REREC
RURAL ELECTRIFICATION & RENEWABLE ENERGY CORPORATION

MINISTRY OF ENERGY
REPUBLIC OF KENYA
ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED OROPOI SOLAR MINI-GRID

PROJECT: KENYA OFF-GRID SOLAR ACCESS PROJECT

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

LOCATION : OROPOI VILLAGE, KALOBEYEI WARD, TURKANA WEST SUB-COUNTY IN TURKANA COUNTY

2023

CERTIFICATION

This ESIA project report for the proposed Oropoi 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 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 Oropoi, 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

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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	Customer Social Responsibility
CIDP	County Integrated Development Plan
CPS	Country Partnerships Strategy
DOSHS	Directorate of Occupational Safety and Health Services
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EPRA	Energy Petroleum Regulatory Authority
EPT	Energy and Petroleum Tribunal
EPRA	Energy and Petroleum Regulatory Authority
ESI	Electrical Supply Industry
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
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 Transmission Company
KII	Key Informant Interviews
KOSAP	Kenya Off-Grid Solar Access Project
KP	Kenya Power
LEP	Labour and Employment Plan
LGRCs	Local Grievance Redress committee
MGs	Mini Grids
MOE	Ministry of Energy
MSDS	Material Safety Datasheet
NEMA	National Environmental Management Authority
NGOs	Non-Governmental Organizations

NLC	National Land Commission
NTSA	National Transport and Safety Authority
OHS	Occupational Health and Safety
OM	Operation and Maintenance
OP	Operational Policies
PAD	Project Appraisal Document
PAPs	Project Affected Persons
PCU	Project Co-ordination Unit
PPAs	Power Purchase Agreements
PPEs	Personal Protective Equipment
PV	Photo-voltaic
REREC	Rural Electrification and Renewable Energy Corporation
RPF	Resettlement Policy Framework
SA	Social Assessment
SEA	Strategic Environmental Assessment
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 Resources 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 Oropoi 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 Oropoi 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 Oropoi 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 county has sandy soils that support scattered shrubs and grasslands which are ideal for livestock production. The county's land is highly erodible. The exploitation of the soil resource thus must take into account conservation measures due to their fragile nature. The mineral potential of the soils is not exactly known as no geological mapping has been done.

A water catchment is an area that shares one outlet point for surface runoff or base flow. The Food Security Master Plan for Turkana outlined the major watersheds for Turkana including runoff water (Oduor et al 2012). There are nine major catchment areas in Turkana County, ranging from 543 ha2 with a potential runoff of 27 Mm3, to 14,127 ha2 with a potential runoff of 1,465 Mm3 (Turkana Food Security Master Plan 2012).

The two main perennial rivers are the Kerio and Turkwel. River flow in each is influenced by the rainfall patterns in their catchments. The rivers also receive runoff from ephemeral streams (laghas). A dam built for hydro-power generation at upper Turkwel River from 1986 to 1993, releases a perennial flow into the river with an annual discharge around 300 Mm3 per annum (GIZ 2014).

The topography of Turkana varies between semi-arid and arid landscapes consisting of low-lying plains and isolated hills and mountain ranges (Opiyo et al., 2015). It rises from a low altitude of 369m at Lake Turkana to 900m near Uganda border in the west.

The community is mainly pastoralist that move with livestock in search for pasture and water. Formal employment is less than 5%. Other sources of income in the society include retail businesses. Due to the aridity of the area, crop farming is only practiced during the rainy season. The project will bring direct job opportunities to the locals during the construction phase and other indirect forms of employment throughout the cycle of the project

E-6 Project Description

The Oropoi Mini Grid project aims to provide electricity to approximately 121 residential and 8 nonresidential consumers in Oropoi village at Kalobeyei Ward in Turkana west sub-County 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.

A Low Voltage Power Distribution Network will be established to distribute the power to customers. The project utilizes solar panels with a total capacity of 100 kWp to harness solar energy. Solar power is a clean and renewable energy source that will provide a significant portion of the electricity needed for the project. A 250 kWh Battery Energy Storage System is incorporated to store excess solar energy during the day, ensuring a consistent power supply even during cloudy or nighttime conditions. A 60 kVA diesel generator is included to serve as a backup power source for periods of low solar generation or in case of battery depletion. It provides reliability and backup in the event of extended periods of cloudy weather or high demand. A 2,000-liter fuel tank is provided to store diesel fuel for the generator, ensuring continuous operation during extended periods of low solar or high demand. Additionally, PV Inverter: A 100 kW solar PV inverter is used to convert the direct current (DC) electricity generated by the solar panels into alternating current (AC) electricity suitable for consumer use.The estimated cost of the project is around USD 337,189.23 although this amount may change as more detailed plans are developed.

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

To develop the Oropoi Mini Grid approximately 1.214 hectares of land will be acquired from the community in line with the national laws and World Bank provisions. In accordance with the World Bank's Operation Policy (OP) 4.12 on Involuntary Resettlement, an abbreviated Resettlement Action Plan (A-RAP) was prepared,

outlining the principles and procedures for land acquisition and compensation. This plan is annexed to this ESIA.

E-7 Project Alternatives

Solar energy is identified as a non-polluting and site-specific option, and the proposed site for Oropoi 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 22nd, a total of 59 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 concerns raised by stakeholders included The table below presents the issues /comments raised by the stakeholders during the public meeting and the responses given by the study team.

Table 0-1 Summary of minutes

No.	issue	Comments	Response from the consultant
1	Distribution coverage	Distance coverage of minigrid distribution co	The mingrid would cover a radius of 1.5kms from the site. Those living out of the minigrid coverage will be provided with alternative solutions of

			accessing electricity such as low price portable solar systems
2	Compensation in kind	Compensation in kind option	The community were asked to choose three projects in order of priority priorities they'd like to be compensated ,they requested the contractor to equip the community borehole and pipe water to community water Kiosk.
3	Timelines	When the project will commence	The consultant assured the community the project will be implemented as soon as reporting has been certified and the project licensed

E-9 – Impacts and Mitigation Measures

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

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

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

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

Table 0-2: Summary of Pre-construction Impacts

Impact	**Significance Of Impact (Pre-Mitigation)**	**Residual Impacts (Post-Mitigation)**
Land acquisition	Minor	Negligible
Way leaves	Minor	Negligible

Impact	Significance Of Impact (Pre-Mitigation)	Residual Impacts (Post-Mitigation)
Stakeholder identification and consultations	Major	Minor

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

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

Table 0-4: Summary of Operation Phase Impacts

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

E-10 Environmental and Social Management and Monitoring Plan

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

These measures emphasize a proactive approach, prioritizing prevention rather than reaction. They encompass various aspects such as proper waste handling and disposal to prevent pollution, engaging stakeholders to address grievances, providing personal protective equipment (PPE) for workers, ensuring adequate supervision, and emphasizing good workmanship from the contractor. Specific plans are also outlined to address specific issues that may arise. The ESMMP also highlights environmental performance indicators that should be regularly monitored. Monitoring serves as a means to detect and draw attention to any changes or problems in environmental quality. It involves continuous or periodic reviews of the ESMMP implementation progress, allowing for adjustments and improvements as necessary.

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

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

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

E- 11 Conclusion

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

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

1 INTRODUCTION

The Ministry of Energy (MOE) Kenya is coordinating the implementation of the Kenya Off-Grid Solar Access Project (KOSAP) to provide access to clean and modern energy services through off-grid solar to 14 underserved counties. Mandera, Wajir, Garissa, Tana River, Samburu, Isiolo, Marsabit, 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), enterprises, community facilities, and water pumps in Turkana County as one of the counties in Kenya that have been defined as "marginalized areas" based on the County Development Index (CDI) by the Commission on Revenue Allocation (CRA). According to the CRA as the communities in the marginalized areas have been excluded from social and economic life of Kenya for different reasons" (CRA, 2013).

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 four times lower than the national average. They present profound infrastructure deficits, including lack of access to roads, electricity, water, and social services. There is also significant insecurity in certain areas, giving rise to substantial numbers of displaced persons and livelihood adaptations that further undermine economic prosperity.

1.1 CONTEXT

This ESIA report has been prepared based on Site visit baseline survey, desktop survey, documentation review, consultation with stakeholders and in accordance Environmental Management and 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 (MOE) as the implementing agencies.

The project components are:

- Component 1- US$40M: Mini-grids for Community Facilities, Enterprises, and Households -This component will support electrification of areas where electricity supply through mini-grids represents the least cost option from a country perspective.
- 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 K-OSAP.

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

1.2 PROJECT OVERVIEW

The Project Site is located in Oropoi village at Kalobeyei sub-location, Turkana County at Latitüde 03°48´51.7 N, 034°21’32.4 E. The proposed solar mini grid will be located on a 1.214Ha piece of land identified by the community and project proponents. The mini grid will comprise Solar panels, batteries, invertors, perimeter fence and distribution line to cover a radius of approximately 1.5 km.

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 and Monitoring Plan (ESMMP) 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 Justification for the ESIA

The approach chosen in undertaking this study was careful to consider EMCA, 1999, and its 2015 Amendment requirements, as well as the Environmental Impact Assessment and Audit Regulations, 2003. It involved largely an understanding of the project background, the preliminary designs and the implementation plan. The approach and methodology applied during the study enabled collection of both primary and secondary data. Qualitative and quantitative methods of data collection were employed. Secondary data was obtained through literature reviews while primary data was obtained through physical observations, photography, check lists, interviews and stakeholders' consultation.

Key activities undertaken during the study included the following:

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

The initial stages of this assessment was project are discussed below screening. Screening of the project sought to ascertain whether or not this project falls within a category that requires ESIA prior to commencement. Other considerations made during this stage included a preliminary assessment of the environmental sensitivity of the proposed project area/site. This screening indicated that the proposed solar Mini-grid is among the listed projects under Schedule 2 of EMCA, 1999 thus requires an ESIA study.

Project scoping was the next stage which was done to delineate project issues that required detailed analysis. This step involved collection of primary and secondary data through field visits and literature review respectively. Discussed Below are steps that were undertaken to conduct ESIA at Oropoi;

1.4.2 Kick-off Meeting

The Consultant had a brief kick-off meeting with the Proponent on 12th July 2021 followed by subsequent online meetings and discussion on various aspects of the project up to 5th August, 2021. 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.

1.4.3 Screening and Scoping

Evaluation of ESIA procedure has been undertaken as a fundamental procedure to implementation of the solar power mini-grid 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.

1.4.4 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 (PAD) and the four main safeguard framework documents prepared under KOSAP- these are Social Assessment (SA), Vulnerable and Marginalized Group Framework (VMGF), Resettlement Policy Framework (RPF) and the Environmental and Social Management Framework (ESMF).
Other documents that were reviewed included Turkana County Integrated Development Plan 2018-2022, various Kenyan legal legislations, World Bank safeguard policies, topographical maps, google earth/maps, and Kenyan government publications among others.

1.4.5 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.

1.4.6 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. Interviews, discussions, photography, observations and check lists are some of the methods employed in gathering the data.

1.4.7 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, workplace Sexual Harassment, Spread of HIV/AIDS, STDs & other communicable diseases, Gender biases and inequality exclusion of vulnerable and marginalized groups (VMGs) and vulnerable individuals and households from accessing project decision making and governance structures, engagement processes, opportunities and benefits. The vulnerable individuals and households 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 Oropoi

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.

1.4.8 Public Consultations

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

Owing to the different categories of the stakeholders, the ESIA team opted to employ various methods in engaging them. The methods included; face to face discussions for the government officers and key stakeholders, focused group discussions with the men, women and youth and a public baraza/meeting for the community members.

1.4.8.1 Stakeholder Identification and Mapping

Stakeholder engagement and participation was carried out at different levels and with different stakeholders. Stakeholder's identification and mapping was done based on the following criteria that is project affected persons and interested parties. The stakeholders include;

- Beneficiaries of the proposed project who largely are the community members living within 1.5 km radius of the proposed project
- Interested parties include
    - County Government of Turkana various department including the office of the governor, land and environment, survey and public administration such as ward and village administrators. In addition is the county commissioner and officers under his administration such as chiefs.
    - Members of parliament and members of county assembly

1.4.8.2 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 Oropoi village.

1.4.8.3 Public Forum/Meeting

The project team undertook community engagement forums with the target beneficiaries and the communities where the solar Mini-grids will be set. The main objective was to explain the project details including need for land identification and solicit broad community support and acceptability of the project. One open meeting with all the community members was held. The KOSAP team explained to the community members about the project and other related information as discussed in the minutes. The meeting was then opened up for a plenary session.

Community engagement proceedings and resolutions are presented in form of minutes taken/written during the meetings. The meeting was well attended by all people including men, women, youth and persons with special needs.

1.4.8.4 Focus Group Discussions

After the meetings the community members were told of the need to have focus group discussions to discuss the project further and allow the different groups more opportunities to ask questions or give suggestions regarding the project. Therefore, three separate meetings for men, women and youth were needed. In these meetings the message on the project was echoed again especially on benefits and impacts (both positive and Negative) of the project to the community, rights of the community and the need to have a grievance redress mechanism and committee with representation from all groups in the community.

1.4.8.5 Key Informant Interviews

Key Informants were identified both at the county and locational levels and they were interviewed to obtain baseline information in regard to the proposed project. The key informant interviewed was from the education and health sectors.

1.4.8.6 Stakeholder Engagement Schedule

The ESIA team identified four categories of stakeholders namely; government officials, opinion leaders at local level, elders and the general community. Stakeholder engagement began early in the planning phases of the project. The stakeholder consultations were undertaken on the 22nd January 2022. During these meetings, project information in terms of preliminary design, positive impacts, negative impacts, mitigation measures among others were discussed with various stakeholders. The stakeholders gave their views in to the project.

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

- Land use aspects,
- Neighborhood issues,
- Project acceptability,
- Social, cultural and economic aspects,
- Environmental Impacts
    - Physical impacts,
    - Biological impacts,

- Legal Compliance.

1.4.9 Environmental and Social Management and Monitoring Plan (ESMMP)

The ESMMP as the implementation instrument of the ESIA has captured all the parameters that need to be monitored on a routine basis. The parameters 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 pre-construction, 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 ESMMP include an implementation schedule and budget cost estimates for the mitigation measures. It also describes institutional arrangements with regard to the implementation of the ESMMP among the implementing agencies, and the contractor(s). This has specific responsibilities, procedures and resources required by each institutional actor engaged in implementing the ESMMP.

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

Additionally, the ESMMP has a component on contracting management that will ensure the implementation of the ESMMP by all contractors and subcontractors. A contracting mechanism is included in the ESMMP to incentivize contractors and their subcontractors to comply with the ESMMP or alternatively penalize them for failure to comply with the ESMMP. 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 ESMMP also have a budget to guide the contractor on resources required for the implementation and monitoring of the ESMMP.

Figure 1-1 is a summary of the methodology the consultant adopted in undertaking environmental and social impacts assessment for the proposed Oropoi ESIA project.

