking documents on site (waste transportation, waste treatment and disposal). • Re-use construction waste to the maximum extent possible; • Good management of the runoff/storm water to reduce its impact on loose soil; • Control construction activities especially during rainy / wet conditions. • Periodically sample soil for analysis and use the results to monitor the contamination in comparison with the initial monitoring results.					

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
Impacts on Air Quality - Point source emissions	• Prevent Idling of vehicles and equipment's; • The speed of vehicles to the site should be limited to 10-15km/h; • The site should be sprinkled with water regularly to reduce amount of dust generated by the loading trucks; • Carry out regular maintenance to the construction machinery and equipment. This will minimize generation of hazardous gases and other suspended particulate matter. • Properly plan transportation of waste materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road; • Diesel Generator should be enclosed at an adequate stack height. • Visual inspection of dust pollution from roads and the demolition site and	• Construction • Operation • Decommissioning	Contractor, KPLC	Daily site inspection	Inspection records	100,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	appropriate intervention if dust levels are high. • Maintenance and servicing of machines and engines off-site. • Grievance procedure for dust complaints. • The use of appropriate Personal Protective Equipment (PPE) such as dust masks, in particular, for the site workers. • All demolition wastes will be transported in designated trucks which will be covered.					
Impacts on Ambient Noise Levels - Increase in Noise Level	• Only well-maintained equipment should be operated on-site; • If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible; • Machinery and construction equipment that may be in	- Pre- construction - Construction - Operation - Decommissioning	Contractor, KPLC.	Daily inspections of the vehicles and machinery	Grievance records	50,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	intermittent use should be shut down or throttled down during non-work periods; and - Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged. - Construction machineries should be maintained regularly to reduce noise resulting from friction; - Normal working hours of the contractor to be defined (preferable 8 am to 5pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise; - Sensitize construction truck drivers to switch off vehicle engines while offloading materials.					
Visual Intrusions and changes in Landscape	The extent of the site office and storage area should be limited in area to only that which is essential;	Construction	Contractor KPLC. and	Weekly site inspection	Inspection report	No additional cost

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	- Minimize presence of ancillary structures on the site and minimize roads disturbance; and - Upon completion of construction work, areas utilized for labor camp, storage area to be restored to original form.					
Impacts on Water Environment - Depletion of Water Resources - Water Contamination	- Ensure proper cover and stacking of loose construction material to prevent surface runoff and contamination of receiving water point; - The workforce will be given training towards proactive use of designated areas/bins for waste disposal and encouraged to use toilets. Open defecation and random disposal of sewage shall be strictly restricted; - Construction workers to be sensitized about water conservation and encouraged use of water optimally; - Regular inspection for identification of water leakages and preventing	- Pre- construction - Construction - Operation - Decommissioning	Contractor KPLC. and	Daily site inspection.	Inspection reports	20,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	wastage of water from water supply tankers. - Recycling/reusing water to the extent possible. - The contractor should provide portable/mobile toilets for use on site					
Waste generation and management	- The Contractor shall develop a Solid Waste Management Plan in accordance with the guidelines. - All Project staff will be trained on this plan and attendance will be recorded. - Preparation and implementation of a Waste Management Plan (WMP) will be done. - Fuel shall be stored on site in temporary above ground storage tanks. - Adhere to Kenyan laws and regulations applicable to waste management and the MSDS. - Proper waste segregation and color coding of the waste receptacles.	- Construction - Operation - Decommissioning	KPLC, Contractor	Weekly Records of Audits and Visual Inspection Well-disposed hazardous materials	Inspection reports	50000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• Provision of temporary ablution facilities and ensure treatment and/or removal of sewage wastes off site. • Hazardous wastes such as damaged solar panels and batteries that contain heavy metals shall be collected and stored prior to disposal offshore at a licensed facility as per the requirements of the solid waste management plan. This will be done by a Licensed NEMA Waste Handler. • Any Solar Panel or batteries removed from the array for disposal will first be collected and stored in the covered 10ft container before being disposed of. • Hazardous waste shall be shipped offshore to a facility licensed by NEMA to handle hazardous waste. • Maintain all waste tracking documents (Transportation, treatment and disposal)					

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• Solid Waste Management Code of Practice will be integrated into SOP • Any solar panels or batteries removed from the array for disposal will first be collected and stored in the covered 10ft container provided by the Contractor. • For final disposal, the Contractor will ensure hazardous items are shipped offshore to a facility licensed to handle hazardous waste. This waste can also be managed locally by NEMA licensed waste battery handlers					
Impacts on Occupational Health and Safety - Injury, near-misses and fatalities for construction staff.	• All workers (regular and contracted) should be provided with training on Health and Safety management system of the contractor during construction stage and EHS policies and procedures during the operation stage; • Obtain and check safety method statements from contractors;	Operation	Contractor, KPLC and site caretakers.	Daily inspection of incident reporting forms.	Incident reporting forms	200,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• Monitor health and safety performance and have an operating audit system; and • Permitting system should be implemented to ensure that cranes and lifting equipment is operated by trained and authorized persons only; • Appropriate safety harnesses and lowering/raising tools should be used for working at heights; • All equipment should be turned off and checked when not in use; and • A safety or emergency management plan should be in place to account for natural disasters, accidents and any emergency situations.					
Impacts on Community Health and Safety - General Nuisance to the surrounding community and Accidents/Injury	• As part of the stakeholder engagement and information disclosure process, providing an understanding to the community concerning the activities proposed to be	• Pre- construction • Construction • Operation • Decommissioning	KPLC and the contractor	Incident Records, Local community grievance redress system.	Grievance records	20,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	undertaken and the precautions being adopted for safety; - Developing an onsite ESMS and EHS Policy by the developer; - Ensuring that the sub-contractor agreements that the developer enters into require all contractors to possess an EHS plan with provisions for monitoring of the EHS performance of contractors and their workers; - The excavated areas will be properly fenced for safety and sign boards in local languages will be put up; - No hazardous waste or any waste be stored within the site for long periods of time and be in contact with the soil in order to prevent against ground water contamination - The truck drivers carrying construction machinery and materials will be instructed to drive within speed limits with careful consideration for village			Number of monthly complains from the locals		

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	traffic; • Movement of heavy equipment and construction materials will be regulated during peak hours (0900hrs to 0500hrs).					
Fire hazards	• The power plant must contain firefighting equipment (Portable fire extinguishers) of recommended standards and in key strategic points • Detection/alarm systems that can detect fire should be considered and installed • A fire risk assessment and evacuation plan should be prepared and posted at strategic points and should include procedures to take when a fire is reported. • Workers especially operators of the plant must be trained on fire fighting and management • 'No smoking' signs shall be posted within the Mini-grid area	• Construction	• Contractor, KPLC	Quarterly	• Records of any Fire incidences • Fire equipment and evacuation plan	100,000.00

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	A fire Assembly point should be identified and marked					

8.5 Approach to Environmental Impact Management

The proposed ESMMP will be the responsibility of the proponent/KP and the contractor as outlined. This section presents the range of approaches that will be used to manage potential impacts of the proposed project.

8.5.1 Management Plan during Construction Phase

The contractor will prepare targeted management plans to deal with specific environmental and social aspects guided by the ESMMP and any other emerging issues on the ground. The contractor shall prepare these plans and have them approved by both the proponent and the Bank before they mobilize to the site:

- Construction management plan
- Rehabilitation and site closure plan
- Local recruitment plan
- Workplace health and safety plan
- Community safety plan
- Emergency management and response plan
- SEA/SH Prevention and Response plan
- Stakeholder Engagement management plan
- Grievance Redress mechanism
- Labor influx management plan

8.5.2 Construction Management Plan

The construction management plan for the proposed project shall include the following:

a) Management of Fuels and other Hazardous Materials

- The Contractor shall comply with all applicable laws, regulations, permit and approval conditions and requirements relevant to the storage, use, and proper disposal of hazardous materials.

b) Management of the Construction Site

- The contractor shall prevent littering and the random discard of any solid waste on or around the construction site
- The contractor shall manage other solid and liquid waste

c) Fire Prevention and Management

- The Contractor shall take all necessary precautions to prevent fires caused either deliberately or accidentally during construction process.
- The Contractor shall prepare a fire prevention and fire emergency plan as a part of the plans to be submitted to KP.

d) Management of Air Quality

- The Contractor shall institute appropriate measures to minimize or avoid air quality impacts. This can be achieved through formulation of air quality management plan.

e) Neighboring Landowner and Occupier Relations

- The Contractor shall respect the property and rights of neighboring landowners and occupiers at all times and shall treat all persons with deliberate courtesy.
- The contractor shall respect any special agreements between the KP and the neighbors e.g., the wayleaves agreements signed between Kenya power and landowners will need to be respected by the contractors.

f) Complaints Register

The contractor shall establish and maintain a register for periodic review by KP that logs all the complaints raised by the neighbors or the general public about construction activities. The register shall be regularly updated, and records maintained including the name of the complainant, his/her domicile and contact details, the nature of the complaint and any action taken to rectify the problem.

g) Construction Control

The construction control for the proposed project shall cover the following:

Control of Access

The contractor shall ensure that the construction site is accessed by authorized persons only and up-to-date records kept

i) Control of material supply and burrow areas

- The contractor shall, as far as possible, source all material needed to construct the proposed project from the licensed quarries
- In instances where materials are to be obtained from a new burrow area; the contractor shall comply with relevant legislations.
- The contractor shall prepare a method statement including plans, detailing the expected quantity of excavation, temporary and permanent drainage control, the final contouring of the burrow pit and the proposed method of rehabilitation.

8.5.3 Rehabilitation and Site Closure Plan

- After completion of construction activities, the contractor shall clear the site of construction materials and dispose wastes in appropriate disposal sites.
- The contractor shall remove all temporary works on the construction site and grow grass on areas that are not covered by the installations to control erosion

8.5.4 Local Recruitment Plan

The contractor will prepare a local recruitment plan to guide on recruitment of locals. The plan shall pay attention or adhere to Employment Act.

In designing the local recruitment plan contractor shall:

- Comply with the provisions of Employment Act, 2007
- Wherever possible, give priority to qualified local people when hiring employees.

The mitigation measure is:

- Prepare a local recruitment strategy that is fair and transparent to ensure all community segments - men, women, vulnerable individuals, minority clans, and VMGs who meet OP 4.10 criteria) - can access subproject benefits during construction and that prioritizes hire of locals for skilled, semi-skilled and unskilled labour.

8.5.5 Workplace Health and Safety Plan

The workplace health and safety plan to be implemented by the contractor and KP shall include the following key measures:

- The contractor shall comply with all relevant legislative requirements governing worker health and safety at the work place (e.g., OSHA 2007 and its subsidiary legislations).
- The contractor shall prepare and implement measures to minimize diseases likely to be contracted by the construction workers as a result of the proposed project such as HIV & AIDs and other communicable diseases
- The contractor shall have obligations of managing the safety of its employees by;
 - Provision of appropriate PPEs to employee
 - Training employees on competence
 - Employing competence and qualified staff
 - Provision of First Aid Kits onsite
 - Should have a trained first aider
 - Document and create awareness on safe work procedures and work instruction

- The contractor will manage accidents by having an emergence response plan which will include contacts for emergency service providers e.g., ambulances, fire brigade and nearest hospitals
- Health and safety performance will be continuously monitored, and procedures reviewed with the aim of eliminating risk as far as reasonably practicable.

8.5.6 Community Health and Safety Plan

The community health and safety plan to be implemented by the contractor shall include:

- Adherence to OSHA 2007 Act and its subsidiary legislations to ensure that health and safety of immediate neighbors and the public is not threatened.
- The contractor to ensure that construction work is undertaken in manner not likely pose risks to community health and safety.
- The contractor shall undertake an independent risk assessment prior to construction. The findings of this assessment will inform the development of a community safety plan and create awareness to the community on the same

8.5.7 Emergency Preparedness Plan

The Contractor shall develop an emergency plan that will enable rapid and effective response to all types of environmental emergencies in accordance with recognized national and international standards.

The emergency plan shall include establishment of a network of communication between the Contractor and emergency services including police, ambulance services, and fire brigades among others.

8.5.8 SEA/SH Prevention and Response Action Plan

The contractor will prepare a SEA/SH Prevention and Response Action Plan that will include a GR that ensures confidentiality. The plan should have an Accountability and Response Framework. The plan will include the necessary measures for prevention and response of GBV impacts.

The mitigation measures shall include:

- Ensure that local employment opportunities are equitably accessible to all segments of the community,
- Ensure equal pay for equal work
- Prepare and implement GBV (SEA/SH management) plan that includes sensitisation of community members and subproject workers on the potential of the subproject giving rise to, exacerbating and/or mitigating SEA and SH, and the appropriate mitigation measures
- Map all GBV service providers and document referral services for survivors, and, sensitize community members and subproject workers on the referral pathways.
- Prepare and implementing a functional and accessible contractor GBV GR for use by workers and community members (as appropriate).
- The GBV GR should allow for anonymous incident reporting and should be GBV survivor-centric
- Sensitize community members and workers on contractor GRs
- Prepare and sensitise Code of Conduct (CoC) for SEA and SH, and their responsibilities for the same, to demystify the stigma associated with SEA and SH

8.5.9 Stakeholder Engagement Management Plan

A Stakeholder Engagement Plan is a formal approach to communicate with project stakeholders to achieve their support for the project. The plan prepared shall specifies the frequency and type of communications, media, contact persons, and locations of communication events. The SEP is a useful tool for managing communications between the contractor and other stakeholder. The plan should meet the following objective of a SEP.

