RUREC
RURAL ELECTRIFICATION & RENEWABLE ENERGY CORPORATION

MINISTRY OF ENERGY

REPUBLIC OF KENYA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED LOMUNYENAKWAAN SOLAR MINI-GRID

PROJECT: KENYA OFF-GRID SOLAR ACCESS PROJECT

SUB-PROJECT: COMPONENT 1. MINI-GRIDS FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS

LOCATION : PARKATI SUBLOCATION, KATILIA LOCATION TURKANA EAST SUBCOUNTY TURKANA COUNTY.

2023

CERTIFICATION

This ESIA project report for the proposed Lomunyanakwan Off-Grid Solar Project was prepared in accordance with the Environmental Management and Coordination Act (EMCA), 1999 and the Environmental (Impact Assessment and Audit) regulations, 2003 and their subsequent amendments EMCA (amendments), 2015 and EIA/EA regulations (amendments), 2019, the World Bank operational procedures (OP) and Environmental Safeguards Standards (ESS) for submission to the National Environment Management Authority (NEMA). We hereby certify that to the best of our knowledge and belief, the information and particulars provided in this report are correct and true. Further, it reflects the views provided by various stakeholders and village elders at Lomunyanakwan, Turkana County.

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Disclaimer:

This ESIA report is strictly confidential to MOEP (the Proponent) and any use of the materials thereof should strictly be in accordance with the agreement between the Proponent and the consultants; Norken International Limited and Centric Africa Limited (the Environmental Impact Assessor). It is, however, subject to conditions in the Environmental (Impact Assessment and Audit) Regulations, 2003 under the Kenya Gazette Supplement No. 56 of 13th June 2003.

ACKNOWLEDGEMENT

The ESIA/Audit Experts are grateful to the project proponent for commissioning this Environmental and Social Impact Assessment. We would like to acknowledge with great appreciation Lomunyanakwan community members and leaders who were involved in the public participation and consultation process, for their co-operation throughout the exercise. I further acknowledge the support, either direct or indirect, from the various parties who assisted the ESIA/EA experts' team towards the successful completion of this ESIA report. They include environmental experts from the Centric and Norken consortium**.** Finally, the consultant wishes to acknowledge and appreciate the efforts and inputs by MoE, the Implementing Agencies (KP and REREC), and the World Bank Group teams in reviewing this report.

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Abbreviations

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	Corporate 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
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
IPs	Indigenous Peoples
JV	Joint Venture
KETRACO	Kenya Electricity Distribution Company
KII	Key Informant Interviews
KOSAP	Kenya Off-Grid Solar Access Project
KP	Kenya Power
LEP	Labour and Employement Plan
LGRCs	Local Grievance Redress committe
MGs	Mini Grids
MOEP	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
SERC	Standards and Enforcement Review Committee
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 Resource Authority

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 Turkana County, one of the target counties, the Proponent is proposing to develop 19 No. mini grid facilities including Lomunyenakwan 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 Lomunyenakwan 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 Lomunyenakwan 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 project area encompasses scarce tree species. Turkana county has a robust ecological system that residents depend on for their animal feed, water and many other benefits. The area's ecological conditions are influenced by the soil type, altitude, vegetation, rainfall pattern and human activities. The two dominant vegetation types in the area include shrubs in the vast region of Turkana East. The shrubs are suitable for livestock rearing.

Vegetation is characterised by patchy, annual grassland and herbaceous plants interspersed with woody shrubs. Edible fruit Maerua subcordata (eerut) is also found in the project area.

The land-use and land-cover of the study area has been interpreted from visual interpretation, survey maps of the area, and subsequently by ground checking during field surveys. The land use within 5 km radius of project is mostly residential. The main activity in the area is grazing of sheep, cows and goats. There was no crop farming in the community. On the site identified, the land is currently unoccupied. However, the PAPs reported that it is used as an alternative route during the rainy season.

E-6 Project Description

Geographically, Lomunyanakwan site falls on coordinates Latitude 2°30'52.2"N and Longitude 36°13'58.9"E. Administratively, it is found in Parkati Sublocation, Katilia Location Turkana East Subcounty Turkana County. The site area is neighboured by Lomunyanakwan village approximately 1km to the North East by Lomunyanakwan village and 600m to the East by Lomunyanakwan Dispensary.

The Lomunyenakwan Mini Grid project aims to provide electricity to both residential and nonresidential consumers in Lomunyenakwan Sublocation, Lokichoggio Location Turkana West Subcounty Turkana 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 405,245.42 although this amount may change as more detailed plans are developed.

The project will utilize 120kWp solar photovoltaic panels, a 300kWh Battery Energy Storage System, and a 82kVa Diesel Generator with a 2000L capacity tank to generate electricity. A 12km Low Voltage Power Distribution Network will be established to distribute the power to customers.

The project consists of two main components: Hybrid Mini-Grids and a 12km 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 Mini Grid, approximately 1.97 hectares of land will be compulsorily acquired by NLC. This land is part of the community's designated public purposes area. The Proponent engaged with the community during the land acquisition process, and there were no objections to transferring 1.97 hectares of land to REREC for the management of the solar mini-grid. In accordance with the World Bank's Operation Procedure 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 the project report.

E-7 Project Alternatives

Solar energy is identified as a non-polluting and site-specific option, and the proposed site for Lomunyenakwan 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 January 16, 2021, a total of 76 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.

Some of the Community concerns include that the land identified for the project is used as the road during the rainy season. Therefore they asked for special compensation for the youth and women. The community requested the following from the project The area has no hospital and experiences water shortages. In addition, the school is ill-equipped. For the compensation project, the village administrator proposed the digging of a borehole; he explained that the borehole which is approximately 1km away has dried up.

Priority	Proposed project	Location	Distance from site

i)	**Water project** The community give an option of water purification and water tank provision **Challenges** • insufficient water supply • The borehole is salty **Required** Water piping to the community, purification of water. Provision of water tank to the community	N-2^{0}31'5" E- 36^{0}14'29"	4km
ii)	**<u>Maternity Ward.</u>** The community give an option of construction of a new ward in the dispensary. **Challenges** • No Lab • Insufficient latrines • Currently the community depends on the mobile clinic donated by 1st Lady during the beyond Zero Campaign.	N-2^{0}30'52" E- 36^{0}13'58"	200m

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 0-1: 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 0-2: 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 0-3: 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
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
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 Project Affected Persons (PAPs)	Moderate	Minor

Impact	Significance Of Impact (Pre-Mitigation)	Residual Impacts (Post-Mitigation)
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 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 Ministry of Energy (MOEP) 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. The 14 underserved Counties include Mandera, Wajir, Garissa, Tana River, Samburu, Isiolo, Marsabit, Turkana, West Pokot, Turkana, Taita Taveta, Kwale, Kilifi and Lamu.

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 around the refugee camps), enterprises, community facilities, and water pumps in fourteen (14) out of the forty-seven (47) 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).

Turkana 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. Their population is highly dispersed, at a density of 64.50/km², which is four times lower than the national average. They present profound infrastructure deficits, including lack of access to roads, electricity, water, and social services.

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 Co-ordination Act (EMCA), 1999 and its amendments; the Environmental Management and Coordination (Amendment) Act, 2015 and World Bank's Environmental and Social Operational policies. 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 Operational policies. The two firms are licensed by National Environment Management Authority (NEMA) to undertake environmental impact assessment studies. 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 (REREC) and the Ministry of Energy (MOEP) 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.

- 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.

- 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.

- 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.

The MOEP 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 (KP).

1.2 Project Overview

The project site is located in Lomunyanakwan area, Parkati Sublocation, Katilia Location Turkana East Subcounty, Turkana County on Latitude 1°20'16.80"S and Longitude 35°21'0.00"E. The proposed solar mini grid will be located on a 1.97 Hectares piece of land located adjacent to Lomunyanakwan Dispensary. The solar mini grid will comprise Solar panels, batteries, inertors, perimeter fence and a power distribution line to cover a radius of approximately 1.5km.

The proposed mini-grid will be the main source of energy providing electricity services to the community facilities, enterprises and homesteads, at Lomunyanakwan market. It will utilize 120kWp solar photovoltaic panels, a 300kWh Battery Energy Storage System, and a 82kVa Diesel Generator with a 2000L capacity tank to generate electricity. A 12km Low Voltage Power Distribution Network will be established to distribute the power to customers.

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 potential environmental and social risks associated with the project and recommends mitigation measures to avoid adverse impacts for the remainder of the project's lifecycle. The project has to comply with international standards(World Bank Environmetal and Social Operational Policies) along with applicable national, and local regulations.

1.4 ESIA METHODOLOGY

1.4.1 Screening and Scoping

Evaluation of ESIA procedure has been undertaken as a fundamental procedure to implementation of the solar power minigrid development project which is systematically mainstreamed into the project's Cycle. World Banks Social OPs underpin and demonstrate this commitment. 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.

1.4.2 **Environmental Impact Assessment**

The steps below were followed in the preparation of this ESIA Report.

1.4.2.1 Kick-off Meeting

The Consultant had a brief kick-off meeting with the Proponent on 12th July 2022 followed by subsequent online meetings and discussion on various aspects of the project up to 5th August, 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.

1.4.2.2 Desk based review and baseline assessment

A comprehensive description of the KOSAP Component 1: project includes a desktop review of all the existing project documentation provided by the Proponent 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.

1.4.2.3 Project Description

The consultant 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 project 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

1.4.2.4 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 entailed 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 report. The ecological and biophysical environment will focus on describing the flora and fauna resident in the Turkana county and at the mini-grid site level. This was be based on observation of flora and fauna, KPIs on local indigenous knowledge on historical and current status of rare, endemic and endangered plant and animal species known to occur in the project area. 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.

1.4.2.5 Impact Assessment (IA) 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. In order 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 was 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, 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 identified included: 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 in Lomunyanakwan area.

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 power line distribution network; restricted access to grazing lands, water resources, soils and tree resources, economic/livelihoods displacement etc.

1.4.3 Environmental and Social Management Plan (ESMP)

The ESMP as the implementation instrument of the ESIA has captured all the parameters that need to be monitored on a routine basis. The parameters are indicated in an Environmental and Social Management and Monitoring Plan (ESMMP) matrix, a detailed description of the implementation and monitoring program.

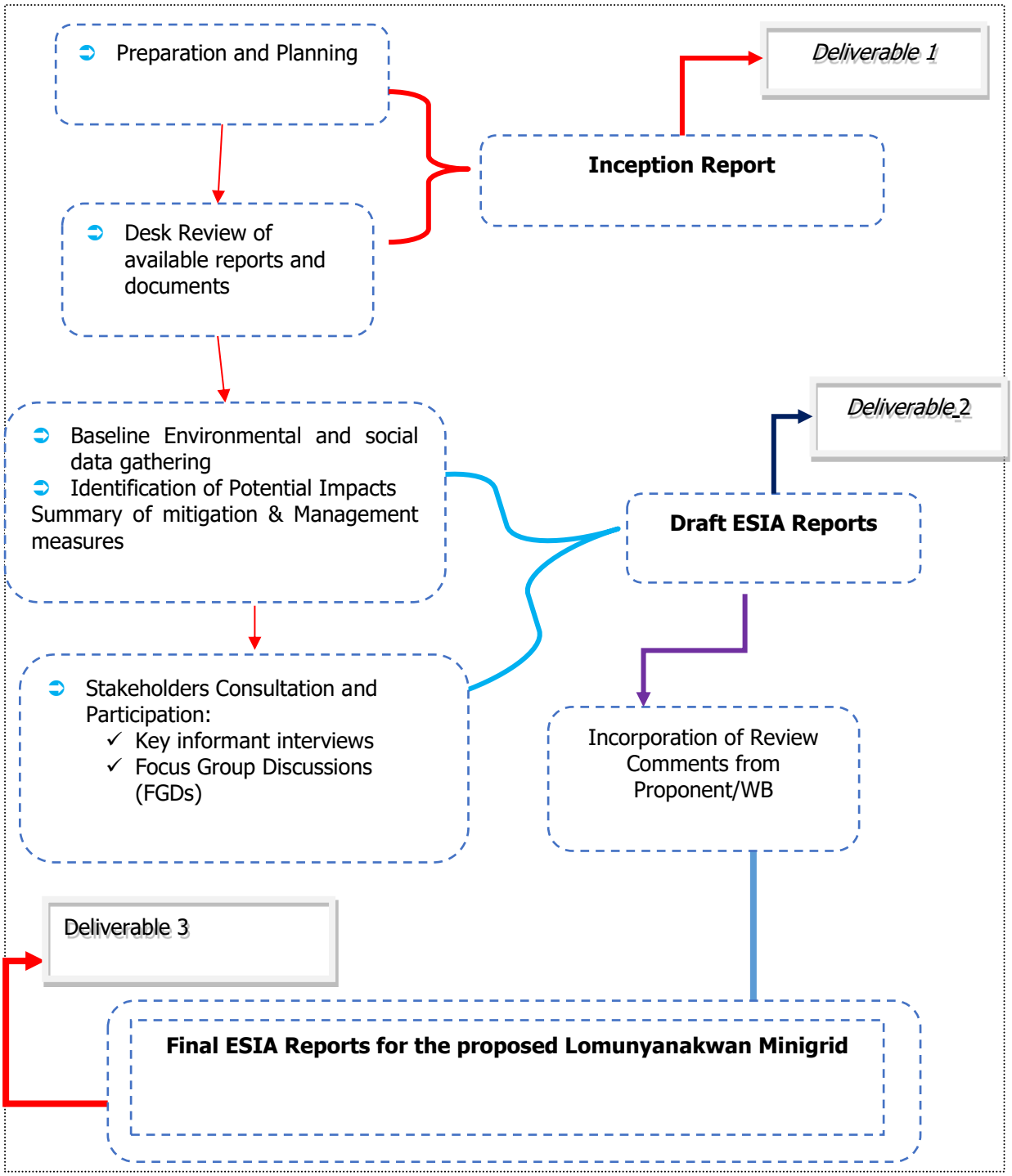
The ESMMP has a detailed arrangement of responsibilities for managing and monitoring the implementation of mitigation measures and the impacts of the project during construction, operation and decommissioning. This include: a description of monitoring methodology, specific operations, and features to be monitored, monitoring reporting relationships and arrangements to ensure that monitoring is effective. Simple and straightforward monitoring processes established for ease of implementation throughout the project cycle. This Plan follows through a description of the impacts and areas affected, key mitigation measures, monitor-able indicators, timeframe, responsibilities, and budget implications.

The ESMP include an implementation schedule and budget cost estimates for the mitigation measures. It also describes institutional arrangements with regard to the implementation of the ESMP 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 ESMP.

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

Additionally, the ESMP has a component on contracting management that will ensure the implementation of the ESMP by all contractors and subcontractors. A contracting mechanism is included in the ESMP to incentivize contractors and their subcontractors to comply with the ESMP or alternatively penalize them for failure to comply with the ESMP. 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, labour 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 1 is a summary of the methodology the consultant adopted in undertaking environmental and social impacts assessment for the proposed Lomunyanakwan ESIA project.



The limitation experienced during the study are illustrated below.

- ✓ Some data which the consultants sought from the community could not be assertained eg. the number of the VMG's, orphans, rate of HIV infections, number of cases of GBV etc.

1.5 LAYOUT OF THE REPORT

Table 1-1: Structure of the ESIA Report

SECTION	TITLE	DESCRIPTION
Chapter 1	Introduction	Introduction to the Project and ESIA scope and methodology adopted.
Chapter 2	Project Description	Technical description of the Project & related infrastructure and activities.
Chapter 3	Applicable Legal and Regulatory Framework	Discusses the applicable environmental and social regulatory framework and its relevance for the Project.
Chapter 4	Environmental, Ecology and Social Baseline	Outlines Environmental, Ecology and Social Baseline status in the study area of the Project
Chapter 5	Stakeholder Engagement and Grievance Redress	Provides an overview of the stakeholder engagement activities undertaken during the ESIA, stakeholder categorization and profiling Additionally, it details the provision of Grievance Redress Mechanism for the project
Chapter 6	Analysis of Project Alternatives	Provides and analysis of project alternatives in terms of location, technology and construction materials
Chapter 7	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.
Chapter 8	Environmental and Social Management and Monitoring Plan	Outline of the ESMMP taking into account identified impacts and planned mitigation measures and monitoring requirements
Chapter 9	Conclusion and Recommendation	Summary of impacts identified for the Project and conclusion of the study.

1.6 TEAM COMPOSITION

S/No	Names	Position
1	Samwel Olela	REREC
3	Samuel Ebei	County Renewable Energy Officer- Engineer- Turkana County
4	Loise Kioko	Norken International Limited /Centric Africa Limited- EIA/EA Expert
5	Patrick Ngari	Norken International Limited /Centric Africa Limited- EIA/EA Expert
6	Martin Gitonga	Norken International Limited /Centric Africa Limited- EIA/EA Expert
7	Sharon Watiri	Norken International Limited /Centric Africa Limited- EIA/EA Expert

1.7 STUDY LIMITATIONS

The limitation experienced during the study are illustrated below.

- ✓ Some data which the consultants sought from the community could not be assertained eg. the number of the VMG's, orphans,rate of HIV infections, number of cases of GBV, population of the location etc.
- ✓ Limited information on some environmental aspects e.g. acquifers, rivers etc.
- ✓ The communication barrier. It was mitigated through having a translator on the team
- ✓ Risk of being infected or transmitting COVID-19. The teams had to adopt preventive measures by wearing face mask and providing the community members with face mask and sanitizers during the public meetings and interactions.
- ✓ Due to drought that was being experienced the community members were engaged in looking for water and pasture thus delaying in attending public participation meetings. This was mitigated by starting the meeting early enough.

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 and identification of the potential impacts on resources and receptors that could result from Project activities during the pre-construction, construction, operation and decommissioning stages.

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

Table 2-1: Components of the Lomunyanakwan Minigrid

S. NO.	PARTICULARS	DESCRIPTION
1.	Location	Geographically, Lomunyanakwan site falls on coordinates Latitude 2°30'52.2"N and Longitude 36°13'58.9"E. Administratively, it is found in Parkati Sublocation, Katilia Location Turkana East Subcounty Turkana County. The site area is neighboured by Lomunyanakwan village approximately 1km to the North East by Lomunyanakwan village and 600m to the East by Lomunyanakwan Dispensary.
2.	Proponent	Ministry of Energy and Petroleum
3.	Administrative location	Parkati Sublocation, Katilia Location Turkana East Subcounty Turkana County.
4.	Neighbours	The site area is neighboured by Lomunyanakwan village approximately 1km to the North East by Lomunyanakwan village and 600m to the East by Lomunyanakwan Dispensary.
5.	Key project components	The solar mini grid will contain Solar panels, batteries, invertors, perimeter fence and length of distribution line to cover a radius of approximately 1.5km.
6.	Location Coordinates	Latitude 2°30'52.2"N and Longitude 36°13'58.9"E.
7.	Minigrid Capacity	PV Array of 80 (DC-kW) of 90kw; 160kWh Battery
8.	Average Elevation	507m
9.	Site Conditions	The site is generally in an open area with minimal fauna and flora.
10.	Road Accessibility	Murram road.
11.	River/canal/nallah/ pond present in project footprint	None

S. NO.	PARTICULARS	DESCRIPTION
12.	Protected areas (National Park/ Sanctuary)/ Forest land within 10 kms	None

2.2 PROJECT LOCATION

Geographically, Lomunyanakwan site falls on coordinates Latitude 2°30'52.2"N and Longitude 36°13'58.9"E. Administratively, it is found in Parkati Sublocation, Katilia Location Turkana East Subcounty Turkana County.