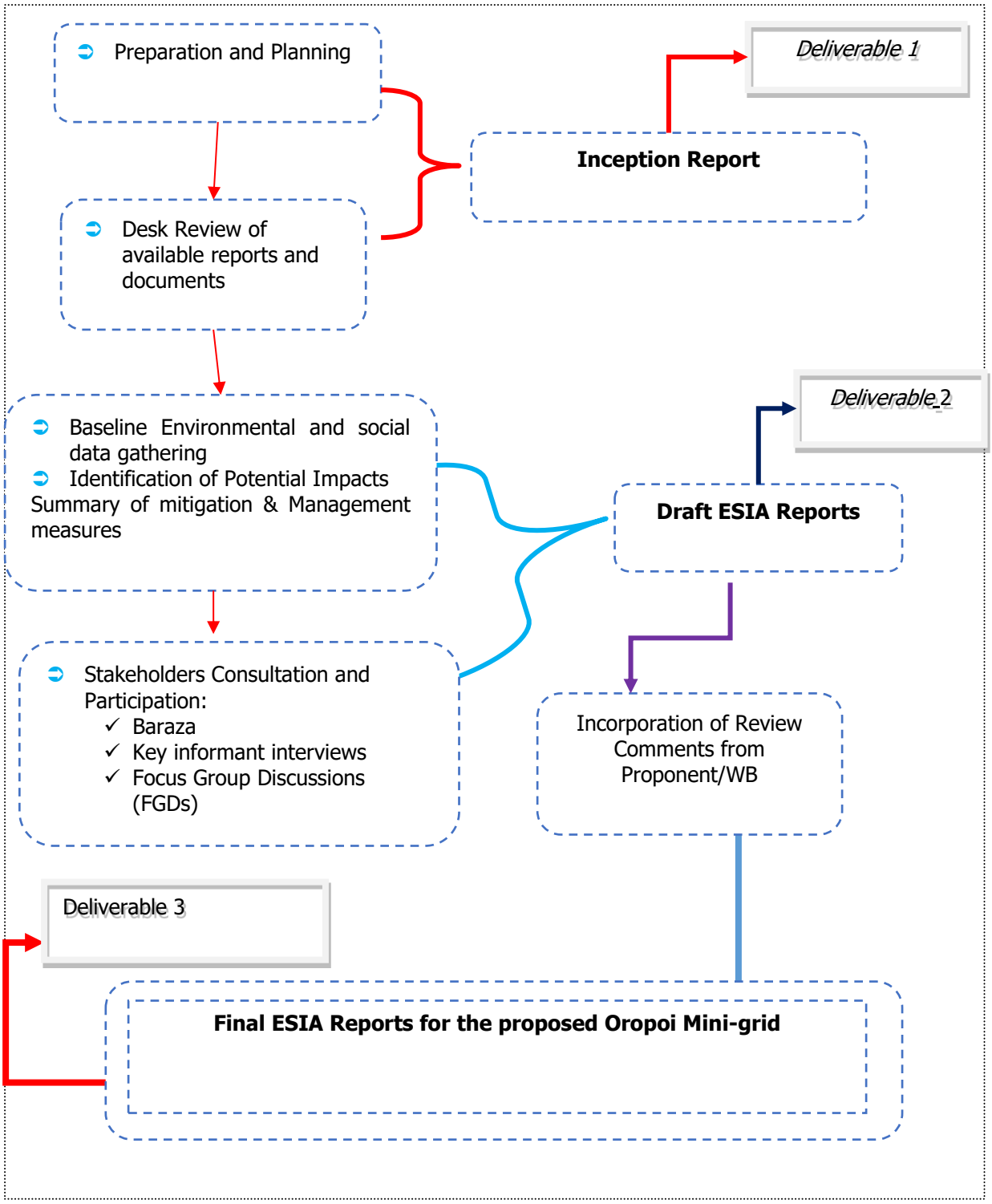


Figure 1-1: *Summary of Environmental and Social Impact Assessment Methodology.*

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.
- ✓ Limited information on some environmental aspects e.g. acquifers, rivers etc.
- ✓ Communication barrier with the community i.e. some people do not understand

Swahili or English. This was mitigated by use of a translator.

1.6 LAYOUT OF THE REPORT

Table 1-1 Structure of the ESIA Report

SECTION	TITLE	DESCRIPTION
Section 1	Introduction	Introduction to the Project and ESIA scope and methodology adopted.
Section 2	Project Description	Technical description of the Project & related infrastructure and activities.
Section 3	Applicable Legal and Regulatory Framework	Discusses the applicable environmental and social regulatory framework and its relevance for the Project.
Section 4	Baseline Setting-Physical and Socio-Economic Environment	Outlines Environmental, Ecology and Social Baseline status in the study area of the Project
Section 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
Section 6	Impact Assessment and Mitigation Measures	This section includes details of identified environmental impacts and associated risks due to Project activities, assessment of significance of impacts and presents mitigation measures for minimizing and /or offsetting adverse impacts identified.
Section 7	Environmental and Social Management and Monitoring Plan	Outline of the ESMMP taking into account identified impacts and planned mitigation measures and monitoring requirements.
Section 8	Impact Summary and Conclusion	Summary of impacts identified for the Project and conclusion of the study.

1.7 STUDY TEAM

This ESIA process was conducted by a team of experts that comprised the following professionals:

Team - 20/01/2022 - progressed the ESIA study.

S/No	Names	Position
1	Caleb Ewoi	CREO Turkana County
2	Kenedy Shisoka	Ministry of Energy
3	Lydia Komen	Norken International Limited /Centric Africa Limited-EIA/EA Expert
4	Allan Owino	Norken International Limited /Centric Africa Limited-EIA/EA Expert

5	Japheth Kipsang	Norken International Limited /Centric Africa Limited-EIA/EA Expert
6	Umulkheir Abdi	Norken International Limited /Centric Africa Limited-EIA/EA Expert

2 PROJECT DESCRIPTION AND ALTERNATIVES

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

Table 2-1 below provides a summary of the pertinent information of the proposed Oropoi solar mini grid;

Table 2-1: Summary Information of the proposed Oropoi Solar Mini-grid

S. NO.	PARTICULARS	DESCRIPTION
1.	Project location	The project is located at coordinates Latitude 03°48´51.7 N and Longitude 034°21'32.4. E.
2.	Proponent	Ministry of Energy
3.	Administrative location	The project is located in Oropoi village at Oropoi sub-location, in Kalobeyei Ward in Turkana west sub county County.
4.	Climatic condition	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).
5.	Average Elevation	2841 ft
6.	Site Conditions	The site is generally in open area with minimal fauna and flora.
7.	Road Accessibility	Earth road.
8.	River/canal/nallah/ pond present in project footprint	None
9.	Protected areas (National Park/ Sanctuary)/ Forest land within 10 kms	None

2.2 PROJECT LOCATION

The proposed Oropoi solar mini-grid project site is located in Oropoi village at Kalobeyei Ward in Turkana west sub-County. Geographically, the site is located at 03°48´51.7 N,034°21'32.4. E. The proposed power MG will be constructed on

approximately 1.214 Ha of land 300 M from Oropoi Primary school. . Figure 2-1 below present the location of the proposed project site.

Figure 2-1: Project Location

2.3 DESCRIPTION OF PROJECT FACILITIES, COMPONENTS AND ACTIVITIES

2.3.1 Nature of the Project

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

2.3.1.1 PV Hybrid Mini-Grid Sizing

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

- The proposed Residential & Non-Residential Users available
- The PV Capacity in kilo Watt peak.
- The storage battery Capacity
- The Inverter capacity in (kW)

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

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

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

2.3.2 Project Components

2.3.2.2 Architecture and Basic Design Specifications

This hybrid power generation site is projected to generate 100(kWp) and is meant to serve between 200-400 households (customers). The proposed mini-grid installations will be built to comply the International Electro technical Commission (IEC) standards. It will have an installation of solar panels of with a capacity of 100 (kWp) and battery house with 250 kWh. The solar panels will have a connection to the batteries through underground cables. The standby generator will also be connected to the system as a backup.

This generator will be a capacity of 60 kVA capacity with a fuel tank of 2000ltrs capacity. To optimize this hybrid system the HOMER software will be used. The goal of the hybridization of diesel systems is to reduce fuel consumption by switching off diesel generator set(s) for several hours a day, in order to reach a PV energy, share in the final mix of at least 60% or more. The power will be distributed to the customers by overhead lines. The project site is expected to serve clients within a radius of 1.5km from the site (generation source).

The PV plant and the battery capacity have been sized accordingly to the daily demand and the solar resources. In addition to this Design architecture, the project site shall have a site office that shall also have a Control Room adjacent as well as a guard house. The guard house shall be constructed using concrete and masonry works whereas the control room and office can also be a containerized facility.
The Solar PV hybrid system is based on a centralized photovoltaic plant connected to a 3-phase 415V AC busbar line, where the multi-mode battery inverter and the diesel generator are also connected.

The plant is configured such that a significant portion of daytime loads is fed directly from the solar generator (grid-tie inverter) without intermediate battery storage usage. The solar PV power plant is also equipped with a Diesel Generator, which is normally used as reserve power. The diesel generator switches on automatically whenever the battery state of charge reaches a certain defined DOD (Depth of Discharge). The diesel generator comprises of 60 kVA unit in three-phase operation and it's equipped with automatic startup function controlled by the battery inverter charger. The figure 2 below illustrates the preliminary data for the mini-grid in Oropoi.

Figure 2: The preliminary Data for Oropoi Solar Mini-grid

Name	Residential	Nonresidential	Circuit (km)	Peak demand (kw)	Daily demand (KW)	Monthly demand (kWh)	PV(DC-KWp)	Genset fuel Tank	Batteries	Generator (kva)	Cost (USD

Oropoi	247	9	9	53	285	8540	100	2000	250	60	337,189.23

Key Components of the Project:

Power Generation Sources:

a) Low Voltage Power Distribution Network:

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

b) **Monthly Energy Demand:** The project is expected to meet a total monthly energy demand of 8540 kWh.

c) **Daily Energy Demand:** The average daily energy demand is approximately 285 kWh, ensuring a consistent supply for the consumers.

d) **Peak Demand:** The peak demand of the system is 53 kW, which is the maximum power requirement during any given moment.

e) **PV Capacity**: The solar photovoltaic panels have a total capacity of 100 kWp.

f) **Battery Capacity**: The Battery Energy Storage System has a capacity of 250 kWh, providing energy storage and ensuring a continuous power supply.

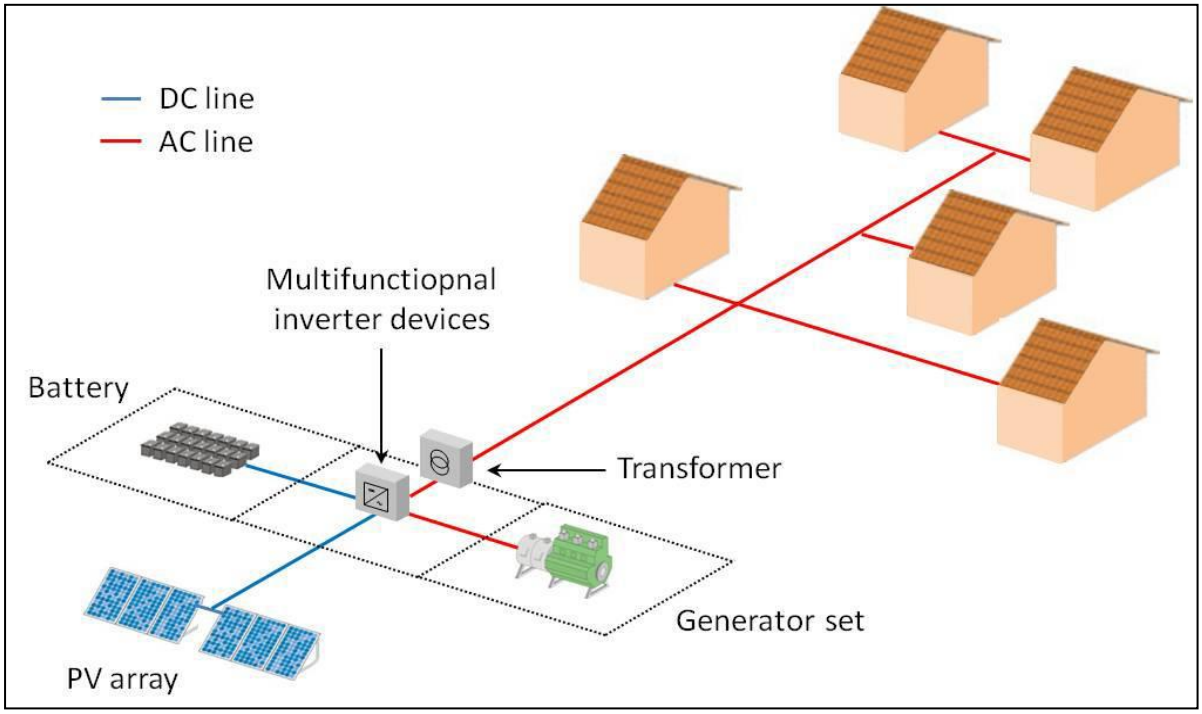
g) **Generator Capacity**: The diesel generator has a capacity of 60 kVA, serving as a backup power source.

h) **LV Network Length**: The low voltage distribution network spans a length of 9 kilometers, connecting consumers to the power source.

i) **Estimated Project Cost**:

The estimated cost of the Oropoi Mini Grid project is approximately USD 337,189.23. It's important to note that this cost may be subject to change as more detailed plans and implementation phases are developed. The investment is expected to provide long-term benefits to the local community, improving their quality of life, economic opportunities, and access to modern amenities.

Figure 3: Illustration sketch of the proposed design of the proposed project



2.3.2.3 The PV Generator

The project utilizes solar panels with a total capacity of 100 kWp to harness solar energy. Solar power is a clean and renewable energy source that will provide a significant portion of the electricity needed for the project. The PV modules should comply with the norms IEC 61215 and IEC 61730. The outside junction box with the positive and negative terminals shall incorporate bypass diodes that have the function of preventing any possibility of the electrical circuit inside the module being broken due to the partial shading of a cell and shall be at least IP 65 and UV resistant.

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

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

2.3.2.4 Powerhouse

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

2.3.2.5 Inverter

Inverters and Chargers:

PV Inverter: A 100 kW solar PV inverter is used to convert the direct current (DC) electricity generated by the solar panels into alternating current (AC) electricity suitable for consumer use.

Battery Inverter Charger: A 60 kW battery inverter charger is employed to manage the energy flow to and from the battery storage system. It ensures efficient charging and discharging of the battery, maximizing the system's overall performance.

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.

2.3.2.6 Battery

A 250 kWh Battery Energy Storage System is incorporated to store excess solar energy during the day, ensuring a consistent power supply even during cloudy or nighttime conditions.

The battery considered is lead-acid, deep discharge type with a permissible repeated deep discharge without damage. Automotive or starting type batteries are not acceptable. It shall be of the open "vented" OPzS type with recombination caps and transparent enclosure for easy inspection of electrolyte level.

OPzS stands for:

O = Ortsfest (stationary)

Pz = PanZerplatte (tubular plate)

S = Flüssig (flooded).

Other batteries can be considered:

1. OPzV type, "gel" lead-acid batteries are "maintenance less" but the unit weight is higher and the lifetime is sensitive to high temperatures.
2. Li-ion batteries, have longer lifetime, are lighter and smaller. But they have a higher investment cost and are not adapted to high air temperature so that an additional active cooling system is needed.

The batteries must be manufactured according DIN 40736-1: "Stationary batteries with tubular positive plates. Capacities, measurements and weights". The battery array will have 12 batteries.

2.3.2.6.1 Battery Rating

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

2.3.2.6.2 Battery Performance

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

2.3.2.6.3 Lifetime

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

2.3.2.6.4 Battery Cabling and Protections

The battery connection point shall be as close as possible to the Multi-mode Inverter. Cables used to connect the battery shall have a temperature rating higher than 20°C above ambient temperature. It is recommended that they be flexible (multithreaded) to allow for easy installation and maintenance. Fuses in cables that connect components to the battery shall be rated for D.C. use, be installed separately as close as possible to the battery terminals and rated to interrupt high fault currents from the battery. A neutralization kit will be provided at the site to manage any battery acid spills that may occur.

2.3.2.7 Multi-Mode 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.

2.3.2.8 Cable Requirements

The cables used in the site shall fulfil these requirements:

- ✓ The cables shall be suitable for laying on racks, in ducts, trenches, trestles, conduits and under-ground buried installation with chances of flooding by water.
- ✓ All cables of module area if laid on cable trays shall be covered. If cables are to be laid underground, laying shall be as per latest relevant code.

- ✓ Cables with Copper conductor on DC side & that with aluminum conductor in AC side to be used as power cables shall have tensile strength as per relevant standards. Conductors shall be stranded.
- ✓ Cables with XLPE insulation, PVC sheathed & armored suitable for a continuous conductor temperature of 90^0C and short circuit conductor temperature of 250^0C shall be used.
- ✓ PVC insulation shall be suitable for continuous conductor temperature of 70^0C and short circuit conductor temperature of 160^0C.
- ✓ Only terminal cable joints shall be accepted. No cable joints to join two cable ends shall be accepted.
- ✓ Cables inside the control room shall be laid in suitable Cable Trays of approved type.
- ✓ Cable terminations for LT cables shall be made with suitable cable lugs & sockets etc. crimped properly and passed through brass compression type cable glands at the entry and exit point of the cubicles.
- ✓ The panels' bottoms shall be properly sealed to prevent entry of snakes / lizard etc. inside the panel.
- ✓ The terminal end of cables and wires are to be fitted with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.