- To help improve project design and implementation
- To inform third parties about changes that affect them
- To take their views into account in the implementation of projects

- To identify adverse impacts and mechanisms to enhance project benefits
- To identify risks from and to a project
- To increase project ownership and sustainability
- To comply with Bank policies that require consultations

The plan shall put this measure in to consideration:

- In consultation with the identified stakeholders, prepare a stakeholder engagement plan (SEP) that is based on their locations (maps) and their information needs at the various subproject phases

8.5.10 Grievance Redress Mechanism

One of the key roles of the Grievance Redress Committees, will be to address disputes led by the administrative chiefs. All PAPs will be informed how to register grievances or complaints, including specific concerns about land and environment. The PAPs will be informed about the dispute resolution process, specifically about how the disputes will be resolved in an impartial and timely manner.

The Land Acquisition Tribunal has the jurisdiction to hear and determine appeals from the decision of the NLC on the process of compulsory land acquisition of land. However, if a party is dissatisfied by the decision of the tribunal, they may appeal to the Environment and Land Court. The court will deal with land related disputes. However, the Land Act 2012 and Environment and Land Court Act 2011 advocates for Alternative Dispute Resolution (ADR) methods in tackling land related disputes. ADR approaches will be given preference and based on customary rules, arbitration, or third-party mediation. ADR will be promoted or defended as a resolution to disputes related to land. The affected persons and other stakeholders also have a right to access the World Bank Redress Service (GRS) and the World Bank Inspection Panel at no cost.

Grievance Redress Principles

The principles of grievance mechanism management that need to be observed include;

- All complaints and grievances are resolved as quickly as possible.
- That the resolution of complaints and grievances should be at the lowest possible level for resolution.
- All complaints that can be resolved, should be resolved immediately on the site. The focus of the GRM is to resolve issues in a customarily appropriate fashion at community level and record details of the complaint, the complainant and the resolution.

Grievance Redress Committee Capacity Building

A grievance redress mechanism and a committee were established in a culturally appropriate manner in consultation with the community during the consultations for ESIA and will be utilized post ESIA. The GRM committee will have the following roles; log the grievances, maintain records of the GRC meetings and grievances, resolve the grievances to the extent possible.

Grievance Procedures

a) *Registration* - Community members can inform the contractor about concerns directly and if necessary, through third parties. Once a complaint has been received, it will be recorded in a complaints log or data system. The log will be kept in hardcopy or electronic form. All reported grievances will be categorized, assigned priority, and routed as appropriate.

Grievance Log

The grievance logbook will ensure that each complaint has an individual reference number, and is appropriately tracked and recorded actions are completed. The information to be recorded will include:

- Name, age, gender of complainant;
- Date the complaint was reported;
- Date the grievance logged;
- Action taken;

- Date information on proposed corrective action sent to complainant (if appropriate);
- The date the complaint was closed; and
- Date response was sent to complainant.

b) *Sorting and Processing* - This step determines whether a complaint is eligible for the grievance mechanism and its seriousness and complexity. The complaint will be screened however this will not involve judging the substantive merit of the complaint.

The following guide will be used to determine whether a complaint is eligible or not:

Eligible complaints may include those where:

- The complaint pertains to the mini-grid project.
- The issues raised in the complaint fall within the scope of issues the grievance mechanism is authorized to address.

Ineligible complaints may include those where:

- The complaint is clearly not mini-grid project -related.
- The nature of the issue is outside the mandate of the grievance mechanism.
- The complainant has no standing to file.
- Other project or organizational procedures are more appropriate to address the issue.
- Closing Out and Escalation: Project-related grievances will be addressed and closed out as appropriate. The GRM will provide a channel for escalation e.g., through legal redress.

The proponent will monitor the activities of the stakeholder engagement and grievance management activities.

The three tiers of the GRM are as described below:

8.5.10.1 National Grievances Redress Committee (NGRC)

NGRC has been established at the National level to ensure participatory and transparent implementation of the project. The NGRC will help the project carry out its mandate efficiently- particularly ensuring effective and amicable settling of disputes among the communities/PAP's.

Members to **NGRC** include representation from the following agencies and entities

1. Representative from the Ministry, chair of the Committee
2. Representative from NLC to handle matters that involve land take
3. Representative of the Implementing Agencies (IA)-KP and KP
4. Representative from the Ministry's Legal office to guide on Alternative Dispute Resolution methods
5. Representative from the County Grievance Redress Committee-depending on the matter at hand; Land or Environment
6. Representative from Gender and Social Development Office who will be responsible for ensuring gender issues are well addressed.
7. Representative from NEMA to handle environmental issues
8. County Surveyor/Physical planner from the county Lands office
9. Project Affected Person's-to represent the matter before the committee

Functions of the National Grievances Redress Committee

- a) Ensuring effective flow of information between PAPs, the implementing agency and the County Grievance Redress committee on matters brought before the committee
- b) Co-ordinate County Grievance Redress Committees (CGRC)
- c) Co-ordinate activities between the various organizations involved; facilitate grievance and conflict resolution at the highest level

- d) Resolving disputes that may arise within the project. If it is unable to resolve any such problems, the PAP's can seek legal redress.

8.5.10.2 County Grievance Redress Committees (CGRC)

CGRC has been established at the county level to ensure participatory and transparent implementation of the project. The CGRC will help the project carry out its mandate efficiently- particularly ensuring effective communication with the communities.

Members to **CGRC** will include representation from the following agencies and entities

1. Representative of NLC, to grant legitimacy to the acquisition process and ensure that legal procedures as outlined in Land Act 2012
2. Representative of the implementing agency
3. Representative of NEMA to handle environmental issues
4. The County Administration representative, which will provide the much-needed community mobilization, and support to the sub-project.
5. County Land Survey Officer will survey all affected land and produce maps.
6. The County Gender and Social Development Officer who will be responsible for ensuring gender programs are adhered to.
7. The County Lands Registrar will verify all affected land and validate the same.
8. Two PAP representatives from Location Grievance Resettlement Committee – act as voice for the PAPs
9. NGOs and CBOs locally active in relevant fields

The CGRC will have the following **specific responsibilities:**

- a) Ensuring effective flow of information between PAPs and the implementing agency
- b) Coordinate Locational Grievance Redress Committees (LGRC)
- c) Coordinate activities between the various organizations involved; facilitate grievance and conflict resolution; and provide support and assistance to vulnerable groups.
- d) Conducting extensive public awareness and consultations with the affected people so that they can air their concerns, interests, and grievances.
- e) Resolving disputes that may arise within the project. If it is unable to resolve any such problems, channel it to the National Grievance Redress committee before utilizing the appropriate formal grievance procedures.

8.5.10.3 Locational Grievance Redress Committee (LGRC)

Since counties are large, further decentralized Grievance Redress Committee will be formed at the location of the sub-project. Subsequently, Locational Grievance Redress Committees (LGRC's), based at each location of a sub-projects, will be established. The LGRC's will be constituted by implementing agencies and representatives of CGRCs through consultation with the PAPs and will act as the voice of the PAPs.

The LGRCs will work under guidance and coordination of CGRC and the implementing agencies. Their membership will comprise of the following:

1. The locational Chief, who is the Government administrative representative at the locational unit and who deals with community disputes will represent the Government in LGRC
2. Assistant Chiefs, who supports the locational Chief and Government in managing local community disputes in village units will form membership of the team.
3. Female PAP, elected by women PAPs, will represent women and children related issues regarding the project
4. Youth representative, elected by youths, will represent youth related concerns in the LGRCs
5. Male representatives elected by the members of the PAPs
6. Vulnerable persons representative will deal and represent vulnerable persons issues in the LGRCs.

7. CBO representatives

Membership of LGRCs will be elected by each category of PAPs except the locational Chief and assistant chiefs who will be automatic members of the team by virtue of their positions. Each of LGRCs will elect their own chairperson and a secretary among themselves.

The roles of LRCCs will include among others the following:

- Conducting extensive public awareness and consultations with the affected people.
- Help ensure that local concerns raised by PAPs as regards to the project are promptly addressed by relevant authorities.
- Resolve manageable disputes that may arise relating to the project. If it is unable to resolve/help refer such grievances to the CGRCs instituted.
- Ensure that the concerns of vulnerable persons such as the disabled, widowed women, orphaned children affected by the sub project are addressed.
- Assist the community in recording grievances, including helping those who cannot write or read.
- Help the vulnerable groups access project benefits
- Ensure that all the PAPs in their locality are informed about the project



Figure 8-1: KOSAP Grievance Redress Mechanism

It should be noted that if complainants are not satisfied with the grievance process, even after arbitration they have the right to present their complaint through the court system.

It is expected that most disputes will be resolved at the lowest level- Locational Grievance Redress Committee and since most disputes arise during the Construction and operation period the contractor's Environmental and Social Safeguard team specifically the Community Liaison Officer will work closely with the community to be able to resolve disputes.

Responsibilities of the Community Liaison Officer include:

- Monitor day to day Implementation of the Project
- Address grievances as they arise on the project
- A member of the Locational and County Grievances Redress Management Committee to respond on issues that may have been brought to the attention of the committee before escalating to the National Grievance Redress Committee
 - Escalate grievances internally to get a lasting solution

Existence of a Local Grievance Redress Mechanism in Munguvueni

A Local grievance redress committee was constituted in 2020. The LGRM was not active during the site visit. It is anticipated that the committee shall become active during the construction and operation phase of the project. The LGRM is composed of the following members of the project committee:

1. The area chief;
2. Youth representatives;
3. Female representatives;
4. Male representative; and
5. Vulnerable persons representative

Contractor will prepare an effective Grievance Redress Mechanisms (GRM) to address and respond to grievances from both the community, the workers and any other stakeholder.

A Grievance Redress Mechanism (GRM) provides access to remedy and identifies procedures to effectively address grievances arising from project implementation. GRM provides an avenue where people can formally lodge their complaints and grievances and have them properly considered and addressed.

The mitigation measures shall include:

- Prepare a project level timebound GRM in consultation with relevant stakeholders
- Ensure the project GRM incorporates existing local dispute resolution mechanisms at the lowest tier and allows access to administrative and judicial processes as well as to other redress mechanisms such as mediation/arbitration and the World Banks grievance redress service (GRS) and the Inspection Panel
- Have a subproject level GRM Focal Point to be responsible for receiving, logging/registering, submitting to the responsible tier for resolution and responding to and updating complainants on resolution status
- Sensitize all stakeholder categories on the GRM and encourage them to make use of it
- Ensure the GRM is functional, culturally appropriate, and accessible to all stakeholders without any cost to them and without fear of retribution or reprisal
- Ensure adequate and proportionate representation of VMGs and vulnerable individuals in the local grievances handling committee.
- Prepare a timebound Contractor's GRM and sensitize community members and project workers its processes
- Ensure all reported grievances are logged, dated, processed, resolved and closed out in a timely manner, or escalated to other levels.
- Ensure the GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity for those who wish to report anonymously.

World Bank Grievances Redress Mechanism

The World Bank has established 2 grievance redress mechanisms that provide avenues for individuals and communities to submit complaints directly if there is belief that they have been, or are likely to be, adversely affected by a World Bank-funded project. In this project PAPs and other stakeholders have the right to know and access at no cost these GRMs as described below.

World Bank Grievances Redress Service

The Grievance Redress Service (GRS) is an avenue for individuals and communities to submit complaints directly to the World Bank if they believe that a World Bank-supported project has or is likely to have adverse effects on them, their community, or their environment. The GRS enhances the World Bank's responsiveness and accountability to project-affected communities by ensuring that grievances are promptly reviewed and addressed. Complaints must be in writing and addressed to the GRS and sent through the following methods namely:

Those aggrieved or their representatives can report their complaints through the following mediums; (i) Online by accessing the online form; (ii) Sending an Email to grievance@worldbank.org; or (iii) Submitting

a letter to the World Bank Headquarters in Washington D.C., United States or World Bank Kenya County Office.

World Bank Inspection Panel

The Inspection Panel is an independent complaints mechanism for people and communities who believe that they have been, or are likely to be, adversely affected by a World Bank-funded project. The Panel is an impartial fact-finding body, independent from the World Bank management and staff, reporting directly to the Board. The Inspection Panel process aims to promote accountability at the World Bank, give affected people a greater voice in activities supported by the World Bank that affect their rights and interests, and foster redress when warranted. In September 2020, the Board updated the resolution that created the Panel and added to the Panel functions. At the same time, the Board approved a resolution establishing the World Bank Accountability Mechanism (AM). The new AM began operations in early 2021 and houses the Panel to carry out compliance reviews and a new Dispute Resolution Service (DRS), which will give complainants another way to have their concerns addressed. Contacts for registration of complaints to the IP are; (i) Tel: +1 202 458 5200: and (ii) Email: ipanel@worldbank.org.