The site area is neighboured by Lomunyanakwan village approximately 1km to the North East by Lomunyanakwan village and 600m to the East by Lomunyanakwan Dispensary.

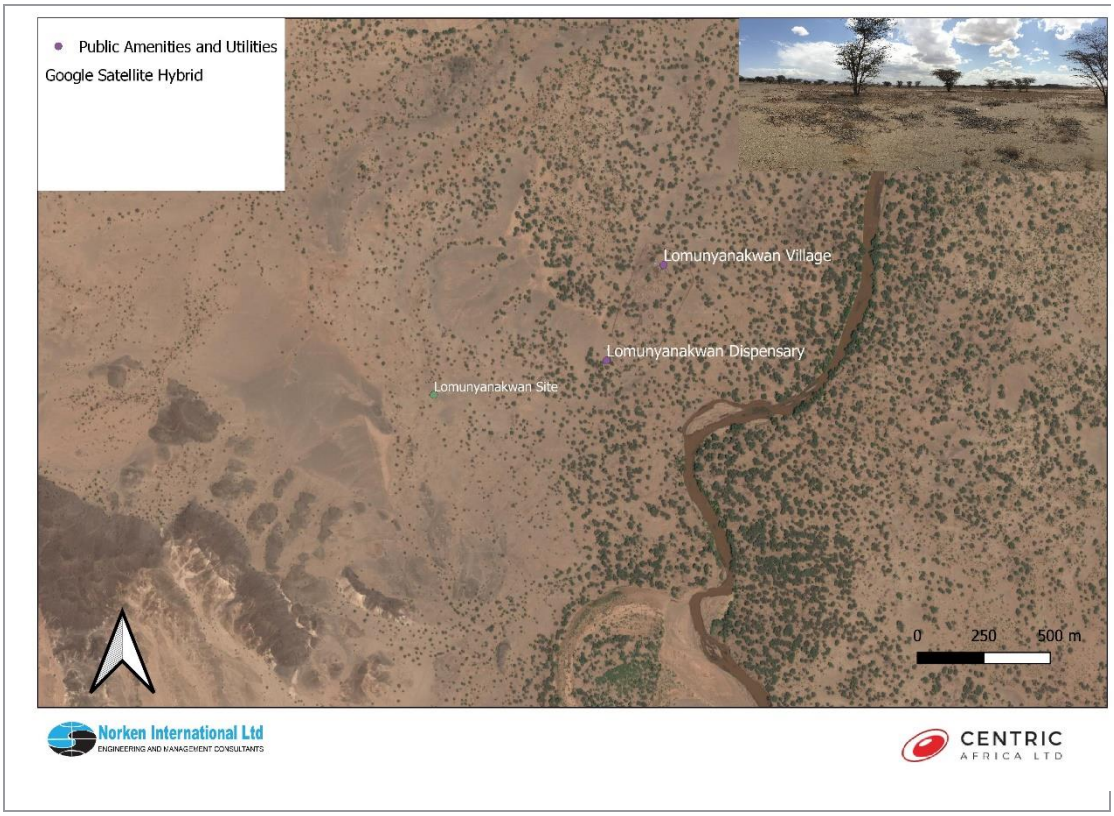


Figure 2-1: Map of Lomunyanakwan Mini-grid site location

Source: Google Earth

2.3 DESCRIPTION OF PROJECT FACILITIES, COMPONENTS AND ACTIVITIES

2.3.1 Project Components

2.3.1.1 Solar PV modules

The project will use 120KWp SPV Crystalline Modules with an Array of 80 (DC-kW) each. The number of PV panels to be used is yet to be determined.

2.3.1.2 Battery Energy Storage System

The 300KWh 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.

2.3.1.3 Inverters

The Inverters shall be designed for 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.

2.3.1.4 Distribution lines

Lomunyanakwan site will have a 12km distribution line circuit to connect consumers to power generated from the solar minigrid.

2.3.1.5 Project 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.

2.3.1.6 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 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 and Battery Energy storage system;

Table 2-2:Summary Of Technical Project Details

Monthly Demand (Kwh)	Daily Demand (Kwh)	Peak Demand (Kw)	Lv Distribution (Km)	Minimum Pv Capacity (Kwp)	Minimum Bess Capacity (Kwh)	Minimum Diesel Genset Prime Rating (Kva)	Fuel Tank For Diesel Genset (L)	Pv Inverter Capacity (Kw)	Total Budget Estimate Per Site ($)
11,200	373	69	12	120	300	82	2,000	120	$405,245.42

2.3.1.7 Project Cost

The development of Lomunyanakwan Mini grid project is estimated to cost approximately USD 405,245.42. This is exclusive of the cost of implementation of the ESMP.

2.3.1.8 Land Requirements

In Lomunyanakwan, the site falls on Unregistered Community Land. The community has offered this 1.97 ha of land for construction of the minigrid under terms of compensation in kind as described in section 2.3.1.9 below. The sub-project site will be acquired by NLC compulsorily and affected communities compensated in-kind through their community project of choice

Construction of the distribution line will involve the acquisition of land. It is anticipated that the DL will pass through the existing road reserves.

2.3.1.9 Compensation Details

The local community has agreed to be compensated in kind arrangement for a 1.97hectare portion of land that will be utilized for the project acquired. The land identified is currently unoccupied. The following are the projects proposed as comensation in kind:

Table 2-3: Projects proposed as compensation-in- kind

Priority	Proposed project	Location	Distance from site
1	**Water project** The community give an option of water purification and water tank provision **Challenges** • No enough water • The borehole water is salty **Required** Water piping to the community, purification of water. Provision of water tank to the community	N-2^{0}31'5" E-36^{0}14'29"	4km
2	**<u>Maternity Ward.</u>** The community gave an option of construction of a new ward in the dispensary. **Challenges** • No Laboratory • Insufficient latrines • Currently the community depends on the mobile clinic donated by 1st Lady under beyond Zero Campaign.	N-2^{0}30'52" E-36^{0}13'58"	200m

Further, an A-RAP has been prepared for the sub project. The A-RAP stipulates procedures and actions for acquiring land and compensating affected communities. 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 this sub project, there is no physical displacement of affected persons, and the foreseen impacts on livelihoods such as grazing occasioned by min-grid construction, way leaves acquisition and implementation of community projects are considered minor. An A-RAP outlining the principles and procedures for land acquisition and compensation is annexed in this report (Annex 7).

2.4 RESOURCE REQUIREMENT

2.4.1 Workforce Requirement

Skilled, semi-skilled and unskilled laborers will be required at the construction stage. During the operation phase, skilled staff comprising operations and maintenance head, engineers, technicians and security guards. Unskilled staff will be hired for housekeeping and module cleaning.

The solar mini-grid will be installed, operated and maintained by the contractor for the first seven years and then handed over to KP engineers and operators. So, for the seven years KP will be monitoring the operations of the contractor.

2.4.2 Water Requirement and Source

2.4.2.1 Construction Phase

Water will be required per day for civil works during construction stage. Further, water will be required for workers at project site. The quantity of water requirement will vary depending on the mobilisation of construction workers at site.

2.4.2.2 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. The quantity of Water requirement during operational phase of the project is not known at this stage of the project. The water for the construction phase will be purchased from the vendors in the area.
As noted previously, approximately, employees (direct and contractual) will be working during operation phase.

2.4.3 Raw Material Requirement

2.4.3.1 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 China.

2.4.3.2 Operation Phase

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

2.4.4 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 design is finalized.

2.4.5 Fire Safety and Security

2.4.5.1 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, 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.

2.4.5.2 Operation Phase

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. The team managing the site will be trained on Fire safety as per the requirement on Fire Risk reduction rules. Further the proponent will be required to undertake Annual OSH Audits, Fire audits and Risk assessment as per the requirement of OSHA 2007 and the relevant subsidiary legislation.

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.

3.1.1 Present Power Supply Position

According to the Turkana County Integrated Development Plan (2028-2022), electricity connectivity in 2018 stands at 20% of households which is an increase from 6% of household connections in 2009 (KP, 2018). Firewood and charcoal are however still the most common sources of energy accounting for 80% of total energy used in the county. Approximately 51% of households are using lanterns for lighting despite the high cost of kerosene. 80% use firewood and 17% use charcoal for cooking. Electricity use is mostly common in male headed households at 7% as compared with female headed households at 4%.

In Lomunyenakwan, majority of the households use solar solutions (D-light) for lighting and mobile phone charging purposes. During the Focus Group Discussions with women, it was reported that women face challenges accessing power. Women have to get home early from business to prepare food before darkness as they cannot afford lighting systems at night.

If the project does not go on, the village and the surrounding area will continue to have no electricity and this will not help in maximizing and utilizing the area facilities, leading to:

- The economic status of the local people remaining unchanged.
- Employment opportunities not created.
- Increased poverty in the area since energy is associated with increased economic development and availability of employment opportunities. Universal access to electricity is a key requirement for meeting Kenya's development goals under Vision 2030.

3.1.2 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.

3.1.3 **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).

3.1.4 **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 Lomunyenakwan 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 Lomunyenakwan). Besides coal and petroleum products used in thermal power processing are not readily available within Lomunyenakwan 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 Lomunyenakwan. 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 Lomunyenakwan 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.

3.1.5 **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.

3.1.6 **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.

3.1.7 **Power distribution line Alternatives**

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

The identified viable option for power distribution within Lomunyenakwan 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 Lomunyenakwan.

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 Lomunyenakwan 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 Lomunyenakwan 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 Turkana 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 sale 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 Lomunyenakwan access routes is the most feasible for the solar mini-grid project in Lomunyenakwan 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.

3.1.8 **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 Turkana 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, Turkana 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 Lomunyenakwan area and Turkana 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

3.1.9 **Conclusion**

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

4 APPLICABLE 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).

  RAREC will be responsible for implementing the project, construction of the generation systems and distribution network for the Lomunyenakwan site. Supply of power will be through RAREC 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 Lomunyenakwan 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 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 REVIEW

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	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.

		environmental management and the conservation of natural 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 Lomunyenakwan 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.

7	**National Laws**		
8	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.
9	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.
10	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.
11	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	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.

		various environmental parameters into public sewers and the environment.	
12	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.
13	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.
14	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
15	Environmental Management and Coordination, (Fossil Fuel Emission Control) Regulations	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	This legislation gives caution to proponent on proper handling and management of fuels. REREC will adhere to the ESMP while handling and managing the fuels

	2006	catalysts, licensing to treat fuel, cost of clearing pollution and partnership to control fossil fuel emissions. The proposed project will generate fuel emissions linked to the back-up generator. This will only happen when the sun rays are poor.	
16	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.
17	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.
18	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

19	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 registered medical health practitioner duly registered by the DOSHS.	The contractor should that the workers exposed to hazards and or accidents undergo requisite medical examinations as required by these rules
20	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.
21	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	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.

		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. - 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.	iii. Developing an emergency plan should a fire occur which includes evacuation procedures etc.
22	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.
23	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-	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.

		(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 to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.	
24	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
25	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.
26	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 REREC will ensure that commodities and codes of practice utilized in the proposed project adhere to the provisions of	All materials and spares used to construct the project will comply with the standardized specifications and certification.

		this Act.	
27	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 business premises in the neighbourhood or those passing along public way, commits an offence.	The REREC 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.
28	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	Land in Lomunyenakwan is community land whose tenure falls under customary land rights. REREC will observe all the relevant provisions of the Act including conversion from community land to public land as will be deemed appropriate

		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.	
29	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	- The proposed project site falls on unregistered Community land which is owned by the Lomunyenakwan 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.

		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. (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	
30	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.
31	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	Land in Lomunyenakwan is community land. The 1.97 hectares allocated by the community for the proposed mini-grid will be acquired for the project. The MOEP will pay

		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.	compensation in kind through implementation of projects in water, education and health sectors.
32	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 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.	The project will have a grievance redress mechanism with a committee. The work of the committee will be to receive and 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.
33	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 – Turkana County.

34	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
35	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.
36	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
37 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 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.	The project will observe the provisions of the Act including management of traffic of construction vehicles as guided by the ESMP
38 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	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

		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.	
39 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.
40 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 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	In complying with this requirement, the ESIA team held consultations on the project with the County Government of Turkana namely the Governor, County Executive 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
41 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	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

		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.	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.
42 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 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.	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.
43 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	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.

		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.	

1.1 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

1.2 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 Lomunyenakwan site does not envisage major physical or economic displacement of people. Lomunyenakwan community have	The policy is applicable for the entire project because there is land acquisition for the Mini-grid, Wayleaves, contractor facilities

		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.	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 Lomunyenakwan 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.

1.3 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 REREC 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 REREC, 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 Lomunyenakwan Project Site is guided by this KOSAP ESMF.

1.4 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 Turkana 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. Further, A-RAPs will be prepared and implemented in sub-project sites on community land (unregistered and registered) and private land. 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.

1.5 VULNERABLE AND MARGINALIZED GROUPS FRAMEWORK (VMGF) FOR KOSAP

As noted above the KOSAP project trigged 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 Lomunyenakwan, the main inhabitants - the Turkana community- are classified as VMGs in Kenya. The ESIA did not identify any adverse impact on the Turkana community therefore, a Vulnerable and Marginalized Group Plan (VMGP) will not be required however, elements of the VMGP such as inclusion of Turkana 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 Turkana

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

1.6 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 with them	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 disproportionatel y WB needs a social assessment to be conducted	WB policy more elaborate and the two are being used to compliment

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 f 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, ECOLOGY AND SOCIAL

5.1 AREA OF INFLUENCE

The Area of Influence (AoI) of the project comprises of the project site and the surrounding area, where the influence of the project activities is anticipated. The areas likely to be affected by the project and its associated activities include:

- The areas where project activities and facilities operated and managed by the Ministry of Energy, Kenya Power (KP), will be established,
- Project site where project components such as solar modules, control room and distribution line to power grid sub-stations; and any other selected CSR project, such as the construction water abstraction and distribution points will be established
- Areas where impacts from unplanned but predictable developments caused by the project that shall occur later or at a related location such as increase in traffic on the approach road;
- Areas where there is biodiversity or on ecosystem services upon which affected communities' livelihood are dependent; and
- Areas where associated facilities will be established

Further to this, the AoI with respect to the environmental and social resources was considered based on the following reach of impacts:

Air Quality

- Impact on ambient air quality from vehicle exhaust;
- Impact of air pollutants emission from construction activities and
- Dust fall- typically up to 200 m from construction activities

Noise

- Noise impact area (defined as the area over which an increase in environmental noise levels due to the project can be detected) - typically 500 m from operations and 200 m from the access road

Water

- Surface water body- typically 500 m upstream and downstream of water intake point and downstream of discharge point
- Other surface water bodies within 1 km of the project footprint
- Groundwater in 1-2 km radius of project footprint

Flora and Fauna

- The direct footprint of the project comprising the project site
- The areas immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence and project related activities (e.g., trampling, water intake/outfall, transportation). This kind of disturbance has been estimated to occur within the project footprint and surrounding areas of about 500 m to 1 km from the activity areas. Based on the above the AoI for environmental studies was limited to 5 km from the project site.

Socio-economic/Social

The AoI for social receptors was fixed to include 2 km radial zone which has been developed based on the reconnaissance site visits and stakeholder consultations with the local community. The AoI for development of the social baseline is within Lomunyanakwan Area which according to the administrative structure falls within Koiyaki Location. The socio-economic information presented in this report has drawn from primary socio-economic survey and the Population and housing census 2019, Kenya Bureau of Statistics (KBS).

5.1.1 Project Footprint Area

The project site is located in Parkati Sublocation, Katilia Location Turkana East Subcounty Turkana County. The site area is neighboured by Lomunyanakwan village approximately 1km to the North East by Lomunyanakwan village and 600m to the East by Lomunyanakwan Dispensary.

The site is gently sloping.

Figure 5-1: General map of Lomunyanakwan Centre

5.2 ENVIRONMENT BASELINE

5.2.1 Land cover

The land-cover of the study area (5kms) has been interpreted from visual interpretation, survey maps of the area, and subsequently by ground checking during field surveys. The land use within 5 km radius of project site is characterized by few semi-permanent commercial and mostly residential land users.

Table 5-1: Structures observed within Lomunyanawan Village

5.2.2 **Topography, Hydrology and drainage**

The topography of the project site is an open area with a fairly gentle slope and mild undulations. The proposed project site is well drained.

5.2.3 **Ecology**

The project area located in Katilia Ward, Turkana East sub county in Turkana County, the area encompasses scarce tree species. Turkana county has a robust ecological system that residents depend on for their animal feed, water and many other benefits. The area's ecological conditions are influenced by the soil type, altitude, vegetation, rainfall pattern and human activities. The two dominant vegetation types in the area include shrubs in the vast region of Turkana East. The shrubs are suitable for livestock rearing.

Vegetation is characterised by patchy, annual grassland and herbaceous plants interspersed with woody shrubs.

Fauna identified within the site area included goats, cows ie. Domestic animals. No wild animals were observed at the site. The area and its environs is not a known breeding site for any endangered species.

Edible fruit Maerua subcordata (eerut) is also found in the project area (refer to plate below)

Plate 4-2: Project area flora presentation

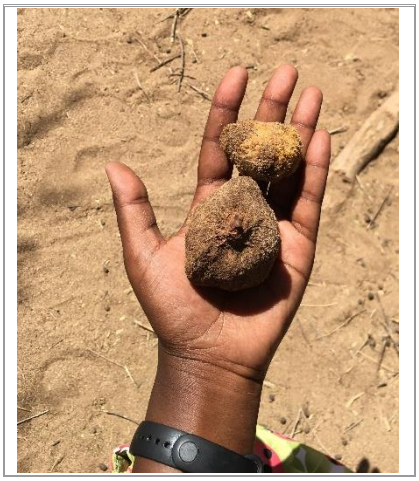


Plate 5-2: Edible fruit (erut) found in the project area

5.2.4 Water Resources

In Lomunyanakwan, water is provided by a borehole. Additionally, residents source their water from Kerio River which is 1km from the site.