2.3.2.9 Diesel Genset

A 60 kVA diesel generator is included to serve as a backup power source for periods of low solar generation or in case of battery depletion. It provides reliability and backup in the event of extended periods of cloudy weather or high demand. The Diesel Genset shall be suitable for indoor or outdoor installation and shall perform accordingly with Multi-mode Inverter and the mentioned architecture model. The Diesel Genset shall be working in a fully automatic manner with the above stated components. The diesel gensets will have base mounted fuel tanks that will be factory tested for leaks. There will also be an external reserve fuel tank with a capacity of 2000 litres. The proponent, through the operating entity will have regular inspection by the manufacturer. The noise rating for the generator set will be 75dBA @ 1 meter at 75% load under free field conditions. The generator sets will have a high-quality noise absorbent and fire-retardant grade acoustic insulation material complying to IS 8183.

2.3.2.10 Distribution lines

Oropoi site will have a distribution line circuit of 9 km in total. The electricity distribution from the generation plant to the end consumers will be done by means of a distribution line formed by low voltage (LV) line at 415V for three phase and 240V for single phase. All lines shall be over-head mounted on concrete poles or eco poles. The project implementing agency will seek way leaves for the LV lines which will run along road reserves and boundaries within the supply area.

2.3.2.11 Project Activities

The main activities during the pre-construction phase will be land acquisition for generation assets, wayleaves, contractor facilities and workers' camps. During the

construction phase, there will be site clearance and leveling, civil works and construction of utilities and structures for the facilities, installation and connection of the power plant.

2.3.2.11.1 Construction Procedures

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

-Construction of raw materials will include solar modules, inverter, wires, metals, among others. All these will be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies.

-Construction machines will include machinery such as trucks, and other relevant construction equipment. These will be used for the transportation of materials, clearing of resulting construction debris.

- A construction labour force of both skilled and non-skilled workers will be required.

Construction activities will include the following:

- Contractor mobilization;
- Site Preparation;
- Procurement of construction material from approved dealers and transport to the site.
- Storage of PV modules delivery and their installation;
- Laying of internal electrical connections; and
- Installation of inverters and Battery Energy storage system .

2.3.2.12 Land Tenure

Oropoi site is a community land on which the community identified for the construction of the mingrid. 1.2141 hectares that will be used for the generation assets will be acquired compulsorily, with compensation in kind for the land taken to the community.

An A-RAP applies where affected persons are not physically displaced, and less than 10% of their productive assets are lost, or fewer than 200 people are displaced. In the case of KOSAP sub-projects, there is no physical displacement of affected persons, and the foreseen impacts on livelihoods such as grazing occasioned by mini-grid construction, wayleaves acquisition, and implementation of community projects are considered minor. A-RAPs will be implemented for sub-project sites on registered and unregistered community land/group ranches.

2.3.2.13 Compensation Details

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

1) Equipping of community borehole

2) Construction of maternity ward
3) Construction of Two Classrooms

2.4 RESOURCE REQUIREMENT

2.4.1 Workforce Requirement

The Solar Mini-grid will be installed, operated and maintained by the O&M contractor on behalf of REREC for the first seven years and then handed over to REREC engineers and operators.

2.4.2 Water Requirement and Source

2.4.2.1 Construction Phase

Water will be required on a daily basis for civil works and for workers at the project site. However, the quantity of water required will vary depending on the duration of construction and 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.

As noted previously, approximately, employees (direct and contractual) will be working during operation phase. For this workforce, approximately 10,000 Litres storage water tank will be required for domestic consumption.

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 suppliers in in the Country or if not available imported from suppliers outside the country.

2.4.3.2 Operation Phase

There will be no 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

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 project site.

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.

2.4.6 Electrical safety

The Contractor shall ensure that all safety equipment such as safety helmet, shoes, gumboots, dust respirator, hand gloves etc are available at the site and shall take adequate steps to ensure the proper use of the equipment at all times.

2.4.7 Access to the Site

It is proposed that the Oropoi Solar Mini-grid will have one access road, which will be designed according to KPLC's standards, taking into account the Ministry of Road's requirements. The Solar Mini-grid will be accessed via the existing murram road. However, a proper access to the site and drainage will be constructed to safely access the Mini -grid site and to avoid flooding.

2.4.8 Security

Providing and maintaining appropriate levels of site security benefits both the contractor, community, workers at the site and the minigrid. Security at the site is influenced by local, legal, social and geographical exposures of the location.

Security risks vary according to the construction type and site location and can originate not only from the external population but also from the project's own workforce. The following are security related to threats at the minigrid;

- Theft of equipment's and/or tools
- Theft of fuel
- Theft of materials from the site or off-site project storage areas
- Vandalism
- Arson
- Breaches of security into partially completed project areas.
- Robbery of or attacks on construction workers
- Trespassers: both accidental and intentional
- Protesters (either related to the site activity or simply for publicity)

The consultants carried out security assessment and the following are major factors to be considered to mitigate on security at the site:

2.4.8.1 Installation of CCTV

Closed-circuit television (CCTV) Security cameras are one of the most important components of the minigrid safety plan, security cameras will be installed at strategic positions at the site to enhance their effectiveness in monitoring of the entire site. Presence of these cameras will deter intruders and prevent burglaries at the site as it will actively deter theft and record what is happening

Security cameras will cover the entire site perimeter and interior locations of the PV array area, inverter stations, main control room, switchyard and building housing the generators. The surveillance system should be monitored by a listed or approved central station alarm monitoring service.

2.4.8.2 Perimeter Fencing

Chain link fence will be installed to secure the minigrid site. This kind of fencing is preferred for its economic advantages, durability and affordability.

2.4.8.3 Security guards

Four security personnel from the community will be employed to man the site throughout the phases of the project. Two will guard the site during the day and two at night. The guards will be responsible to maintain workers and visitor register and ensure the safe departure. They will be trained on how to respond in the event of an incipient stage fire, including emergency notification of local authorities. They will be equipped with suitable communication devices (radio, wireless telephone, etc.) incise of an emergency.

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

2.4.9 Vegetation Undergrowth

Concrete will be used on surfaces where it is required leaving the rest of the areas covered with vegetation. Vegetation undergrowth will be managed by regular slashing and cleaning up of the site compound.

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 (2018-2022), the main challenges faced by the energy sector include poor transmission and distribution infrastructure, the high cost of power, low per capita power consumption and low countrywide electricity access. Only about 2% of the county's households have access to electricty. Households mainly rely on firewood, charcoal, paraffin and solar lanterns for their lighting and cooking needs, with firewood being the main source of energy. According to Kenya National Bureau of Statistics (KNBS) and Society for International Development (SID), 2013, the potential for investment in renewable energy sources is high given that the county receives over 6 hours of sunlight.

3.2 ALTERNATE LOCATION FOR PROJECT SITE

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

i. Geophysical Factors-Proximity to Hills-Shade effect, Soil erosion, Drainage of the area, Flooding etc.
ii. Land identified is free from any dispute on ownership or any other encumbrances
iii. Proximity to public utilities-Schools, Dispensaries, Places of worship and community settlements
iv. No squatters, encroachers or other claims to the land
v. The Size of the Minigrid to be constructed and the optimal coverage of a Minigrid in terms of the number of people to be reached.
vi. The Land identified should be on spaces set aside for public use within the community centres.

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

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

3.3 ANALYSIS OF ALTERNATIVE CONSTRUCTION MATERIALS AND TECHNOLOGY

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

3.4 ALTERNATE SOURCES OF ENERGY

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

The possible alternatives to solar energy include;

- Wind power: shortfalls associated with wind power includes; lack of time series data of wind, trained human resources to intricate design of wind power etc, providing wind power for Oropoi 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 Oropoi). Besides coal and petroleum products used in thermal power processing are not readily available within Oropoi 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 Oropoi. 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 Oropoi on environmental as well as economic grounds
- Fossil fuel

Solar energy was a desirable option because:

- It has low energy-production costs
- The project is environment friendly with minimal greenhouse gas emissions
- Versatile installation

- It is a clean source of energy hence minimal impact on the environment air quality
- Economic savings.

3.5 TECHNOLOGY ALTERNATIVES

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

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

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

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

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

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. The materials will include all consumables, tools, testing instruments or any other equipment required for successful commissioning of the project.

3.6 SOLID WASTE MANAGEMENT ALTERNATIVES

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

3.7 POWER DISTRIBUTION LINE ALTERNATIVES

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

The identified viable option for power distribution within Oropoi 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 Oropoi.

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

3.8 DO NOTHING ALTERNATIVE

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

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

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

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

This policy recognizes that infrastructure, and in particular, a reliable power supply is vital in sparking economic growth. The challenges facing the power sector in Kenya

include weak transmission and distribution infrastructure, high cost of power, low per capita power consumption, and low electricity access countrywide.

The county government of 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 Oropoi 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

3.9 CONCLUSION

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

4 POLICY,LEGAL AND REGULATORY FRAMEWORK

4.1 INTRODUCTION

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

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

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

4.2 KENYA ELECTRICITY SUPPLY INDUSTRY (ESI)

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

- **Kenya Power Company:** responsible for distribution and retail supply of electrical energy to end users. Kenya Power purchases power in bulk from the Kenya Electricity Generating Company Limited (KenGen) and the Independent Power Producers (IPPs) through bilateral contracts or Power Purchase Agreements (PPAs) approved by the Energy and Petroleum Regulatory Authority (EPRA).
- **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, transmission, 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 the community 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, 2021 (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 Oropoi 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 project but also the overall coordination of project implementation and oversight.

  The Rural Electrification and Renewable Energy Corporation (REREC): is established under Section 43 of the Energy Act, 2019 as a corporate body. The Corporation is the successor to the Rural Electrification Authority established under section 66 of the Energy Act No. 12 of 2006 (now repealed) and subject to this Act, all rights, duties, obligations, assets and liabilities of the Rural Electrification Authority existing at the commencement of this Act is to be automatically and fully transferred to the Corporation and any reference to the Rural Electrification Authority in any contract or document shall, for all purposes, be deemed to be a reference to the Corporation.

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

4.3 ENVIRONMENTAL ADMINISTRATIVE / INSTITUTIONAL FRAMEWORK

Presently, there are over twenty (20) 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.

4.4 NATIONAL POLICY AND LEGISLATIVE FRAMEWORK REVIEW

In 2001, the Government established the administrative structures to implement the Environmental Management and Co-ordination Act of 1999 (EMCA). The main administrative structures are described in the following sections:

Table 4-1: Administrative stakeholders and their roles

Stakeholders	Role
NEC	The **National Environmental Council** is responsible for policy formulation and directions for the purposes of EMCA. The Council also sets national goals and objectives and determines policies and priorities for the protection of the environment. *The proponent should ensure that the project abides by the set goals and objectives of the Council*.
NEMA	The responsibility of NEMA is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment. *This ESIA has been prepared for submission to NEMA for review and approval prior to the commencement of the Project activities, in compliance to the EMCA.*
PCC	EMCA has also established a Public Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. The members of the **Public Complaints Committee** include representatives from the Law Society of Kenya, NGOs, and the business community. *The proponent should address all issues arising from the project in accordance with the above requirements, including a clear policy of stakeholder engagement and feedback.*
WRA	Water Resources Authority is responsible for regulation of water resources issues such as water allocation, source protection and conservation, water quality management and pollution control and international waters. One of its functions among others is to receive water permit applications for water abstraction, water use and recharge and determine issue, vary water permits; and enforce the conditions of those permits as well as formulate and enforce standards, procedures and regulations for the management and use of water resources and flood mitigation.

	The project area experiences water scarcity during the drought season. The proponent will have to purchase water for use during construction.

The applicable Policy and Legislative framework is illustrated in ***Table 4-2*** below.

Table 4-2: Policy and Legislative Framework

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.
1	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.
2	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	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

		social development. The integration process was to be achieved through multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources forms an integral part of societal decision-making.	is in line with the requirements of the NEAP. The project will be reviewed by NEMA for approval before implementation.
3	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
4	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
5	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.	The proposed project is to be implemented in the rural setting at Oropoi. The area is not economically empowered hence few HIV/AIDS prevention resources are available. This policy shall provide a framework to

		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;	both the project proponent and contractor to address issues related to HIV/AIDS during the entire project phase.
National Laws			
1	The Constitution of Kenya, 2010	The Constitution of Kenya promulgated in 2010 is the supreme law of the republic and binds all persons and all State organs at all levels of government. The Constitution provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn.	The proposed project complies with the Constitution by proposing a structure in its ESIA on how to deal with Social, Health, safety and environmental issues for sustainable development.
2	Environmental Management and Coordination Act, 1999 (And the Amendments Of 2015)	The EMCA is a framework environmental law in Kenya. This Act (assented to on January 14, 2000) provides a structured approach to environmental management in Kenya. With the EMCA coming into effect, the environmental provisions within the sectoral laws were not superseded; instead, the environmental provisions within those laws were reinforced to better manage Kenya's ailing environment.	The proposed project will be undertaken in accordance with relevant sections of the EMCA, specifically Clauses 58 – 63. These sections of the Act are operationalized by subsidiary legislation promulgated under the Act and specifically Legal Notice (L.N.) 101: Environment (Impact Assessment and Audit) Regulations, 2003.
3	L.N. 101: EIA/EA Regulations, 2003	These regulations provide the framework for undertaking EIAs and EAs in Kenya by NEMA licensed Lead Experts and Firms of Experts. An	The proposed project is subject to relevant provisions of these regulations and subsequently, the ESIA has been undertaken in accordance with the requirements.

	And 2016 Amendments	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.	
4	L.N. 120: Water Quality Regulations, 2006	This regulation provides for the sustainable management of water used for various purposes in Kenya. The regulation contains discharge limits for various environmental parameters into public sewers and the environment.	The contractor will be required to properly manage the effluent from construction activities in accordance with the above regulations prior to discharge into the environment.
5	L.N. 121: Waste Management Regulations, 2006	Generally, it is a requirement under the regulations that a waste generator segregates waste (hazardous and non-hazardous) by type and then disposes them in an environmentally acceptable manner.	Waste to be disposed in accordance with these regulations.
6	L.N. 61: Noise and Excessive Vibration Control Regulations, 2009	The general prohibition of these regulations states that no person shall make or cause to be made any loud, unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures, or endangers the comfort, repose, health, or safety of others and the environment.	Rules 13 and 14 of the regulations define the permissible noise levels for construction sites. These noise limits will be applicable to the proposed project.
7	Environmental Management and Coordination, (Conservation of Biological Diversity)	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	The proposed project will impact biodiversity through clearance of vegetation on the proposed site. This will be done in strict adherence to ESMMP and revegetation of degraded site will be done as spelt out in the ESMMP

	(BD) Regulations 2006	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).	
8	Environmental Management and Coordination, (Fossil Fuel Emission Control) Regulations 2006	These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement No. 74, October 2006. These regulations include internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnership to control fossil fuel emissions. The proposed project will generate fuel emissions linked to the back-up generator. This will only happen when the sun rays are poor.	This legislation gives caution to proponent on proper handling and management of fuels. REREC will adhere to the ESMMP while handling and managing the fuels
9	Licenses and Permits Required Under The EMCA	The subsidiary legislations under the EMCA are partially monitored using permits and licenses. Subsequently all licenses and permits required during the construction phase shall be the responsibility of the individual contractors and their agents. During the operational phase, all permits, and licenses required to operate the project will be the responsibility of the proponent.	The following permits to be available for inspection during the construction and operational phases of the project: ✓ EIA License under Environmental Management and Coordination Act, 1999; ✓ Workplace Registration under Occupational Safety and Health Act, 2007; ✓ Construction Permit by the County Government; and

			✓ Noise Permit under Legal Notice 61: The Environment Management and Coordination (Noise and Excessive Vibration Control) Regulations, 2009.
10	Occupational Health and Safety Act, 2007	The Occupational Safety and Health Act (OSHA) was enacted to provide for the health, safety and welfare of persons employed in workplaces, and for matters incidental thereto and connected therewith.	The contractors will be required to fully comply with Legal Notice 40 titled: Building Operations and Works of Engineering Construction Rules, 1984 (BOWEC). Each contractor will develop and implement a formal construction health and safety plan.
11	L.N. 31: The Safety and Health Committee Rules, 2004	These rules came into effect on April 28, 2004, and require that an Occupier formalize a S&H Committee if there is a minimum of 20 persons employed in the workplace. The size of the S&H Committee will depend on the number of workers employed at the place of work	The contractor will be required to constitute Health and Safety Committee to oversee safety and health at the construction site
12	L.N. 24: Medical Examination Rules, 2005	These rules provide for Occupiers to mandatorily undertake pre-employment, periodic, and termination medical evaluations of workers whose occupations are stipulated in the Eighth Schedule to the OSHA and the First Schedule to this Rules. Workers that fall under the above two schedules are required to undergo medical evaluations by a 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
13	L.N. 25: Noise Prevention and Control Rules, 2005	The rules set the permissible level for occupational noise in any workplace (which includes construction sites)	The contractor to ensure that equipment is serviced properly and/or use equipment that complies with the threshold noise values provided in the act. Alternatively,

		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.	each contractor will be required to develop and implement a written hearing conservation programme during the construction phase.
14	L.N. 59: Fire Risk Reduction Rules, 2007	Several sections of the rules apply to the proposed project as enumerated below. - Regulation 16 requires Proponents to ensure that electrical equipment is installed in accordance with the respective hazardous area classification system. It is also a requirement that all electrical equipment is inspected every six months by a competent person and the Proponent is required to keep records of such inspections. - Regulation 22 provides a description of the functions of a fire-fighting team. - Regulation 23 requires Proponents to mandatorily undertake fire drills at least once a year.	The proponent is expected to comply with the requirements of L.N. 59: Fire Risk Reduction Rules, 2007 by i. Carrying out, and record, a fire risk assessment identifying any possible dangers and risks. ii. Reducing, or where possible remove, the risk of fire and take precautions to deal with the remaining risks. iii. Developing an emergency plan should a fire occur which includes evacuation procedures etc.