Government Management of Land Acquisition Disputes

The Environment and Land Court, established under the Environment and Land Court Act 2011, is a superior court (with offices across the country) that hears and determines disputes relating to land and the environment. Likewise, the Land Acquisition Tribunal established under the Land Act 2012; (PART VIIIA 133A) has jurisdiction to hear and determine appeals from the decision of the NLC on the process of compulsory acquisition of land. Therefore, in the first instance, such appeals are referred to the Tribunal. However, a party dissatisfied with the decision of the Tribunal may appeal to the Environment and Land Court on a question of law only. The regulations to set the Land Acquisition Tribunal established under the Land Value (Amendment) Act of 2019 are underway. Besides, the Judicial Service Commission will chair the Land Acquisition Tribunal once operational.

8.5.11 Labor Influx Management Plan

The purpose of this plan is to provide a clear set of actions and responsibilities for the control of impacts linked to in-migration within the Project's area of influence. This plan will be regularly reviewed and updated to reflect revised Project design, socio-economic changes and learning experienced during its implementation.

The objectives of this plan are as follows:

- Monitor the scale of project induced in-migration into the project area and specific in-migration 'hotspots';
- Support local government and communities to manage both internal and external immigration into the project area; and
- Mitigate and manage any negative impacts and enhance and promote any positive impact related to labor influx.

The plan shall consider these measures:

- Prepare and Implement a Labour Management Plan (LMP) with policies and measures for ensuring that:
- Subproject managers and workers are sensitised on:
 - ✓ County/National Labour laws
 - ✓ County/National Child Labour laws
 - ✓ National/International Forced Labour laws
- Enforce:
 - ✓ The Code of conduct
 - ✓ County/National Labour laws
 - ✓ County/National Child Labour laws

- ✓ National/International Forced Labour laws

8.5.12 Rehabilitation and Decommissioning Management Plan

The rehabilitation and decommissioning management plan include the following:

8.5.12.1 Planning for Closure

- a) The implementing agency shall investigate practical options for closure of the facility at least one year before decommissioning and submit a report to relevant authorities NEMA included.
- b) The Proponent shall develop rehabilitation and decommissioning plan in conjunction with relevant stakeholders at least one year before the end of facility's operations.
- c) The Proponent shall explore options of re-use and recycling of the facility's components/structures.

8.5.12.2 Decommissioning

- a) The Proponent shall take into consideration the health and safety of personnel, contractors, neighbors and the public during the planning and implementation of the demolition process.
- b) The Proponent shall undertake a further survey to identify any contaminated areas and remediate them accordingly.

8.5.12.3 Post Closure

The Proponent shall ensure that the facility's site is free of impacts associated with the closure and demolition

The Proponent shall develop, rollout and implement a monitoring plan that includes:

- a) Monitoring of the rehabilitated site to confirm whether progress is satisfactory.
- b) Outline of how land improvement and future land use will be affected by the past operations and decommissioning of the associated infrastructure.

8.6 Institutional Implementation Arrangements for the Proposed Project

This section presents roles and responsibilities of proponent, implementing agency, supervision consultant and contractor. The project is jointly implemented by the Ministry of Energy and Kenya Power. Specific roles are presented below;

8.6.1 Proponent -Ministry of Energy and Petroleum (MoEP)

The MoEP will provide overall coordination and oversight of the project. MOE will be responsible for overall responsibility for safeguards due diligence, and compliance monitoring. The MOE will also provide funding for the project planning and implementation.

8.6.2 KOSAP Project Implementation Unit

The MOE has already put in place a Project Implementation Unit (PIU) to guide implementation of the project. The PIU is already implementing the project. In the PIU Environmental and Social issues are spearheaded by an Environmental and Social Safeguards Expert whose role is to coordinate and oversee implementation of safeguards. The PIU reports to the MOE.

8.6.3 The Implementing Agency (KP)

KP will be responsible for implementation and operation of the project on behalf of the MOE. Some of the key responsibilities include but not limited to are;

- KP will supervise construction works through a supervision consultant and also directly
- Monitoring the progress of the project in terms of the safeguards and technical aspects.
- Monitoring of the ESMMP implementation
- Ensuring the project is on course in terms of timelines

Note: The Solar Mini-grid will be installed operated and maintained by the contractor for the first ten (10) years and then handed over to KP engineers and operators. So, for the ten years KP will be monitoring the operations of the contractor.

8.6.4 County Government of Tana River

The County government is a key stakeholder. The roles of the county government include giving relevant approvals needed, assisting in process of allocating land for Mini-grid, solving grievances that cannot be sorted at project level, monitoring progress of the project among others.

8.6.5 National Environmental Management Authority

This authority is responsible for approval of ESIA report and licensing and is free to check progress of implementation of ESMMP

8.6.6 Roles and Responsibilities of the Supervising Consultant

- The consultant must appoint an ESHS officer who will be reporting on the ESMMP implementation supervision
- The consultant ESHS officer be required to generate various reports including production of minutes of monthly site visits and quarterly supervision reports detailing environmental, health, social and safety compliance on quarterly basis amongst other technical aspects
- Reporting on the ESMMP implementation progress and recommendations

8.6.7 Roles and Responsibilities of the Contractor

- Implementation of the contractor related aspects of the ESMMP and regularly (monthly) reporting
- The contractor on his part will have to appoint an EHS officer and a Social Specialist to coordinate and report on the ESMMP implementation respectively.
- The contractor to engage a Community Liaison Officer to act as a link between the community and the contractor and support the Social Specialist.
- The contractor will also have the obligation of managing the E&S risks related to his/her operations.
- Maintaining the required level of stakeholder engagement and communication, including providing project schedule information to the public, accepting and resolving public grievances, advertising and hiring local workers.
- Maintain a working grievance redress mechanism.
- The contractor is to comply with all regulations and by-laws at the county level and other relevant regulations and laws
- The contractor shall refer to ESIA recommendations and the ESMMP when preparing the contractors-ESMMP and the specific plans
- The contractor shall provide water required for use in connection with the works including the work of subcontractors and shall provide temporary storage tanks, if required
- The contractor shall make his own arrangements for sanitary conveniences for his workers. Any arrangements so made shall be in conformity with the public health requirements for such facilities and the contractor shall be solely liable for any infringement of the requirements.
- The contractor shall be responsible for all the actions of any subcontractors whom he subcontracts.
- The contractor shall take all possible precautions to prevent nuisance, inconvenience or injury to the neighboring properties and to the public generally, and shall use proper precaution to ensure the safety of the community
- All work operations which may generate noise, dust, vibrations, or any other discomfort to the workers and/or visitors of the client and the local community must be undertaken with care, with all necessary safety precautions taken.

- The contractor shall take all effort to muffle the noises from his tools, equipment and workmen to not more than 70dBA
- The contractor shall upon completion of working, remove and clear away all plant, rubbish and unused materials and shall leave the whole site in a clean and tidy state to the satisfaction of the Proponent. He shall also remove from the site all waste
- No shrubs, trees, bushes or underground thicket shall be removed except with the express approval of the proponent.
- No blasting shall be permitted without the prior approval of KP and the local authorities.
- Borrow pits will only be allowed to be opened up on receipt of permission from the approving authorities.
- The standard of workmanship shall not be inferior to the Kenya Bureau of Standards where existing. No materials for use in the permanent incorporation into the works shall be used for any temporary works or purpose other than that for which it is provided. Similarly, no material for temporary support may be used for permanent incorporation into the works.
- Disposing of the waste generated during construction activities in accordance to the ESMMP.
- The contractor EHS officer will report on ESMMP implementation during construction period. The aspect to be reported by the contractor will include safety issues i.e. hours worked, recordable incidents and corresponding Root Cause Analysis (lost time incidents, medical treatment cases), first aid cases, incidents and accidents, potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training etc.); Environmental incidents and near misses; noncompliance incidents with permits and national law; Training on E&S issues (dates, number of trainees, and topics); Details of any security risks; Worker & External stakeholder grievances and E&S inspections by contractor, including any authorities.

Environmental and Social concerns need to be part of the planning and development process and not an afterthought, it is therefore advisable that all the risks and impacts of the project be prevented and mitigated at the earliest opportunity possible to ensure smooth implementation of the project. Finally, a comprehensive Environmental and Social Management and Monitoring Plan (ESMMP) has been prepared and will guide in implementation of mitigation measures.

8.7 Management of Impacts during Operation Phase

The operation phase of the proposed project will be mainly power supply, line maintenance and clearing of wayleaves. A contractor (contracted to run the plant for a number of years before handing over to KP) will be responsible for all the mitigation measures for negative impacts during the operation phase for the first ten years after which responsibility will be KP. This will be done by implementation of the following steps:

- Inspections
- Corrective action
- Reporting

9 IMPACT SUMMARY AND CONCLUSION

9.1 Introduction

This chapter gives a summary of impacts conclusion and recommendations

9.2 Summary of impacts identified and assessed

During the preparation of this report for the proposed development, it is observed and established that most of the negative social and environmental impacts can be mitigated and have potentially short term low significant effects. The positive impacts are highly rated and will benefit the community at the project area and the county at large. The project proponent, the implementing agency and the contractor must adhere to prudent implementation of the social and environmental management and monitoring plan. The contractor should commit to obtaining all necessary permits and licenses from the relevant authorities and have qualified and adequate personnel to do the project as proposed. The ESIA has proposed adequate safety and health mitigation measures as part of the relevant statutory requirements.

The analysis of the ESIA has demonstrated that the construction and operation of the proposed Solar Mini-grid will have positive impacts to the government and Kenyan society at large. The impacts will include; Increase in reliable and sustainable clean energy, employment to local community members, increase in the national/local investment, increase in government revenue, improvement of standards of living for Munguvueni residents. However, despite the outlined positive impacts, the proposed development will cause some negative impacts such as; noise, dust generation, soil erosion, oil spills, fire hazards, electrocution, shocks, solid waste generation, occupational health hazards, social risks such as labor influx, demand for resources, gender-based violence, conflicts, public health impacts (HIV & AIDs, Covid 19) among others that need to be avoided, reduced and mitigated against.

An Environmental and Socio- economic Monitoring and Management Plan (ESMMP) outline has been developed to ensure sustainability of the project area activities from construction through operation to decommissioning. The plan provides a general outlay of the activities, associated impacts, mitigation action plans and appropriate monitorable indicators. Implementation timeframes and responsibilities are defined, and where practicable, the cost estimates for recommended measures are also provided.

9.3 Conclusion and recommendations

Based on the assessment findings, the consultant concludes that there are no substantial reasons to hinder the proposed project from progressing to the next stage of planning and development. However, this progression is conditional upon the implementation of the recommended mitigations and the monitoring of potential environmental and socio-economic impacts as outlined in the ESMMP.

10 REFERENCES

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- Community Land Act, 2016
- The Land Registration Act, 2012
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- The Energy Act, 2019
- The Constitution of Kenya, 2010
- Tana River County Integrated Development Plan 2018-2022

11 APPENDICES

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APPENDIX 1	Minutes Of the Meeting Held During ESIA Process
APPENDIX 2	List of Attendance Register
APPENDIX 3	Minutes Of Meeting Held During Land Identification Phase
APPENDIX 4	A-RAP
APPENDIX 5	Nema Firm Of Experts Licence And Lead Expert License

APPENDIX 1 Minutes Of The Meeting Held During ESIA Process



Ministry of Energy



Kenya Power

MINUTES OF EIA CONSULTATION FOR THE PROPOSED KENYA OFF-GRID SOLAR MINI-GRID PROJECT IN TANA RIVER COUNTY.

Date: 10/02/2022

Site: Munguvu, Kinyady

Time: 1400hrs

Venue: Munguvu, Baraza Park.

PRESENT

List of all the members present is appended herein.

AGENDA

1. Introduction
2. Opening Remarks
3. Remarks by the consultant
4. Concerns/ Issues from participants
5. Responses
6. Project Acceptance/Rejection
7. Adjournment

Item No	Description	Action by
Min 1/22	Introduction	
1-1	The meeting was started with a word of prayer from one of the participants.	
1-2	The area assistant chief welcomed the ESIA team and explained the low turnout of participants is due to an ongoing burial ceremony for one of the villagers.	Asst. Chief Faiza Chui
1-3	Lavinga led in the introductions of the ESIA team from Norken International, Centric Africa and counterpart from Kenya Power.	Lavinga Omondi



Norken International Ltd



CENTRIC AFRICA LTD



4.1	The community was comfortable and understood the presentation therefore there were no questions or concerns.	
Min 5/22	Responses given by the consultant	



Min 6/22	Acceptance/Rejection of the project	
6.1	All the members present at the meeting accepted the project collectively.	All.
Min 7/22	Adjournment	
7.1	The meeting was adjourned by the assistant chief and the members proceeded to the focus group discussions.	