A water sample was taken from the nearby borehole carried for analysis in the laboratory. The analysis found that the water quality complies with KS: EAS 12:2018 for natural potable water. The results are appended in presented in table 4-3 below.

Table 5-2: Water Analysis Test Results

Test	Results	Units	KS EAS 12:2018: NA
Physical-Chemical Tests			
Turbidity	1.00	NTU	25Max
*pH value	6.83	@25.0^{0}C	5.5-9.5
*Conductivity	1759	µS/cm	2500Max
Dissolved oxygen as DO	6.54	mg/L	-
Temperature	28.0	^{0}C	-
Inorganic Contaminants			
Nitrate as $N0_3$	12.41	mg/L	45 Max
Phosphates as PO_4	<0.01	mg/L	2.2 Max
*Manganese as Mn	<0.01	mg/L	0.1 Max
Mercury as Hg	<0.003	mg/L	0.001 Max
*Calcium as Ca	55.65	mg/L	150 Max
*Lead as Pb	<0.01	mg/L	0.01 Max
*Copper as Cu	<0.01	mg/L	1.0 Max

Arsenic as	<0.01	mg/L	0.01 Max
*Cadmium as Cd	<0.003	mg/L	0.003 Max

Figure 5-3: Location at the project area water resources

5.2.5 Ambient Air Quality

The proposed project area falls within Lomunyanakwan village which can be described as generally rural with interfaces of natural vegetation. Most of the areas are vegetated and there are no industrial developments. The air quality at the proposed project sites is therefore considered to be generally good.

5.2.6 Ambient Noise Quality

In general, the project area has a rural setting where the main source of noise is from motorists and from machines such as the generators used to supply power.

5.2.7 Soil Type and Quality

The major soil type in Turkana West subcounty is sandy. Soils in Turkana are not well developed due to aridity and constant erosion by water and wind. Often they are capped by stone mantles. Aeolian soils are dune sands either active or fossil; Alluvial soils range from coarse sands to flash flood silts, while black or brown clays occur locally in areas of impended drainage.

Due to the low rainfall and high temperatures there is a lot of evapo-transpiration resulting into deposition of salt in the soil and capping on the surface.

A soil sample was collected from the site and submitted to a NEMA designated Laboratory for analysis of Petroleum Hydrocarbons. The results obtained and which are presented in table 11 below shows that the

pollutants of concern were not detected in the sample. The further indicates that the site has not been impacted by petroleum hydrocarbons.

Table 5-3: Soil testing results

Test	Method	Results	Units	Limit
BTEX				
Benzene	PQA/LIM/002	<0.01	mg/kg	<0.01
Toluene	PQA/LIM/002	<0.01	mg/kg	<0.01
Ethyl benzene	PQA/LIM/002	<0.01	mg/kg	<0.01
Xylene	PQA/LIM/002	<0.01	mg/kg	<0.01
PAH				
Naphthalene	PQA/LIM/004	<0.01	mg/kg	<0.01
Acenaphthylene	PQA/LIM/004	<0.01	mg/kg	<0.01
Acenaphthene	PQA/LIM/004	<0.01	mg/kg	<0.01
Fluorene	PQA/LIM/004	<0.01	mg/kg	<0.01
Phenanthrene	PQA/LIM/004	<0.01	mg/kg	<0.01
Anthracene	PQA/LIM/004	<0.01	mg/kg	<0.01
Fluoranthene	PQA/LIM/004	<0.01	mg/kg	<0.01
Pyrene	PQA/LIM/004	<0.01	mg/kg	<0.01
Benzo(b)anthracene	PQA/LIM/004	<0.01	mg/kg	<0.01
Chrysene	PQA/LIM/004	<0.01	mg/kg	<0.01
Benzo(b)fluoranthene	PQA/LIM/004	<0.01	mg/kg	<0.01
Benzo(k)fluoranthene	PQA/LIM/004	<0.01	mg/kg	<0.01
Benzo(a)pyrene	PQA/LIM/004	<0.01	mg/kg	<0.01

Table 5-4: Soil Type in Lomunyanakwan

5.2.8 Climate and Meteorology

Turkana has a hot, dry climate with temperatures ranging between 20ºC and 41ºC and with a mean of 30.5ºC. Rainfall in the area is bimodal and highly variable (Opiyo et al., 2015). The long rains occur between April and July and the short rains between October and November. Annual rainfall is low, ranging between 52 mm and 480 mm with a mean of 200 mm (Turkana County Investment Plan, 2016-2020). Rain patterns and distributions are erratic and unreliable. Rain usually comes in brief, violent storms that result in flash floods. The driest periods (akamu) are in January, February and September and the county is highly prone to drought.

5.3 SOCIO-ECONOMIC ENVIRONMENT

5.3.1 Demographic Profile

The 2019 population in Katilia location stood at 39,423 with 20,040 being male and 19,371 female. There was a total of 5,253 households surveyed out of which all 5,253 were conventional and none was a group quarter. The total land area occupied by Talek Sublocation is 4,934.4km^2 while the population density was 8 persons per square kilometre.

A community profile was compiled using a tool and the following site-specific information (given by the area Assistant Chief) was gathered:

Table 5-5: Summary of demographic profile

Attribute	Magnitude/Number
Approx. population	5000
Households	500
Gender	Male – 35% Female – 65%
Ave. No. per household	10 per house
Approximate No. of Vulnerable Households	Male HH: 40 Female HH: 120 Chid HH: 20 Elderly: 200 PLWD: 15
Indigenous	Indigenous- 80% Settlers – 20%
Primary ethnic group	Turkana
Other ethnic group	None
Primary religion	Christianity

5.3.2 Education infrastructure

At Lomunyanakwan area, there was one school identified near the site. A key informant interview was conducted with the Deputy Headteacher from Lomunyanakwan Primary School. From this interview, it was established that there are 4 teachers serving a population of 333 pupils eith a ratio of 3:7 for males and females respectively. The attendance rates were reported to be fair for both males and females. In addition, completion rates were reported to be 90% for males and 20% for female pupils. Only 30% go to higher education level. The low completion rate for girls was attributed to child marriage.

5.3.3 Occupation and Livelihood Profile

The main livelihood activities undertaken by people in Lomunyanakwan village are pastoralism. Historically, the Turkana relied upon nomadic pastoralism for their livelihoods. Over the past 40 years, the ability of Turkana people to secure their livelihood from nomadic pastoralism has come under pressure. While the population of the county has increased dramatically since 1979, the availability of new livelihoods options has not grown in proportion with the population. As such, the natural resource base of the county has become stressed, resulting in the degradation of the environment upon which pastoralism depends. (Turkana County CIDP, 2018-2022)

Plate 5-6: Livestock waiting to drink from the community borehole

5.3.4 **Land Use**

The land-use and land-cover of the study area has been interpreted from visual interpretation, survey maps of the area, and subsequently by ground checking during field surveys. The land use within 5 km radius of project is mostly residential.

The main activity in the area is grazing of sheep, cows and goats. There was no crop farming in the community.

On the site identified, the land is currently unoccupied. However, the PAPs reported that it is used as an alternative route during the rainy season.

5.3.5 **Social and Physical Infrastructure**

Social and physical infrastructure identified in the study area includes health, water and education facilities. These include Lomunyanakwan Primary School, Lomunyanakwan Dispensary and Lomunyanakwan Borehole Water Project. These are located within a 2km radius of the project site.

Plate 5-7: Borehole project in Lomunyanakwan

5.3.6 **Health in the project area**

In Turkana County, the doctor-population ratio stands at 1:20 000 compared to 1:70 000 in 2013, while the nurse-population ratio is 1:2310 compared to 1:5200 in 2013. The average distance a person needs to travel to the nearest health facility dropped from 50 km in 2013 to 35 km in 2017.

The proposed project area is served by a dispensary (pictured below in Plate 4-6).Lomunyakwan dispensary serves a population of about 6000 within a 30km radius. Services offered include general outpatient treatment, maternal health care, immunization of newborns and infants, nutrition services and HIV services. The dispensary is served by 1 nurse, 1 Community Health Worker and 1 Patient Assistant.

The gaps in the health care system in Lomunyanakwan are:

1. Lack of medical equipment
2. Poor state of roads
3. Lack of emergency vehicles

The top 3 health issues were reported to be:

1. Diarrhoea,
2. Malaria, and
3. Urinary Tract Infections (UTIs)

Figure 5-4: Lomunyanakwan Dispensary

5.3.7 **Vulnerable groups**

According to the World Bank, a vulnerable group is a population that has some specific characteristics that make it at higher risk of falling into poverty than the others.

5.3.7.1 Majority Vulnerable groups

The categories of vulnerable groups and their corresponding number of households reported at the project area include:

Category	Approximate No. of Vulnerable Households
Male HH	20
Female HH	120
Chid HH	20
Elderly	200
PLWD	15

Gender based vulnerability

Turkana County is a patriarchal society, but the situation of women and men is not static, as incidences of environmental hardships like drought have led to their transformation in the socio-cultural and socio-economic organization. Due to livestock losses, women play an active role to ensure family survival through engagement in diversified income generating activities. At the same time, there has been an increase in the number of female-headed households. Although there is a significant number of female headed families, female engagement in decision-making was reported to be low in the women focus group discussion.

Women in female-headed households are more vulnerable to poverty than married women in Turkana as they cannot own livestock. Due to gender discrimination and challenges faced by female-headed households, they are more vulnerable to food insecurity than male-headed households.

During the Focus Group Discussion with women, it was reported that men have more control over household resources such as land, assets and equipment. In a typical household, the head of the household

is the eldest male members, while the decision-making authority is shared between him and adult sons. While men are mostly responsible for ensuring the financial security of the family, the women mostly undertake household activities such as cooking, cleaning, taking care of the children and elders etc.

In addition,female literacy was reported to be low among women over the age of 18 and higher among the younger girls.

An interview with the health worker at Lomunyenakwan Dispensary revealed that the elderly persons are the most vulnerable in the community.

Gender Based Violence

Intimate partner violence is the most common form of GBV in Lomunyanakwan. It affects married people. Based on the Focus Group Discussion with women at Lomunyanakwan, intimate partner violence is common.

Generally, women do not feel safe in the community because there have been incidences of conflict between the Turkana community and the Pokot community. Whenever there is conflict, men die and women are left widowed and vulnerable.

An interview with the health practitioner at Lomunyanakwan Dispensary revealed that Gender based violence cases have been reported in the clinic.

5.3.8 Culture and heritage

The county currently has museums and heritage sites which play a crucial role in socioeconomic advancement. However, no cultural sites were observed within or near the proposed mini-grid or observed during the field visit.

As previously mentioned, Turkana society is firmly patriarchal in nature, with elder Turkana men sometimes joined by retired elders, determining most major matters for the Turkana tribes. However, the consultant ensured that women were represented in the consultation process at Lomunyanakwan. It was observed that women sat separately from the men in observance of the culture.

Traditional Turkana people's lifestyle concentrates on their cattle which make up the primary source of food.

Lomunyanakwan centre is fairly commercial, and therefore the residents practice business activities to earn income.

5.3.9 Insecurity

Since devolution, the Kenyan National Government has made tremendous strides in ensuring that the ratio of police officers to civilians is increased, in order to meet the standards of the UN and globally accepted norms of 1:450. Turkana County has a total of 391 police officers and 23 police stations/posts spread across all sub-counties, giving a ratio of 1:2,871 using 2017 population data.

In both the Male and female FGD, it was reported that insecurity is high in Lomunyanakwan area due to cattle raids by the neighboring communities.

5.3.10 Religion in the project area

Most residents in the project area are Christians.

5.3.11 HIV/AIDs prevalence

In 2013, the county HIV prevalence was very high compared to the national average. Together with partners (Elizabeth Glaser Paediatric AIDS Foundation, Save the Children, AFYA-IMARISHA Aids Health Foundation, International Rescue Committee, Diocese of Lodwar, AIC health ministry), many programmes were put in place to curb the situation. These programmes have resulted in a significant decrease from a 7.6% county HIV prevalence rate in 2013 to 4.0% by 2015, below the national average of 5.9% (NACC, 2016). Mother to child HIV transmission rates went down from 11.9% in 2012 to the current rate of 7.9%

in 2017(Turkana CIDP, 2018-2022).

HIV/AIDS infections in Lomunyanakwan was confirmed to be very low by the Clinical Officer at Lomunyanakwan Dispensary.

5.3.12 **COVID 19 prevalence**

According to the Statista[1] website, Turkana County has had 1087 cases of COVID 19 as at November 2022.

Records of COVID 19 cases at Lomunyanakwan Dispensary were not reviewed during the field visit.

Figure 1:

[1] https://www.statista.com/statistics/1136519/cumulative-coronavirus-cases-in-kenya-by-county/

6 STAKEHOLDER ENGAGEMENT

This section profiles the key stakeholders for the Lomunyanakwan site solar project and assesses their potential concerns and levels of influence. The process of stakeholder engagement involved.

i. Stakeholder identification and analysis
ii. Planning how the engagement with stakeholders will take place.
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 Lomunyenakwan. 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.

6.4 STAKEHOLDER CHARACTERIZATION AND IDENTIFICATION

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 Lomunyanakwan the stakeholders have been identified and listed in table 13 below:

Table 13: Identified Stakeholder categories

Stakeholder Category	Stakeholder Group	Connection to the KOSAP
Government	➲ Government agencies ➲ National regulatory bodies	National Government are of primary importance in terms of establishing policy
	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
Communities at the project area	Community interest groups	➲ Local communities to be affected either directly or indirectly by Projects ➲ Majority and Minority Vulnerable groups ➲ Health institutions ➲ Education institutions ➲
	VMG	➲
	Pastoralists	➲

Civil Society Non-Governmental Organizations (NGOs) Private sector	National, Local and Community based organizations	➲ NGOs with direct interest in the Project interventions, and its social and environmental aspects and that are able to influence the Project directly or through public opinion. ➲ Such organizations may also have useful data and insights that are useful to the project and may be able to identify areas of collaboration with the project in areas of common interest.

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 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 below.

Table 14: Stakeholder Significance and Engagement Requirement

		Likelihood of Influence on/ by Stakeholder		
		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 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 s of low to medium or medium to high primarily imply that their influence and importance could vary in that 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 to make it comprehensive for any given period.

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 Lomunyenakwan village.

Stakeholder Category	Relevant Stakeholders	Magnitude of Influence/Impact	Urgency/Likelihood of Influence	Overall rating of stakeholder rating
Government	National Government agencies	Large	High	Major
	National regulatory bodies	Large	Medium	Major
	County government	Large	Medium	Major
Local Community	Local communities to be affected either directly or indirectly by Projects	Large	High	Major
	Majority and Minority Vulnerable and Marginalized groups	Large	High	Major
	Education and Health institutions	Medium	Low	Minor
Civil Society Non-Governmental Organizations (NGOs)		Medium	Low	Minor
Private sector				

6.7 Information Shared to the Community Members

The REREC representative gave a description of the KOSAP project and clarified that its objective was to electrify the project site 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 from the consultant team 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 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.

6.8 Key Feedback Received During Stakeholder Consultation Process

A detailed Consultation and Public Participation and community engagement for Lomunyanakwan Solar Mini Grid was held at Lomunyanakwan on 16th January 2022 chaired by the area assistant chief.

Benefits of the project

- The community was in support of the project. They noted that the project will beneficial to the community as it will:
    - Improve security due to security lights
    - Advancement in technology/use of computers due to availability of power
    - Employment opportunities
    - Improved healthcare due to power availability
    - Business growth due to availability of electricity
    - Improve access to water

Community concerns

- The community raised they following concerns and comments:
    - The land identified for the project is used as an alternative route during the rainy season. Therefore they asked for special compensation for the youth and women
    - They appreciated the sensitization on the communicable diseases such as HIV/AIDS

Community remarks, requests and recommendations

- The community requested the following from the project:
    - Compensation for the youth and women
- They appreciated sensitization on communicable diseases especially on HIV/AIDS
- The area has no hospital and experiences water shortages. In addition, the school is ill-equipped
- The village administrator proposed the digging of a borehole; he added that the borehole which is approximately 1km away has dried up

Summary of Consultant and Client Responses and remarks

The consultant while addressing the community's issues raised, gave the following response:

- ✓ Interested users will be connected to the electricity at an affordable cost i.e., Ksh.1000
- ✓ The Contractor/KOSAP will rehabilitate and plant trees after the construction phase of the project
- ✓ All non-skilled labor will be sourced from the Lomunyanakwan Community and not from other areas
- ✓ The community was assured that the project will commence soon after ESIA approval process
- ✓ That noise form the Machinery will be minimized

Caption	*Photo*
Public participation "Baraza" Session	

Focus Group Discussion with the Men	
Focus Group discussion with Youth	

Verbatim minutes and participants lists of the meeting and FGDs are attached in this report's annexure.

6.9 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 REREC 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.

6.10 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

6.10.1 **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 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 REREC on monthly basis alongside the construction progress reports

7 IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 Introduction

This section provides an assessment of potential environmental and social impacts from the proposed Projects as well as the proposed mitigation measures to avoid, reduce, remediate or compensate for potential negative impacts and to enhance positive impacts. A description of the assessment methodology used to assess the significance of potential impacts, taking into account impact magnitude and sensitivity of receptors and resources affected, is provided below. To facilitate the reading of the ESIA, the same heading structure in terms of environmental indicators, receptors or resources affected by the project activities were considered as the ones used in the baseline and listed in section 6. All the mitigation measures identified in this chapter have been collated into the Environmental and Social Management Plan and Environmental and Social Monitoring Plan matrices. This is including Occupational Health and Safety.

According to Chapter 3.6 of the ESMF, there are no significant and/or irreversible adverse environmental issues anticipated from the K-OSAP electrification Project; as these will all be located in remote and sparsely populated areas. Potential negative impacts are expected to be small-scale and site-specific and appropriate mitigation measures will be included to address these impacts.

7.2 IMPACT 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:

7.3 DEFINING IMPACT

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.

7.3.1 Assessment Of Significance

Criteria for assessing the significance of impacts will stem from the following key elements:

- Status of compliance with relevant Kenyan legislation, policies and plans and any relevant Kenyan or industry policies, standards or guidelines, as well as international best practice standards and guidelines;
- The magnitude (including nature, scale and duration) of the change to the natural or socioeconomic environment (e.g. an increase in coastal erosion, or an increase in employment opportunities),

expressed, wherever practicable, in quantitative terms. The magnitude of all impacts is viewed from the perspective of those affected by considering the likely perceived importance as understood through stakeholder engagement;

- The nature and sensitivity of the impact receptor (physical, biological, or human). Where the receptor is physical, the assessment considers the quality, sensitivity to change and importance of the receptor. For a human receptor, the sensitivity of the household, community or wider societal group is considered along with their ability to adapt to and manage the effects of the impact; and
- The likelihood (probability) that the identified impact will occur. This is estimated based upon experience or evidence that such an outcome has previously occurred.