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

		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.	
17	The Energy (Solar Photovoltaic Systems) Regulations, 2012	These regulations shall apply to a solar PV system manufacturer, importer, vendor, technician, contractor, system owner, a solar PV system installation and consumer devices. The Regulations prohibits any person from designing or installing any solar PV system unless he/she is licensed by EPRA.	The Regulations regulates the design and installation of PV systems. The persons engaged in the designing and installation of the Mini-Grid shall be licensed by EPRA
18	The Public Health Act (Cap. 242)	The Act prohibits the proponents from engaging in activities that cause environmental nuisance or those that cause danger, discomfort or annoyance to inhabitants or is hazardous to human and environmental health and safety.	The proponent will be in line with the regulations of this act and will ensure suppression of infectious diseases and maintain proper sanitation during all the phases of the project.
19	The Standards Act Cap 496	The Act is meant to promote the standardization of the specification of commodities, and code of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control.	REREC will ensure that commodities and codes of practice utilized in the proposed project adhere to the provisions of this Act. All materials and spares used to construct the project will comply with the standardized specifications and certification.

20	Penal Code Act (Cap.63)	Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commits an offence.	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.
21	The Land Act, 2012	An Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land- based resources, and for connected purposes Forms of Tenure. 5. (1) There shall be the following forms of land tenure- (a) freehold; (b) leasehold; (c) such forms of partial interest as may be defined under this Act and other law, including but not limited to easements; and (d) customary land rights, where consistent with the Constitution. Methods of acquisition of title to land. 7. Title to land may be acquired through— (a) allocation; (b) land adjudication process; (c) compulsory acquisition; (d) prescription; (e)	Land in Oropoi is community land whose tenure falls under customary land rights. KPLC will observe all the relevant provisions of the Act including conversion from community land to public land as will be deemed appropriate

		settlement programs; (f) transmissions; (g) transfers; (h) long term leases exceeding twenty-one years created out of private land; or (i) any other manner prescribed in an Act of Parliament. Conversion of land. 9. (1) Any land may be converted from one category to another in accordance with the provisions of this Act or any other written law. (d) Community land may be converted to either private or public land in accordance with the law relating to community land enacted pursuant to Article 63(5) of the Constitution.	
22	Community Land Act, 2016	This Act is critical for the proposed project is within community land. Section 6(1) of the Act provides that 'county governments shall hold in trust all unregistered community land on behalf of the communities for which it is held'. Furthermore, Section 6(2) maintains that 'the respective county government shall hold in trust for a community any monies payable as compensation for compulsory acquisition of any unregistered community land'. Section 30(1) states that 'Every member of the community has a right to equal benefit from community land'. Section 26(1) provides that 'a community may set aside part of the registered	The proposed project site falls on unregistered community land. The community has since allocated 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 or health needs.

		community land for public purposes and Sub-section (2) holds that 'where land is set aside for public purposes under Sub-section (1), the (Land) Commission shall gazette such parcel of land as public land'. These provisions offer a window for the proposed project to acquire land for project works legally for communities as necessary and to convert the same into public land. This is useful for the project as once done powerful groups will not have opportunity to exclude them on account of their socio - economic statuses. In any event, Section 35 holds that, 'subject to any other law, natural resources found in community land shall be used and managed- (a) Sustainably and productively. (b) For the benefit of the whole community including future generations. (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 beneficiaries and thus their rights secured in this Act	

23	Land Registration Act, 2012	Section 27 (2) provides that a transfer without valuable consideration shall have the same effect as a transfer for valuable consideration when registered.	Once the KOSAP PIU finalizes stakeholder engagements in all the identified counties, the transfer process shall be commenced to ensure that the land rights are secured. This gives the project the required land security to allow project implementation, which is in compliance with this legal requirement.
24	Land value amendment Act 2019	It aims at standardizing the value of land in Kenya for the primary purpose of enhancing efficiency and expediting the compulsory land acquisition process for public projects. It introduces Section 107A into the Land Act, which provides the criteria for the valuation of freehold and community land that is the subject of compulsory acquisition. Community Land, like freehold land, shall be valued based on the criteria outlined in Section 107A and the Land Value Index which will be jointly developed by the national government and county government. Section 5 introduces a list of the forms in which compensation can be made.	Land in Oropoi is community land. The 1.214 ha Identified and allocated by the community for the proposed mini-grid will be acquired for the project. The MOE will pay compensation in kind through implementation of projects in water, education or health sectors. The community chose borehole solar installation, piping of water to community Water kiosk and as the first priority and construction of a maternity ward as the second priority.
25	The Environment and Land Court Act 2011	This is an Act of Parliament intended to give effect of article 162(2) b of the constitution; to establish a 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	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

		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.	project GRM, this court will provide a forum for timely resolution of such grievances.
26	The Physical and Land Use Planning Act, 2019	This Act of Parliament makes provision for the planning, use, regulation, and development of land and for connected purposes.	The proposed site is not in contravention of any Zoning regulations. The project site is within unregistered community land; necessary county approvals will be sought by the proponent e.g., Project design approval and change of use. The approvals shall be issued by the Physical planner in the department of Lands, Housing and Urban Development – Turkana County.
27	The Employment Act No 11 of 2007	This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the energy sector.	With the Contractor and the Project Proponent being primary employers during the construction and operational phases of the Project, respectively, they are bound by this law to abide to its stipulations on employee management and relations
28	The Work Injury Benefit Act, 2007	This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment	The Proponent and Contractor will maintain an insurance policy cover for its employees, record of accident, carryout proper accident investigations; organize for pre-employment and regular medical examinations for staff.
29	Air Quality Regulations (2014)	Regulation 3 stipulates that the objective of these Regulations is to provide for the prevention, control, and abatement of air pollution to ensure clean and healthy ambient air.	The Proponent and contractor will implement mitigation during construction to ensure neighbouring properties are not impacted by nuisance dust

30	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 ESMMP
31	National Museums and Heritage Act, 2006	The Act seeks to consolidate the law relating to national museums and heritage; to provide for the establishment, control, management and development of national museums and the identification, protection, conservation and transmission of the cultural and natural heritage of Kenya; to repeal the Antiquities and Monuments Act and the National Museums Act.	During implementation of the project, the Act will be followed in the event of case of chance find of cultural heritage on the proposed site
32	The Prevention, Protection and Assistance to Internally Displaced	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	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.

	Persons and Affected Communities Act, 2012	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.	
33	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
34	The Sexual Offenses Act 2006	This is a comprehensive law that criminalizes a wide range of behaviours including rape, sexual assault, defilement, compelled or induced indecent acts with child imbeciles or adults, gang rape, child pornography, child trafficking, child sex tourism, child prostitution, exploitation of prostitution, incest by male and female persons, sexual harassment, deliberate transmission of HIV or other life threatening sexually transmitted disease, stupefying with	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 labour influx on a project when workers are believed to be interacting with community women. Hence, abusive behaviour can occur not only between project-related

		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.	staff and those living in and around the project site, but also within the homes of those affected by the project.
35	The Children Act, 2012	Part 2 of the Act denotes the rights of the children and their welfare shall be protected from child labour 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.
36	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	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

		person with a disability access to opportunities for suitable employment. (2) A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees. (3) An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment.	and exposed to negative impact from the project that could adversely affect them.

4.5 WORLD BANK OP APPLICABILITY

Error! Reference source not found. below shows the applicability of World Bank Operational OPs to the proposed project in Oropoi;

Table 4-3: World Bank Operational Ops

S.No.	Safeguard Policy	Objective	Applicability
1.	Environment Assessment (Operational Policy, OP/BP 4.01)	The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies.	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 MoE has commissioned an Environmental impact assessment in order to identify and address the potential impacts to a level that is acceptable.
2.	Natural Habitats (Operational Policy, OP/BP 4.04)	This policy 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 Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of	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.

		terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities but retaining their ecological functions and most native species.	
3.	Indigenous Peoples (Operational Policy 4.10)	The objective of this policy is to (i) ensure that the development process fosters full respect for the dignity, human rights, and cultural uniqueness of indigenous peoples; (ii) ensure that adverse effects during the development process are avoided, or if not feasible, ensure that these are minimized, mitigated or compensated; and (iii) ensure that indigenous peoples receive culturally appropriate, gender and inter-generationally inclusive social and economic benefits.	The policy is applicable because the inhabitants of Oropoi who are Turkana are classified as a marginalized group in Kenya. They are the main inhabitants and the sole beneficiaries of the proposed solar mini-grid. Further the proponent will continue to engage the beneficiaries in a culturally appropriate way and allow for decision making in a free, prior and informed consent manner throughout the phases of the project.
4.	Involuntary Resettlement (Operational Policy, OP/BP 4.12)	The objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; (iii) encourage community participation in planning and implementing resettlement; and (iv) provide assistance to affected people regardless of the legality of land tenure.	The policy is applicable to the entire project because there is land acquisition for the Mini-grid, Wayleaves, contractor facilities and worker's camps.

4.6 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 subprojects.

The ESMF provides guidelines for MoE, KPLC & 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 Oropoi Project Site is guided by this KOSAP ESMF.

4.7 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.

4.8 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 KPLC 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.

The VMGF is applicable because the main inhabitants and sole beneficiaries of Oropoi are Turkana community who are classified as VMGs in Kenya. The ESIA did not identify any adverse impact on the communities therefore, a Vulnerable and Marginalized Group Plan (VMGP) will not be required. However, elements of the VGMP such as inclusion of VMGs in the stakeholder engagement process and representation on the locational grievance redress committee will be captured in the ESMP, to ensure that the community access culturally appropriate project benefits and opportunities, in a gender sensitive and intergenerationally inclusive manner.

4.9 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.

Table 4-4: 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	ESIA is needed once determination	Similar- both require ESIA	ESIA is prepared in line with EMCA /EIA

determination had been established and should be prepared identifying all environmental and social impacts and mitigation measures proposed to address the impacts.	had been established and should be prepared identifying all environmental and social impacts and mitigation measures proposed to address the impacts.	depending on the project impacts.	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	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 can share the projects benefits and ensure that negative impacts of the project do not fall on them disproportionately WB needs a social assessment to be conducted.	WB policy more elaborate and the two are being used to compliment.

enhance their participation.			
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 from the 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 – PHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT

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, REREC will be established,
- Project site where project components such as solar modules, control room and transmission line to power grid sub-stations; and any other selected compensation in kind 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 e.g., approach road construction and widening of existing road.

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 Oropoi Village which according to the administrative structure falls within Oropoi 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 falls in Oropoi Village, Kalobeyei ward, Turkana West sub-county in Turkana County. The site is relatively flat; however, the surrounding areas within the location has undulating slopes of average estimated slope of 1.2%. The site is located at a close proximity to Oropoi shoping center which is within a 150m radius from the site.

5.1.2 Study Area

Locations of ecological and social surveys were also selected based on receptor locations; in addition, special emphasis is given to areas within 1.5 km radius of the project site and distribution lines. Based on the secondary information of the region, the following baseline information on environment, ecology and social has been discussed under the sections below:

5.2 PHYSICAL ENVIRONMENT

5.2.1 Geology and soils

The county has sandy soils that support scattered shrubs and grasslands which are ideal for livestock production. The county's land is highly erodible. The exploitation of the soil resource thus must take into account conservation measures due to their fragile nature. The mineral potential of the soils is not exactly known as no geological mapping has been done.

5.2.2 Topography

The topography of Turkana varies between semi-arid and arid landscapes consisting of low-lying plains and isolated hills and mountain ranges (Opiyo et al., 2015). It rises from a low altitude of 369m at Lake Turkana to 900m near Uganda border in the west.

5.2.3 Project site flora and Fauna

Plant species identified at the project area surrounding during ESIA study were;Balanites pedicellaris (Elamash), Borscia coriacea (Edung),Dobera glabra (Edapal), Fiscus sp. (Echoke), Grewia bicolor (Epat),Maerua subcordata (eerut),Acacia nubica (Epelet), Acacia senegal (Ekunoit), Balanites orbicularis (Ebei), Cordia sinensis (Edome), Dobera glabra (Edapal), Fiscus sp. (Echoke), Grewia bicolor (Epat), Grewia tenax (eng'omo),Maerua subcordata (eerut), Salvadora persica (esokon), Tamarindus indica (Epederu), Zizyphus mauritiana (Ekalale) and Acacia tortilis (Ewoi). The proposed site falls mainly within arid and semi-arid lands. The area is characterised by

semi-arid conditions. The area is mainly semi-arid with sparse vegetation mainly indigenous shrubs and a few ebei trees.

No wild animals were observed at the site. The area and its environs are not a known breeding site for any endangered species. The site does not present natural ecosystem for wildlife habitation. The project area is largely pastoral land which is a major form of livelihood for the local community. Some of the livestock include cows, goats, sheep, donkey, chicken and domestic pets such as cats and dogs. Other animals found in the project area are common ostrich, snakes etc. as mentioned by the community members. No other notable wild animals were sighted in the area.
There is also diversity of bird life in the area mostly concentrated in shrubs vegetation including stuthio Camelus), African Cuckoo (Cucus Gularis), lappet-faced vulture, isabelline wheatear among others..

5.2.4 Hydrogeology and Drainage

A water catchment is an area that shares one outlet point for surface runoff or base flow. The Food Security Master Plan for Turkana outlined the major watersheds for Turkana including runoff water (Oduor et al 2012). There are nine major catchment areas in Turkana County, ranging from 543 ha2 with a potential runoff of 27 Mm3, to 14,127 ha2 with a potential runoff of 1,465 Mm3 (Turkana Food Security Master Plan 2012).
The two main perennial rivers are the Kerio and Turkwel. River flow in each is influenced by the rainfall patterns in their catchments. The rivers also receive runoff from ephemeral streams (laghas). A dam built for hydro-power generation at upper Turkwel River from 1986 to 1993, releases a perennial flow into the river with an annual discharge around 300 Mm3 per annum (GIZ 2014).

5.2.5 Water Resources

With regard to water quality in Oropoi, water is sourced from Oropoi missionary borehole. The water is considered clean by the locals and utilizes it for drinking and domestic uses but is slightly saline.

5.2.6 Ambient Air Quality

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

5.2.7 Ambient Noise Quality

In general, the project area is a rural setting where the main source of noise is from motorists and domestic animals. The noise quality of Oropoi is considered to be within the Kenyan limits for a mixed residential zone.

5.2.8 Soil Type

The major soil types in the county are tertiary volcanic soils. The soil in the project area is skeletal soil i.e., they are rocky, shallow and stony and contains gravel and sand. The high concentration of sand in the soil makes it to quickly drain excess water and cannot hold significant amounts of water or nutrients for plants. The soils in the project area are not suitable for crop farming

5.3 SOCIO-ECONOMIC ENVIRONMENT

5.3.1 Demographic Profile

The demographic profile in terms of total population, number of households, household size and sex -ratio of the selected villages surveyed in study area has been discussed in section below:

According to the 2019 Kenya Population and Housing Census (KNBS), Kalobeyei ward ha an area of approximately 384.8 Km^2 with a population estimate of about 1500 people. The average gender ratio for the population within the project area is estimated to be 54% male and 46% female. ***Table 5-1*** below presents a summary of demographic profile of Oropoi.