Ministry of Energy



Minutes Prepared by: SHARON WATIRI	Date: 10/02/2022
Position: Environmentalist	
Signature: [Signature]	
Minutes Confirmed by: FAIZA CHUI	Date: 15/02/2022
Position: ASST. CHIEF	
Signature: [Signature]	



APPENDIX 2 List of Attendance



Baringo



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES, TANARIVER COUNTY

Venue: MUNGUVUENI BARAKA TALK

Date: 10/02/2024

Time: 14:00hrs

#	Name	Gender M/F	Position/Institution/ Location/Village	Phone/ID No.	Signature
1.	SHAPOU WATIRI	F	Norken (17) Ltd	0724124848	
2.	Daniel Ciano	M	CENTRIC AFRICA LTD	0718068517	
3.	KOMORO BUE	M	MUNGUVUENI	0	
4.	ROSELINE NJERU	F	KPIC - NBI	0720571017	
5.	MURGE M. LAKOLE	M	AG. CHIEF	0723679864	
6.	FAIZA H. CHUI	F	ASST. CHIEF	0717393712	
7.	IGUONG NIZAMU GAWAHA	F	MUNGUVUENI	0757672275	
8.	WADIJA AHINTAU	F	MUNGUVUENI	0794066475	
9.	TATUMA II. HOMORA	F	MUNGUVUENI		
10.	JINANGO M OMAR	F	MUNGUVUENI		

ASSISTANT CHIEF
MUNICIPALITY

10 FEB 2024





ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES, TANARIVER COUNTY

Venue: MUNGUWENI BARAZA PARK.....

Date: 10/02/2022.....

Time: 1400hrs.....

#	Name	Gender M/F	Position/Institution/ Location/Village	Phone/ID No.	Signature
1.	MUKAJUMA H. SWALEHE	F	MUNGUWENI	074101347	
2.	HADIA KHADIJA HAMISI	F	MUNGUWENI	—	
3.	HABWIZA RADHIA MOHAMUD	F	MUNGUWENI	0769371345	
4.	MWATUMU MANENO	F	MUNGUWENI	—	
5.	MUKAJUMA HASHORA	F	MUNGUWENI	—	
6.	HADIA MWINADIE BUYA	F	MUNGUWENI	0114113730	H.M.B
7.	JATUMA MANENO BUYA	F	MUNGUWENI	—	
8.	MARIAMU MAKURU BUYA	F	MUNGUWENI	—	
9.	HADIA KHADIJA GALANA		MUNGUWENI	—	
10.					

ASSISTANT CHIEF
MINAZINI SUB-LOCATION

10 FEB 2022

P. O. BOX 1-80201

GARSEN



CENTRIC
AFRICA LTD



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES, TANARIVER COUNTY

Venue: ANTIQUE MARKET

Date: 10/02/2011

Time: 14:00h

#	Name	Gender M/F	Position/Institution/ Location/Village	Phone/ID No.	Signature
1.	JILLO MOHAMMED BAWA	M	MUNKHUVENI	0724541940	Jillob
2.	BUWA ALI BAKARI	M	MUNKHUVENI	0798557473	Bawa
3.	OMARA HAMISI OMAR	M	MUNKHUVENI	0798330060	Hamisi
4.	HAMISI BAHULA	M	MUNKHUVENI	0759920646	Bahula
5.	BASHORA MOHAMMED BAWA	M	MUNKHUVENI	0114772074 0706	Bawa
6.	SAIB KUMARA LAKELE	M	MUNKHUVENI	—	Laakele
7.	HAMISI BONA	M	MUNKHUVENI	0791534813	Bona
8.	OMARA OMARA DITATTO	M	MUNKHUVENI	—	Ditatto
9.	BONA KITHMAN BAHULA	M	MUNKHUVENI	070349	Bona
10.	BAKARI BASHORA KUMARA	M	MUNKHUVENI	0759974809	Bakari



P. O. Box 1 - 80701,
GABRIEL POLYMER INTERNATIONAL LTD



Bq1162



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES, TANARIVER COUNTY

Venue: MUNGUVENI, BARATA PARK

Date: 10/02/2022

Time:

#	Name	Gender M/F	Position/Institution/ Location/Village	Phone/ID No.	Signature
1.	GAKAIDA DRIVO ABDALLA	M	MUNGUVENI	0708884874	
2.	HUSSEIN HIRIBAE SHEVO	M	MUNGUVENI	0705763388	
3.	BIASILARA SAID BUYA	M	MUNGUVENI	—	
4.	HASSAN SHEVO HIRIBAE	M	MUNGUVENI	—	
5.	OMAR OMARA SAID	M	MUNGUVENI	0713446711	
6.					
7.					
8.					
9.					
10.					



Men FGD List

Women FGD List

Youth FGD List

KOSAP: FINDINGS OF COMMUNITY ENGAGEMENTS AND SOCIAL SCREENING EXERCISE FOR MUNGUVUENI SOLAR MINI-GRID IN TANA RIVER COUNTY

BASELINE INFORMATION

1. Identified Land/Site

- The identified site for the proposed Munguvueni Solar Mini-grid is in Mnazini sub location, Ndera location in Tana River County
- The land is owned by the community and its status is unregistered community land.
- The County Government of Tana River holds the land in trust for the community
- Land in the area is not adjudicated and not surveyed
- No activity was ongoing at the site during the site visit

2. Socio Economic Baseline Information

1. The main economic activity in the area is farming of maize, peas, mangoes, bananas, tomato and keeping of livestock such as goats, chicken and cows. Other livelihood activities include; few businesses and employment of few people in the school and dispensary
2. The public facilities in the area include; a school, dispensary and a mosque.
3. No activity was being undertaken at the time on the identified site

3. Vulnerable And Marginalized Groups

1. The people living in belong to the Pokomo tribe. The pokomo are not recognized under Kenya law as part of marginalized group in Kenya and they meet the World Bank OP 4.10 (indigenous People) criteria.
2. The family set up is patriarchal where the men are the heads of households
3. The religion practiced in Munguvueni is Islam
4. The proposed project is set to supply power to people living in Munguvueni village and the public facilities
5. In Munguvueni there are vulnerable households and individuals comprising the very poor, special needs people, poor female headed households and these will need extra support in enhancing their ability to share in the project benefits.

4. Grievance Management Systems

1. Grievances in Munguvueni are solved and managed by elders who are drawn from heads of households
2. Grievances that cannot be solved by the elders and religious leaders are referred to the Chiefs office
3. A grievance redress committee was constituted and the community members elected the members to deal with KOSAP project grievances

STAKEHOLDER ENGAGEMENT

Stakeholder engagement was carried out during the site identification exercise at two levels namely at the County Government of Tana River and at the community level i.e. with the direct beneficiaries of the proposed solar mini-grid at Munguvueni village.

Minutes of Meeting with the County Commissioner of Tana River County

The KOSAP project team paid a courtesy call to the County Commissioner of Tana River County on 27th September 2021. The main agenda was to brief the commissioner on the purpose of the KOSAP team visit to the county. Dorothy (team leader) outlined the agenda of the visit which was community engagement to inform them on the project and allow them to identify land for setting up the Mini-grid. The team leader noted that there was a component of compensation (in kind) for the land identified by the community which would be received by the community in form of a project. The community was also to be guided on the need to choose a community project to be executed alongside the solar mini-grid project. The commissioner noted that the project is welcome and that his office would give full support on key matters especially on mobilization of communities through the DCCs and chiefs and also on matters security to ensure the project is a success.

Minutes of Meeting with the County Officials of Tana River County

The KOSAP team visited County Government of Tana River and held a meeting with the CECM's for Finance and Economic planning who was holding brief for the CECM's (Energy, Environment and Natural Resources (EE&NR) on the 27th September 2021 at his office. The main agenda was to brief County administration on the progress of KOSAP project and on the need for community engagement in line with KOSAP land/site identification requirements and need for community engagement during project planning.

The CECM welcomed those in attendance at 3.40 p.m. and invited all the officers present for brief introductions. Dorothy (team leader of the KOSAP) team explained that KOSAP project was on course and was at the phase of land/site identification for setting up the Mini-grid. She noted that KOSAP project had 3 main components namely; mini-grids, standalone solar for house hold and standalone solar system for boreholes and public facilities (schools, hospitals and chiefs offices). She noted that the team had purposely visited in regard to component one (solar mini-grid). She added that Tana River County was to benefit from 6 Solar Mini-grids to be funded by the KOSAP project and 28 boreholes would be fitted with standalone solar systems for pumping water. She noted the team had visited the county for three main agendas namely;

- Undertake community engagement to sensitize the community on the project information (components of the project, benefits, negative impacts and mitigation measures).
- Explain the land requirements for the project to the community to enable better decision making in identifying land for the Mini-grid.
- Undertake an environmental and social screening of the proposed sites to check suitability in terms of environmental, technical, social, safety and health requirements.
- Giving the community an opportunity to choose a project as part of compensation in kind in return for the land given to build the solar mini-grid

She informed the meeting that the Government of Kenya through the Ministry of Energy is seeking to partner with the community by asking the community to identify land for setting up the Mini-grid and the Government will provide the funds for setting up the solar Mini-grid.

The CECM noted that they are ready to support the process in the best interest of the community members and for the success of the project. Dorothy also noted that, the process of Land registration may take long,

and so the KOSAP team was also seeking for advance possession of the sites identified as the relevant departments in the County together with the National land commission progress registration of the land.

The CECM noted that many of the areas in Tana River are not covered by the national electricity network (grid) and this has also slowed down service delivery. He said that the project is welcome and will be supported by the County.

Plenary sessions-Questions and Answers and suggestions

1. CEC. Who will execute the community project?

Response: Dorothy-the Ministry of Energy will fund the project and it will be constructed by the same contractor doing the Mini-grid.

2. To whom will the land for setting the Mini-grid be transferred to?

Response –KPLC

The CECM noted that the County is faced with cyclic disaster of droughts and flooding. He said that for all projects the proposed land to be set up must be well identified so as to avoid setting up projects on the flood basins to avoid losses in the event of flooding. The meeting ended at about 4.30 p.m.

List of attendance

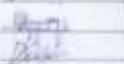
REPUBLIC OF KENYA



TANA RIVER COUNTY GOVERNMENT
FINANCE & ECONOMIC PLANNING DEPARTMENT
ATTENDANCE SHEET

PURPOSE OF THE MEETING: KUSAP

VENUE: CCCA's (Finance + Econ Planning) Office DATE: 29th Sept, 2021

S/NO	NAMES	DESIGNATION	TEL NO	E-MAIL ADDRESS	SIGNATURE
1	MATHEW BARWASA	CCCA Finance	0725831183	bugababwasa@gmail.com	
2	Samuel Barasa	CCCA Finance	0725831183	bugababwasa@gmail.com	
3	Kilunguri Barchani	Physical Planner	0725831183	bugababwasa@gmail.com	
4	Joseph Kipropch Korir	Surveyor, WFL	0722566574	Joseph.Kipropch.Korir@gmail.com	
5	D-SEUNE NTCW	SE, KPLC	0725831183	bugababwasa@gmail.com	
6	JACKSON GAKU MBEU	County Revenue Department	0725831183	bugababwasa@gmail.com	
7	ISAMBEY GICHUHI	Education - NTCW	0725831183	bugababwasa@gmail.com	
8	DOROTHY KIPKORIR	Education - NTCW	0725831183	bugababwasa@gmail.com	
9	Amari Bandia	Asst Dir. NFE	0724248535	Amari.Nandi@kenya.go.ke	

Minutes of Community Consultation meeting leading to Land Identification and Grievance Redress Committee Constitution

Project: Proposed Munguvueni Solar Mini-grid

Venue of meeting: Munguvueni village, Mnazini sub location in Ndera location of Tana River County

Date: 29/9/2021

Agendas

1. Preliminaries
2. Project description
3. Technical aspects of the project
4. Positive Impacts of the project –Solar Mini-grid
5. Negative Impacts of the project and mitigations measures
6. Need for land for the project
7. Grievance Redress Mechanism for the project
8. Plenary session
9. Focus Group discussions
10. Environmental and social screening of the site

Minute 1/KOSAP/2021: Preliminaries

The Assistant Chief of Munguvueni sub location called the meeting to order at 10.15 a.m. The meeting began with a word of prayer. The main language of communication was Kiswahili as the community could understand the language. The chief greeted the people and asked them to participate freely in matters that regard development in their area. She then invited the ward administrator to address the community members. The ward administrator asked the community members to feel free during the consultations and provide the information needed. He said he supports the project and so does the county government and promised to work hand in hand with them for the success of the project. The chief called the CREO (County Renewable Energy Officer) to welcome the project team. Madam Jackie (CREO) welcomed the KOSAP team and told the community members that the KOSAP project was progressing on well. She noted that the project (solar Mini-grid) is coming to the community to benefit them and so they need participate actively to ensure its success.

She then welcomed Samuel (KPLC) to proceed with the meeting. Samuel asked the project team to make brief introductions and the project team present is as shown in the table below.

KOSAP Project Team

S/No	Names	Position
1	Mwenda Riungu	Director Lands- Tana River
2	Dorothy Kagweria	Safeguards coordinator Ministry of Energy
3	Samuel Abaya	Environmental and Social specialist-KPLC
4	Mr. Muita	National Lands Commission coordinator-Tana river
5	Jackbed Gakii	County Renewable Energy Officer-Tana River
6	Rachel Kisiangani	KPLC –Land/Physical Planner
7	Joseph Korir	KPLC –Surveyor
8	Abubakar Jibo	Tana River County -planner
9	Kennedy Gachau	Engineer-KPLC
10	Roseline Njeru	Socio Economist-KPLC

Minute 2/KOSAP/2021: Project Description

Samuel explained that the national government is implementing KOSAP in partnership with County Government in 14 Counties in areas that are far away from the national electricity grid. He said the proposed project is called KOSAP-(Kenya Off-grid Solar Access Project) is being implemented jointly by the Ministry

of Energy, the Kenya Power and Lighting Company (KPLC) and the Rural Electrification and Renewable Energy Corporation (REREC) in partnership with the World Bank as a development partner, County Government as a partner and the communities in Off-grid areas being the beneficiaries. Off-grid areas are those places where the national electricity grid has not reached, and whose electricity access has been very low. The reason for choosing solar energy was because the area is far away from the national grid and the fact that the area is well endowed with natural sunlight with high temperatures.