It is generally accepted that significance is a function of the magnitude of the impact and the likelihood of the impact occurring.

For this assessment, significance has been defined based on five levels described in table below;

Table 7-1: Categories of Significance

category	**significance**
Positive impacts	Positive impacts provide resources or receptors, most often people, with positive benefits. It is noted that concepts of equity need to be considered in assessing the overall positive nature of some impacts such as economic benefits, or opportunities for employment
Negligible impacts (or Insignificant impacts)	Negligible impacts (or Insignificant impacts) are where a resource or receptor (including people) will 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.
Minor	An impact of minor significance ('Minor impact') is one where an effect will be experienced, but the impact magnitude is sufficiently small (with or without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate	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.
Major	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.

For environmental impacts the significance criteria used in this ESIA is shown in Table 7-2: .

Table 7-2: Overall Significance Criteria for Environmental Impacts

Receptor sensitivity (or resource value)	**Impact Magnitude**		
	Low	**Medium**	**High**
Low	Minor	Minor	Medium
Medium	Minor	Medium	Major
High	Medium	Major	Major

For the social impact assessment, the perceptions of stakeholders, expressed as opinions around certain issues, can be as important as actual impacts. Consequently, the concept of perception is explicitly brought into the evaluation of significance after an impact is evaluated. When an impact is of significant stakeholder concern, this may be causing to raise the significance rating. This prompts the formulation of more rigorous and appropriate mitigation measures which focus on the source of the impact and also address stakeholder perceptions. The risk of not addressing stakeholder perceptions is that reputational damage could arise, resulting in the loss of a 'social licence to operate.

7.3.2 **Magnitude of Impact**

The impact assessment describes what will happen by predicting the magnitude of impacts and quantifying these to the extent practical. The term 'magnitude' covers all the dimensions of the predicted impact to the natural and social environment including:

- the nature of the change (what resource or receptor is affected and how);
- the spatial extent of the area impacted, or proportion of the population or community affected;
- its temporal extent (i.e., duration, frequency, reversibility); and
- where relevant (accidental or unplanned events), the probability of the impact occurring.

For biophysical impacts, the definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment are provided in Table 7-2

For social impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact, the ability of people to manage and adapt to change and the extent to which a human receptor gains or loses access to, or control over, socio-economic resources resulting in a positive or negative effect on their well-being (a concept combining an individual's health, prosperity, their quality of life, and their satisfaction).

Table 19 below (under Likelihood) provides an account of the key features (definitions) of each of the impact significance classifications (from Not Significant to High); specifically linking them to the need for mitigation measures.

7.3.3 **Sensitivity of Resources and Receptors**

Sensitivities are defined as aspects of the natural or social environment which support and sustain people and the physical environment. Once affected, their disruption could lead to a disturbance of the stability or the integrity of that environment. For ecological impacts, sensitivity can be assigned as low, medium or high based on the conservation importance of habitats and species. For habitats, these are based on naturalness, extent, rarity, fragility, diversity and importance as a community resource.

For socio-economic impacts, the degree of sensitivity of a receptor is defined as 'a stakeholder's (or groups of stakeholders') resilience or capacity to cope with sudden changes or economic shocks. The sensitivity of

a resource is based on its quality and value/importance, for example, by its local, regional, national or international designation, its importance to the local or wider community, or its economic value.

7.3.4 **Likelihood**

Terms used to define likelihood of occurrence of an impact are explained in Table 7-3

Table 7-3: Explanation of Terms Used for Likelihood of Occurrence

An impact with a		
High probability	Refers to a very likely impact	Refers to very frequent impacts
Medium probability	Refers to a likely impact	Refers to occasional impacts
Low probability	Refers to rare impacts	Refers to rare impacts
	As far as one-time events (e.g., air emissions) or slowly developing effects are concerned (e.g., impacts on local life style)	As far as possibly recurring impacts are concerned, such as accident or unplanned events (e.g., traffic accident, fire)

7.4 **DEFINITION OF MITIGATION MEASURES**

Mitigation measures are developed to avoid, reduce, remedy or compensate for significant potential negative impacts, and to create or enhance potential positive impacts, such as environmental and social benefits. In this context, the term "mitigation measures" includes operational controls as well as management actions. These measures are often established through industry standards and may include:

- Changes to the design of the project during the design process (e.g., changing the development approach);
- Engineering controls and other physical measures applied (e.g., waste water treatment facilities);
- Operational plans and procedures (e.g., waste management plans); and
- The provision of like-for-like replacement, restoration or compensation.

For potential impacts that are assessed to be of major significance, a change in design is sometimes required to avoid or reduce the significance. For potential impacts assessed to be of moderate significance, specific mitigation measures such as engineering controls are often sufficient to reduce these impacts to ALARP ('as-low-as-reasonably-possible') levels. This approach takes into account the technical and financial feasibility of mitigation measures. Potential impacts assessed to be of minor significance are usually sufficiently managed through good industry practice, operational plans and procedures.

In developing mitigation measures, the first focus is on measures that will prevent or minimise potential impacts through the design and management of the Project rather than on reinstatement and compensation measures.

7.5 **ASSESSING RESIDUAL IMPACTS**

Impact prediction takes into account any mitigation, control and operational management measures that are part of the project design and project plan. A residual impact is the impact that is predicted to remain once mitigation measures have been designed into the intended activity. The residual impacts are described in terms of their significance in accordance with the categories identified in Table 7-2 above.

Social, economic and biophysical impacts are inherently and inextricably interconnected. Change in any of these domains will lead to changes in the other domains.

7.6 POSITIVE IMPACTS DURING CONSTRUCTION PHASE

This section enumerates and discusses the positive impacts associated with the proposed project during construction phase of the project.

7.6.1 Creation of Employment Opportunities

Various employment opportunities will be available during construction. The opportunities will be both skilled and unskilled. Majority of the unskilled and semi-skilled jobs will be taken up by the local community. Employment of the locals will increase skill transfer from the contractors.
The approximate number of workers to be employed by the proposed project is not yet known, however, this will contribute to easing unemployment level in the area. There will be a trickledown effect to the economy at large resulting from new income revenues as well as services provided through this project.

The impact significance is low as it will employ few people over a short period

Enhancement Measures

- Contractor should ensure that they prioritise the local community in allocating job opportunities.
- Contractor should ensure that job opportunities are not discriminatory
- Equal opportunities should be given to both men and women

7.6.2 Improving local economy

During this phase, the project will require supply of building materials most of which will be sourced locally at the nearest trading centre and its environs to the extent possible. Therefore, the project will provide ready market for local enterprises with such materials and boosts the local economy.

The businesses that will benefit during this phase are such as hotel, shops, artisan industries and food vending who will be benefit directly from the construction, as people working there will need commodities from them. This will promote the informal sector in securing some temporary revenues and hence improved livelihoods.
One of the responsibilities of the Project Affected Persons (PAPs) of the proposed Solar Mini-grid is to undertake wiring of their premises before there are connected and payment of a connection fee of Ksh 1000. The MOE through its implementing agency REREC should consider supporting at least 50 households that are very poor through installation of ready boards to offset the cost of wiring so that they can also access electricity.

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

Enhancement measures

- The proponent should ensure that their contractors/suppliers remit taxes and have a tax compliance certificate
- Prioritise local purchases over imports.
- Remit taxes on behalf of employees
- Contractor should prioritise local purchases over imports;
- Contractor should give prefence to local labour which increases the local's ability to spend

7.7 POSITIVE IMPACTS DURING OPERATION PHASE

7.7.1 Quality, Reliable Power Supply

There is no electricity in Lomunyenakwan. This is a maiden project with an aim of supplying power through solar because the area is far away from the national power grid. Once operational, household and public

institutions (dispensary, primary school) and shopping centre in the area will greatly benefit from the stable power supply.

The impact significance is high as it will provide power where it wasn't for a long period

Enhancemement measures

- The proponent should ensure that they have a functional customer support team and a field response team;
- The proponent should ensure that they commuinate power outages early to consumers

7.7.2 Employment Creation

Employment opportunities will also be created during the operation phase of the project. Opportunities that will be created include unskilled, semi-skilled to skilled jobs. These will involve security personnel, and staff to operate and maintain the Mini-grid. Employment will increase skill transfers.

The impact significance is low as it will employe people to manage the substation

Enhancemement measures

- The proponent should ensure that they prioritise the local community in allocating job opportunities.
- The proponent should ensure that job opportunities are not discriminatory
- Equal opportunities should be given to both men and women

7.7.3 Reduction of Pollution Associated with Thermal Power Generation, Kerosene and Wood Fuel Usage:

Residents in the area use different sources of energy. Electricity supply will imply that as many as are willing can apply for connection and get connected. This will result in reduced individuals and organizations using diesel generators, less reliance on kerosene, wood fuel and charcoal. This would mean less carbon dioxide is released to the environment and destruction of forests will be reduced hence decreasing greenhouse gases.

The impact significance is high as it will provide cleaner energy over a long [eriof of time for manny households

Enhancemement measures

- The proponent should ensure that the power provided cost is competitive to discourage the locals from using unclean source of power.
- The proponent should ensure that they commuinate power outages early to consumers

7.7.4 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.

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

Enhancement Measures

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

7.7.5 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.'

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

Enhancement Measures

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

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

7.7.7 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.

7.7.8 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.

7.7.9 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.

7.8 POSITIVE IMPACTS DURING DECOMMISSIONING PHASE

7.8.1 Employment Opportunities

Once the project has served its purpose it will then be decommissioned. This will involve demolition and removal of the facility. During demolition, unskilled, semi-skilled and skilled employment opportunities will be available to the public.

7.8.2 **Site Rehabilitation**

After demolition of the proposed project, rehabilitation of the project site will be carried out to restore it to its original status or to a better state than it was. This will include replacement of topsoil and re-vegetation which will lead to restoration of the visual, vegetative and aesthetic state of the site.

7.9 **NEGATIVE IMPACTS DURING PRE-CONSTRUCTION PHASE**

7.9.1 **Impacts on Land Acquisition and Compensation (land, wayleaves and potential loss of pasture)**

The identified site for the proposed Mini-grid is a 1.97 hectare land owned by the Lomunyenakwan community (under unregistered community land tenure). The site area is neighboured by Lomunyanakwan village approximately 1km to the North East by Lomunyanakwan village and 600m to the East by Lomunyanakwan Dispensary.

The identified site is currently unoccupied, although the community reported that they use it as an alternative route during the rainy season . The assessment found that;

- No residential houses or businesses premises were on the piece of land
- No socio-economic activity was taking place on the land
- No physical relocation will take place.

Way Leaves

Supply of electricity will involve passing of low voltage (LV) lines to connect the customers to power. It is estimated that the LV circuit will be constructed mainly along the road reserve and along the boundaries to supply power.

The impact significance for this impact is assessed minor considering the community willfully allocated the land for project construction.

Mitigation Measures

- Land for mini-grids will be acquired by NLC compulsorily and affected communities compensated in-kind.
- The contractor will sign and adhere to the agreement for use of community land for contractor facilities and worker's camps, and restoration of the site after use.
- 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 during construction of the low voltage lines

7.10 **KEY ENVIRONMENTAL IMPACTS – CONSTRUCTION PHASE**

7.10.1 **Land Use**

The study area consists of commercial land with patches of open scrubland The local distribution lines will be laid by Kenya Power. Considering the land use of Lomunyenakwan area, the distribution line will be located on Unregistered Community Land. The land procured for the project site was uncultivated, and undeveloped. There is no major dependency for grazing on the land procured for the project. Thus, receptor sensitivity is assessed as **low.**

During consultation, it was learnt that the land did not belong to marginal pastoralists. The establishment of the minigrid will convert commercial land to electrical 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**.

For the purpose of assessment of impacts on land use of the area, the following project activities leading

to an alteration in land use of the area during construction phase have been considered:

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

The land take receptor sensitivity will be low. This is due to the fact that there will be visual change upon installation of the minigrid. There is no major dependency for grazing or agriculture on the land offered for the project. The magnitude criteria of this impact will be medium because there will be noticeable of change over the restricted site area. The change may be medium to long term and is reversible. The overall impact significance on land use will be Moderate. This is the case due to the fact that the receptor sensitivity is medium and the impact magnitude is medium.

Figure 7-1: 1.5km buffer area within which distribution lines will be installed and consumers shall be served

7.10.1.1 Mitigation Measures

- The actual area of land use impact would be limited to the footprint of 1.97 hectares of unregistered community land and immediate vicinity of the minigrid site.
- There will be additional land utilized for distribution 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 siteOn completion of construction activities, land used for temporary facilities such as materials yard if any should be restored to the extent possible; and
- The land use in and around permanent project facilities should not be disturbed.
- Construction activities should be restricted to designated area;

7.10.2 **Impact on Topography**

The project area exhibits flat topography with minor undulations. There are no water bodies that pass though the proposed project site. 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 undulating topography (refer to figure below) the study area may exhibit presence of micro drainage channels. Therefore, the impact magnitude has therefore been assessed as small. The overall impact significance will be Minor. This because the impact magnitude is low and there will be no major changes to the topography and the receptor sensitivity is low.

Figure 7-2: Lomunyenakwan 1500m radius

7.10.2.1 Mitigation Measures

- 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.

7.10.3 **Impact on Soil Environment**

During the construction phase, project activities that may impact the environment are described below:

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

The significance of the impact to the soil will be minor due to the nature of the works and the fact that construction and operational activities will be confined in the small project area.

7.10.3.1 Additional Mitigations

- 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 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

7.10.4 **Impact on Air Quality**

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.

There are few Receptors (settlements) within 500 m of the project site and the impact magnitude will be moderate and sensitivity medium hence the impact significance will be moderate.
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 Figure below shows a 500m buffer within which air quality impacts are likely to be felt.

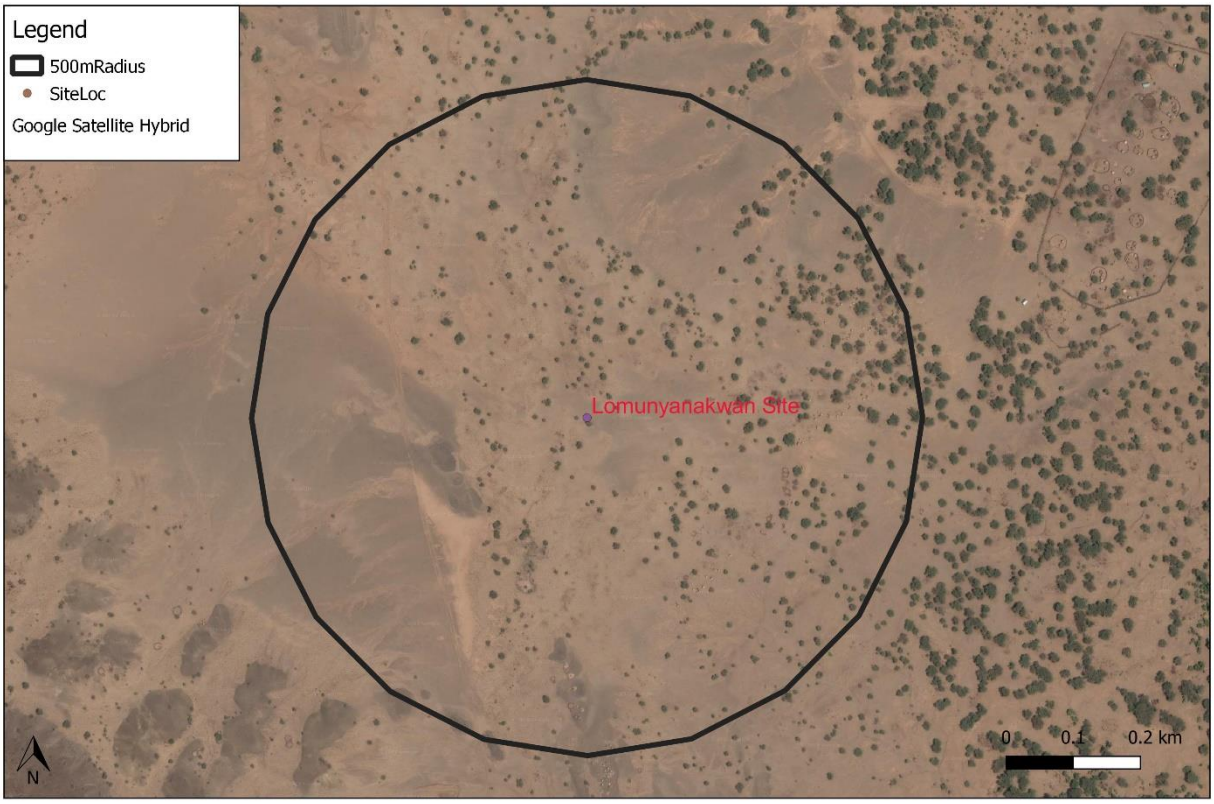


Figure 7-3:Receptors within a 500m radius of project site

7.10.4.1 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, in particular, for construction workers.
- All construction materials will be transported in designated trucks which will be covered.

7.10.5 **Impact on Ambient Noise**

As most of the noise generating activities will be performed within the site area, construction activities will likely have a small to insignificant incremental impact on the existing noise levels. 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.

The sources of noise in the construction phase include construction activities, operation of DG sets and movement of vehicles. There will also be increased noise levels because of increased anthropogenic movement in the area.

Lomunyenakwan Market residents 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 considered to be minor to medium considering the construction period of the project to last for less than 12 months and proximity to Lomunyenakwan Village.