Table 5-1: Summary of demographic profile

Attribute	Magnitude/Number
Approx. population	1500
Households	223
Gender.	Male – 54% Female – 46%
Ave. No. per household	6
Dominant ethnic group	Turkana
Primary religion	Christianity

5.3.2 Educational Infrastructure

As per the observation and information sought from Oropoi Location, the area has one school ; Oropoi primary school.The geographical location map coordinates for the school is 3.816024 (Latitude), 34.360023 (Longitude).
Most of the young people below 18 years of age can generally read and write while most of those above that age cannot. These schools are currently connected to solar power which is unreliable, and it is anticipated that they will benefit from the project by getting connected to the reliable electricity once the project has been implemented. The school had 246 pupils (48% and 52% girls and boys) enrolled in the primary school but these figures keep changing cause of drop outs due to effects of culture, poverty and security related issues. There were a total of 8 primary school teachers and this implies that the teacher/pupil ratio is 1:37 and The pupil to classroom ratio is 17.4:1.. According to key information interview with the school headteacher, 80 percent of pupils transit to secondary schools, major causes of school dropout are said

to be pastoralism, early marriages and insecurity. There is therefore urgent need to come up with strategies that will keep children in school. There is no Tertiary institution in the Area.The school is run by religious organization.

5.3.3 Access to health

The village is served by Oropoi dispensary that was reported to be ill equipped during the FGDs. Despite its condition, the residents prefer the dispensary as compared to the traditional methods of treatment. The dispensary is currently served by 2 Nurses, 1 nutritionist and 2 community health workers (a male and a female). The main health issues across all ages and gender are

- Upper tract infections
- Pneumonia
- Malaria
- Malnutrition

Malnutrition was the most prevalent among most groups due to food insecurity while Sexual health issues are the least common among the community.
The dispensary currently uses solar power installed for lighting purposes and it is anticipated that when the project is implemented, they will be connected to the electricity that will improve healthcare in Oropoi.

5.3.4 Occupation and Livelihood Profile

The community is mainly pastoralist that move with livestock in search for pasture and water. Formal employment is less than 5%. Other sources of income in the society include retail businesses. Due to the aridity of the area, crop farming is only practiced during the rainy season. The project will bring direct job opportunities to the locals during the construction phase and other indirect forms of employment throughout the cycle of the project.

5.3.5 Land Use

Land in the community is mainly communal and is used mainly for livestock grazing. The main animals kept are goats, sheep and camels.

5.3.6 Energy Access

The main source of energy for the residents of Oropoi is wood fuel. It is estimated that about 85% of the households rely on fire wood as their main source of power, mainly for cooking. This has partly contributed to a decline in tree cover. 10% of the 129 households in the study area have access to electricity (portable solar systems). Energy tapped from the Solar system connected to the Oropoi Dispensary was purposely used for lighting.
Oropoi area is not covered by the national grid and hence the proposed solar project

5.3.7 Social and Physical Infrastructure

Transportation and Road network: Oropoi area can be accessed by 56 km of earth road that connects to a tarmac road 59km to Kakauma town. The main forms of

transport are private vehicles and motorbikes. Oropoi has an Airstrip 1km from the project site.

Sanitation: Open defecation (OP) is widely practiced in the village. There are however few pit latrines.

Mobile Network Coverage: *Safaricom* is the only Network coverage within the village with a signal that is relatively poor.

5.3.8 Vulnerable Individuals and Households

According to the World Bank Document-Vulnerability: A View from Different disciplines by Jeffry Alwang and Paul B. Siegel, a vulnerable group is a population that has some specific characteristics that make it at higher risk of falling into poverty than the others. The categories of vulnerable groups identified at the project area include:

- ✓ Poor Female headed households;
- ✓ Child headed households;
- ✓ The elderly (80 years and above);
- ✓ Persons living with disability (PLWD).

The vulnerable households can hardly access the basic needs and most of them rely on well-wisher within the community. The project should consider such households for electricity connection. Most of them cannot afford the one thousand shillings' connection fees.

5.3.9 Gender based vulnerability

The society in the project area is characterized by a patriarchal family structure. Women continue to be rooted in traditional norms of social behavior which include minimal participation in household or economic decision making, lesser economic freedom and limited opportunity to socialize with other females in the village. 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 the man. In addition to this, men are responsible for ensuring the financial security of the family. The women on the other hand are responsible for household activities such as fetching water, cooking, cleaning, taking care of the children and also grazing of animals.

5.3.10 Gender Based Violence

Based on the Focus Group Discussion with women at Oropoi, there are domestic violence cases and there are no support centres for GBV cases. The forms of GBV that may arise during project implementation include Sexual Harassment (SH) and Sexual Exploitation and Abuse (SEA). A SEA/SH Prevention and Response Action Plan needs to be prepared and implemented in all the phases of the project.

5.3.11 Culture and heritage

There is no cultural site of significance that was reported/observed near the project area. Oropoi is made up majorly the Turkana community which make up 99% of the total population. The community values keeping of cattle, sheep and goats while the other 1% communities are settlers and are involved in businesses and others are civil servants employed. The community in the project area are a patriarchal society; men typically speak for women and make decisions in the family. The Borana community members still practice polygamy.

5.3.12 Religion in the project area

The community members at Oropoi represent mainly the Christians. Oropoi (Missionary) Catholic church was identified in the area. The days of worship are usually Sundays for the Christians therefore, the contractor is expected to put in to consideration the time of worship.

5.3.13 HIV/AIDs prevalence

Exact number of people infected with HIV/AIDs in Oropoi was not known, According to National AIDs Control 2020, HIV prevalence in Turkana was (1%) lower than the national prevalence of 7% (Kenya HIV Estimates 2020). The county contributed 1% and 1.4 % of the total new HIV infections in Kenya among adults and children respectively. The threat posed by HIV and AIDS is the increase of orphaned and vulnerable children and death of productive population. It also increases demand for health services and health care provision. The Interventions to address the threat should be multi-sectoral. The county and constituency AIDS technical committees must mobilize all stakeholders in the fight against new infections and promote community-based care for those infected and affected by AIDS. HIV and AIDs related issues must further be mainstreamed in all the development activities in the county and also need to focus more on health education for prevention of mother to child transmission

5.3.14 Community Organizations/Non-State Actors

Turkana county has 105 registered co-operatives societies (Turkana county CIDP 2018-2022), there are was one registered youth group **(Kusuroi Unit)** in Oropoi. The group contribute towards community empowerment. Several NGOs, INGOs, FBOs and special interest groups work these include Cash transfer, Inua Jamii and Nawiri. These organizations intervene in the social sector mainly in the informal settlements. They contribute considerably towards community empowerment, protection of human rights awareness creation and civic education. Most women groups operate in uninformal revolving funds (merry go round, table banking). The level of activity of women and youth groups in the county depends on funding from various donors and government funded initiatives.

6 STAKEHOLDER ENGAGEMENT

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

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

6.1 LEGAL REQUIREMENT FOR STAKEHOLDER ENGAGEMENT

Timely stakeholder analysis and engagement is key as it provides opportunities for stakeholders to make significant contribution to the project design and implementation which results in enhanced project acceptance among other benefits.

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 Oropoi. 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.

6.2 OBJECTIVES OF PUBLIC PARTICIPATION

The objective of stakeholder engagement/participation is to identify stakeholders and allow such parties the opportunity to:

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; and
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 ESIA 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.

6.3 STAKEHOLDER CONSULTATION AND DISCLOSURE REQUIREMENT FOR THE PROJECT

The World Bank OP 4.01 Environmental Assessment - Stakeholder Engagement and Information Disclosure emphasises on engagement in meaningful consultations with all stakeholders. The stakeholders should be provided with timely, relevant, understandable, and accessible information, and consult with them in a culturally appropriate manner, which is free of manipulation, interference, coercion, discrimination, and intimidation. The ESIA report will be made available in public places that are accessible to project-affected groups and local NGOs (NEMA website and Respective NEMA County offices).

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

- Meeting with the client
- Consultation with the county commissioner and the county officials
- Key stakeholder interviews with the county officials
- Public meeting in Oropoi

- Focus Group Discussions

6.4 STAKEHOLDER CHARACTERISATION AND IDENTIFICATION

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

6.4.1 Stakeholder Mapping

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

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

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

Table 6-1: Identified Stakeholders

Stakeholder Category	Stakeholder Group	Connection to the KOSAP	Consultation tool
Project Affected Persons	Local Community	Local communities to be affected either directly or indirectly by the project Vulnerable Individuals and Households Health institutions Education institutions	**Public Meeting** 2 public meetings were held at Oropoi shopping center under an acacia tree on 20/3/2021 and 22/01/2022. **Focus Group Discussions (FGD)** The FGDs were conducted with the men, women, youth. **Key Informant Interviews (KII)** The KIIs for Oropoi Primary school, Oropoi Dispensary were conducted through one-on-one interviews. The chief was also interviewed on the Community Profile.
Interested Parties	Government agencies National regulatory bodies	National Government are of primary importance in terms of establishing policy	**Meeting** A meeting was held with the Turkana County Commissioners

	County government	County government are also of primary importance in county energy requirements and proposed interventions They will play an important role in implementation and sustainability of the project	

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

Table 6-2: Stakeholder Significance and Engagement Requirement

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

6.5 APPROACH AND METHODOLOGY USED IN CARRYING OUT THE PUBLIC PARTICIPATION

ESIA consultants employed various methods in engaging different categories of the stakeholders, these methods included; face to face discussions for the government officers, focused group discussions with men, women, youth and people living with disability (PLWDS) and a public baraza/meeting for the community members.

6.5.1 Stakeholder engagement schedule

The ESIA team identified four categories of stakeholders namely; government officials, opinion leaders at local level and elders and the general community. Stakeholder engagement began early in the planning phases of the project. A letter was written from the Ministry of Energy to Turkana County commissioner informing them about the need to undertake public participation for the proposed project. Stakeholder consultations was undertaken on 1st February 2022. During this time project information in terms of (preliminary design, positive impacts, negative impacts, mitigation measures among others were discussed with various stakeholders. Different categories of stakeholders gave their views on the project.

6.5.2 Mobilization for the community Meeting

County renewable energy officer (CREO) informed the county government and the local community administration on the purpose of the consultation meeting two weeks prior to the date of engagement. 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 regards to KOSAP community engagement forums. The chief then informed the people about the meeting through announcement by word of mouth and telephone communication given by the local leaders' key among them were village administrator and village elders in Oropoi village.

6.5.2.1 Methods of consultations

Since there were various groups in the community, different methods were used to disseminate the project information as well as get feedback from the said groups, as discussed beginning section 6.6.

6.5.2.2 Meeting with Turkana County key stakeholders

A meeting was held with Turkana County commissioner for Turkana County and his officers on 14th Jan 2022. The main agenda was to brief them about the presence of the consultants at their administrative areas so as to explain the project to them and solicit their views on it as well as brief them on the need to carrying out consultations with the target communities before project is implemented.

6.5.2.3 Public forum/meeting

The project team undertook community engagement forums with the target beneficiaries and the communities where the solar Mini-grids will be set. The main objective was to explain the project details including need for land identification and solicit broad community support and acceptability of the project. An open meeting with the community members was held. The (KOSAP team) explained to the community members about the project and other related information as discussed in the minutes (attached in **Appendix 3**). The meeting was then opened up for a plenary session – (discussed further in the section).

Community engagement proceedings and resolutions are presented in this section in form of minutes taken/written during the meeting. The meeting was well attended by all people including men, women, youth and persons with special needs.

6.5.2.4 Focus Group Discussions

After the meeting the community members were told of the need to have focus group discussions to discuss the project further and allow the different groups more opportunities to ask questions or give suggestions regarding the project. Therefore, separate meetings for men, women and youth were held. In these meetings the message on the project was echoed especially on benefits and impacts (both positive and Negative) of the project to the community, rights of the community and the need to have a grievance redress mechanism and committee with representation from all groups in the community

6.6 STAKEHOLDER ANALYSIS

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

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

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

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

Table 6-3:Summary of Stakeholder Influence

Stakeholder Category	Relevant Stakeholders	Magnitude of Influence	Urgency/Likelihood of Influence	Overall rating of stakeholder rating
Interested Parties	National Government agencies	Large	High	Major
	National regulatory bodies	Large	Medium	Major
	County Government	Large	Medium	Major
Project affected Persons	Local communities to be affected either directly or indirectly by Projects	Large	High	Major
	Vulnerable Individuals and Households	Medium	High	Major
	Education and Health institutions	Medium	Low	Minor

6.7 INFORMATION SHARED TO THE COMMUNITY MEMBERS

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

6.8 STAKEHOLDER ENGAGEMENT DURING THE LAND IDENTIFICATION PROCESS

A Consultative meeting was held with the Oropoi community on 20th March, 2021, to discuss the details of the proposed mini-grid project, the project's land requirements, the impacts of the project and grievance redress. Focus Group Discussions were also

carried out separately with men, women and the youth. The FGDs were to allow the groups to freely express themselves and to ensure that they understood the project.

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

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

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

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

6.9 KEY FEEDBACK RECEIVED DURING STAKEHOLDER CONSULTATION PROCESS

The general stakeholder consultation was done in a public meeting (Baraza) organized at Oropoi shopping centre under a big acacia tree. The meeting was chaired by the area Assistant chief and the village administrator. The feedback received during the stakeholder consultation process have been summarized below:

6.9.1 Summary of minutes

The table below presents the issues /comments raised by the stakeholders during the public meeting and the responses given by the study team.

Table 6-4 Summary of minutes

No.	issue	Comments	Response from the consultant
4	Distribution coverage	Distance coverage of minigrid distribution co	The mingrid would cover a radius of 1.5kms from the site. Those living out of the minigrid coverage will be provided with alternative solutions of accessing electricity such as low price portable solar systems

5	Compensation in kind	Compensation in kind option	The community were asked to choose three projects in order of priority priorities they'd like to be compensated ,they requested the contractor to equip the community borehole and pipe water to community water Kiosk.
6	Timelines	When the project will commence	The consultant assured the community the project will be implemented as soon as reporting has been certified and the project licensed

The minutes of the baraza meeting have been appended in Appendix 2 of this report.

Public participation "Baraza" Session

Focused Group Discussion with the Men

Focused Group Discussion with the Women

Focused Group Discussion with the Youth

Plate 6-1: Stakeholder's engagement process

6.10 SUMMARY FEEDBACK RECEIVED DURING FOCUSED GROUP DISCUSSION

The Focus Group Discussions were held with Men, Women and the Youth, below are key concerns and expectations that were raised during the FGDs have been summarized below in Table 6-5;

Table 6-5: Issues and concerns raised during the FGDs

Groups	Issues/comments discussed
Men	✓ The men confirmed that they were fully aware and well conversant with of the project. They added that the project has been disclosed to them a couple of times during land acquisition period and were concerned that the project is taking too long to be implemented; ✓ They asked the client to implement the project as soon as possible and that they were not willing to engage the

	client on any other meeting/public participation-A sign of stakeholder fatigue; ✓ Top three community needs according to Men FGD are Water project, Electricity and improvement of Oropoi primary school classrooms. They requested for a project on water sector e.g., water reticulation to curb on their water challenges as their project of choice in compensation in kind.
Women	✓ The women reported they had heard about the project before and feel they knew what it was about. ✓ The project is worthwhile because it would benefit them. They emphasized that the project would lead to business growth in the area and availability of cheap electricity. They stated that the project negative impacts can be mitigated significantly to negligible levels hence the development should process. ✓ The women requested that the contractor to consider them for employment during construction period. ✓ Top three community needs according to Women FGD are Water project, Maternity ward improvement in Oropoi dispensary and electrification of the area. They requested for a project on water sector e.g., water reticulation to curb on their water challenges as their project of choice in compensation in kind.
Youth	✓ The youth reported that they were well conversant with the project and that the project had been disclosed to then severally in 2021. ✓ They added that the project will help create jobs for them and improve the security of the area. ✓ They were concerned that the project is taking too long to implement and wanted to know the distance coverage of the power connection. ✓ The youths in Oropoi have one youth group that was established in 2013. The main function of the group is empowering the community in business and preaching peace/peace making. ✓ They asked to be considered for jobs during the project implementation.