He further expounded that the proposed Solar Mini-grid being implemented under KOSAP is part of the government's effort towards universal access to power. He said the proposed solar Mini-grid is one of the six Solar Mini-grids to be funded through KOSAP in Tana River County. He told the community that the project was in the preliminary implementation stages which requires public participation of various stakeholders.

He further noted that the agenda of the visit was to;

- Undertake community engagement to sensitize the community on the project, need to identify land for the project, sensitize the community on their rights in regard to the project so that they can make informed decisions.
- Undertake an environmental and social screening of the proposed site to check suitability in terms of environmental, technical, social, safety and health requirements.
- Explain the need to set up Grievance Redress Mechanism for the project, guide the community in electing Grievance Redress Mechanism committee members and sensitize the members of their role during project implementation

Samuel then welcomed the Director from Tana River to address the community. The Director noted that the County government of Tana River is in support of the project as it is key in speeding up development in the County. He added that the ministry of lands and planning in the county will assist in the necessary processes in regard to land to ensure the project complies with the relevant requirements. He said that the County Government of Tana River is in support of the KOSAP project.

The NLC coordinator was invited to address the community. The coordinator noted that most of the land in the area is community land and much of it is not registered nor adjudicated. He said the NLC is ready to support the MOE in the KOSAP project to ensure land identified for the project will comply with the requirements of the community land Act and other relevant laws and ensure that land identified for the Solar Mini-grid will be used for public purpose only i.e. to supply power to the community.

He invited (Engineer- Kennedy) to explain to the community the technical aspects of the solar Mini-grid project.

Minute 3/KOSAP/2021: Technical aspects of the project

Kennedy (KPLC) explained that the technical aspects of the Mini grids will entail; the installation of solar PV panels, battery, and thermal diesel backup unit (generator) to support solar and street lights. He explained to them that once constructed the Solar mini-grid will be operated by the implementing agency KPLC and the beneficiaries/those interested will be expected to pay for connection of electricity (one thousand shillings) and do wiring in their houses. He told them that connection of power will involve passing of electrical lines along the roads in order to reach their houses, business premises and public facilities and the route for passing the lines is called way leave. He noted that once the designs are done, the community will be notified of the exact routes during future consultations and that they will be required to give way leave consent (allowing the service lines to pass through their land in the extreme cases) and also do wiring of the houses. He noted that the project will not compensate for way leaves due to budget constraints so that they can make an informed decision. He added that distribution or supply lines will cover a radius of 1km from the mini-grid for quality supply.

He told them that once connected, the beneficiaries will be expected to pay for electricity consumed and that the tariff employed will be the same as what other Kenya Power customers pay.

Minute 4/KOSAP/2021: Positive Impacts/Benefits of the Project

Samuel explained that, every project has both positive impacts and negative impacts. Our assignment is to explain to you the impacts of the project so that you understand how the project will benefit you and the community at large and also explain to you the negative impacts of the project and their mitigation measures. The project benefit both direct and indirect discussed are as follows:

1. Better source of lighting- replacement of Kerosene lamp and small de-lite lamps with electricity lighting which is clean energy and has better lighting
2. Benefits to education- provide source of lighting which enables pupils and students to take advantage of longer hours of preps/study in school and at homes. Electricity will be useful in availing power needed to enable use of radio and television sets therefore pupils can access electronic educational information
3. Business opportunities-Power provides energy needed to power some gadgets that are difficult and expensive to power with generators. Access to electricity will therefore allow the community to take advantage of new business opportunities and enhance the existing ones e.g. Barber shops, salons, posho/maize mills, welding, photo copying, printing, fuel stations, milk coolers and fridges to preserve meat, milk among others. He asked the community to take advantage and set up such businesses
4. Employment and wealth creation- community members will get opportunities to provide non-skilled and skilled labor during construction and operation phases of the project
5. Local material supplies and other requirements- the proposed project provides opportunities to supply materials that are locally available
6. Up Scaling Electricity Access to the off-grid areas- this area is far away from the grid and so the proposed project helps to reach this area faster and in a cost effective manner as opposed to grid connections.
7. Impact on health education-due to availability of power, communities can purchase communication equipment like radios and televisions which in turn provides access to information on various issues such as health topics on HIV/AIDs, nutrition and the current Covid-19 pandemic among other information
8. Health benefits of the project- health benefits of the project are linked to replacement/elimination of use of kerosene lamps and candles, no need to use fuel generators which emits smoke causing respiratory diseases, the dispensary will also benefit from power that can be used to preserve drugs and vaccines alongside powering other medical equipment.
9. Improved standard of living- Living standards of the community is bound to improve as they take advantage of small house hold appliances like e.g. TV, Fridges, radios, blenders, iron boxes e.t.c.
10. Security- Enhanced security due to improvement in lighting up of the area through the street lights. Improved security also means more hours of business. The place will also be safe as lighting puts off opportunistic criminals who take advantage of darkness.
11. Communications- improved communication due to availability of electricity to charge phones, opportunities to set up information communication and technology related business-like cyber cafes, access to E-government services among others.
12. Presence of electricity will also attract other business investors to invest in the area

Minute 5/KOSAP/2021: Negative impacts of the project

Having discussed the benefits of the project, Samuel explained that projects also have negative impacts. He noted that the most important thing is to be able to mitigate the negative impacts so that they do not

affect the community adversely. He said "the proposed solar Mini-grid will have some environmental and occupational related negative impacts and presented them alongside their mitigation measures most of which will be implemented by the contractor. Samuel presented the negative social impacts and their mitigations as shown in the table.

1.	Negative impact	Mitigation measures to be implemented by contractor
2.	Vegetation clearance	• Clear only the areas that are needed to put up the mini-grid according to designs • After construction, do landscaping with grass to areas that have no electrical installation as opposed to living areas bare • Re-vegetation by planting of trees
3.	Air pollution linked to dust from construction activities	• Water active areas to suppress dust • Fence off construction site • Use of masks by workers • Limit vehicle speed to minimum possible when passing residential areas and the centre
4.	Air pollution from vehicle emissions	• Maintain and service vehicles • No idling of vehicle's engines
5.	Solid waste	• Clear all solid waste and dispose in line with NEMA guidelines
6.	Land. As you had been briefed before, the site identified should; -must not result in displacement of community members - We must avoid land that is currently settled or which has squatters.	• The MOE is going to give compensation in kind for the land identified for the project.
7.	Occupation safety and health hazards e.g. accidents, fall from heights, pricks by sharp objects	❖ Use of proper personal protective equipment like gloves, overalls, helmet, safety shoes ❖ Allocating work according to skills ❖ Toolbox talks to workers to identify hazards and risky activities and putting mitigation measures ❖ Close supervision of work
8.	Labor influx. The nature of the project will require technical skills that are not all available in this community. This will require movement of construction workers (labour influx) into this community. There are some risks that are involved with labor influx and we need to mitigate them as follows to avoid negative impacts on our community.	❖ Reduction of labor influx by recruitment of local workforce to the extent possible especially unskilled and semi-skilled jobs by the contractor as much as possible.
9.	Risk of social conflict due to competition for resources and opportunities	❖ We shall establishment and operationalize an effective Grievance Redress Mechanism accessible to community members where your grievances can be sorted ❖ Awareness-raising among local community and workers on

		the need to have a good /cordial working relation ❖ Consultations with and involvement of local communities in project planning ❖ Provision of cultural sensitization awareness for workers regarding engagement with local community. ❖ Contactor shall make provision to provide resources needed by the workers if the need for such resources may result to competition and conflicts e.g. water ❖ Working closely between contractor and the project grievance redress committee to address complains on time.
10.	Increased illicit behavior and crime (including prostitution, theft and substance abuse)	❖ Sensitization campaigns both for workers and local communities against such social evils (like we are doing) ❖ Enforcement of sanctions (e.g., dismissal) for workers involved in criminal activities
11.	Spread of diseases (including STDs and HIV/AIDS)	❖ Education/awareness about transmission of diseases ❖ Awareness creation on STDs among the workers and local community on ethics, morals, general good behavior and the need for the project to co-exist with the neighbours during the community and worker engagement forums. ❖ Provide condoms to employees
12.	Public health issues such as spread of diseases like Covid 19	❖ Adherence to ministry of health protocols issued ❖ Avail hand washing facilities –water and soap ❖ Keeping social distance to the extent possible ❖ Use of face masks ❖ Encourage workers to be vaccinated
13.	Gender-based violence i.e. sexual exploitation and abuse of the community members by workers	❖ Information and awareness raising campaigns to you community members and specifically women and girls on need to be on the look-out and raise such issues/complaints ❖ Mandatory awareness creation for workers by contractor on required lawful conduct in the community and legal consequences for failure to comply with laws ❖ Requirement of contractor to have code of conduct for the workers and to implement them ❖ Working closely with chiefs and local law enforcement to act on community complaints on time
14.	Gender-based violence i.e. sexual harassment among workers	❖ Requirement of contractor to have code of conduct for the workers and to implement them ❖ Inclusion of GBV specific mitigation measures in the environmental and social management plan of contractor
15.	Child labour	• Ensuring that children and minors are not employed directly or indirectly on the project. • Enforcement of Employment Act that requires contractor to adhere to minimum age • Allowing your children to be employed is illegal and punishable by law because it interferes with the children's right to education • Report any case to the chief's office

16.	Demand for Material/resources e.g water, sand, ballast	Contractor to consult with elders before using scarce resources in the community like the water to avoid conflicts.
17.	Oil Spill Hazards	- Contractor not to repair vehicles or equipment on site - Maintain vehicles and equipment in good state of repair
18.	Storm water and erosion	Contractor to put measures to harvest rainwater and control erosion during construction
19.	Wastewater/ effluent	Contractor will provide sanitation facilities for workers
20.	Noise resulting from excavation machinery, vehicles and workers	- Contractor to work only during the day - In case of blasting contractor to give notice to community through the village elders, grievance committee and chiefs office
21.	Visual and Aesthetic Landscape Impacts	- The visual negative impacts can be mitigated through putting up a wall round the facility to keep off/screen the project stacks, poles, panels - Proper siting decisions can help to avoid aesthetic impacts to the landscape.
22.	Fuel storage on site	- Contractor will undertake proper installation of the fuel storage tanks for the back-up generator. - Have a budded wall 1.5 times the fuel stored to allow controlled collection in case of a spill. - During operation implementing agency will ensure proper maintenance of the solar panels
23.	Public safety –potential risk of shocks and electrocution	As explained below in details

Public safety in regards to electricity

Samuel educated the community by highlighting the importance of using electricity safely. He said electricity is good but failure to take safety precautions while interacting with power infrastructure can result in electric shocks, fires and even electrocution/death. He emphasized the following precaution/preventive measures to observe in order to prevent risk of electric shocks, fires and electrocutions.

- ✓ Engage a certified technician to do wiring in your premises
- ✓ Use quality materials while wiring
- ✓ Do not engage in individual illegal extensions of power lines to other houses
- ✓ Don't touch sockets and switches with wet hands or wipe with wet cloths
- ✓ Do not tie your livestock on electric poles
- ✓ Do not cut earth wires that run along some electric poles
- ✓ Do not touch or go near any electric wire if you find it fallen on the ground
- ✓ Report any incident regarding electricity at the local office –staff in charge of operating the Mini-grid
- ✓ Vet all new people coming to the village by checking whether they have registered their presence with the office of the chief especially those purporting to be technicians
- ✓ In case of a black out/no power supply do not open sockets or switches

Minute 6/KOSAP/2021: Land requirements for the project

Samuel told the community that one of the agendas of the project team's visit was to check the land/site that the community had or would identify for the project. The project team together with the community would undertake an environmental and social screening to determine whether it is appropriate for the proposed solar Mini-grid project. He then invited Rachel and Korir (KPLC) to talk to the community on the issues to consider while identifying the land for the project. Korir explained to the public forum that the land identified need to meet certain criteria to ensure it is suitable for the Mini-grid. He listed the criteria

as follows; the land need to be relatively flat, not prone to flooding, stable soils, not resided by families, ability to receive maximum sunlight, land which has no conflicts and one that is central to residents and public facilities so that it will be possible to supply more people in the target community. He added that the project needs about 2-3 acres of land.

Rachel asked the community about the ownership of the portion they had identified for the project. The community noted that the land they have identified is part of land which the community had set aside for community project services sometimes ago.