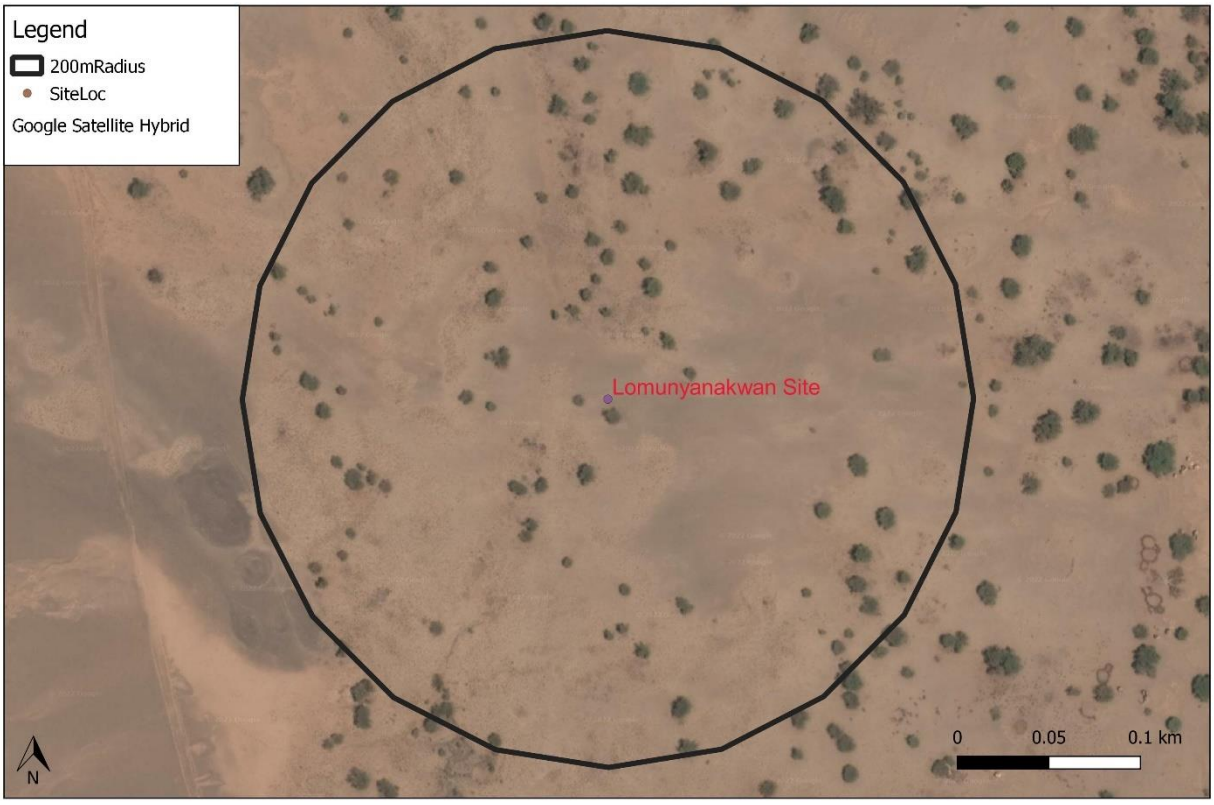


Figure 7-4: Radius of 200m within which noise impacts are likely to be felt

7.10.5.1 Assessment Criteria for Impact on Ambient Noise

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 41 and Table 42 respectively.

Normal working hours of the contractor to be defined (preferable 0800hrs to 1700hrs). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise.

The impact significance has therefore been assessed moderate. This due to the fact that the impact magnitude is low and the receptor sensitivity is medium. The site is on very close proximity to

Lomunyenakwan market and few residential houses nearby.

7.10.5.2 Mitigation Measures

- 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 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.

7.10.6 Visual Intrusions and Changes in Landscape Impact

The project site is located on plain terrain with slight undulation. 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 minigrid 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; with pastoralism as a primary activity. Although the solar panels, inverter 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 a number of equipment or infrastructure when being erected such as small 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 site 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. Proper siting decisions can help to avoid aesthetic impacts to the landscape.

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

7.10.6.1 Mitigation Measures

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

- The extent of the site office 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
- Upon completion of construction work, areas utilized for labour camp, storage area to be restored to original form.

7.10.7 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 waste paper 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 low since the proponent has an effective management system for waste and hazardous substances being generated or utilized during the project life.

The impact significance for waste generation and soil contamination has been assessed as minor. Given the low sensitivity of the surrounding areas and the medium magnitude of the potential consequences of soil contamination, the potential impact significance is rated as minor.

7.10.7.1 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 log book 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.

7.10.8 Fire Outbreaks

Carelessness and negligence both at the solar mini-grid and by the Project Affected Persons (PAPs) of electricity may cause fires. With the mitigation measures in place the impact is evaluated to be of moderate significance due to high sensitivity and low magnitude.

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 fire fighting and management
- 'No smoking' signs shall be posted within the Mini-grid area
- A fire Assembly point should be identified and marked

7.10.9 Water demand

During this period the demand for water will be lesser than that used in construction. However, some amounts of water will be needed in wiping of the panels and use at the solar plant facility. Therefore, caution need to be exercised to ensure prudent use of water. The impact is assessed to be negligible due to very low magnitude of the impact.

Mitigation Measures

- There is need to source for a sustainable water source for use
- Install water-conserving automatic taps
- Encourage water harvesting from rooftops and storage for cleaning purposes (washing the panels off dust)
- Any water leaks through damaged pipes and faulty taps should be fixed promptly.

7.10.10 Flooding

Flooding may occur and cause damage to the plant and other associated infrastructure but the risk of

occurrence is low since the area is not known for regular flooding. The impact is assessed to be negligible due to very low magnitude of the impact.

Mitigation measures

- Ensure drainage channels are free of any obstruction at all times i.e., not blocked
- Construct more channels and or expand existing ones
- Raise foundations of the solar panels and ensure a proper and firm concrete base
- Create flooding diversions and or spill ways to divert water from getting into the solar power facility

7.10.11 Accidental Oil Spills or Leaks

There is possibility of oil leaks from construction vehicles. The construction machines on the proposed site have moving parts which will require continuous oiling to minimize the usual corrosion or wear and tear. These processes may lead to oil spill to the ground. The impact significance will be minor due to the nature of the works and the fact that construction activities will be confined in the small project area.

Mitigation Measures

- In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately.
- It is proposed that the refueling and maintenance of vehicles will not take place at the construction site.
- Contractor to create awareness for the employees on site on procedures of dealing with spills and leaks from oil for the construction machinery
- Vehicles and equipment must be serviced regularly and kept in good state to avoid leaks.
- In case of spillage the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials and/or other materials approved by materials.
- Proper training for the handling and use of fuels and hazardous material for construction workers.
- All chemicals should be stored within the bunded areas and clearly labeled detailing the nature and quantity of chemicals within individual containers.

7.11 KEY SOCIAL IMPACTS – CONSTRUCTION PHASE

7.11.1 Impact on local economy and 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. Where possible, construction materials will be sourced locally in order 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, inverter room, internal roads, laydown areas, labour camp, distribution 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 tea stalls, supply of intermediate raw materials, repair outlets, hardware stores etc. However, these are likely to be temporary.

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.

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

7.11.1.1 Enhancement Measures

- A significant segment of labour 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 labour, 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 audit sub-contractors and suppliers with respect to compliance of utilizing local labour and resources.

7.11.2 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 minigrid sites are located 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.

7.11.2.1 Embedded/in-built control

7.11.2.2 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 minigrid and erection of distribution line will be done through experienced and trained workers.

7.11.2.3 Additional mitigation measures

- 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, ear muffs and face masks;
- Lifting equipment should be operated by trained and authorised 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;
- 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.

7.11.3 Community Health and Safety

The receptors for impacts on community health and safety include project site workers, settlements in the close 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 distribution lines and substations and movement of material and personnel may result in impacts on the health and safety of the community.

Construction activities will involve the use of machinery and installation of distribution 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 e.g., power line, fire safety and management of emergency situations.

Majority of the Project Affected Persons (PAPs) who will be customers and users of the power have not used electricity before. Failure to take appropriate precaution while interacting with electricity can result in electric shocks, fires and even electrocution/death. Impact significate is rated as moderate considering the high impact magnitude and low receptor sensitivity.

Mitigation Measures

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

7.11.3.1 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 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;
- 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

- 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 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 traffic;
- Movement of heavy equipment and construction materials will be regulated during peak hours (0900hrs to 1700hrs).
- Implementing the existing grievance redress mechanism
- Inspect the wiring of the houses before connecting power
- 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 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

7.11.4 **Increase in competion for scarce resources and strain on public utilities**

The influx of workers in the area is expected to lead to increase in demand for public amenities such as hospitals, transport, schools water resources etc. This could lead to a loss of access to these services by locals especially those who could be among the vulnerable categories. Due an increase in demand, cost of housing near the sites will disadvantage the locals.

The nature of the project will require technical skills that might not be available in the community. This might require movement of construction workers into the community.. It is expected that technically skilled personnel might be sourced from outside the community while the unskilled labour is expected to be sourced locally. It is therefore a possibility that the neigbouring communities might go out looking for opportunities in project area thus creating competition. The significance of this impact is considered to be minor because the receptor sensitivity will be medium, and the impact magnitude is low.

Mitigation Measures

- ❖ Reduction of labor influx by tapping into the local workforce to the extent possible
- ❖ Recruitment of local workforce to the extent possible especially unskilled and semi-skilled jobs
- ❖ Consultations with and involvement of local community in project planning and other phases of the project
- ❖ Awareness-raising among local community and workers on the need to have a good /cordial working relation
- ❖ Sensitization/awareness to 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 e.g., water
- ❖ Establishment and operationalization of 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.
- ❖ Gender considerations in employment opportunities
- ❖ Appropriate compensation for work done
- ❖ Respect for community values/culture

- ❖ Prompt payments as per the contractual agreements/terms

7.11.5 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 communities. With an increase in population of the project areas, 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).

The significance of labour influx is considered to be minor because except for the technically skilled personnel, most of the labour is expected to be sourced locally.

7.11.5.1 Additional Mitigation measures

In contract documents for the Contractor, MOEP/REREC should make explicit reference to the need to abide by Kenyan law, international best practice and the ratified ILO conventions and MOEP's policies in relation to health and safety, labour and welfare standards.

In selection of a Contractor, MOEP/REREC 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 MOEP/REREC 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.
- 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.
- 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

7.11.6 Child labour

Implementation of the Lomunyenakwan project 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.

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

7.11.6.1 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 every worker under their jurisdiction signs a document committing themselves to the protection of the area children.

7.11.7 **Forced Labor**

During construction of the mini-grid the risk of forced labor is likely to occur and precaution is need to safe guard the community from being subjected to forced labor. 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 labor
- Community to report any form of forced labor at the site
- Contractor to ensure that all workers have a national ID card or documentation to show they are adults (above 18 years).

7.11.8 **Impacts on Cultural Heritage**

Cultural and paleontological artifacts and cultural landscapes may be disturbed by the construction of the mini grid facilities. These could include community burial sites, sacred shrines. It is expected that a number of workers will be on-site during decommissioning of the project including skilled, semi-skilled, and unskilled personnel.

Based on the analysis provided above, impacts on cultural heritage during the construction phase will be Minor considering low sensitivity of the receptor and low magnitude of the impact.

7.11.8.1 Additional Mitigation measures (Execution of a Chance Find Procedure)

In order to minimize the potential for impact to sub-surface cultural archaeological material, the proponent should establish a Chance Find Programme which includes the following provisions:

- A chance find can be reported by any member of the Project. Accordingly, if a chance find is encountered, the first course of action is to stop work in the vicinity of the find. Then the following steps will be undertaken:
    - Inform site supervisor/foreman.
    - Install temporary site protection measures (warning tape and keep off signs).
    - Inform all personnel of the Chance Find if access to any part of the work area is restricted.
    - Establish a localized no-go area needed to protect the Chance Find.
    - The National Museum of Kenya will be contacted to perform a preliminary evaluation to determine whether the Chance Find is cultural heritage and if so, whether it is an isolate or part of a larger site or feature.
    - Artefacts will be left in place when possible; if materials are collected, they will be placed in bags and labelled by an archaeologist and handed over to the National Museum of Kenya; no Project personnel are permitted to take or keep artefacts as personal possessions.
    - Document find through photography, notes, GPS coordinates, and maps (collect spatial data) as appropriate.
    - If the Chance Find proves to be an isolated find or not cultural heritage, the specialists brought in from the National Museum of Kenya will authorize the removal of site protection measures and activity in the vicinity of the site can

resume.

- If the archaeological specialists from National Museum of Kenya confirm the Chance Find is a cultural heritage site, they will inform the project team and initiate discussions with the latter about treatment.
- Prepare and retain archaeological monitoring records including all initial reports whether they are later confirmed or not.
- Develop and implement treatment plans for confirmed finds using the services of qualified cultural heritage experts.
- If a Chance Find is a verified cultural heritage site, prepare a final Chance Finds report once treatment has been completed.
- While investigation is on-going, co-ordinate with on-site personnel keeping them informed as to status and schedule of investigations, and informing them when the construction may resume.
- If mitigation is required, then expedient rescue excavations will be undertaken by the National Museum of Kenya specialist, except in the case that the chance find is of international importance (i.e., Critical Cultural Heritage). If an archaeological site of international importance is encountered special care will be taken and archaeologists with the appropriate expertise in addressing the find will be appointed.

7.11.9 Gender Based Violence, Sexual Exploitation and Abuse & Sexual Harassment

Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) may be committed against the communities by the construction workers and by staff during the operation and maintenance of the mini-grids. Incidences of Sexual Harassment (SH) may occur among the staff during construction, operation and decommissioning phases of the project.

There are minimal incidences of gender-based violence in Lomunyenakwan as identified during Focus group discussions with women. However, it cannot be ruled out during project implementation. Thus, the significance of this impact pre-mitigation is considered to be minor owing to the low sensitivity of the receptor and low magnitude of the impact.

7.11.9.1 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; and,
    - A referral pathway to refer survivors to appropriate support services.

7.11.10 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 and marginalized households and individuals 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.

The activities of component 1 envisages upon completion of MGs, that the relevant Implementing Agencies will connect customers from community facilities, enterprises and households to the electricity grid on a commercial basis under a market driven approach. There is a high likelihood that the targeted Project Affected Persons (PAPs) 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.

During the ESIA study the community identified those considered vulnerable in the community include:

- Orphans/Child headed households
- Persons Living with Disabilities
- Widows

Considering the high sensitivity of the VMGs identified in the project and high magnitude, the impact significance is considered to be major. However, it is important to take into account the project site inhabitants are predominantly from the Turkana community.

7.11.10.1 Mitigation measures

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.
- 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.

7.11.11 Risk of Communicable Diseases; HIV/AIDS

The construction operation and maintenance 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 through risky behaviours involving job seekers and people employed on the project.

Based on the analysis provided above, impacts on disease distribution during the construction phase will be Moderate pre-mitigation.

7.11.11.1 Additional Mitigation measures

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

- The Contractor will make condoms available to employees and communities neighbouring the site office during construction.
- 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.

7.11.12 COVID-19 amongst workers and the community

This impact is triggered during Project Construction Phase and operation phase due to the Project attracting various categories of workers drawn from local, and national markets. This therefore pose risk of spread of COVID-19 and measures should be in place to curb this.

COVID – 19 is a highly infectious disease and since consultations are required during the project implementation, it will also pose a potentially high risk of infection to and among communities. It is important that alternative ways of managing consultations and stakeholder engagement are implemented to mitigate the impacts.

According to the Ministry of Health, Turkana County is one of the few counties with a few number of reported Covid 19 cases and infections. At the time undertaking the assessment, the county had only 1040 Covid-19 reported cases and was ranked at number 35 out of the 47 counties. No significant cases had been reported in Lomunyenakwan area. If the status remain the same even at the time of implementation of the project then the significance of this impact pre-mitigation is considered to be moderate

The receptor sensitivity medium and low magnitude, hence Moderate significance.

7.11.12.1 Mitigation Measures

- Install handwashing facilities with adequate running water and soap, or sanitizing facilities at entrance to main site;
- Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, doorknobs etc.;
- All workers and visitors accessing the site every day shall be subjected to rapid Covid-19 screening which may include temperature check and other vital signs;
- The project shall put in place means to support rapid testing of suspected workers for covid-19;
- Avoid concentrating of more than 5 workers at one location. Where two or more people are gathered, maintain social distancing of at least 2 meters;
- Sensitize all community segments and project workers on Covid 19 and precautionary measures that need to be observed;
- Avoid concentrating of more than 15 community members at one location. Where two or more people are gathered, maintain social distancing of at least 2 meters;
- The team carrying out engagements within the communities on one-on-one basis will be provided with appropriate PPE for the number of people they intend to meet;
- Restrict site access to only Authorised persons; and
- Continuously adhere to the MoH, WHO and World Bank guidelines on Covid-19 management.

7.11.13 Impacts Related to Stakeholder identification and consultations

This impacts are associated with these risks:

i) 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

ii) 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)

iii) 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.

iv) 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

v) 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
- Sensitise the various stakeholder categories on the existence, roles and responsibilities of the various implementation structures

7.12 KEY ECOLOGICAL IMPACTS- CONSTRUCTION PHASE

During the construction, operation and decommission activities of the Mini grids there could be loss of flora and fauna leading to change in natural habitat conditions for local species of plants and animals. Actions with negative impact on biodiversity include clearance of vegetation leading to alteration of local micro-climatic conditions. Disturbances of the top soil by removal or compaction. This could lead to increased soil erosion due to surface run-off water with reduced recharge potential of ground water reserves.

The Project site is located on open undeveloped land. Considering the fact that the site is already in an urban area and vegetation clearance has already been done, displacement of species may have already happened.
Based on habitat sensitivity value, open scrub habitat was found to sustain only Least

Concern species, and such habitat is widespread in the study area and beyond study area, so the loss of such habitat for project activity affects only a small portion of such habitat. So, the impact magnitude on habitat, based on "Habitat-Impact Assessment Criteria" is considered to be "Negligible".

Based on species sensitivity value, project construction activity is not going to cause a substantial change in the population of the species or other species dependent on it. So based on "Species-Impact Assessment Criteria" the impact magnitude on species was also found to be "Negligible".

7.12.1.1 Mitigation Measures

Vegetation clearance should be kept restricted to project site only and should be avoided wherever possible. Moreover, it is recommended that the selected contractor should display and educate labourers not to collect fuel wood from adjacent scrublands and alternate arrangement for fuel, like LPG must be made available in the labour camps for cooking.

7.13 KEY ENVIRONMENTAL IMPACTS – OPERATION PHASE

7.13.1 Impact on Soil Environment

Some of the activities that may impact on the soil environment include Storage of oil and lubricants onsite; disposal of municipal solid waste and waste water from site office; and Storage of waste materials onsite.

Since the chances of soil compaction and erosion during the O&M phase are minimal, the impact magnitude is assessed to be negligible.

7.13.1.1 Embedded/in-built control

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

7.13.1.2 Significance of Impact

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

Both the receptor sensitivity and the impact magnitude will be low.

7.13.1.3 Additional Mitigation Measures

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

7.13.2 Waste Generation and Management

During operation phase, the waste generated from project includes domestic solid waste and hazardous waste like waste oil and lubricants and oil containing 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 hazardous and non-hazardous waste generated will be much lesser in quantity in operation phase than during the construction phase. Thus, the Impact magnitude has been assessed to be small.

7.13.2.1 Embedded/in-built control

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 hazardous and non-hazardous 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.