6.10.1 Consent

The Community members present unanimously accepted the proposed project.

6.11 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.

6.12 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

6.12.1 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. All the mitigation measures identified in this chapter have been collated into the Environmental and Social Management Plan ('ESMMP') matrix, including Occupational Health and Safety.

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.

7.4 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 in **Error! Reference source not found.** below based on five levels;

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 **Error! Reference source not found.**.

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.

7.5 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 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).

7.6 SENSITIVITY OF RESOURCES AND RECEPTORS

Sensitivities are defined as aspects of the natural or social environment which support and sustain people and nature. 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.

7.7 LIKELIHOOD

Terms used to define likelihood of occurrence of an impact are explained in **Error! Reference source not found.** below.

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)

7.8 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.

7.9 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 **Error! Reference source not found.** and **Error! Reference source not found.** 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.

7.10 PRE-CONSTRUCTION PHASE-NEGATIVE IMPACTS

7.10.1 Impacts related to Land Acquisition

The proposed project will entail the acquisition of a 1.2141 hectares land parcel for setting up the mini-grid. The land acquired may also be used to develop contractor facilities, worker's camps and other ancillary facilities e.g., storage and sanitary facilities. Loss of land used by the communities for livestock grazing and farming may trigger land disputes. New settlements may arise due to migration of people to the centres near the mini-grid disrupting the existing community settlement patterns. The project proponents will use existing access roads to set up the low-voltage power distribution lines and will seek access from beneficiaries and clients in whose property they will undertake electricity connection to the power grid.

During the consultation, it was also reported that the community is not entirely dependent on the land for income. The land has minimal vegetation cover. After implementing the embedded controls, the impact magnitude is assessed to be minor.

7.10.1.1 Source of Impact and Overview of Baseline Conditions

- Additional employment opportunities may also be created for the local youth by the contractor.

7.10.1.2 Embedded/In-built Controls

Enabling the community to benefit from the project by supporting local projects e.g., healthcare access, schools and local water need.

7.10.1.2.1 Significance of Impact

The impact significance for communal land uptake is assessed minor considering the community willfully gave the land for project use.

7.10.1.3 Additional Mitigation Measures

The following additional measures may be recommended to minimise this impact:

- Providing skills-based training interventions, especially for self-employment to the young and unemployed. This will enhance their employability and create potential for income generation through self-employment;
- Procuring resources from the local sources so as to induce more employment in the supply chain.
- Community compensation in kind. The community identifying projects admissible in Water, Health and Education sector within a radius of 10 km. During the public meetings the community identified these projects: the first priority was equipping community borehole and piping the water to the community water kiosks. The second priority was construction of a maternity ward at Oropoi dispensary.

7.10.2 Impact related to Way leaves acquisition

The project proponent will use existing access roads to set up the power distribution lines and will seek access from beneficiaries and clients in whose property they will

undertake electricity connection to the power grid. Supply of electricity will involve passing of low voltage (LV) lines to connect the customers to power.

7.10.2.1 Embedded/In-built Controls

The LV lines will be constructed mainly along the road reserve and along the boundaries to supply power.

7.10.2.1.1 Significance of Impact

The impact significance is assessed minor considering no acquisition of land is anticipated.

7.10.2.2 Mitigation measures

- Consultations with the community during construction of the low voltage lines

7.10.3 Impact Related to Stakeholder identification and consultations

These impacts are associated with these risks:

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

   Mitigation measures

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

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

   Mitigation Measures

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

issues/concerns raised for each agenda item, and responses by the implementing agency)

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

   Mitigation measures

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

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

   Mitigation measures

   - Consult with all segments of the community and agree on the criteria to be used to elect leaders into the subproject governance structures
   - Facilitate each segment of the community to elect their representatives to the various governance structures based on the agreed criteria
   - Train members of the various governance structures on their roles and responsibilities

5. *Risks related to exclusion of some stakeholder categories (VMGs, minority clans, disadvantaged individuals, women, youth, PWDs) from the consultation processes and the established subproject implementation structures*

   Mitigation measures

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

7.10.3.1 Embedded/In-built Controls

Stakeholder engagements regarding the project to get their views and consent done prior to construction works. The consultations include public barazas, focus group discussions and key informant interviews.

7.10.3.1.1 Significance of Impact

The impact significance would be major, however, if the mitigation measures are used the residue impact is minor.

7.11 CONSTRUCTION PHASE- POSITIVE IMPACTS-

7.11.1 Impact on Employment

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

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

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

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

7.11.1.1 Impact Significance

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

7.11.1.2 Enhancement Measures

- A significant segment of labour requirement during the construction phase will be sourced locally. While, the significance of the impact on 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 Local Trade

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

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

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

7.11.2.1 Impact Significance

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

7.11.2.2 Enhancement Measures

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

7.12 CONSTRUCTION PHASE-NEGATIVE IMPACTS

7.12.1 Change in Land Use

The study area consists of communal land with patches of open scrubland. The internal distributions lines will be laid by REREC. Considering the land use at Oropoi area, the distribution line will be located on community land to close and next to public facilities such as school, health clinics etc.. The land procured for the project site was uncultivated, and undeveloped. During consultation, it was established that the land belongs to the community. The community has since offered to 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.

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 store yard.

The land use receptor sensitivity criteria will be low. This is due to the fact that there will be visual change upon installation of the mini-grid. 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.

7.12.1.1 Embedded/In-built Control

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

7.12.1.2 Significance of Impact

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.

7.12.1.3 Additional Mitigation Measures

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

7.12.2 Impact on Topography

The topography of the project site is an open area with gentle slope of about 0.7% and mild undulations. There are no water bodies that pass though directly 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 undulating topography, study area may exhibit presence of micro drainage channels. Therefore, the impact magnitude has therefore been assessed as minor.

7.12.2.1 Embedded/In built Control

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

7.12.2.2 Significance of Impact

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.

7.12.2.3 Additional 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.

7.12.3 Impact on Soil

7.12.3.1 Project Phases and Associated Activities

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

Construction Phase

- 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.

Operation and Maintenance Phase

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

Decommissioning Phase

- Removal of PV modules;
- Removal of associated infrastructure including battery and generators.

7.12.3.2 Significance of Impacts

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.

7.12.3.3 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

7.12.4 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.

7.12.4.1 Embedded/in-built control

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

7.12.4.2 Significance of Impact

There are few Receptors (settlements) within 200 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.

7.12.4.3 Additional Mitigation Measures

- Spraying water on soil before excavation and periodic access road wetting to reduce nuisance dust levels.
- Visual inspection of dust pollution from roads and the construction site and appropriate intervention if dust levels are high.
- Speed restriction of construction vehicles to a speed of 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 construction workers.
- All construction materials will be transported in designated trucks which will be covered.

7.12.5 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.

There are some residents within the 500m from the site and will most likely be affected by increasing noise levels. The receptor sensitivity is therefore considered as medium. Impact magnitude is considered to be minor to medium considering the construction period of the project that will last for not more than 12 months.

7.12.5.1 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.

7.12.5.2 Embedded/in-built control

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.

7.12.5.3 Significance of Impact

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.

7.12.5.4 Additional 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 8am 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.

7.12.6 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 mini-grid and associated structures and further during operations. This Project is the first major solar power Project in the vicinity of project area and the new development will have impact on the surrounding area.

The project area is primarily a rural area and with 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 large number of equipment or infrastructure when being erected such as dumpers and transportation vehicles on site. Additionally, the presence of bare soil along the access roads would increase the potential visual impact. The significance of the visual impacts will reduce at increasing distance from the development.

The construction of the mini-grid sites may involve the site clearance of vegetation (minimal vegetation at the site) 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 then lower the visual appeal of the area.

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

7.12.6.1 Embedded/In-built Control

Proper siting decisions can help to avoid aesthetic impacts to the landscape. The project site is located in open area with minimal settlement besides the Oropoi shopping centre.

7.12.6.2 Significance of Impact

Construction activities will mainly be inside the site footprint and will have moderate impact on the present visual environment. The sensitive receptors include the residents near the site. The impact magnitude will however be low hence the visual change during construction phase will be assessed as minor.

7.12.6.3 Additional Mitigation Measures

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

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

area to be restored to original form.

7.12.7 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 managed other solar power projects as well and has effective management systems for waste and hazardous substances being generated or utilized during the project life cycle as part of their Environmental and Social Management Framework.

7.12.7.1.1 Embedded/in-built control

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

7.12.7.1.2 Significance of Impact

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.

7.12.7.1.3 Additional Mitigation Measures

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

7.12.8 Impacts on Water Resources and water quality

During construction, excavation activities will involve soil exposure which results in soil erosion due to wind and surface runoff due to rains. Seepage from spilled fuels and oils and leaking machinery can also negatively impact groundwater water which could lead to potential contamination.

7.12.8.1.1 Significance of Impact

Generally, due to the localized area of impact, the overall significance of the related impacts on water quality is considered to be minor, provided the necessary mitigation/ management measures are implemented.

7.12.8.1.2 Mitigation Measures

Measures shall be put in place to minimize erosion and sediment mobility, especially during construction. These measures include:

- Clear the necessary areas only.
- Appropriate remedial measures shall be implemented by the contractor in the event of erosion.
- Infrastructure shall be designed to ensure that contaminated run-off does not reach watercourses.
- In the event of an oil spill the procedures contained in the emergency response plan of the contractor will come into effect.
- No vehicle maintenance and service shall be done at project site but in approved garages or service stations to avoid any possible oil and fuel spills that could contaminate soils and possibly ground water quality.
- Ensure that potential sources of petro-chemical pollution are handled in such a way to reduce chances of spills and leaks.
- Construction activities to avoid any unchanneled flow of water at the site
- Storage areas that contain hazardous substances should be bundled with an approved impermeable liner and provision for a pit to be made in case of oil spill.
- The excavation and use of rubbish pits during construction should be strictly prohibited.
- 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,
- Areas contaminated by spilled concrete and/or fuels and oils leaking from vehicles and machinery should be cleaned immediately.
- The contractor to source for alternative source of water for construction purposes to avoid potential conflict with the community.

7.12.9 Impacts from Hazardous Materials

Some hazardous materials will be used during construction phase of the project. They include insulating oil, paints, solvents and oils. Spilled chemicals can contaminate soil as well as pollute water resources. Additionally, hazardous and flammable substances if improperly stored and handled on site become potential health hazard for construction workers and the public.

7.12.9.1.1 Significance of Impact

The amount of hazardous waste generated will be minimal. The significance of the impact will be minor due to a low magnitude and medium sensitivity.

7.12.9.1.2 Mitigation Measures

- Maintenance of construction vehicles will not be done on site
- All hazardous products and waste should be labelled and handled properly to avoid contact with the ground
- Material handling to be done by trained and qualified staff
- The contractor site should have designated area (concrete bunded) for storing hazards materials

7.12.10 Fire Hazards

During construction of the project, fire hazards are likely to occur especially when precaution measures are not taken to account. Smoking is one of causes of fires and this can happen if cigarette butts are left carelessly. Additionally, keeping of fuels onsite during construction can be a potential cause of fire.

7.12.10.1.1 Significance of Impact

This impact is evaluated to be of moderate significance. All the construction activities will be confined at the project site hence high sensitivity and low magnitude.

7.12.10.1.2 Mitigation Measures

The following measures should be put in place to prevent fire hazards:

- Create awareness to the construction workers on potential fire hazards
- Provision of firefighting equipment (extinguishers) on site during construction.
- No smoking shall be done on construction site
- 'No smoking' signs shall be posted at the construction site
- A fire evacuation plan must be posted in various points of the construction site including procedures to take when a fire is reported.

7.12.11 Energy Consumption

The construction works will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability.

7.12.11.1.1 Significance of Impact

This impact will be negligible owing to the size of the project that will require very few trucks during the construction phase.

7.12.11.1.2 Mitigation Measures

- Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to

these measures, the contractor shall monitor energy use during construction and set targets for reduction of energy use.
- Regular maintenance of vehicles to ensure efficient consumption of fuels.

7.12.12 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. Therefore, the receptor sensitivity has been assessed as medium.

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

7.12.12.1 Embedded/in-built control

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

7.12.12.2 Significance of Impact

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.

7.12.12.3 Additional Mitigation Measures

- Contractor should ensure that no unauthorized dumping of used oil and other hazardous waste is undertaken at the site;
- Designated areas should be provided for Solid Waste and daily collection and period disposal should be ensured;
- Construction 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.

7.12.13 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
- Risks of road accidents during the transportation of material and equipment to the project sites owing to the poor road network leading to the Village.

7.12.13.1 Embedded/in-built control

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

7.12.13.2 Significance of Impacts

The impact on occupational health and safety during the construction 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.

7.12.13.3 Additional mitigation measures

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

7.12.14 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.

7.12.14.1 Embedded/in-built control

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

- The excavated areas will be properly fenced for safety and sign boards in local languages will be put up;
- No hazardous waste or any waste be stored within the site for long periods of time and be in contact with the soil 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).

7.12.14.2 Significance of Impact

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

7.12.14.3 Additional Mitigation Measures

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

- Developing an onsite ESMS and EHS Policy by the 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.

7.12.15 Increase in Illicit behaviour and crime

The nature of the project will require technical skills that may not be all available in the project areas. This will require movement of construction workers into the project community. With an increase in population of the project area, the social set up may be affected resulting to different negative social impacts such as illicit behaviour and crime (including prostitution, theft and substance abuse).

7.12.15.1 Significance of Impact

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

7.12.15.2 Additional Mitigation measures

- In contract documents for the Contractor, MOE/REREC should make explicit reference to the need to abide by Kenyan law, international best practice and the ratified ILO conventions and MOE's policies in relation to health and safety, labour and welfare standards;
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities;
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty;
- In selection of a Contractor, MOE/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 MOE/REREC should be undertaken to ensure the relevant labour laws and occupational health and safety plans are adhered to at all times;
- 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;

7.12.16 Increase in competition 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 neighboring communities might go out looking for opportunities in project area thus creating competition.

7.12.16.1 Embedded/In-build Control

The contractor to ensure reduction of labor influx by tapping into the local workforce to the extent possible and recruitment of local workforce to the extent possible especially unskilled and semi-skilled jobs

7.12.16.2 Significance of Impact

The significance of this impact is considered to be minor because the receptor sensitivity will be medium, and the impact magnitude is low.

7.12.16.3 Additional Mitigation Measures

- 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.

7.12.17 Impacts related to Labour Influx

The nature of the project will require technical skills that may not be all available in the project areas. This will require movement of construction workers into the project community. With an increase in population of the project area, the social set up may be affected resulting to different negative social impacts such as competition for resources, illicit behaviour and crime (including prostitution, theft and substance abuse).

7.12.17.1 Significance of Impact

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

7.12.17.2 Additional Mitigation measures

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

7.12.18 Child labour

Implementation of the 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.

7.12.18.1 Significance of Impact

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

7.12.18.2 Mitigation measures

- The contractor should develop a code of conduct to ensure children are protected from any negative impact from the construction works.
- The contractor should strictly hire people who are above 18yrs and ensure they provide their Identity Cards.
- The contractor shall ensure every worker under their jurisdiction signs a document committing themselves to the protection of the area children.

7.12.19 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 project construction of the project including skilled, semi-skilled, and unskilled personnel. During the consultation and field survey, no cultural artefact was established at the proposed project site.

7.12.19.1 Significance of Impact

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.

7.12.19.2 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.

7.12.20 Gender Based Violence, SEA & SH

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 phases of the project. This may be experienced while the women are searching for jobs and those giving the jobs may ask for sexual favours.

7.12.20.1 Significance of Impact

GBV cannot be ruled out during project implementation. Thus, the significance of this impact is considered to be Minor considering low sensitivity of the receptor and low magnitude of the impact.

7.12.20.2 Mitigation measures

- Prepare an Awareness Raising Strategy, which describes how workers and local communities will be sensitized to GBV risks, and the worker's responsibilities;
- Identify GBV Services Providers to which GBV survivors will be referred, and the services which will be available;
- Elaborate GBV Allegation Procedures i.e. How the project will provide information to employees and the community on how to report cases of GBV breaches to the GRM.
- An Accountability and Response Framework, to be finalized with input from the contractor, should include at minimum:

- GBV Allegation Procedures to report GBV issues to service providers, and internally for case accountability procedures which should clearly lay out confidentiality requirements for dealing with cases; and,
- A Response Framework which has:
    - Mechanisms to hold accountable alleged perpetrators associated to the project;
    - The GRM process for capturing disclosure of GBV;
    - A referral pathway to refer survivors to appropriate support services.