She explained to them that based on the ownership of land they had explained, their land falls under the category of community land and its use and management is governed by the Community Land Act 2016. The community was told that land under this Act is owned by the community but is held in trust for them by the County Government of Tana River because the community is not registered. She noted that the government of Kenya had secured a loan from its development partners i.e. World Bank to implement the KOSAP project. She explained that the government was seeking partnership with the community in the KOSAP project where by the community would identify land for setting up the solar mini-grid while the government would provide the money for setting up the solar mini-grid.

Rachel educated the community on the following issues;

- That in the Community Land Act, the County government of Tana River only holds the land in trust for them and that they are the owners of the land
- Importance of public participation by key stakeholders including community members during the planning and operation phase of the project.
- That they have a right to give their views, opinions or fears on the proposed project
- The ownership of the land will be transferred to KPLC and that the project will be managed by KPLC
- The community will choose about 3 projects as payment in kind in three main sectors namely health, education and water and one of their (priority) would be implemented subject to a total amount of Kenya shillings on million. The community would be given a chance to deliberate on these projects

She told them that once the community agrees to identify a piece of land for the project there was a form which the leaders of the community would sign as a form of commitment and that it would be forwarded to the county government for information and for progressing other processes needed in the land registration.

Survey of the land and request for advance possession.

Rachel noted that the process of land allocation, land surveying and land transfers and registration are long and requested the community for advance possession of the land. This meant that the community would allow construction works to take place as the process of land registration is being progressed. The community agreed to the advance possession request. She explained to the community members that the surveyor will need to pick exact GPS points of the agreed identified portion of land for the solar mini-grid so that the process of land allocation till registration may be progressed.

Selection of the community projects

The ward administrator thanked the community for continued fruitful engagements. He moderated as they discussed the community projects and the following were selected in order of priority.

1. Two class rooms
2. Maternity ward

3. Library

Minute 7/KOSAP/2021: Plenary session

There was a time of discussion concerning the site for setting up the Mini-grid due to the fact that the village had been ear marked by the county government for relocation to a cluster. The government of Tana River has come up with clusters to deal with the problem of flooding. The community is yet to relocate to the cluster but based on the issue of flooding the site that the community had identified was at the cluster. The cluster is yet to be planned by the county government so that the exact portion for the mini-grid could be identified.

Samuel then invited the community members to a plenary session for the community members to ask questions or seek clarifications on the information shared. The project officers were to write the question and answer accordingly. The questions raised are presented in the table below.

	Name	Questions/suggestions	Response	Response by agency on how feedback will be used or acted upon
1	Mohammed Buya	What if an individual was to identify land so he would lose because the compensation is in kind and to the public	Yes. The compensation is in kind and for the benefit of the community. This is the reason are seeking identification of land that has been set aside for community projects.	-
2	Hamidi Buya	We have heard that we need to be within one kilometer radius. the place we as the community had identified is more than a kilometer because this area where we currently live floods. So how do we get power	The mini-grid cannot be installed in a flood zone. So discussions will continue between the county government and the MOE. If people are moving to the cluster then they will be within reach of the supply.	-
3	Mbuya Hello	Our area or the identified area is forested who will do the vegetation clearance	It is the responsibility of the contractor to do clearance and he will give employment to the locals	-
4	Mohammed	I have heard we shall pay 1000 shillings for power. What else are we paying	Every customer will pay for power consumed	

Photo of the community Meeting at Munguvueni



Minute 8/KOSAP/2021: Grievance Redress Mechanism (GRM)

Samuel explained that in a project, grievances may arise and it is important to have a grievance redress mechanism that is known to all the community members and accessible with no costs to the community members. Before explaining how to set the GRM, she asked the community to explain how they deal with grievances/issues

Existing grievance redress mechanism in the village.

One of the elders reported that the elders in the community provide leadership to the community. These elders also resolve the conflicts or grievances or any issue in the village. Any of the grievances that is difficult to resolve is referred to the office of the Chief

KOSAP Project GRM:

Samuel explained to the community that it is important to put in place a project grievance redress mechanism (GRM). He noted that the GRM to be set should borrow heavily from the existing conflict resolution structures in the community. He added that the need for a GRM is to provide the community and other stakeholder's opportunity to share project information and raise questions and grievances about the project. He told the community that they are free to raise any complaint or request information about the project. He further explained that the project will have a three-tier grievance redress mechanism as follows.

1. Locational grievance redress committee. This is the lowest level (forum) where the community will get project information and also ask questions. At this level you the community will choose project committee members who will also double as grievance redress committee. The membership will comprise; elders/men representatives, representatives from women, youth, special needs (persons with disability), and the office of the chief as Ex-officials. This will be the first stop for receiving information and raising grievances. The members to be chosen should possess leadership skills and it is hoped that most of the grievances will be resolved at this level.
2. The second level of grievance redress will be the County Grievance Redress Committee comprising members of the County working group. This committee is at the county level and will resolve complaints or issues that are unable to be resolved at the locational/project level. The chairman of the project grievance redress committee at the community will forward issues/ complaints to the

county grievance redress committee through CREO who will also be responsible for giving feed back to the local committee.

3. The third level will be the National grievance redress committee comprising of KOSAP Project Implementation Unit at the Ministry of Energy and the implementing agencies. Matters that not resolved at the County level will be escalated to this National GRC by the CEC-Energy
4. The last level of the GRM for the community or project affected persons will be arbitration or legal redress in a court of law once all the three levels have been exhausted.

He explained further that members of the project/ grievance redress committee will be chosen by the community members themselves. The committee chosen will be in charge of giving project information to the community and be a focal point for reporting project related issues of concern or grievances. He added that the composition of the committee should have representatives from all groups in the community including men, women, youth and persons with disability. The table below indicates the members of the GRMC chosen by the community members.

S/N o	Name	Representative of	Contacts
1	Bakari Buto Hero	Men	0741101048
2	Ai HeroBuya	Men	070211172
3	Hamidi Ali Baya	Youth	0745228751
4	Fatuma Jinango Baya	Women	0745360988
5	Fatuma Maneno Buya	Women	

Minute 9/KOSAP/2021: Focus Group Discussions

The community members were told of the need to have focus group discussions to discuss the project further and allow the people more opportunities to ask questions or give suggestions regarding the project. Therefore three separate meetings for men, women and youth were held. In these meetings the message on the project was echoed again especially on benefits and impacts (both positive and Negative) of the project to the community, rights of the community in regard to land and the need to have a grievance redress committee with representation from all groups in the community. Each group was told to elect their representatives to the GRM.

a) Focus Group Discussion with the women

Dorothy (MOE) explained to the women that it was important to hold a separate discussion with them so that they have opportunity to freely express themselves. One focus group discussion was held with the women. She explained the agenda of the visit by the officers from national government and county government i.e. was to undertake an environmental and social screening of the identified site to check suitability in terms of environmental, technical, social and health requirements. The second objective was to undertake community engagement to sensitize the community on the project. The third objective was to explain the land requirements for the project and the need for a project grievance redress mechanism. She then gave a summary of the project in terms of its positive and negative impacts and their mitigation measures and the requirements for identifying land for the project. She also explained the need for the women to select a representative to the project committee who would represent their views/issues to the committee for redress.

The discussion went further to bring out issues on how the women can take advantage of the project benefits rather than taking a back seat. She then explained to them that women would benefit more from the electricity because there are the ones who are more exposed to unclean energy as they are the ones

who take more time in the kitchen. They would also benefit from access to information through use of radios and TV that are powered by electricity enabling them to make informed choices on different issues such as nutrition, health among others. They were also set to benefit if they could set up small businesses like salons, cold drink kiosks, children will have time to study and enhanced security due to the fact that the area will be well lit among other benefits.

Gender based violence issues were also discussed and emphasized because women and girls are more affected by gender-based violence due to the subordinate status of women in many societies, discrimination against them and their higher vulnerabilities to violence. She noted Gender-based violence takes many forms, including sexual, physical, and psychological abuse. Other issues discussed were the importance of addressing GBV incidences and the need to report and document any complaints against workers, while ensuring survivor centred approach (respect for the choices, wishes, rights and dignity of the survivor). The women were told to be more vigilant to ensure young girls do not fall prey to GBV incidences (sexual exploitation and abuse). The women were requested to keep talking to the girls on GBV risks and the need to raise alarm in case of risk factors to ensure prompt redress.

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The women were allowed time to ask questions, give suggestions and or seek clarifications regarding the proposed project.

Table 2: Question, Suggestions, feedback and response for Focus group discussion with women

Name of Person making the contribution (e.g. comment or question)	Question, Comment, Suggestion	Feedback/Responses by project team	Response by agency on how feedback will be used or acted upon
Fatuma-	On relocation; We are ready to move to the clusters but there are no basic amenities in the cluster-the school is still in the flood zone and the county has not built a school for us in the cluster. Should we demolish our houses today is the county ready to facilitate our movement to the cluster?	The county should be able to facilitate your movement to the new location. County staff will explain this arrangement further when they conduct sensitization on the same	

Photo of Focus Group discussion with the women



b) Focus group discussion with the youth

The youth were also invited to a separate discussion. Roseline (KPLC) explained to the youth that they are also key to the decisions that are made in the community and so discussion with them was necessary so that they have opportunity to express themselves. She explained the agenda of the visit by the KOSAP team from national government and county government was to undertake an environmental and social screening of the proposed site to check suitability in terms of environmental, technical, social and health requirements. The need to undertake community engagement to sensitize the community on the project. The third objective was to explain the land requirements for the project, rights of the community members and the need for a project grievance redress mechanism and committee. She then gave a summary of the project in terms of its positive and negative impacts and their mitigation measures and their rights and requirements for identifying land. She told the youth to select a representative to the project committee who would represent their views/issues to the committee for redress. She explained to the youth that they would benefit from the project in terms of job opportunities, ability to set up shops or enhance their businesses due to power supply, entertainment, use of ICT while those in school could benefit from better lighting and ability to access e-learning opportunities through radios, T.V and internet services.

Plenary Session

She asked the youth to feel free to air their opinions on the project. The youth said they support the project. The youth were then allowed to ask questions.

Table 3: Question, Suggestions, feedback and response for Focus group discussion with youth

Name of Person making contribution (e.g. comment or question)	Question, Suggestion	Comment, Feedback/Responses by project team	Response by agency on how feedback will be used or acted upon
Salim Mitolo	Why do you give us a mini-grid why not the normal power	The mini-grids are being given to areas that are far away from the national grid to beat on cost	

Photo of the Focus group discussion with the Youth



c) Elders/men discussions

Samuel explained to the men that it was important to hold separate discussion so that the community get enough opportunities to be informed of the project and be free to ask questions. He told the men that public participation in projects is crucial as it helps build consensus and enables people to make informed choices regarding projects. He repeated the agenda of the visit by the officers was to; undertake an environmental and social screening of the proposed site to check suitability in terms of environmental, technical, social and health requirements. The second objective was to undertake community engagement to sensitize the community on the project. The third objective was to explain the land requirements for the project, rights of the community in regard to the project and the need for a project grievance redress mechanism. Samuel then gave a summary of the project in terms of its positive and negative impacts and their mitigation measures and the requirements for identifying land for the project. He also explained the need for the men to select representatives to the project committee who would represent their views/issues to the committee for redress.

He also noted that men of Munguvueni will play a major role towards successful implementation of the proposed solar mini-grid project. The men were asked to identify various ways they be involved towards successful implementation of the proposed project.

The following were the responses;

1. Men to be supervisors of the youths who will be working in the proposed project site.
2. Men to be involved in decision making especially in conflict resolution in regard to the proposed project implementation.
3. Men to be engaged in all meeting and consultation in regard to the proposed project
4. Employment
 - In identifying workers from the community
 - To be considered in both skilled and non-skilled employment (marsonary, security, drivers, storekeepers among others)
5. Provision of construction materials
 - Water
 - Murram, sand, building stones, ballast among others
 - They proposed that the contractor to consider giving men with the capacity to supply building materials like cement, metals, timbers, iron sheets among others

6. Conflict resolution (wherever there is a dispute between the contactor and the community men proposed to be called in and assist in mediation process)

The elders said they welcome the project and that they had already agreed on the portion of land where the project would be implemented i.e. part of the land which had already been set aside at the cluster. The discussion was then opened up for questions.

Plenary Session

Question, Suggestions, feedback and response for focus group discussion with Men

Name of Person making the contribution (e.g. comment or question)	Question, Suggestion	Comment,	Feedback/Responses by project team	Response by agency on how feedback will be used or acted upon
Mohammed	How long will it take before the construction of the proposed project starts?		Government project do undergo various approvals before they are implemented as per the law. Currently the team is identifying land where the proposed project will be implemented. KPLC will procure the contractor is planning to start construction of the proposed mini-grid by next year.	
Saidi Komora	What will happen if the contractor won't pay for the services rendered by the community members?		The contractor will be guided by the labour laws, hence payments shall be made to the services offered. The county government through the CREO is ready to sort any challenges between community and contractor	
	What happens with the land once the project is decommissioned since the title deed will read KPLC? What happens with the land once the project is decommissioned since the title deed will read KPLC?		The National Land Commission is the custodian of the community land will monitor the transfer land back to the community.	
Buya Hero	Spread of diseases and unwanted pregnancies amongst our school going daughters. How will the issue be handled?		These are potential impacts, it is not a must that they will happen. The contractor will take the responsibility. Before works begin the contractor should have a meeting with the community and you will	

		demand to know how he will manage his/her members of staff in relation to the community members interactions.	
	Can community members be allowed to supply the contractor with building materials?	Yes, members of the community who have the capacity of supplying building materials shall approach the contractor and express his/her interests on the same.	
Other comments	• The men noted that they will not entertain any form of conflict between the locals and the contractor's members of staff. • The contractor to take full responsibility for any social impacts that could be caused by his members of staff. • Any consultation to be undertaken should be guided by utmost respect to the members of the community. • The men proposed to have a meeting with the contractor before the construction works starts to plan on how to involve the community in the implementation of the proposed project • The employees who will come from other parts to work in the proposed project site should maintain high standards of discipline and comply with the community norms and ways of living.		