7.13.2.2 Significance of Impact

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

7.13.2.3 Additional Mitigation Measures

- The waste generated should be disposed of through approved NEMA waste handlers.
- The hazardous wastes should 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 hazardous and non-hazardous 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 should be routed through proper collection and containment.
- 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 colour coding of the waste receptacles.
- 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 Licenced 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 off.
- 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)

- Solid Waste Management Code of Practice will be integrated into SOP

7.13.3 Impact on Water Environment

Water is required during operation phase to meet domestic requirements of O&M staff and for cleaning solar panels. For that purpose, the water requirement will most likely be sourced from existing bore holes in the nearby area, and through packaged water bottles. 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 residents in Lomunyenakwan revealed that there is sufficient ground water availability 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.

The overall significance of impacts is assessed to be minor.

7.13.3.1 Mitigation Measures

- Planning of toilets and waste collection areas should be away from natural drainage channels;
- Ensure proper cover and stacking of loose construction material to prevent surface runoff and contamination of receiving water point/resource;
- 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 labour deputed onsite to be sensitised 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

7.13.4 Landscape and Visual Impacts

The solar panels will be spread over a horizontal form with to some height above the ground level. In addition, the entire facility will be fenced with a stone wall, hence may not 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-by.

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 of time. Based on the above, significance of visual impact on landscape during operation phase of the project has been assessed as minor due to low receptor sensitivity and impact magnitude being medium.

7.13.4.1 Mitigation measures

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

operational phase:

- Signage related to the minigrid 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.

7.13.5 Flooding

Flooding may occur and cause damage to the plant and other associated infrastructure but the risk of occurrence is low since the area is not known for regular flooding.

7.13.5.1 Significance of Impact

The impact is assessed to be negligible due to very low magnitude of the impact.

7.13.5.2 Mitigation measures

- Ensure drainage channels are free of any obstruction at all times i.e., not blocked
- Construct more channels and or expand existing ones
- Raise foundations of the solar panels and ensure a proper and firm concrete base
- Create flooding diversions and or spill ways to divert water from getting into the solar power facility

7.13.6 Noise and Vibration

Negligible noise and vibration will be produced during operation phase of the project and would be from the backup generator.

7.13.6.1 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.

7.13.7 Electric and magnetic fields (EMFs)

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.

7.13.8 Dust emissions

During operation phase not much dust will be generated from the facility but wind and dust storms are potential impacts. This impact will be negligible because there will be no activities on site that will have the potential to generate dust.

7.13.8.1 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

7.13.9 Vehicle exhaust emissions

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

7.13.9.1 Significance of Impact

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

7.13.9.2 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.

7.14 KEY SOCIAL IMPACTS – OPERATIONS PHASE

7.14.1 Impact on Energy supply

The construction, operation and maintenance of the mini-grids will improve enrgy supply in Lomunyenakwan area. Receptors in the Social Area of Interest that may be able to make the most of the

available power supply in their businesses, households and public amenities.

Thus, anticipated benefits of the Project include increased power supply mainly during construction of the mini-grids; impoved education due to the increased length of the schoolday as students may extend their studies to earlier or later hours of the day; improved healthcare because of the reliable lighting and refridgeration of medicines.

Electricity access will replace kerosene lamps which are expensive to operate. Kerosene is costly both for low income households that buy it, and for governments that subsidize it. In parts of Africa, for instance, kerosene costs make up 10-25% of household monthly budgets according to a report by Lighting Africa market trends report 2013. A study on Energy Kiosks for Lighting up Kenya presented in at Light Africa conference in 2010 found that on average a family spends about Kshs750 per month for lighting kerosene. Empirical data presented by Kenya National Bureau of Statistics found 2013 indicates that a family consuming about 50kw/h of electricity which is mainly domestic paid a bill of Kshs 586 in February 2012, Kshs. 568 in January 2013 and 564 in February 2013 which gives an average bill of Kshs. 572. Comparing these two costs of consumption electricity bills seem to be cheaper than using kerosene for lighting by about Kshs. 128. Therefore, the Kenya Off Grid Electricity Access Project means greater savings on the part of the households.

According to Kenya Power's annual report of 2012/2013, electricity access stood at 4.8million customers as at June 2016. This translates to about 60% of the total population accessing electricity. Needless to say, the uptake has been low due to the situation that the cost of connection has to be paid up front keeping in mind that about 46.6% of the Kenyan population is poor. Furthermore, the off-grid areas are disadvantaged due to lack of national grid hence the need for the K-OSAP project.

Access to electricity will change the standard of living of the people as they can use domestic appliances like iron boxes, fridges, television sets, washing machines to mention but a few. Use of electricity for lighting implies that the people will not be exposed to smoke arising from use of kerosene lamps which predisposes people to respiratory diseases.

The impact significance will be moderate due to the high impact magnitude and the high receptor sensitivity.

7.14.1.1 Enhancement Measures

- Enhancing community safety by encouraging the use of qualified and EPRA licensed technicians to do the wiring of the power connection
- Consider subsidizing the connection fee for the vulnerable persons as they may not be able to afford the fees

7.14.2 Impact on Economy and Employment

Community consultations and observations made during the site visit suggest that the existing scenario of the Pastoralism 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.

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.

7.14.2.1 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

7.14.3 Impact on Occupational Safety and Health

During the operation phase, maintenance and repair will be done on the site. Therefore, there will be potential impacts on workers' health and safety due to exposure to risks through such 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 minigrid sites are located 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.

Because the maintenance activities will be conducted less frequently compared to the construction phase activities, the impact magnitude on occupational Safety and Health will be minor. Considering that the accidents may result in injuries and death, the sensitivity is considered to be major. Therefore, the significance is major.

7.14.3.1 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 minigrid and erection of distribution line will be done through experienced and trained workers.

7.14.3.2 Additional mitigation measures

- All maintenance 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;
- Lifting equipment should be 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;
- 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.

7.14.4 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.

7.14.4.1 Significance of Impact

With the implementation of the mitigation measures the impact significance is minor to negligible.

7.14.4.2 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

7.14.5 Impact on Community Safety and Health

The receptors for impacts on community health and safety include project site workers, 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 minigrid 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.

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 minigrid site will be properly fenced for safety and sign boards in local languages will be put up;
- 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 (0900hrs to 1700hrs).

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

7.14.5.1 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 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;
- 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
- 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

7.14.6 **Fire Outbreaks**

Carelessness and negligence both at the solar mini-grid and by the beneficiaries of electricity may cause fires. With the mitigation measures in place the impact is evaluated to be of moderate significance due to high sensitivity and low magnitude.

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 fire fighting and management
- 'No smoking' signs shall be posted within the Mini-grid area
- A fire Assembly point should be identified and marked

7.14.7 **Gender Based Violence- SEA/ SH**

Gender based violence risk is also possible during operation phase although the labor force will be smaller. the impact is assessed as minor due to the low magnitude and medium receptor sensitivity. Therefore, measures must be put in place to address GBV risks.

Mitigation Measures

To manage GBV risks, the contractor will prepare a SEA/SH Prevention and Response Action Plan that will include a GR that ensures confidentiality. The plan will include the necessary measures for prevention and response.

Key tasks will include
- Community engagement to create awareness on GBV risk/ issues
- Creating awareness to workers on the need to refrain from GBV incidences
- Mandatory awareness creation for workers on required lawful conduct in the community and legal consequences for failure to comply with laws
- Mandatory signing and implementation of code of conduct for the workers
- Creation of partnership or liaison with specialized actors in GBV who can respond appropriately in case of any incidence (provide contacts to community)
- Ensure a survivor centered approach in responding to GBV incidences i.e., decision to report lies with the survivor or the guardian in case of a minor.
- Contractor to provide established referral pathway including police station with a gender desk for handling GBV cases and also free toll numbers/hot lines for reporting GBV
- The contractor will also facilitate any survivor who decides to take legal action by referring them to the nearest established legal support facility that offers legal support to GBV survivors.
- ❖ Ensure Confidential reporting and responding to GBV cases if reported;
- ❖ Encourage reporting of all GBV incidences to the chief or the grievance redress committee members or community elders; and
- ❖ Ensure all complaints on GBV or harassment are reported directly through CREO - county renewable energy officer.

7.14.8 **Public Health Impacts –HIV/AIDs**

There is potential for HIV/AIDs risks during operation phase. Therefore, the contractor need to put measures to prevent the same. Based on the fact that the receptor sensitivity will be medium and the impact magnitude low, the impact significance will be Minor.

Mitigation Measures

- 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
- The contractor will provide public education/information about HIV/AIDS transmission and prevention measures.
- Provision of condoms to workers
- Allowing migrant workers time to be with their families

7.14.9 **Public health Impacts -Covid 19 disease**

It is likely that the project will be implemented during the Covid 19 pandemic and so preventive measures must be put in place to prevent the disease from spreading. The receptor sensitivity will be medium and the impact magnitude low, therefore, the impact significance will be Minor.

Mitigation Measures

- Social distance must be observed
- Provision of hand wash facilities before access
- Provide thermal guards for temperature check and monitoring for workers and any other person coming to site
- Enforce wearing of masks
- Make provision for testing and treating especially of workers
- Display Ministry of Health guidelines on COVID 19 at strategic points and ensure adherence
- Create awareness on COVID 19 preventive measures
- Provision of contact numbers for the nearest health facility for testing and treatment
- Adhering to any other measures from the ministry of health which may be issued from time to time

7.15 **KEY ENVIRONMENTAL IMPACTS – DECOMMISSIONING PHASE**

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

Decommissioning Phase activities include removal of PV modules and associated minigrid infrastructure including batteries.

7.15.1 **Impact on Soil Environment**

The project activities that may impact the soil environment during the decommissioning phase are described include: removal of PV modules, and removal of associated infrastructure including battery and generators.

The significance of the impact to the soil will be minor due to the nature of the works and the fact that the decommissioning activities will be confined in the small project area.

7.15.1.1 Mitigation Measures

- 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;
- 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 and backfilling of excavated areas.
- Enclose the demolition site and protect the soil to prevent the waste soils and other debris from being washed away by surface runoff and wind.
- Any soil potentially contaminated by chemicals, oils, fuels to be collected and disposed of by a NEMA authorized waste handler

7.15.2 **Impact on Air Quality**

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

- Fugitive emissions from site demolitions and demolition waste handling etc.;
- Fugitive emission from traffic movement;
- Exhaust emission from operation of machineries like pile drivers, vehicles;

There are few Receptors (settlements) within 500 m of the project site and the impact magnitude will be moderate and sensitivity medium hence the impact significance will be moderate.
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.

7.15.2.1 Mitigation Measures

- Visual inspection of dust pollution from roads and the demolition site and appropriate intervention if dust levels are high.
- Speed restriction of the vehicles to a speed of 10-15km/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, in particular, for the site workers.
- All demolition wastes will be transported in designated trucks which will be covered.

7.15.3 **Impact on Ambient Noise**

The sources of noise in the decommissioning phase include demolition activities and movement of vehicles. There will also be increased noise levels because of increased anthropogenic movement in the area.

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

- Demolition activities; and
- Transportation of demolition wastes materials, machinery and personnel;

Normal working hours of the contractor to be defined (preferable 0800hrs to 1700hrs). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise.

The impact significance has therefore been assessed to be minor. This due to the fact that the impact magnitude is low and the receptor sensitivity is medium.

7.15.3.1 Mitigation Measures

- 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 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.
- 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 the truck drivers to switch off vehicle engines while loading materials from the demolitions.

7.15.4 Impacts on Waste Generation and Soil Contamination

General demolition waste generated onsite will comprise of concrete, steel cuttings/filings, packaging paper or plastic etc. solid wastes consisting of electronic waste, plastic, glass and waste paper will also be generated by the 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. Therefore, the receptor sensitivity has been assessed as medium.

The impact significance for waste generation and soil contamination has been assessed as minor. Given the low sensitivity of the surrounding areas and the medium magnitude of the potential consequences of soil contamination, the potential impact significance is rated as minor.

Mitigation Measures

- Contractor should ensure that no unauthorized dumping of used oil and other hazardous waste is undertaken at the site;
- 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 log book 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.

7.16 KEY SOCIAL IMPACTS – DECOMMISSIONING PHASE

7.16.1 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 who will be affected.

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

7.16.1.1 Mitigation Measures

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

- Notify the GRC, Local leadership, the County Government reps of the specific jobs and the skills required for the Project
- Prioritize the employment of unskilled labour from the local communities.
- Prioritize the procurement of goods and services from within Turkana County.
- Develop and implement a fair and transparent employment and procurement policy.
- Advertise all jobs and tenders. (The jobs can be advised through local administrative offices, GRC meetings)
- Ensure gender mainstreaming during employment
- The contractor shall inform the workers and local community about the duration of work; and
- Reduction of worker will be done phase wise and corresponding to completion of each activity.

7.16.2 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.

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.

7.16.2.1 Additional mitigation measures

- 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;
- 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.

7.16.3 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 decommissioning phase activities that involve removal and disassembling of the minigrid 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.

7.16.3.1 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;

7.16.3.2 Significance of Impact

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

7.16.3.3 Additional Mitigation Measures

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

- The minigrid site should be properly fenced for safety and sign boards in local languages will be put up;
- The truck drivers carrying construction machinery and materials should be instructed to drive within speed limits with careful consideration for village traffic;
- Movement of heavy equipment and construction materials should be regulated during peak hours (0900hrs to 1700hrs).
- Implementing the onsite ESMS and EHS Policy by the contractor;
- 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;
- 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
- Implementing the existing grievance redress mechanism

7.16.4 Risks 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.

7.17 CUMULATIVE IMPACTS

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 PLAN (ESMP)

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 (REREC) 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, REREC 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 – REREC 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

REREC 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 REREC 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 renumeration, 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 Decomissioning	Contractor Proponent	-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 Decomissioning		-Number and types of businesses sourced from, businesses owned and operated by vulnerable individuals, types	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
				and quantities of materials etc.		
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, and 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 project) 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	Pre- Construction	Contractor- *(contractors' facilities, workers camps)* Proponent- *(project land for generation assets)*	-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)
	form. -Consultations with the community on the low voltage lines. -The design of the distribution line will utilize the existing road reserves. However, any damage to structures, crops, trees, community facilities and other assets will be compensated in line with the RPF provisions.					
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	Construction Decomissioning	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)
	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. -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.	Construction Decomissioning	Contractor, Proponent	-Updated employment register indicating locals employed, their ages, national identification numbers etc. -Grievances raised, aggrieved persons	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	-Put visible signage on site "**No Jobs for children**" -Do not allow children at the project site.			and status on resolution etc.		
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 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.	Construction Operations Decomissioning	Contractor Proponent	-Minutes of awareness creation sessions for the community and workers on GBV-SEA/SH. -Code of conduct signed by all those with physical 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	Quarterly	50,000.00
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	Construction Decomissioning	Contractor Proponent	-Number of reported cases of forced labor.	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	a national ID card or documentation to show they are adults (above 18 years).					
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-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	Construction Operations Decomissioning	Contractor	-Availabiliy of and implementation of the Stakeholder Engagement Plan. -# of stakeholder consultations held -Record of stakeholder consultations held (minutes of meetings and list of participants). -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	Quarterly	30,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	committee to include representatives from the community. -Sensitize stakeholders on SEP and GRM.			resolution etc. -Concerns raised andactons 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. • 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	Pre-construction Construction Operations Decomissioning	Contractor Proponent	Minutes of consultative meetings with all community segments including VMGs and vulnerable individuals and households, grievances raised and status on resolution etc.	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	fully resolved in a timely manner. • Access to culturally appropriate project benefits and opportunities.					
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	O&M Contractor; Proponent	-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 and status on resolution etc	Quarterly	No additional cost
Inadequate grievances management	-Constitute a Local Grievances Committee is in consultation with all community segments, and incorporates the existing local dispute resolution mechanism. -Implement a workers	Construction Operations Decomissioning	Contractor Proponent	-Local Grievances Committee in place, composition of committee, awareness of community and workers on project	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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.			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.		
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	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)
	should be addressed through landscaping and grassing, carting away and proper 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	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)
	disposed-off appropriately. 5. No servicing vehicles on site					
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	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)
	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 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.	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)
	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					
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	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)
	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					

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	10. Proper disposal of waste in line with solid waste regulation 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.	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)
	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 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	Noise levels-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

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	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)
	the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials 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	Construction	Contractor	-Records of any Fire incidences -Fire equipment and evacuation plan	Quarterly	100,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	including procedures to take when a fire is reported. 6. Designate an assembly point					
Impacts of construction material sourcing (e.g., quarrying)	1. Source all building materials such as stone, sand, ballast 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.	Construction	Contractor	Sources of raw materials (from local community)	Quarterly	Part of contractor's cost
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	Contractor	Water usage records	Quarterly	Part of contractor's cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	construction and operation phase.					
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 (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.	Construction	Contractor	Energy consumption records	Quarterly	No additional cost
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	Construction	Contractor	Records of any near misses, incident, and accidents. Records of corrective actions	Quarterly	1,000,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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 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			implemented if there was an accident.		

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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 *Barazas.* 2. Awareness creation and consultations with local communities prior and during construction on the dangers of these diseases 3. Informing workers on local cultural values and health matters. 4. Provision of condoms to workers	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)
	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	Operation	O&M 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)
	2. Emphasis on prudent waste generation and give priority to reduction at source 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	Operation	O&M Contractor; KPLC	-Engine maintenance records -Oil spill containment plan	Quarterly	200,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	soil should be scooped and disposed of appropriately.					
Increased oil Consumption	1. Efficient energy consumption 2. Install an energy-efficient lighting system	Operation	O&M Contractor; KPLC	Energy consumption records	Quarterly	No additional cost
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	Operation	O&M 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	Operation	O&M Contractor; KPLC	-Provision of serviced fire equipment,	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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. 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			evacuation plan and safety signages -Records of fire safety training		
Visual Impacts	1. Fence round the solar Mini-grid to keep off/screen the solar panels.	Operation	O&M Contractor; KPLC	Presence of a perimeter fence	Quarterly inspections	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
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.	Operation	O&M 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	Operation	O&M 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 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	Operation	O&M 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)
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	Operation	O&M 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	Operation	O&M Contractor; KPLC	Presence of well-maintained receptacles and centralized collection	Quarterly	200,000.00
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	Operation	O&M Contractor; KPLC	Noise levels-Records of noise measurements done by contractor within the project area and at distances of 30m from the Solar mini-	Quarterly	Part of contractor's cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
				grid		
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 infrastructure e.g., not tying livestock on electric poles, no cutting earth	Operation	O&M Contractor; KPLC; consumer	-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)
	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	Operation	O&M 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)
	3. Maintain records of any person who comes to site					
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	Operation	O&M 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	Operation	O&M Contractor; KPLC	-SEA/SH Prevention and Response Action Plan -Grievance records	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	include the necessary measures for prevention and response and must ensure survivor-based approach					
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 2. Provision of condoms to workers 3. Allowing migrant workers time to be with their families	Operation	O&M Contractor; KPLC	Number of awareness creation sessions conducted. -Availability of and distribution of condoms		20,000.00
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	Operation	O&M 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)
	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					
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	Operation	O&M Contractor; KPLC	Visual inspection	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
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	Operation	O&M Contractor; KPLC	Engine maintenance records	Quarterly	No additional cost
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	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

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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.					
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 3. Provision of facilities for proper handling and storage of demolition	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)
	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 Malkaghala 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
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;	- 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						
	• 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 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.					