7.12.21 Exclusion of VMGs, Vulnerable Individuals and Households

A significant risk associated with this project is the potential for the exclusion of Vulnerable and Marginalized Groups (VMGs), vulnerable individuals and households including the elderly, PLWDs, widows, widowers, orphan-led households, minority clans/sub-clans from participating and or benefiting from the mini-grids project. VMGs participation and inclusion could be disadvantaged based on social identity, which may be across dimensions of gender, age, location, occupation, race, ethnicity, disability, sexual orientation and religion. There is potential risk of lack of intentional actions by the mini-grids contractor(s) and implementing agencies for the inclusion of VMGs in the project activities and benefits. This potentially leads to the exclusion of VMGS from the benefits and opportunities derived from the proposed mini-grid facilities.

The activities of component 1 envisages upon completion of the MG, 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 beneficiaries of the new electricity connections to the mini-grids network will be dominated by the local elites. This may lead to the exclusion of those without the financial resources to connect to the mini-grid electricity distribution network. This could result in a situation where a majority persons or households with adequate financial resources in the project area will be able to take advantage of the provision to connect to the electricity grid. This will negate a key objective of the project of overcoming energy poverty.

During the ESIA study the community identified the people and households considered vulnerable in the community as:

- ✓ Women headed households
- ✓ Orphans
- ✓ Persons Living with Disabilities - Albinos
- ✓ The elderly (80 years and above)

7.12.21.1 Significance of Impact

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

7.12.21.2 Mitigation measures

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

7.12.22 Risk of Communicable Diseases

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

7.12.22.1 Significance of Impact

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

7.12.22.2 Mitigation measures

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

- Sensitize all community segments and project workers on Covid 19 and precautionary measures that need to be observed;
- Restrict site access to only Authorised persons; and
- Continuously adhere to the MoH, WHO and World Bank guidelines on Covid-19 management.

7.12.23 Impacts of construction material sourcing (e.g., quarrying)

The construction of the project will utilize materials such as; stone, ballast, sand and hardcore. It is anticipated that they will be obtained from quarry and mining operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly supports, encourages and promotes environmental degradation at the illegal quarry sites and causes medium to long term negative impacts at source, including landslides.

7.12.23.1 Significance of Impact

The significance of this impact will be moderate due to high sensitivity and low magnitude.

7.12.23.2 Mitigation Measures

- The contractor should source all building materials such as stone, sand, ballast and hard core from NEMA approved sites;
- Ensure accurate budgeting and estimation of actual construction materials to avoid wastage;
- Reuse of construction materials where possible.

7.12.24 Increased Water Demand

During the construction of the project there will be increased demand for water by the construction workers and the construction works. Water will be mostly used in the construction works and for wetting surfaces or cleaning completed structures. It will also be used by the construction workers for domestic purposes.

7.12.24.1 Significance of Impact

Although the sensitivity of the receptor (surface water) in the project area is high owing to unavailability of feasible alternative source of water for the local community, the overall significance of impacts is assessed to be negligible due to negligible magnitude of the impact.

7.12.24.2 Mitigation Measures

- Prudent use of available water;
- Consultations with the project local committee on use of water in the community to avoid conflicts with the community;

Contractor to make own arrangements to provide water for construction works different from the community boreholes to avoid any conflicts with community.

7.12.25 Energy Consumption

The construction works will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability.

7.12.25.1 Significance of Impact

This impact will be negligible owing to the size of the project that will require very few trucks during the construction phase.

Mitigation Measures

Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the contractor shall monitor energy use during construction and set targets for reduction of energy use.

- Regular maintenance of vehicles to ensure efficient consumption of fuels.

7.13 OPERATION PHASE-POSITIVE IMPACTS

7.13.1 Impact on Economy and Employment

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

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

7.13.1.1 Significance of Impact

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

7.13.1.2 Enhancement Measures

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

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

7.13.2 Quality, Reliable Power Supply

There is no electricity at Oropoi. 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 in the area will greatly benefit from the stable power supply.

7.13.2.1 Significance of Impact

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

7.13.2.2 Enhancement Measures

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

7.13.3 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.

7.13.3.1 Significance of Impact

The impact significance is high as it will provide cleaner energy over a long period of time for many households

7.13.3.2 Enhancement Measures

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

7.13.4 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.

7.13.4.1 Significance of Impact

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

7.13.4.2 Enhancement Measures

- REREC 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

7.13.5 Impact on Education

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

7.13.5.1 Significance of Impact

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

7.13.5.2 Enhancement Measures

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

7.13.6 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 near-sightedness 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.

7.13.6.1 Enhancement Measures

- Educate the consumers on the benefits of lighting with electricity as opposed to the other sources of lighting

7.13.7 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.

7.13.7.1 Enhancement Measures

- Educate the consumers on the uses of electricity to improve their lifestyles

7.13.8 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.

7.13.8.1 Enhancement Measures

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

7.13.9 Communication improvement

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.

7.13.9.1 Enhancement Measures

Ensure that the power supply is reliable.

7.14 OPERATION PHASE -NEGATIVE IMPACTS

7.14.1 Impact on Soil

7.14.1.1 Soil compaction and Erosion

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

7.14.1.1.1 Embedded/in-built control

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

7.14.1.1.2 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.

7.14.1.1.3 Additional Mitigation Measures

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

7.14.2 Waste Generation and management

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

The quantity of hazardous and non-hazardous waste generated will be much lesser quantity than during the construction phase. Thus, the receptor sensitivity Impact magnitude has been assessed too small.

7.14.2.1 Embedded/in-built control

The waste generated will be disposed of through approved NEMA waste handlers.
The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and disposed through NEMA approved hazardous waste handler.
During operation phase, the quantity of municipal waste and hazardous waste generated is less and probability of the hazardous waste generation is only during plant maintenance and therefore occasional. The waste generated would be routed through proper collection and containment.

7.14.2.1.1 Additional Mitigation measures

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

7.14.2.2 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.

7.14.2.3 Additional Mitigation Measures

- Municipal domestic waste generated at site to be segregated onsite;
- Ensure hazardous waste containers are properly labelled and stored onsite provided with impervious surface, shed and secondary containment system;
- Ensure routinely disposal of hazardous waste through NEMA approved waste Handlers and records are properly documented; and

- Maintain all the waste tracking documents (Transport, treatment and disposal)
- The overall impact significance on land due to waste disposal during O&M phase has been assessed as minor.
- Disposal of hazardous wastes shall be done strictly as per the conditions of authorisation granted by NEMA.
- Ensure hazardous waste is properly labelled, stored onsite at a location provided with impervious surface, shed and secondary containment system.

7.14.3 Impact on Water quality and demand

Water is required during operation phase to meet domestic requirements of O&M staff and for cleaning solar panels. For that purpose, the water requirement will most likely be sourced from existing local water vendors in Oropoi area. During operation phase, there will be no wastewater generation from the power generation process.

The demand for water during operation phase 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.

Discussions with the residents in oropoi confirmed that water is a major concern in the area. As noted earlier, the local community rely on underground water sources; boreholes in the community.

Since the project is likely to generate very little or negligible amount of wastewater during the O&M phase, the impact on water resources will be negligible as there will be no perceptible or readily measurable change from baseline conditions.

7.14.3.1 Embedded/in-built control

- Planning of toilets and waste collection areas should be away from natural drainage channels;
- The contractor to source for a sustainable water source for use;

7.14.3.2 Significance of Impact

Although the sensitivity of the receptors in the project area is high owing to unavailability of feasible alternative source of water for the local community, the overall significance of impacts is assessed to be negligible due to negligible magnitude of the impact.

7.14.3.3 Additional Mitigation Measures

- Ensure proper cover and stacking of loose construction material to prevent surface runoff and contamination of receiving water point;
- The workforce will be given training towards proactive use of designated areas/bins for waste disposal and encouraged to use toilets. Open defecation and random disposal of sewage shall be strictly restricted;
- Construction workers to be sensitised about water conservation and encouraged use of water optimally;
- 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.
- Install water-conserving automatic taps;
- Encourage water harvesting from rooftops and storage for cleaning purposes (washing the panels off dust).

7.14.4 Landscape and Visual Impacts

The solar panels will be spread over a horizontal form with a maximum height of 2m above the ground level. The current use of land surrounding site is grazing, mixed commercial and residential. The permanent change of current landscape to area spread with solar panels will have potential visual impact for nearest habitations and passers.

7.14.4.1 Significance of Impacts

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

7.14.4.2 Suggested mitigation measures

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

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

7.14.5 Increased oil Consumption

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

7.14.5.1 Significance of Impact

The impact will be of minor significance.

7.14.5.2 Mitigation Measures

To ensure efficient energy consumption during the operation phase of the project, the contractor to install an energy-efficient lighting system at the project site facilities. This

will contribute immensely to energy saving during the operational phase of the project. In addition, the plant operators will be sensitized to ensure energy efficiently in their daily operations.

7.14.6 Increased Storm Water Flow

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

7.14.6.1 Significance of Impact

The impact will be of minor significance.

7.14.6.2 Mitigation Measures

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

7.14.7 Fire Outbreaks

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

7.14.7.1 Significance of Impact

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

7.14.7.2 Mitigation Measures

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

7.14.8 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.

7.14.8.1 Significance of Impact

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

7.14.8.2 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.

7.14.9 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.

7.14.9.1 Significance of Impact

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

7.14.9.2 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

7.14.10 Noise and Vibration

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

7.14.10.1 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.

7.14.11 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.

7.14.12 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.

7.14.12.1 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

7.14.13 Vehicle exhaust emissions

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

7.14.13.1 Significance of Impact

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

7.14.13.2 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

7.14.14 Collision and Electrical hazards from Distribution Infrastructure

A number of birds' species were identified during the impact assessment. These include Speckled Pigeon, Purple-crested Turaco, Common Swift, Black-headed Heron, Speckled Mousebird, European Roller, Cardinal Woodpecker, Black-crowned Tchagra, Red-backed Shrike, Hunter's Sunbird among others.
The distribution lines and poles can potentially constitute an electrocution and collision hazard to birds. Some birds also utilize the distribution towers for nesting.

7.14.14.1 Embedded/ in-built Control

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

7.14.14.2 Significance of Impacts

The receptor sensitivity is low and the impact magnitude will be medium hence the minor impact significance.

7.14.14.3 Additional Mitigation Measures

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

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

7.14.15 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; heat stress and working during high temperatures
- 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

7.14.15.1 Embedded/in-built control

- 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;

7.14.15.2 Significance of Impacts

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

7.14.15.3 Additional mitigation measures

- All workers (regular and contracted) should be provided with training on Health and Safety management system of the contractor during construction stage and EHS policies and procedures during the operation stage;
- Obtain and check safety method statements from contractors;
- Monitor health and safety performance and have an operating audit system; and
- Permitting system should be implemented to ensure that the 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.

7.14.16 Impact on Community Safety and Health

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

components may result in impacts on the health and safety of the community.

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

7.14.16.1 Embedded/in-built control

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

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

7.14.16.2 Significance of Impact

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

7.14.16.3 Additional Mitigation Measures

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

- Implementing the existing grievance redress mechanism
- The local community recommended that a technical operator should be stationed within or near the site in order to handle emergencies in the event that they occur

7.14.17 Gender Based Violence, SEA & SH

Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) may be committed against the communities by the staff during the operation and maintenance of the mini-grids. Incidences of Sexual Harassment (SH) may occur among the staff during operation and maintenance phase of the project. This may be experienced while the women are searching for jobs and those giving the jobs may ask for sexual favours.

7.14.17.1 Significance of Impact

GBV cannot be ruled out during project implementation. Thus, the significance of this impact is considered to be Minor considering low sensitivity of the receptor and low magnitude of the impact.

7.14.17.2 Mitigation measures

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

- Mechanisms to hold accountable alleged perpetrators associated to the project;
- The GRM process for capturing disclosure of GBV;
- A referral pathway to refer survivors to appropriate support services.

7.14.18 Exclusion of VMGs, Vulnerable Individuals and Households

A significant risk associated with this project is the potential for the exclusion of Vulnerable and Marginalized Groups (VMGs), vulnerable individuals and households including the elderly, PLWDs, widows, widowers, orphan-led households, minority clans/sub-clans from participating and or benefiting from the mini-grids project. VMGs participation and inclusion could be disadvantaged based on social identity, which may be across dimensions of gender, age, location, occupation, race, ethnicity, disability, sexual orientation and religion. There is potential risk of lack of intentional actions by the mini-grids contractor(s) and implementing agencies for the inclusion of VMGs in the project activities and benefits. This potentially leads to the exclusion of VMGS from the benefits and opportunities derived from the proposed mini-grid facilities.

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

7.14.18.1 Significance of Impact

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

7.14.18.2 Mitigation measures

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

- Enlist the services of reputable advisers with good local knowledge
- Implement the existing grievance redress mechanism

7.14.19 Risk of Communicable Diseases

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

7.14.19.1 Significance of Impact

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

7.14.19.2 Mitigation measures

- The Contractor should develop and implement pre-employment screening measures for workers, which should include communicable diseases. Individuals found to be suffering from these diseases will need to be sensitized on prevention of transmission to others and management of the disease prior to mobilisation to site.
- The Contractor should develop and implement a Communicable Diseases Policy and an information document for all workers directly related to the Project. The document should address factual health issues as well as behaviour change issues around the transmission and infection of diseases.
- The Contractor will make condoms available to employees
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities.
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty.
- Sensitize all community segments and project workers on Covid 19 and precautionary measures that need to be observed;
- Restrict site access to only Authorised persons; and
- Continuously adhere to the MoH, WHO and World Bank guidelines on Covid-19 management.

7.14.20 Shocks and electrocutions to the beneficiaries

Majority of the beneficiaries 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.

7.14.20.1 Significance of Impact

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

7.14.20.2 Mitigation Measures

The following precaution/preventive measures need to be observed in order to prevent risk of electric shocks, fires and electrocutions.

- Inspect the wiring of the houses before connecting power
- 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 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

7.14.21 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.

7.14.21.1 Significance of Impact

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

7.14.21.2 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

7.15 DECOMMISSIONING PHASE

7.15.1 Preparation for decommissioning

The solar power plant may be decommissioned due to various reasons and there are impacts that will need to be mitigated. Once the REREC makes the decision for decommissioning the following will be required;

- ❖ Prepare a Decommissioning Plan and submit to NEMA and the County Governments of Kwale to obtain approval for implementation.
- ❖ Implement the decommissioning plan including backfilling, revegetation, disposal of waste material, recycling of recyclable material among others

Some of the positive impacts associated with the proposed project during its decommissioning phase include;

7.15.2 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.

7.15.2.1 Significance of Impact

Impact magnitude is considered to be small considering the decommissioning period to last for a short duration. The overall impact significance is envisaged to be Minor due to low sensitivity and medium magnitude.

7.15.2.2 Enhancement Measures

- Notify the GRC, Local leadership, the County Government reps of the specific jobs and the skills required for the work
- 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.

7.15.3 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.

7.16 DECOMMISSIONING PHASE- NEGATIVE IMPACTS

7.16.1 Impact on Soil

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

7.16.1.1 Significance of Impacts

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.

7.16.1.2 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 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

7.16.2 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; and
- Point source emission from diesel generator.

7.16.2.1 Embedded/in-built control

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

7.16.2.2 Significance of Impact

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

7.16.2.3 Additional Mitigation Measures

- Periodic access road wetting to reduce nuisance dust levels.

- 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.

7.16.3 Impact on Ambient Noise

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

7.16.3.1 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:

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

7.16.3.2 Embedded/in-built control

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.

7.16.3.3 Significance of Impact

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

7.16.3.4 Additional 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;
- Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.
- The 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; and

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

7.16.4 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 food 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.

7.16.4.1.1 Embedded/in-built control

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

7.16.4.1.2 Significance of Impact

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.

7.16.4.1.3 Additional 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.

7.16.5 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 (mainly security guards) who will be affected.

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

7.16.5.1 Significance of Impact

The overall impact significance is envisaged to be Minor due to low sensitivity and medium magnitude.

7.16.5.2 Additional Mitigation Measures

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

- 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.