Photo of Focus Group discussion with the Men



Minute 10 /KOSAP/2021: Environmental and social screening of the site

The project team and the community members did not do actual screening of the identified site at the cluster. This is because the county government is undertaking planning of the cluster and will advise on the actual point.

CONCLUSION

1. The community welcomed the project and is in support of the project.
2. The area where the community lives is far from the identified site. This is because the community currently lives in an area that floods when Tana River breaks its banks. The county government has identified clusters (area not prone to flooding) where the community is supposed to relocate to.
3. No residential houses and no economic activity or business premises were at the cluster
4. Land identified belong to the community and is communally owned, representatives of the community signed the land forms as a sign of commitment
5. There will be no physical or economic displacement
6. In terms of consultations one public meeting was held with the residents of Munguvueni. In addition, focus group discussions were held separately with the men, the women and the youth to enhance the stakeholder engagements. The engagements were fruitful and the community identified land for the proposed Mini-grid.
7. The need for a grievance redress mechanism (GRM) was explained to the community including the need and roles of a grievance redress committee (GRC). A GRC was chosen with representatives from the men, women, youth and special needs group.
8. The need for advance possession of the land as the process of survey and registration progresses was explained to the community and the community agreed to the request.
9. It was explained to the community that it will be their responsibility to pay for connection to power , wiring of their premises and to pay for power consumed
10. The community choose 1 projects as compensation in kind which is a maternity ward at Mnazini dispensary

The meeting ended at 5.10 p.m.

Recommendations

1. Environmental Social screening of the actual site will be done once the planning of the cluster is done.

ANNEX

List of Attendance of the Community Engagements meetings Main Meeting



REPUBLIC OF KENYA

MINISTRY OF ENERGY

KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP).
ENVIRONMENTAL, SOCIAL SCREENING AND LAND IDENTIFICATION FOR PROPOSED
SOLAR MINI-GRID FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

MEETING VENUE: MUNGUNENI VILLAGE

DATE: 29/9/2021

MAIN MEETING

LIST OF ATTENDANCE

No	NAME	Identification number - ID No	Mobile No.	Village	Gender	SIGN.
1.	FAIZA H. OCHI	24316938	0717393712	MUNGUNENI	F	
2.	BUYA HERO AWADH	20707864	0769484561	"	M	
3.	SALIM MISOLO BUTA	12329437	0740150010	"	M	
4.	BAKARI BUTE HERO	23816551	074101048	"	M	
5.	BWA AHMAN BATHOLA	23816551	0703992806	"	M	
6.	DANIELA SALIM GHOFWA	30438059	0704530474	"	M	
7.	HAMIS BATHOLA MAKANGE	4659879	0759120646	"	M	X

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No	NAME	Identification number - ID No	Mobile No.	Village	Gender	SIGN.
8.	SAB KEMERA LAKPLE	4659948	—	"	M	
9.	SADIKI JILLO HIRIBAE	38339606	0792415517	"	M	
10.	BASHIR MUMBERO BUTA	35442786	0711537528	"	M	
11.	BUYA DE BAKARI	22668966	0798557472	"	M	
12.	SAB BUTE BATHOLA	1379991	—	"	M	
13.	ALU HERO BUNJA	4659953	0702141172	"	M	
14.	SAB OMAR	12779496	0713587014	"	M	
15.	OKASH BATHOLA BATHOLA	4659942	0759678088	"	M	
16.	TWANA KEMERA BATHOLA	1270348	0791904003	"	M	
17.	MUSSEIN HIRIBAE SHEVO	39813902	0794605015	"	M	
18.	HAMIS ALI BUTA	3041506	0745228751	"	M	
19.	MUHAMMAD BUYA JILLO	1379058	0707798605	"	M	
20.	OMAR - MADAWAHAMISI	23667275	0798623701	"	M	
21.	HAODO MARO	4659784	0747704	"	F	
22.	ATIE MADINA DEWO	20782322	—	"	F	
23.	MUHAMMAD M. BATHOLA	—	0798502965	"	P	
24.	HAMIS ABDOU ALI	—	0700763522	"	F	
25.	Muhammad Mader	35280237	—	"	F	

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No	NAME	Identification number -ID No	Mobile No.	Village	Gender	SIGN.
26	HABISA NDOGE SALIM		0713661657	MUNGUWENI	F	M.N.S
27	MWATJUMA - M. KOMBO				F	MA
28	HUSSEIN KOMORA	30641608	0758338705	"	M	S.M.S
29	FATUMA MZINA GAWAJA		0757672275	"	F	F.M.S
30	HASUBO KHADJA SAID		0115929771		HF	HA
31	JUMARA FATUMA BUYA	20997463	0745360988	"	F	F.M.S
32	FATUMA HALAKO BONA	1377115		"	F	F.M.S
33	MARIAM MAKUBU BUTA	9762891	0707614083	"	F	M.M.S
34	MWATJUMA HADISA KOMORA			"	F	H.M.S
35	FATUMA MAMUKU KOMORA		07014402745	"	F	F.M.S
36	MAMUKU MARIAMU BAKAR			"	F	M.M.S
37	FATUMA DINARU MBURU	112729729	0704297808	"	F	F.M.S
38	FATUMA HALAKO BODARI			"	F	
39	MARIAM HADISA BUTA	21791929		"	F	M.M.S
40	MWATJUMA HADISA BUTA			"	F	M.M.S
41	RASHID MACHAMUWA GAWAJA			"	F	R.M.S
42	FATUMA MARIAM BUTA			"	F	F.M.S
43	MWATJUMA HADISA BUTA			"	F	M.M.S



No	NAME	Identification number -ID No	Mobile No.	Village	Gender	SIGN.
44	HABISA BUTA AHMAN		0794066685	MUNGUWENI	F	F.M.S
45	SALMA ZAMAKALO HUSEN		07	MUNGUWENI	F	S.M.S
46	HASHIM BUYA MITOLO		0742262965	"	M	H.M.S
47	JUMARA MWANAHAMU OMAR		0112195949	"	F	J.M.S
48	MWANAHAMU NDOGE HADISA			"	F	M.M.S
49	FATUMA HADISA KOMORA			"	F	F.M.S
50	FATUMA NKANDUGU KOMORA	35277992	0757248690		F	F.M.S
51	FATUMA HALAKO SAID		0701550357	"	F	F.M.S
52	NAMUKU OMAR	3561981	3561981	"	F	N.M.S
53	FATUMA HALAKO KOMORA	26594481	26594481	"	F	F.M.S
54	FATUMA HADISA GAWAJA			"	F	F.M.S
55	MWANAHAMU M. SAID			"	F	M.M.S
56	DINARU MWANAHAMU HADISA	26613178	0745982288	"	F	D.M.S
57	BIASIMARA MORTO SAID			"	M	B.M.S
58	SHAMU ANNA KOMORA	26578425		"	M	S.M.S
59	KENNETH MWATA	7494649	0722230036	NLC	M	K.M.S
60	KOMEDY GACHAU	2739623	07506218	KPLC	M	K.M.S



REPUBLIC OF KENYA

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KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP).
ENVIRONMENTAL, SOCIAL SCREENING AND LAND IDENTIFICATION FOR PROPOSED
SOLAR MINI-GRID FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

MEETING VENUE: MONGUWANI VILLAGE

DATE: 29/9/2021

MAIN MEETING

LIST OF ATTENDANCE

No	NAME	Identification number -ID No	Mobile No.	Village	Gender	SIGN.
1.	ROSEMARY NJERU		0725571017	KPIC	F	
2.	Samuel KANTA	21582448	0723492652	KPIC	M	
3.	Kislangesi Dasheda	18367	070632227	KPIC	F	
4.	JACKSON GAKU	27337229	0719500739	CREO	F	
5.	DORIS KAGUMU			MOE		
6.	Abdalla Abas Abdurahman	22566394	0711426770	ward admin	M	
7.	Jibo Abubakar Mngatira	3041024	0706561980	CGIR	M	



No	NAME	Identification number -ID No	Mobile No.	Village	Gender	SIGN.
8.	MUGENYA RIONGUA	22011931	0721766556	CGIR	M	
9.	JOSEPH KARIKURU KARIR	7867177	0722566394	KP	M	
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List of Attendance for the Men Focus Group Discussion



REPUBLIC OF KENYA

MINISTRY OF ENERGY

KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP).
ENVIRONMENTAL, SOCIAL SCREENING AND LAND
IDENTIFICATION FOR PROPOSED SOLAR MINI-GRID FOR
COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

MEETING VENUE MUNGUYENI VILLAGE

DATE 29/9/2021

FOCUS GROUP DISCUSSION: MEN

LIST OF ATTENDANCE/PARTICIPANTS LIST

No	NAME	Identification number -ID No	Mobile No.	Village	SIGN.
1.	Said Buthe Bashora	1379991	-	MUNGUYENI	
2.	SAID KOMORA LAKOLE	4659948	-	MUNGUYENI	
3.	Mohammed Buja Jilo	1379058	0707798605	MUNGUYENI	
4.	Okash Bahola Babu	4659742	0759678587	"	
5.	TWAKA KOMORA BASHORE	1379348	0797904013	"	
6.	BUJA HERO AWABH	20707864	0769454561	"	
7.	HAMISI BAHOLA KAKANGE	4659879	0759920046	"	
✓ 8.	BACARI BUTHERO	-	0741101048	"	
9.	HUSSEIN KOMORA OMARA	8297544	0714422896	"	
✓ 10.	ALI HERO BUJA	4659953	0702141172	"	
11.	JOSEPH KIPKATICH KAPPA	7867177	072255394	KLP	
12.	SAMUEL ABAYA	21542548	0723492012	KPLC	
13.	KENNETH MWEITA	7494649	0722232056	NLC	

List of Attendance for the Women Focus Group Discussions



REPUBLIC OF KENYA

MINISTRY OF ENERGY

KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP),
ENVIRONMENTAL, SOCIAL SCREENING AND LAND
IDENTIFICATION FOR PROPOSED SOLAR MINI-GRID FOR
COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

MEETING VENUE MINGUENI VILLAGE

DATE 29/9/2021

FOCUS GROUP DISCUSSION: WOMEN

LIST OF ATTENDANCE/PARTICIPANTS LIST

No.	NAME	Identification number - ID No	Mobile No.	Village	SIGN.
1.	FATUMA HADISA GAWANA	4659836		MINGUENI	FH
2.	MWANAHADISI HADISA HIDEA	4659689	07591389	MINGUENI	FH
3.	MARIAM HADEDE OMAR	21791929	07139176	MINGUENI	FH
4.	ESHA HABUJE KOMORA	4659959	074202195	MINGUENI	FH
5.	FATUMA MANENO BUYA	3914757		MINGUENI	FM
6.	FATUMA DILLORE MENEJI	12729729	0704297808	MINGUENI	FM
7.	JUNANKO FATUMA KISA	20997463	074526089	"	FH
8.	MWANAHADISI MARIAMU KOMORA	2950245	07	"	FH
9.	FATUMA HALAKO BONA	1379115		"	FH
10.	MWANAHADISI MARIAMU KOMORA	2950245		"	FH
11.	HASUBO KHADIJA SAID		01159237	"	FH
12.	MARIAM MAKULU BUYA	9768891	070764052	"	FH
13.	MWANAHADISI HADISA KOMORA	4659416	071448251	"	FH



No.	NAME	Identification number - ID No	Mobile No.	Village	SIGN.
14.	FATUMA HADEDE OMAR	4659784	071336729	MINGUENI	FH
15.	FATUMA HADISA KOMORA	26594481		"	FH
16.	FATUMA MARIAMU KOMORA	25372922	07572857	"	FH
17.	FATUMA BUYA ALHASSAN		079066475	"	FH
18.	FATUMA MARIAMU KOMORA	39493836		"	FH
19.	FATUMA HADEDE OMAR	29178830		"	FH
20.	KHADIJA NODOR SAID		071666401	"	FH
21.	ESHA HALAKO BONA		071655357	"	FH
22.	MARIAM HADISA OMAR	35361951		"	FH
23.	MARIAM MAKULU BUYA	35417301		"	FH
24.	MWANAHADISI MARIAMU KOMORA		079850716	"	FH
25.	MWANAHADISI MARIAMU KOMORA			"	FH
26.	Berobu Kigoro			MINGUENI	FH
27.	Jalibon Gauri	23757201	071750003	CARU-KUAT	FH
28.	Jalibon Gauri	23757201	071750003	CARU-KUAT	FH
29.	Jalibon Gauri	23757201	071750003	CARU-KUAT	FH
30.					
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List of Attendance for the Youth Focus Group Discussion