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• 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.					
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	• Construction • Operation • Decommissioning	Contractor monitored by the supervising engineer	Daily site inspection	Inspection records	100,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	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 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;	- Pre- construction - Construction - Operation - Decommissioning	Contractor, monitored by supervising engineer.	Daily inspections of the vehicles and machinery	Grievance records	50,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• 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 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;					

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• 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; • 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.	Construction	Contractor and proponent.	Weekly site inspection	Inspection report	No additional cost
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;	• Pre- construction • Construction • Operation • Decommissioning	Contractor and proponent.	Daily site inspection.	Inspection reports	20,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	• Regular inspection for identification of water leakages and preventing 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	Proponent, 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) • 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					

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	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; • 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	Operation	O&M Contractor, KPLC	Daily inspection of incident reporting forms.	Incident reporting forms	200,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	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 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	• Pre- construction • Construction • Operation • Decommissioning	Proponent and the contractor	Incident Records, Local community grievance redress system. Number of monthly complains from the locals	Grievance records	20,000

IMPACT ISSUE	MITIGATION MEASURES	Phase	RESPONSIBILITY	MONITORING FREQUENCY	COMPLIANCE INDICATOR	COST
Environmental Impacts						
	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 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	• Construction	• Contractor	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						
	on fire fighting and management • 'No smoking' signs shall be posted within the Mini-grid area • 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/REREC 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 REREC.

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 REREC 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 REREC 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 REREC 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 if 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 REREC
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:

a) Conducting extensive public awareness and consultations with the affected people.
b) Help ensure that local concerns raised by PAPs as regards to the project are promptly addressed by relevant authorities.
c) Resolve manageable disputes that may arise relating to the project. If it is unable to resolve/help refer such grievances to the CGRCs instituted.
d) Ensure that the concerns of vulnerable persons such as the disabled, widowed women, orphaned children affected by the sub project are addressed.
e) Assist the community in recording grievances, including helping those who cannot write or read.
f) Help the vulnerable groups access project benefits
g) Ensure that all the PAPs in their locality are informed about the project

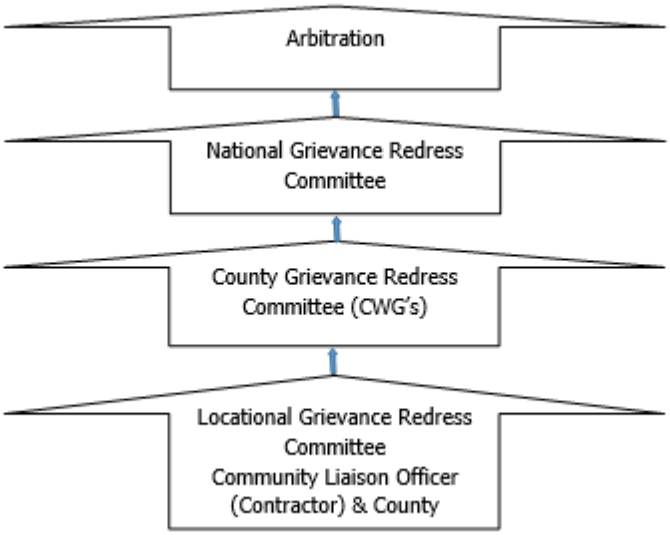


Figure 8-1: KOSAP Grievance Redress Mechanism

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 Lomunyanakwan

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 meditation/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 (REREC)

REREC 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;

- REREC 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 REREC engineers and operators. So, for the seven years REREC will be monitoring the operations of the contractor.*

8.6.4 **County Government of Turkana**

The County government is a key stakeholder. The roles of the county government include giving relevant approvals needed, assisting is 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 REREC 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 REREC) will be responsible for all the mitigation measures for negative impacts during the operation phase for the first seven years after which responsibility will be REREC. This will be done by implementation of the following steps:

- Inspections
- Corrective action
- Reporting

9 CONCLUSION AND RECOMMENDATION

9.1 Introduction

This chapter gives a summary of impacts conclusion and recommendations

9.2 SUMMARY OF IMPACTS IDENTIFIED AND ASSESSED

9.2.1 Pre construction and Construction Phase Impacts

A number of impacts have been identified as a result of the construction of the proposed Lomunyanakwan project. Of these, impacts on employment, procurement and the economy have been determined to be positive.

The significance of the identified negative impacts associated with the construction phase is moderate prior to the application of appropriate mitigation measures. The significance of two of the identified negative impacts associated with the construction phase, specifically: impacts related to labor and working conditions and visual impacts are minor prior to the application of appropriate mitigation measures. With the application of appropriate mitigation measures, the significance of all the identified negative impacts associated with the construction phase will be reduced to minor or negligible.

9.2.2 Operational Phase Impacts

A number of impacts have also been identified to be associated with the operational phase of the proposed Lomunyanakwan solar project. Of these impacts, four (collectively referred to as Impacts on Employment, Procurement and the Economy) will be positive impacts. Prior to the application of appropriate mitigation measures, none of the identified negative impacts will be of major significance during the operational phase. The presence of electrical infrastructure will pose this health threat to avifauna prior to the application of appropriate mitigation measures. Four of the negative impacts are of minor significance before the application of appropriate mitigation measures. These include: impacts on water quality; health, safety and security and visual impacts.

With the application of appropriate mitigation measures, the significance of all the identified negative impacts associated with the operational phase will be reduced to MINOR or NEGLIGIBLE

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.

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.

10 REFERENCES

The following list of references was referred to in preparing this Project Report:

1. Environmental Assessment Source Book, 1999 (World Bank),
2. George, C. and Lee, N., 2000 Environmental Assessment in Developing and Transitional Countries, Willey: Chichester, UK
3. Government of Kenya (GoK), 1999. The Environmental Management and Co-ordination Act, 1999. Government Printer.
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5. Government of Kenya (GoK), 2009. The Environmental Management and Co-ordination Act, Regulations 2009, Legal Notice No. 61, 2009. Government Printer
6. Government of Kenya (GoK). The Public Health Act Chapter 242 Laws of Kenya.
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8. Government of Kenya (GoK), Building code, Building order 1968 and Grade 11 Building Order 1968
9. Government of Kenya: The Physical Planning Act 2019
10. Government of Kenya: Occupational Safety and Health Act,2007
11. Government of Kenya: Factories and Other Places of Work (Safety and Health Committee) Rules 2004
12. Government of Kenya: Water Quality Regulations, 2006
13. Government of Kenya: Waste Management Regulations, 2006
14. Government of Kenya: The Occupational Safety and Health Act, 2007
15. Government of Kenya: Noise Prevention and Control Rules 2005
16. Government of Kenya: Hazardous Substances Rules, 2007
17. Government of Kenya: Factories and Other Places of Work (Noise Prevention and Control) Rules 2005
18. British Standard (BS) 5228 Part 4, 1997: Noise Control on Construction and Open Sites: Code of Practice for Noise and Vibration Control applicable to piling operations
19. International Labor Organization 1983: Encyclopedia of Occupational Health and Safety Vol. II, Geneva.
20. Sombroek WG, Braun HMH & Van der Pouw BJA, 1982: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, 1980 (Kenya Soil Survey, Nairobi),
21. Community Land Act, 2016
22. The Land Registration Act, 2012
23. The Land Act, 2012
24. The Energy Act, 2019
25. The Constitution of Kenya, 2010
26. Isiolo County Integrated Development Plan 2018

11 APPENDICES

List of appendices	
APPENDIX 1	Minutes Of The Meeting Held During ESIA Process
APPENDIX 2	List of Attendance
APPENDIX 3	Soil sampling measurement results
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 and Petroleum

REREC
RURAL ELECTRIFICATION & RENEWABLE ENERGY CORPORATION

MINUTES OF EIA CONSULTATION FOR THE PROPOSED KENYA SOLAR MINIGRID PROJECT IN TURKANA COUNTY

Date: 16/01/2022	**Time:** 1055hrs
Venue: LOMUNYENAKIWAAN CENTRE	

PRESENT

List of members present is appended herein

AGENDA

1. Introduction
2. Opening Remarks
3. Remarks by the consultant
4. Concerns/Issues from participants
5. Responses to the issues raised
6. Acceptance/rejection of the proposed project
7. Adjournment

Item No	Description	Action by
Min 1/22	**Introduction**	
1.1	The meeting was started by a word of prayer from one of the participants	
1.2	The area chief welcomed the visitors to the location	Chief
1.3	The village admin further welcomed the visitors to the area and gave apologies for the ward administrator	Village admin
1.4	Louse led in the introductions of the consultants and counterpart staff.	Louse Kioko

Ministry of Energy and Petroleum

RENEC
RURAL ELECTRIFICATION & RENEWABLE ENERGY CORPORATION

Min 2/22	Opening Remarks	
2.1	Louse explained that the purpose of the visit was for the KOSAP project which is a project that electrifies 14 underserved counties. She explained that Turkana is among the counties. She further stated that Turkana County has 20 cities	Louse Kioko.
Min 3/22	**Remarks by the consultant**	
3.1	Louse explained that the project was a solar project and the community should allocate a piece of land where the project will be set up. She explained that currently the ESIA process was ongoing and a licence will be sought from NEMA upon completion of reporting. She explained that the project has 4 components and currently component 1 was being installed.	Louse Kioko.
3.2	Mr. Ebei explained that the project requires a piece of land for set up. He explained the project components will be batteries, solar panels, inverter and explained the importance of each. He further explained that the connection fee will be on the beneficiaries bill and the connection fee will be Ksh 1000.	Mr Ebei
3.3	Samuel explained further the need for land for the solar mini grid. He explained that the community will donate the kind	Samuel Oleka. PEREC

KATILIA LOCATION
DATE
P.O. BOX 21-2

or the proponent will buy the land or payment will be through compensation. He explained the compensation in kind can be in 3 sectors health, water or education. He explained in case the community wants payment in cash, the money will be held by the county government until the land is registered.
He explained that in the case of compensation it is the community that will choose the project.

Q & A for land ~~acquisition~~ identification

The chief requested the members of the community to identify land for the solar minigrid.
The elders of the community together with the community agreed on a piece of land

3.4 Patrick explained that every project has positive and negative impacts. The positive impacts include employment opportunities clean energy, improved economy of the area's goods will be sourced locally. The anticipated negative impacts include dust generation during construction, elite capture, solid waste generation, risk of communicable disease, child labour, open holes leading to accidents, impact on vegetation, risk of insecurity incidences, land acquisition may lead to conflicts. He further explained all the mitigation measures of the anticipated negative impacts.

Patrick Ngari Mwangi

Min 4/22	**Concerns / Issues/Recommendations from participants**	
4.1	He stated that the land donated is used as the road during the rainy season. He asked for special compensation for the youth and the women.	Simon Anam
4.2	He appreciated the learning on the use of electricity. He appreciated the sensitization on HIV /AIDS especially. He asked for salt licks for the cattle.	Mzee Chodokori
4.3	He expressed happiness for the project. He explained the area has no hospital and also experience water shortages, the school is also ill equipped. He explained that there is a Lagha which is a major problem in the community. He also requested	Phillip

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	for the repair of roads so that they can be passable with lorries	
4.4	The village administrator proposed the digging of a borehole for a sub-village of the village. The borehole that is approximately 1 km has dried up. The water available can also not serve both the animals and the people.	Village Admin
Min 5/22	**Responses to concerns/issues raised**	
5.1	Loise explained that the compensation in kind is only for one project and should not exceed 1 million. The community should only choose one project within the 3 admissible areas	Loise Kioko

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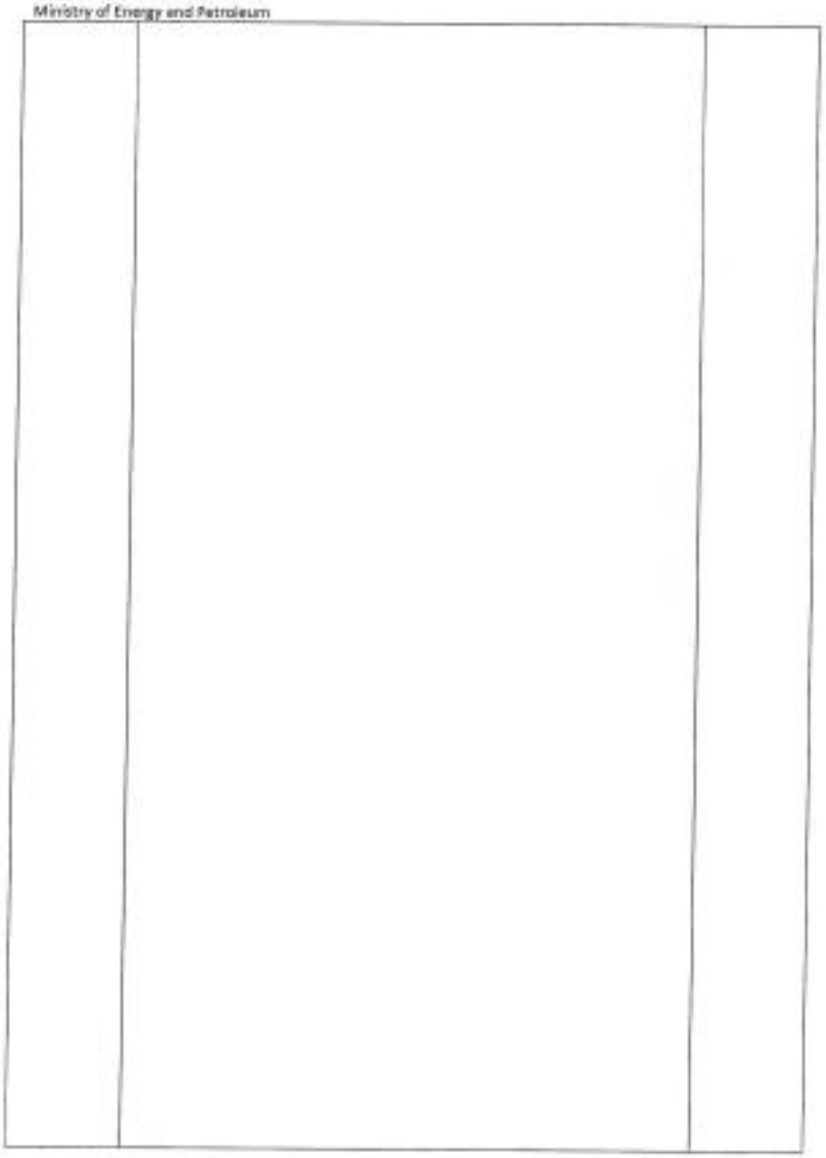

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Min 6/22	**Acceptance/Rejection of the project**	
6.1	The community accepted the project The community agreed on a water project for the compensation in kind. project	All
Min 7/22	**Adjournment**	
7.1	The meeting was adjourned by the village administrator at 1219 hrs and the community proceeded to the focus group discussion where every group was to choose representatives for the Grievance Redress Committee.	

Minutes Prepared By:
Name: NGUGI SHARON WATIRI Date: 16/01/2022
Position: Environmentalist Signature:

Minutes Confirmed By:
Name: SAMSON EREGAE Date: 16/1/2021
Position: ASS. CHIEF Signature:

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APPENDIX 2 LIST OF ATTENDANCE

Baraza

RERE Kenya Power Ministry of Energy

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES.

Venue.... Lomunyan akwan ....

Date.... 16/1/2022 ....

Time.... 1055hrs ....

List of Participants

#	Name	Position/Institution/Location		Phone No.	Signature
1.	Samuel Ofela	REREC - NOE	M	0734401558	[signature]
2.	Loise Kioko	Norken International Ltd	F	0719335653	Mutkuo
3.	Martin Gitonga	Norken International Ltd	M	0719319946	[signature]
4.	Sharon Wachiri	Norken (I) Ltd	F	0724124848	[signature]
5.	Ngari Patrick Mirungi	Centric Africa	M	0716494493	[signature]
6.	Lokwanyan Samuel	TCG - ENERGY	M	0716580835	[signature]
7.					
8.					
9.					
10.					

Norken International Ltd — KATILIA LOCATION (DATE ----) P.O. BOX ... — Ass. chief [signature] — CENTRIC AFRICA

Baraza

Ministry of Energy and Petroleum REREC Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomijenakwan Centre

Date: 16/01/2022.

Time: 1055hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	LORUKIA AMATALEM	PASTORALIST	MALE	0717845107	[signature]
2.	ATARO CHAMA	PASTORALIST	MALE	0710489347	[signature]
3.	LOTAKA LOBEL	PASTORALIST	MALE	NONE	[signature]
4.	TOPOS LOTONIA	PASTORALIST	MALE	NONE	[signature]
5.	LOBEI LOMURIA	PASTORALIST	MALE	NONE	[signature]
6.	LOBERAI IKAL	PASTORALIST	MALE	NONE	[signature]
7.	EBOIBOL AKWAKINE	PASTORALIST	MALE	NONE	[signature]
8.	LOBIBAN LOBEL	PASTORALIST	MALE	0724820934	[signature]
9.	PAULO LOROTAKAL	PASTORALIST	MALE	NONE	[signature]
10.	NGILIMO NGIGOLOKI	PASTORALIST	MALE	NONE	[signature]
11.	ECHWAA LOKITAUNGA	PASTORALIST	MALE	0743770471	[signature]
12.	NAKAALEI LODUNGO	PASTORALIST	MALE	0741369817	[signature]
13.	ERUPE LOJAO	PASTORALIST	MALE	NONE	[signature]
14.	NAMWAE NAKASAA	PASTORALIST	MALE	0790257740	[signature]

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General Meeting

Ministry of Energy and Petroleum

REREC

Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwan

Date: 14th Jan 2022 Time: 1055hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	HESBON KAPOLON NAKOLONYOI	VILLAGE ADMINISTRATOR	MALE	0759287718	
2.	PETER KALENE	PA LOMUNYENAKWAN DISPENSARY	MALE	0717495373	
3.	NGURIKIT E. LEDWARD	T/AT LOMUNYENAKWAN PRI	MALE	0728351706	
4.	DESMOND E. EDUNG	Teacher Lomunyenakwan	MALE	0792068852	
5.	PHILIPH LOKOOLI	PASTOR	MALE	0745303024	
6.	LOKWARAJ ECHUMAN	PASTORALIST	MALE	0725426597	
7.	NAMULE LOKWAKIKA	PASTORALIST	MALE	NONE	
8.	HENRY NANIKAN	NURSE I/C LOMUNYENAKWAN DISPENSARY	MALE	0707581715	
9.	ECHWATA LOROT	PASTORALIST	MALE	NONE	
10.	NAPAI LOTONIA	PASTORALIST	MALE	NONE	
11.	IKOEL KAIPAT	PASTORALIST	MALE	NONE	
12.	LONGORON LOTONIA	PASTORALIST	MALE	NONE	
13.	LOPETET LOCHOK	PASTORALIST	MALE	NONE	
14.	EREKAE LORUNYE	PASTORALIST	MALE	0741713776	

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Ass chief

CENTRIC AFRICA

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Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwan centre

Date: 16/01/2022 Time: 1055hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	SELINA AKUUTA	PASTORALIST	FEMALE	NONE	
2.	AMANMAN EKAALE	PASTORALIST	FEMALE	NONE	
3.	SELINA NACHUKULEI	PASTORALIST	FEMALE	NONE	
4.	CHOPIR NARUKWEL	PASTORALIST	FEMALE	NONE	
5.	KORDTO EREKAE	PASTORALIST	FEMALE	NONE	
6.	NGIPEL EKUNDAM	PASTORALIST	FEMALE	NONE	
7.	NUNUKO LOCHARA	PASTORALIST	FEMALE	NONE	
8.	NATAPAR AKOL	PASTORALIST	FEMALE	NONE	
9.	ZEKUT LOWAPAN	PASTORALIST	FEMALE	NONE	
10.	ASINYEN MERONI	PASTORALIST	FEMALE	NONE	
11.	LOKWAKIDORAM LOWAPAR	PASTORALISTS	FEMALE	NONE	
12.	OME NAKANEYO	PASTORALIST	FEMALE	NONE	
13.	VERONICA NAWAR	PASTORALIST	FEMALE	NONE	
14.	NAPOLA LOPOKOR	PASTORALIST	FEMALE	NONE	

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KATILIA LOCATION DATE ... P.O. BOX 51-...

Ass chief

CENTRIC AFRICA

Ministry of Energy and Petroleum REREC Baraza Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwan Centre

Date: 16/01/2022

Time: 10.55hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	IKAI EKAALE	PASTORALIST	FEMALE	NONE	
2.	NAKIRU LOTORE	PASTORALIST	FEMALE	NONE	
3.	ALICE LONGDYAKARU	PASTORALIST	FEMALE	NONE	
4.	NALIBIT NAKONEYO	PASTORALIST	FEMALE	NONE	
5.	NAMORU CHOPIR	PASTORALIST	FEMALE	NONE	
6.	IMONI NZELIMO	PASTORALIST	FEMALE	NONE	
7.	LOSIKIRIA LOKOTEL	PASTORALISTS	FEMALE	NONE	
8.	EKIDOR NAKONEYO	PASTORALISTS	FEMALE	NONE	
9.	IRIA CHODOKORT	PASTORALIST	FEMALE	NONE	
10.	LOKAI OTAMA	PASTORALISTS	FEMALE	NONE	
11.	NGASOSA OTAKI	PASTORALISTS	FEMALE	NONE	
12.	LOBEI OMA	PASTORALISTS	FEMALE	NONE	
13.	NAMERT ECHUMAN	PASTORALIST	FEMALE	NONE	
14.	EKIDOR TOPOS	PASTORALIST	FEMALE	NONE	

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ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwan Centre

Date: 16/01/2022

Time: 1055hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	NGIRIRA NAKWAAN	PASTORALISTS	FEMALE	NONE	
2.	ANNAH LOBEREL	PASTORALIST	FEMALE	NONE	
3.	ALICE LONGDLEA	PASTORALIST	FEMALE	NONE	
4.	OMA NANGORORU	PASTORALIST	FEMALE	NONE	
5.	AKURI LOSIKE	PASTORALIST	FEMALE	NONE	
6.	AKAL ESTHER	PASTORALIST	FEMALE	NONE	
7.	SELINAH EUKOT	PASTORALIST	FEMALE	NONE	
8.	ESEKON CHODOKORT	PASTORALIST	FEMALE	NONE	
9.	PRICILLA NANEET	PASTORALIST	FEMALE	NONE	
10.	ATABO CHAMA	PASTORALIST	FEMALE	NONE	
11.	NANCY ICHARAIT	PASTORALIST	FEMALE	NONE	
12.	LOMUA CHANA	PASTORALIST	FEMALE	NONE	
13.	LOKII LOCHAKWAN	PASTORALIST	FEMALE	NONE	
14.	LOKOLONYOI CHAMA	PASTORALIST	FEMALE	NONE	

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Male FGD

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ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomanigenakwan

Date: 16/1/2022 Time: Noon

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	ARII KERID LOKWANI		MALE	29942126	
2.	LOBEREI IKAI		MALE	2991493	
3.	EBEI SAMAL EBEI		MALE	24743515	
4.	NGILIMO NGNGOLOKI		MALE	30770347	
5.	NAMUAR NAKWA		MALE	35726504	
6.	EKAI MOJONG ETAAN		MALE	0748735093	
7.	EBOIBOI AKWAKINE		MALE	29483045	
8.	LOPETET LOCATOK		MALE	35733560	
9.	NARUKWEI LORUNYE		MALE	35947557	
10.	PETER KALENE		MALE	0717495373	
11.	PETER LOKUNYA		MALE	0768184413	
12.	LOBEI LOMURIA		MALE	0742 72051 2	
13.	Topos LOTONIA LODIO		MALE	0743 912119	
14.	LOWOI LOCATOK		MALE	29939 16	

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Asst - Chief

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ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomanigenakwan Primary

Date: 16/1/2022 Time: 12noon

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	LORUKIA AMATARET		MALE	0717 845707	
2.	LOWOI LOCATOK		MALE	35730260	
3.	ERABOK LOCHOL KAMARIAKWAN		MALE	30765746	
4.					
5.					
6.					
7.					
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11.					
12.					

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES.

Venue: Lomunyena Kwan

Date: 16.Feb.2022

Time: 1200hrs

List of Participants

#	Name	Position/Institution/Location	Phone No.	Signature
1.	Aselcen Lopeusae	Lomunyen Akusan	30798147	
2.	IR:A Elcdor Chama	Lomunyen Akusan	2833103075	
3.	Epuice Adaro	Lomunyen Akusan	28245711	
4.	Erot Lopanae Chooma	Lomunyen Akusan	30765714	
5.	Alice Longolo	Lomunyen Akusan	35736593	
6.	Ekal Losukia Angaleg	Lomunyen Akusan	9829777	
7.	Ikita Tereza	Lomunyen Akusan	35733311	
8.	Adonga Lorot Akal	Lomunyen Akusan	9829788	
9.	Eipa Lorot Akal	Lomunyen Akusan	35730509	
10.	Gladys Kolol	Lomunyen Akusan		

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Ass. chief [signature] [stamp] CENTRIC AFRICA

Nancy Ichelect Lomunyen Akusan 0728829919
Jacinta Akamais Lomunyen Akusan 29121446
Aipa Lomuteke Lomunyen Akusan 28384688
Akimlim Lokoseos Lomunyen Akusan 28248692.
Lotukol Lochuch Lomunyen Akusan
Isla Lorukea Lomunyen Akusan
Longor Lobai Lomunyen Akusan
Ngoratin Ereng Lomunyen Akusan 28252693
Lepeyale Esaman Lomunyen Akusan 25288393
Lomunyen Akusan 29781189.

FGD Female

Ministry of Energy and Petroleum

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Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwan

Date: 16/01/2022

Time: 1200hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Anna Akwotor	Lomunyenakwan	F	0714223598	
2.	Zolkuzu Lowsan	Lomunyenakwan	F	0792899877	
3.	Ekidor Nakuneyo	Lomunyenakwan	F	20791876	
4.	Regina Losereo	Lomunyenakwan	F	0799770420	
5.	Jecinta Topos	Lomunyenakwan	F	35736381	
6.	Esther Nawoot	Lomunyenakwan	F	30762361	
7.	Ngipoei Ekuwom	Lomunyenakwan	F	0746002049	
8.	Lobei Awoi Esme	Lomunyenakwan	F	0748051059	
9.	Abolia Sokon Kaitiki	Lomunyenakwan	F	30618476	
10.	Lokii Lochakwan Kaitiki	Lomunyenakwan	F		
11.	Ikoel Lowsar Losike	Lomunyenakwan	F		
12.	Nakeneyo Lotonia	Lomunyenakwan	M	8566296	

FGD Female

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Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwan

Date: 16/01/2022

Time: 1200hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Lochooro Lorenga	Lomunyenakwan	F	27559242	
2.	Esekon Chodokori	Lomunyenakwan	F	28252330	
3.	Ekiru Lopur Napus	Lomunyenakwan	F	0799148062	
4.	Lowsar Ekuwom	Lomunyenakwan	F	28263029	
5.	Namusow Chopis	Lomunyenakwan	F		
6.	Nawat Nakuwai	Lomunyenakwan	F	28252597	
7.	Ekitela Napus Kaitiki	Lomunyenakwan	M	21453137	
8.	Iria Chodokori Amozolem	Lomunyenakwan	F		
9.	Arsam Lotolos Angoli	Lomunyenakwan	F	4801261	
10.	Akuwi Eregae	Lomunyenakwan	F	35713992	
11.	Asinyen Lokwae	Lomunyenakwan	F	0703414665	
12.	Achuwom Longochol	Lomunyenakwan	F	20811146	
13.	Lopusmoe Sekon	Lomunyenakwan	F	28388832	
14.	Selina Achukia Lokolonyo	Lomunyenakwan	F	30790706	

Norken International Ltd

Ass. Chief Edward

KATILIA LOCATION

CENTRIC AFRICA

Ministry of Energy and Petroleum

REREC

Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

Venue: Lomunyenakwaan Youth FGD

Date: 18/01/2022

Time: 1200hrs

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Loyamwa Longorok	Lomunyenakwaan	M	0712820226	[signature]
2.	Nadan Shopir	Lomunyenakwaan	M	0741046962 07403	[signature]
3.	Michael Enare	Lomunyenakwaan	M	0798911721	[signature]
4.	Alice Erot	Lomunyenakwaan	F	0743770481	[signature]
* 5.	Stacy Kang'ethe	Lomunyenakwaan	F	0741444673	[signature]
6.	Margaret Lomuthe	Lomunyenakwaan	F	0702717570	[signature]
7.	Ekal Chodokor	Lomunyenakwaan	M	0769318728	[signature]
8.	Michael Apaare Lemuya	Lomunyenakwaan	M	0704896541	[signature]
9.	Francis Obei	Lomunyenakwaan	M	0792899929	[signature]
* 10.	Kalapata C: Kaaleng		M	0768367583	[signature]
11.					
12.					
13.					
14.					

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Ass chief [signature]

KATILIA LOCATION (DATE ...) P.O. BOX 51-... LODWAR

CENTRIC AFRICA

Ministry of Energy and Petroleum

REREC

Kenya Power

ENVIRONMENTAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP) FOR UNDERSERVED COUNTIES

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* 5.	Stacy Kang'ethe	Lomunyenakwaan	F	0741444673	[signature]
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* 10.	Kalapata C: Kaaleng		M	0768367583	[signature]
11.					
12.					
13.					
14.					

Norken International Ltd

Ass chief [signature]

KATILIA LOCATION (DATE ...) P.O. BOX 51-... LODWAR

CENTRIC AFRICA

APPENDIX 3 SOIL AND WATER SAMPLING MEASUREMENT RESULTS

Polucon
At your service

NORKEN INTERNATIONAL LIMITED
P.O BOX 9682-00100
NAIROBI, KENYA

TEST REPORT NO: 202216010309A	
SAMPLE	SOIL
DATE & PLACE SUBMITTED	08th February 2022 at Polucon Laboratory, Nyali
DATE ANALYSIS STARTED	09th February 2022
SAMPLING METHOD	N/A
MARKS	Turkana 1

TEST	METHOD	RESULTS	UNITS	CLIENT SPECIFICATIONS
BTEX				
Benzene	PQA/LIM/002	<0.01	mg/kg	-
Toluene	PQA/LIM/002	<0.01	mg/kg	-
Ethyl benzene	PQA/LIM/002	<0.01	mg/kg	-
Xylene	PQA/LIM/002	<0.01	mg/kg	-
PAH				
Naphthalene	PQA/LIM/004	<0.01	mg/kg	-
Acenaphthylene	PQA/LIM/004	<0.01	mg/kg	-
Acenaphthene	PQA/LIM/004	<0.01	mg/kg	-
Fluorene	PQA/LIM/004	<0.01	mg/kg	-
Phenanthrene	PQA/LIM/004	<0.01	mg/kg	-
Anthracene	PQA/LIM/004	<0.01	mg/kg	-
Fluoranthene	PQA/LIM/004	<0.01	mg/kg	-
Pyrene	PQA/LIM/004	<0.01	mg/kg	-
Benzo(a)anthracene	PQA/LIM/004	<0.01	mg/kg	-
Chrysene	PQA/LIM/004	<0.01	mg/kg	-
Benzo(b)fluoranthene	PQA/LIM/004	<0.01	mg/kg	-
Benzo(k)fluoranthene	PQA/LIM/004	<0.01	mg/kg	-
Benzo(a)pyrene	PQA/LIM/004	<0.01	mg/kg	-

*********End of test results*********

Limit of Quantification (LOQ) = 0.01 mg/kg

Mombasa Lab
15th February 2022

Analyst

M. Bahati – Chemist

Technical signatory

POLUCON SERVICES KENYA LTD.

Where a statement of conformity is made, the following decision rules are applied not considering uncertainties: "conforms/comply" – Results are within limits while "does not conform/comply" –Results exceed limits. This test report and/or certificate is issued subject to Polucon Services (K) Limited Standard Terms and Conditions, a copy of which is available on request, and, cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. "Unless otherwise stated the results shown in this test report refer only to sample(s) tested and such sample(s) are retained for 90 days only (If non-perishable)."
NB: This report relates to submitted sample(s) only. The source and/or markings are as provided by the customer

GL8855
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Member of POLUCON Group

ISO 9001:2015 Certified
Designated Laboratory
ISPM15 CERTIFIED
Heat Treatment provid IPPC KE - 016

Polucon
At your service

NORKEN INTERNATIONAL LTD
P.O BOX 9882-00100
NAIROBI, KENYA

TEST REPORT NO: 202216010310A	
SAMPLE	WATER
DATE & PLACE SUBMITTED	08th February 2022 at Polucon Laboratory, Nyali.
DATE ANALYSIS STARTED	09th February 2022
SAMPLING METHOD	N/A
MARKINGS	Turkana 2

TESTS	TEST METHOD	RESULTS	UNITS	KS EAS 12: 2018: NATURAL POTABLE WATER SPECIFICATION
PHYSICAL-CHEMICAL TESTS				
Turbidity	APHA 2130 B	0.47	NTU	25 Max
*pH value	APHA 4500-H+	7.87	@ 35.0°C	6.5 Min – 8.5 Max
*Conductivity	APHA 2510 B	3200	µS/cm	2500 Max
Dissolved oxygen as DO	AOAC 973.45	6.50	mg/L	-
Temperature	APHA 2550	26.3	°C	-
INORGANIC CONTAMINANTS				
Nitrate as NO_3	APHA 4500-NO_3	27.00	mg/L	45 Max
Phosphates as PO_4	APHA 4500-P E	<0.01	mg/L	2.2 Max
*Manganese as Mn	APHA 3111B	<0.01	mg/L	0.1 Max
Mercury as Hg	APHA 3112B	<0.003	mg/l	0.001 Max
*Calcium as Ca	APHA 3111B	3.55	mg/L	150 Max
*Lead as Pb	APHA 3111B	<0.01	mg/L	0.01 Max
*Copper as Cu	APHA 3111B	<0.01	mg/L	1.0 Max
Arsenic as As	APHA 3114 B	<0.01	mg/L	0.01 Max
*Cadmium as Cd	APHA 3111B	<0.003	mg/L	0.003 Max

*********End of test results*********

Comment: Based on the above tests only, the water does not conform with the referenced specifications for natural potable water due to high conductivity.

Mombasa Lab
15th February 2022

Analyst

E. Wambugha – Chemist

Technical signatory

Polucon

Onsinyo – Lab manager

*Indicates test(s) covered under the KEMAS accreditation schedule while '-' indicates test(s) subcontracted to an approved Laboratory holding ISO/IEC 17025 accreditation. Where a statement of conformity is made, the following decision rules are applied not considering uncertainties: 'conform/comply' – Results are within limits while 'does not comply' – Results exceed limits. This test report and/or certificate is issued subject to Polucon Services (K) Limited Standard Terms and Conditions, a copy of which is available on request, and, cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. "Unless otherwise stated the results shown in this test report refer only to sample(s) tested and such sample(s) are retained for 90 days only (if non-perishable)."

NB: This report relates to submitted sample(s) only. The source and/or markings are as provided by the customer.

GL8857

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KEBS ISO 9001:2015 Certified

nema Designated Laboratory

ISPM15 CERTIFIED Heat Treatment provid IPPC KE - 018

APPENDIX 4 ABBREVIATED RESETTLEMENT ACTION PLAN (A-RAP)

1. Lomunyanakwan Sub-project Site

The Quimbiso sub-project site is on unregistered community land and held in trust by the County Government of Turkana on behalf of the community, in line with the Community Land Act 2016. The proposed site is uninhabited, has no structures, community facilities, or encumbrances. Consultations leading to the identification and selection of the sub-project site are captured in the Environmental and Social Screening report for Lomunyanakwan. *Refer to Chapter 4 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 5000 (approximately 500 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 0.97 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 Lomunyanakwan community requested for the construction of a new ward at the dispensary and water purification and water tank provision. The value of the priority community project will be proportional to or higher than the value of land under acquisition. 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.	REREC
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.	REREC
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	REREC
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.	or damage to the above will be compensated/restored at full replacement cost,[2] in line with the provisions of the RPF.	

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 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 Lomunyanakwan 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.

Figure 1:

[2] A cost basis that will yield compensation sufficient to replace assets, plus necessary transaction costs associated with asset replacement).

4.3 Summary of Consultations on Land Acquisition and Compensation Options

Date	Objective	Implementing Entities	Land Acquisition and Compensation Aspects Discussed	Key	Responses Given
January 16th 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.	The community requested for the construction of a new ward at the dispensary and water purification and water tank provision	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.
REREC	• 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))

nema
mazingira yetu | uhai wetu | wajibu wetu

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

P.T.O.

ISO 9001 BUREAU VERITAS Certification UKAS

ISO 9001:2015 Certified

FORM 7 (r.15(2))

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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**
(individual or firm) of address
P.O. Box 860 - 20200 Kericho

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**

General

registration number **1893**

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

P.T.O.

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