REPUBLIC OF KENYA

MINISTRY OF ENERGY

KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP).
ENVIRONMENTAL, SOCIAL SCREENING AND LAND IDENTIFICATION FOR PROPOSED
SOLAR MINI-GRID FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

MEETING VENUE: Munguini MUNGUINI VILLAGE

DATE: 29/9/2021

FGD YOUTH

LIST OF ATTENDANCE

No	NAME	Identification number -ID No	Mobile No.	Village	Gender	SIGN.
1.	Hamid Bura	30441546	0745228751	Munguini	M	<i>[Signature]</i>
2.	Said Omar Dina	12729496	0713589014	"	M	<i>[Signature]</i>
3.	Hassan Bura Kenia	30441608	0758338905	"	M	<i>[Signature]</i>
4.	Bashara Mohamed Bura	35442786	0711537528	"	M	<i>[Signature]</i>
5.	DHIDHA SALIM SHAFWA	30438059	0704530474	"	M	<i>[Signature]</i>
6.	SALIM MUSA Bura	12729489	0711015020	Munguini	M	<i>[Signature]</i>
7.	Sadiki Jillo HAMBRE	38339606	0797415517	"	M	<i>[Signature]</i>

1



No	NAME	Identification number -ID No	Mobile No.	Village	Gender	SIGN.
8.	HUSSEIN HIRIBAESHEVO	39813902	0794605615	"	M	<i>[Signature]</i>
9.	Bura Ali Bakari	22668966	0798667473	"	M	<i>[Signature]</i>
10.	Bashara Said Mohamed	—	—	"	M	<i>[Signature]</i>
11.	Baseme Njeru	—	072057107	KPLC	F	<i>[Signature]</i>
12.	MULENDA Bura	22071931	0721766536	C.G.T.A	M	<i>[Signature]</i>
13.	KENNETH MURATA	7494649	0722220038	NLC	M	<i>[Signature]</i>
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15.						
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APPENDIX 4: ABBREVIATED RESETTLEMENT ACTION PLAN (A-RAP)

1. Munguvuseni Sub-project Site

The Munguvueni sub-project site is on unregistered community land and held in trust by the County Government of Tana River on behalf of the community, in line with the Community Land Act 2016. The proposed site is uninhabited, has no structures, community facilities, or encumbrance and is utilized by the community for grazing. Consultations leading to the identification and selection of the sub-project site are captured in the Environmental and Social Screening report for Munguvueni. *Refer to Chapter 5 of the ESIA for the comprehensive socio-economic profile.*

2. Actual Census Survey of PAPs and Valuation of Affected Assets

The number of project-affected persons (PAPs) is 400 (approximately 80 households). The land acquisition-related impacts are loss of land and pasture. Mitigation measures include in-kind compensation for loss of land and pasture, and designing power distribution lines to avoid impacting trees, crops, structures, and community facilities. No physical displacement is anticipated; however, there is minimal loss of pasture occasioned by the acquisition of land utilized by the community for grazing. The 1.3416 hectares identified for the sub-project will be acquired compulsorily by the National Land Commission (NLC). The proposed site will be valued and compensated in line with the provisions of the Resettlement Policy Framework (RPF) prepared under KOSAP. *Refer to section 2.2 of the ESIA for the sketch map of the site.*

3. Compensation Measures Agreed with the PAPs and other Resettlement Assistance to be Provided

The proponent requested the community identify three priority projects, whereby one out of the three would be provided as in-kind compensation for loss of land and pasture. The Munguvueni community proposed various projects namely, construction of 2 classrooms in Mumbuji Primary School, maternity ward, fencing of the Mumbuji Primary School and construction of a library in Abo Primary School. In addition, loss or damage to crops, trees, structures, and community facilities will be compensated in line with the provisions of the RPF, and as summarized in the entitlement matrix below.

3.1 Entitlement Matrix

Types of Impact	Person(s) Affected/Eligible for Compensation	Compensation/Entitlement/Benefits	Responsible organization
1. Loss of Land			
Loss of unregistered community land.	Community.	Compensation in-kind as prioritized by the community.	KPLC
Loss of land in unregistered group ranches.	Group ranch members.	Compensation in-kind as prioritized by the community.	
Loss of land in registered group ranches.	Group ranch members.	Compensation in-kind as prioritized by the community.	
Loss of land owned by the National Police, county governments and the Ministry of Interior	Government agencies.	No compensation for public land allocated to another government body.	
Loss of land owned by the Kenya Forest Service (KFS) and Kenya Wildlife Service (KWS).	Government agencies.	No compensation for public land allocated to another government body. However, payment of conservation fees to KWS and KFS as stipulated under their respective regulations is foreseen.	

2. Loss of Use on Land			
Loss of use on public land (e.g., grazing, farming etc.).	Communities utilizing public land.	Communities do not own public land; however, they utilize public land with consent from the relevant agencies. The project will implement the infrastructure project prioritized by the community as compensation for the loss of public land use.	KPLC
Loss of use on unregistered community land, unregistered group ranches and registered group ranches (e.g., grazing, farming etc.).	Communities utilizing unregistered community land, unregistered group ranches, and registered group ranches.	Compensation in-kind as prioritized by the community.	
3. Loss of /Damage to Assets on Land			
Trees	Community members on unregistered community land; community members utilizing public land; members of registered and unregistered group ranches and government entities.	During detailed design for power distribution lines and construction of the mini grid and community project, any crops, structures, trees, and community facilities shall be avoided to the extent possible. However, loss or damage to the above will be compensated/restored at full replacement cost, ¹ in line with the provisions of the RPF.	KPLC
Crops			
Structures			
Community facilities e.g., water sources (earth pans, boreholes etc.).	Community members on unregistered community land, community members utilizing public land, and members of registered and unregistered group ranches.		

4. Consultations with PAPs About Acceptable Compensation Options and Alternatives that have been Considered

Detailed consultations with PAPs on land acquisition and compensation, including the modalities of acquiring land and compensation options, were undertaken during the Environmental and Social Screening, Environmental and Social Impact Assessment, and the NLC land valuation process. The following sections provide a summary of the consultations.

4.1 Engagement of Project -Affected Persons (PAPs)

Local administration and County Renewable Energy Officers (CREOs) supported the proponent and implementing agency (IA) to mobilize community members and other stakeholders for public consultations and engagement activities. National and county government entities, community segments (men, women, youth, elders, persons with

¹ A cost basis that will yield compensation sufficient to replace assets, plus necessary transaction costs associated with asset replacement).

disability, vulnerable and marginalized groups, etc.), NGOs, and local leaders were engaged through key informant interviews, community meetings, and focus-group discussions. The proponent and IA implemented appropriate measures to ensure PAPs effectively participated in the consultations. *Refer to Chapter 6 of the ESIA on public consultation and engagement.*

Once the compensation award and Bill of Quantities (BoQs) are known, the Implementing Agency (IA) will engage the community and agree on the community project to be executed as in-kind compensation. During these consultations, the IA and the community will define the roles and responsibilities of the community in monitoring the implementation of in-kind compensation and maintenance once the IA hands it over to the community. Thus, the IA and the community will effect an agreement to be signed by the local leadership; representatives of the Grievance Redress Committees at the locational, county, and national levels; A-RAP Implementation Committee, and Implementing Agencies.

4.2 Identification of Community Representatives

The Munguvueni Locational Grievance Redress Committee (LGRC), constituting a chairperson, secretary, and three members, was formed through community consensus. The committee's membership comprises men, women, youth, persons with disabilities, and ethnic minorities. The LGRC is responsible for engaging PAPs and resolving complaints. Refer to Chapter 6 of the ESIA on the Grievance Redress Committees. Further, the community will constitute the A-RAP Implementation Committee responsible for coordinating community engagements on the A-RAP and monitoring the implementation and closure of the A-RAP. The representation of the committee will consider gender, vulnerability, and intergenerational sensitivities.

4.3 Summary of Consultations on Land Acquisition and Compensation Options

Date	Objective	Implementing Entities	Land Acquisition and Compensation Aspects Discussed	Key Issues Raised	Responses Given
29 th September 2021	Environmental and Social Screening. Voluntary land donation (VLD). Constitution of the Locational Grievance Redress Committee (GRC).	Ministry of Energy (MoE) Kenya Power (KPLC) Rural Electrification and Renewable Energy Corporation (REREC)	Site identification and land allocation for the sub-project. Criteria for VLD. Community entitlements (forms of compensation and implications for each).	What if an individual was to identify land so he would lose because the compensation is in kind and to the public.	Yes. The compensation is in kind and for the benefit of the community. This is the reason are seeking identification of land that has been set aside for community projects.
				We have heard that we need to be within one kilometre radius. the place we as the community had identified is more than a kilometre because this area where we currently live floods. So how do we get power.	The mini-grid cannot be installed in a flood zone. So, discussions will continue between the county government and the MOE. If people are moving to the cluster, then they will be within reach of the supply.

				On relocation; We are ready to move to the clusters but there are no basic amenities in the cluster-the school is still in the flood zone and the county has not built a school for us in the cluster. Should we demolish our houses today is the county ready to facilitate our movement to the cluster?	The county should be able to facilitate your movement to the new location. County staff will explain this arrangement further when they conduct sensitization on the same
10 th February, 2022	Environmental and Social Impact Assessment.	Consultants MoE KPLC REREC	Land acquisition through compulsory acquisition (not voluntary land donation). Selection of three priority community projects, whereby one is to be implemented as in-kind compensation for land.	Construction of 2 classrooms in Mumbuji Primary School Maternity Ward Fencing of the Mumbuji Primary School and Construction of a library in Abo Primary School.	The proponent has set aside KES 1 million to implement the priority in-kind compensation project. The value of the project will be proportional to or greater than the value of land. NLC will determine the value of land.
May 2023	Compulsory Land Acquisition.	NLC	Site inspection and inquiries. Land valuation. Award of compensation.		

5. Institutional Responsibility for Implementation of the ARAP

Entity	Role
Ministry of Energy	Coordinate A-RAP implementation and provide budget for in-kind compensation.
National Land Commission	Implement the statutory process for compulsorily land acquisition, including site gazettement and inspections, inquiries, valuation, and award of compensation.
Kenya Power	- Monitor all land acquisition and compensation aspects (including A-RAP closure), complemented by a third-party monitor. - Provide budgets for stakeholder engagement, grievance management, and monitoring, including the facilitation of the Land Acquisition and Compensation Implementation Committee, and the Grievance Redress Committee.
Mini-grid Contractor	Implement in-kind compensation concurrently with the solar mini-grid project.
Supervising Consultant	Monitor and report on implementation of in-kind compensation, and overall project compliance with social safeguards.
Grievance Redress Committees	Formed at the locational, county, and national levels, and responsible for resolving complaints, including A-RAP related grievances.

A-RAP Implementation Committee	Coordinate A-RAP engagements at the community level, monitoring A-RAP implementation and closure.
Affected Community	Responsible for the operation and maintenance (O&M) of in-kind compensation project. An agreement stipulating the O&M roles and responsibilities of the community will be effected.

6. Procedures for Grievance Redress

The Project procedures for grievance redress were established through a public consultation process and informed by the existing conflict resolution structures in the community. The Grievance Redress Mechanism (GRM) comprises tiers at the project, county, and national levels. *Refer to Chapter 8 of the ESIA for a detailed GRM.*

7. Implementation Timetable and Budget for the ARAP Implementation

7.1 Timelines

The proponent will commission the community project by May 25th, 2025, before operationalizing the mini-grid. The mini-grid contractor will implement the mini-grid and the community project simultaneously. The Supervision Consultant and IAs will implement a commitment register to ensure the mini-grid contractor can achieve the agreed-upon milestones. The register will be complete with clear and practical timebound indicators, which can be monitored by all parties – the PAPs, IAs, the Ministry, third-party monitor, and the Bank.

7.2 Budget

The proponent has set aside KES 1 million for the community project (budget captured in the ESMP). The compensation award from NLC and the Bill of Quantities will inform the final cost of the community project. The costs for in-kind compensation, stakeholder engagement, grievance management (including the facilitation of the GRCs and the A-RAP Implementation Committee), and monitoring are covered under the project.

APPENDIX 5: Nema Firm Of Experts Licence And Lead Expert License



FORM 7

(r.15(2))

**NATIONAL ENVIRONMENT MANAGEMENT
AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING
LICENSE**

License No : NEMA/EIA/ERPL/18263

Application Reference No: NEMA/EIA/EL/23929

M/S Norken International Limited
(individual or firm) of address
P.O. Box 9882 - 00100 NAIROBI

is licensed to practice in the
capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **0181**

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

Issued Date: 12/30/2022

Expiry Date: 12/31/2023

Signature.....

(Seal)

Director General
The National Environment Management Authority





FORM 7

(r.15(2))

**NATIONAL ENVIRONMENT MANAGEMENT
AUTHORITY(NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING
LICENSE**

License No : NEMA/EIA/ERPL/18279

Application Reference No: NEMA/EIA/EL/23951

M/S Isaiah Kegora
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Issued Date: 12/30/2022

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Signature.....

(Seal)

Director General
The National Environment Management Authority