7.16.6 Impact on Occupational Health and Safety

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

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

7.16.6.1 Embedded/in-built control

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

7.16.6.2 Significance of Impacts

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

7.16.6.3 Additional mitigation measures

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

7.16.7 Gender Based Violence, SEA & SH

Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) may be committed against the communities by the workers. Incidences of Sexual Harassment (SH) may occur among the staff during decommissioning phases of the project. The only type of gender-based violence in Oropoi as identified during FGD women is the domestic violence.

7.16.7.1 Significance of Impact

The significance of this impact is considered to be Minor considering low sensitivity of the receptor and low magnitude of the impact.

7.16.7.2 Mitigation measures

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

7.16.8 Exclusion of VMGs, Vulnerable Individuals and Households

A significant risk associated with this project is the potential for the exclusion of Vulnerable and Marginalized Groups (VMGs), vulnerable individuals and households including the elderly, PLWDs, widows, widowers, orphan-led households, minority clans/sub-clans from participating and or benefiting from the mini-grids project. VMGs participation and inclusion could be disadvantaged based on social identity, which may be across dimensions of gender, age, location, occupation, race, ethnicity, disability, sexual orientation and religion. There is potential risk of lack of intentional actions by the mini-grids contractor(s) and implementing agencies for the inclusion of VMGs in the project activities and benefits. This potentially leads to the exclusion of VMGS from the benefits and opportunities during the decommissioning phase.

7.16.8.1 Significance of Impact

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

7.16.8.2 Mitigation measures

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

7.16.9 Risk of Communicable Diseases

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

7.16.9.1 Significance of Impact

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

7.16.9.2 Mitigation measures

- The Contractor should develop and implement pre-employment screening measures for workers, which should include communicable diseases. Individuals found to be suffering from these diseases will need to be sensitized on prevention of transmission to others and management of the disease prior to mobilisation to site.
- The Contractor should develop and implement a Communicable Diseases Policy and an information document for all workers directly related to the Project. The document should address factual health issues as well as behaviour change issues around the transmission and infection of diseases.
- The Contractor will make condoms available to employees and communities neighbouring the site during decommissioning.
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities.
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty.
- Sensitize all community segments and project workers on Covid 19 and precautionary measures that need to be observed;
- Restrict site access to only Authorised persons; and
- Continuously adhere to the MoH, WHO and World Bank guidelines on Covid-19 management.

7.16.10 Child labour and forced labour

During decommissioning phase of the mini-grid the risk of forced labor and child labour is likely to occur and precaution is needed to safe guard the community from being subjected to forced labor.

7.16.10.1 Significance of Impact

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

7.16.10.2 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).

7.16.11 Impacts related to labour influx

During project decommissioning phase, technical skills that may not be all available in the project areas. This will require movement of construction workers into the project community. With an increase in population of the project area, the social set up may be affected resulting to different negative social impacts such as illicit behaviour and crime (including prostitution, theft and substance abuse).

7.16.11.1 Significance of Impact

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

7.16.11.2 Additional Mitigation measures

- In contract documents for the Contractor, MOE/REREC should make explicit reference to the need to abide by Kenyan law, international best practice and the ratified ILO conventions and MOE's policies in relation to health and safety, labour and welfare standards;
- All project personnel should be inducted on a Code of Conduct that gives guidelines on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities;
- If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the commencement of their contract, they will face disciplinary action including dismissal from duty;
- In selection of a Contractor, MOE/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 MOE/REREC should be undertaken to ensure the relevant labour laws and occupational health and safety plans are adhered to at all times;

7.17 CUMULATIVE IMPACTS

7.17.1 Cumulative Impact Assessment

It was observed during the site survey that there are no other similar solar projects within the projects site. Therefore, it is assumed that there will be no cumulative impacts from the above mentioned projects on the local soil, water, land, air and ambient noise environment.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Environmental And Social Management and Monitoring Plan

A detailed Environmental and social management and monitoring plan for pre-construction, construction, operation and decommissioning phase is well illustrated in the table below:

Table 8-1: ESMMP Phase

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	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
				vulnerable individuals, types 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, 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.	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	1,000,000

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	-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 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.					

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Labor Influx and related impacts (SEA/SH, HIV/AIDs and other STIs)	-Tap into the local workforce to the extent possible to reduce labor influx. -Recruit local workforce to the extent possible especially for unskilled and semi-skilled jobs. -Consult with and involve local community in project planning and other phases of the project. -Raise awareness among local community and workers on the need to have a good /cordial working relation -Sensitize workers regarding engagement with local community. -Make provision to provide resources needed by the workers if the need for such resources may result to competition e.g., water. -Establish and operationalize an effective Grievance Redress Mechanism accessible to community	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)
	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. -Put visible signage on site "**No Jobs for children**"	Construction Decomissioning	Contractor, Proponent	-Updated employment register indicating locals employed, their ages, national identification numbers etc. -Grievances raised, aggrieved persons and status on resolution etc.	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	-Do not allow children at the project site.					
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.	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)
	-Ensure that all workers have 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.	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),	Quarterly	30,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	-Prepare and implement a grievance redress mechanism to deal with grievances. -The grievance redress committee to include representatives from the community. -Sensitize stakeholders on SEP and GRM.			grievances raised and status on 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	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)
	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.					
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	Proponent	-Interventions to enable those vulnerable access project benefits. -Number of complaints raised by VMGs/vulnerable individuals regarding access to project services.	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
				-GRM that is culturally appropriate and accessible. Grievances raised and status on resolution etc		
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 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.	Construction Operations Decomissioning	Contractor Proponent	-Local Grievances Committee in place, composition of committee, awareness of community and workers on project and worker GRMs, updated GRM logs, types of grievances -Availability of grievance redress process -Number of grievances reported -Number of grievances resolved in a timely manner -Number of grievances escalated to	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	-GRM provides for confidential reporting of particularly sensitive social aspects such as GBV, as well as anonymity.			national courts and the World Bank Grievances Redress Service and Inspection Panel.		
Environmental Impacts						
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

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Soil erosion	1. Avoid groundbreaking during the seasons of high rainfall to avoid erosion. 2. Monitoring of areas of exposed soil during rainy seasons to ensure that any incidents of erosion are quickly controlled. 3. Construction related impacts like erosion and cut slope destabilizing should be addressed through landscaping and grassing, carting away and proper 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.	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)
Contamination of soil from fossil fuels	1. Ensure waste water generated is discharged or drained into approved drainage facilities 2. Construction vehicles must be maintained in good state and proper servicing to ensure no oils are likely to leak 3. Care must be exercised not to spill any fossil fuels 4. Any contaminated soil shall be scooped and disposed-off appropriately. 5. No servicing vehicles on site	Construction	Contractor	Records of any leakages from construction equipment/ vehicles.	Quarterly	50,000.00
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/watere	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)
	d during dry or windy conditions to reduce dust emissions. 4. Burning of woody debris & construction waste to be prohibited **5.** Use of personnel protective equipment (PPE) -masks should be provided to all personnel in areas prone to dust emissions 6. Restrict speed on loose surface roads during dry or dusty conditions 7. Keep stockpiles and exposed soils compacted and re-vegetate as soon as possible. 8. Construction trucks moving materials to site, delivering sand and cement to the site should be covered to prevent material dust emissions into the surrounding areas					

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	9. Plant short trees to break speed of wind					
Vehicle exhaust and emissions from Generator	1. Drivers of construction vehicles must be sensitized so that they do not leave vehicles idling so that exhaust emissions are lowered. 2. Maintain all machinery and equipment in good working order to ensure minimum emissions of carbon monoxide, NO_X, SO_X and suspended particulate matter 3. Maintain equipment in good running condition – no vehicles to be used that generate excessive black smoke 4. Use of diesel which is Sulphur- free to run the power producing	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)
	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 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	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)
	requirement of OSHA ACT 2007 and Building rules on storage of construction materials 6. Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of waste generated over time 7. Recovery of materials remains and return to stores 8. Re-use of materials where possible 9. Proper budgeting to avoid waste generation 10. Proper disposal of waste in line with solid waste regulation 6. Construction wastes to be managed in accordance with					

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	construction standards in Kenya					
Impacts on Water Resources and Water Quality	1. Clear the necessary areas only. 2. Appropriate remedial measures shall be implemented by the contractor in the event of erosion. 3. Infrastructure shall be designed to ensure that contaminated run-off does not reach water source i.e., earth dam. 4. Contractor to develop an oil-spill containment plan as part of the emergency response plan. In the event of an oil spill the procedures contained in the emergency response plan of the contractor will come into effect. 5. No vehicle maintenance and service shall be done at project site	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)
	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	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

	machinery should be cleaned immediately					

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	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)
	good state to avoid leaks. 5. In case of spillage the contractor should isolate the source of oil spill and contain the spillage using sandbags, sawdust, absorbent materials 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	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)
	4. 'No smoking' signs shall be posted at the construction site 5. A fire risk assessment and evacuation plan should be prepared and must be posted in various points of the construction site including procedures to take when a fire is reported. 6. Designate an assembly point					
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

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Increased water demand	1. Prudent use of available water 2. Consultations with the project local committee on use of water in the community to avoid conflicts with the community 3. Source and utilize a sustainable and reliable water supply for both construction and operation phase.	Construction	Contractor	Water usage records	Quarterly	Part of contractor's cost
Energy Consumption	1. Ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. 2. Proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not	Construction	Contractor	Energy consumption records	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	consumed in excessive amounts. 3. Complementary to these measures, they monitor energy use during construction and set targets for reduction of energy use.					
Occupational Health and safety Impacts	1. Use skilled personnel for activities which demand skills/technical tasks 2. Awareness creation/Tool box talks on safety to workers while at construction site 3. Workers coming to the site should be knowledgeable on safety precautions to take 4. Appropriate PPE (helmet, safety harness, boots, masks, climbing irons) 5. Proper general house keeping 6. Close supervision of workers 7. Risk assessment by contractor of the	Construction	Contractor	Records of any near misses, incident, and accidents. Records of corrective actions implemented if there was an accident.	Quarterly	1,000,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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 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

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
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 5. Allowing migrant workers time to be with their families 6. The contractor is impressed upon not to	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)
	set a construction camp on site. 7. The contractor will provide public education/information about HIV/AIDS transmission and prevention measures. 8. Ensure equal treatment of workers 9. Provide all appropriate COVID-19 preventive measures including campaign to maintain individual measures at the workplace.					
Sanitary waste	**1.** Construct/ install pit latrines for both genders clearly labelled	Construction	Contractor	Presence of separate and clean washrooms for both the gents and ladies	Quarterly	300,000.00
Solid Waste Generation	1. Provide waste handling facilities such as labeled waste bins 2. Emphasis on prudent waste generation and	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)
	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	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)
	fuels for the operators of the Mini-grid. *6.* In the event of accidental leaks, contaminated top soil should be scooped and disposed of appropriately.					
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

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Increased storm water flow	1. Construct the drainage system in a way to follow natural drain of the water 2. Concrete only the required area and leave the rest of the land with vegetation like grass 3. Construct rain water harvesting system on the control buildings/office and harness into storage tanks for use	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 extinguishers) of recommended standards and in key strategic points 2. Detection/alarm systems that can detect fire should be and installed	Operation	O&M Contractor KPLC	-Provision of serviced fire equipment, evacuation plan and safety signages -Records of fire safety training	Quarterly	50,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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					
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
Water demand	1. Ensure prudent use of water. 2. Install water-conserving automatic taps.	Operation	O&M Contractor KPLC	Water usage records	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	3. Any water leaks through damaged pipes and faulty taps should be fixed promptly.					
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

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Noise and Vibration	1. Generator room should be sound proof to ensure no noise of a nuisance level will be produced. 2. Monitor noise levels	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-grid	Quarterly	Part of contractor's cost
Shocks and electrocutions	1. Inspect the wiring of the houses before connecting power 2. Safety awareness campaigns to the community before connection of power on safety precautions such as: ○ Require community to engage a certified technician to do wiring in the premises ○ Use of quality materials while wiring ○ Refraining from individual illegal extensions of power lines to other houses ○ Observing safety	Operation	O&M Contractor KPLC	-Records of awareness sessions conducted -Incidences report	Quarterly	No additional cost

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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					

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
Community Safety- Access to site by general public	1. Fencing off the facility to keep of community members, children and livestock from entering into the facility 2. Controlled access to the site only with prior approval 3. Maintain records of any person who comes to site	Operation	O&M Contractor KPLC	Presence of a controlled access and records of every person accessing the site	Daily	Part of contractor's cost
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	Operation	O&M Contractor KPLC	Grievance records	Quarterly	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	5. Ensure all grievances are logged and closed 6. Monitoring the pattern of grievances to come up will long term measures					
Gender Based Violence –SEA and SH	To manage GBV risks, the contractor will prepare a SEA/SH Prevention and Response Action Plan that will include a GRM that ensures confidentiality. The plan will include the necessary measures for prevention and response and must ensure survivor-based approach	Operation	O&M Contractor KPLC	-SEA/SH Prevention and Response Action Plan -Grievance records	Quarterly	20,000.00
Public Health Impacts – HIV/AIDs	1. Sensitize workers and the community on prevention and mitigation of HIV/AIDS and other sexually	Operation	O&M Contractor KPLC	Number of awareness creation sessions conducted.		20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	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			-Availability of and distribution of condoms		
Public health Impacts - Covid 19 disease	1. Social distance must be observed 2. Provision of hand wash facilities before access 3. Temperature check and monitoring of the temperature of workers and any other person coming to site 4. Enforce wearing of masks 5. Make provision for testing and treating especially of workers	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)
	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.	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)
	4. Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible. 5. Demolish mainly during the day when most of the neighbors are out working.					
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	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)
	storage of demolition materials to reduce the amount of waste caused by damage or exposure to the elements 4. Adequate collection and storage of waste on site 5. Safe transportation to the disposal sites / designated area 6. Hazardous waste must be disposed by NEMA approved waste handler					
Dust Emissions	1. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard	Decommissioning	Contractor	Visual inspection	Daily	20,000.00
Public Health-HIV/AIDS	The project will sensitize workers and the surrounding communities on prevention and mitigation of HIV/AIDS and other sexually transmitted diseases, through staff training and	Decommissioning	Contractor	Records of awareness creation sessions conducted. -Availability of and distribution of condoms	Once off	20,000.00

Potential Impacts	Recommended Mitigation Measures	Project phase	Responsibility	Monitoring Indicator	Frequency	Estimated Cost (Ksh)
	awareness campaigns/ to the community.					
	Total					5,380,000.00

Table 8-2: Institutional Framework and Compliance/Implementation of the ESIA/ESMMP

No	Institution	Role/Function
1	The National Environment Management Authority (NEMA)	NEMA: • Approves the ESIA Report; • Issues EIA License for project implementation; and • Carries out independent Audit to determine compliance with ESMMP.
2	Directorate of Occupational Safety and Health Services (DOSHS)	DOSHS: • Provides OSH permits for workplaces of the project including campsites and quarries; and • Conducts inspections to ensure conformance to OSHA.
3	Water Resources Authority (WRA)	WRA: • Provides necessary water abstraction permits for boreholes and surface water sources (rivers, streams etc.); and • Monitors water use in the region and provide guidance water use.
4	National Land Commission (NLC)	NLC: • Exercises the power of compulsory land acquisition on behalf of MoE and vest the acquired land to MoE.
5	National Gender and Equality Commission	The Commission: • Ensures that there is gender equality and equity throughout the implementation of the project; and • Representatives will monitor and evaluate gender quality and equity with regards to job provision and harassment cases on site to ensure compliance with the law
6	Ministry of Trade, Gender and Youth Affairs	• Work with poor, marginalized, vulnerable and disadvantaged communities as its primary target group will ensure that this group is supported and is not left out of the project implementation.
7	County Government of Turkana	County Governments will: • Provide approval for the project & project site; • Approval of community land consent & verification; and • Provide support.
8	Supervision Consultant	Supervising Consultant: • Will engage the following dedicated full-time safeguards staff to support risk management: ✓ Supervising Engineer (RE) ✓ Social Safeguards Specialist ✓ Environmental Safeguards Specialist • Review and approval of the ESMMPs and other plans; • Day to day supervision of Contractor implementation of the ESMMPs and other plans; • Regular reporting on the ESMMP implementation; and

		• Has full time Environmental, Health and Safety and Social Specialists
9	Contractor	Contractor: • Will engage the following dedicated full-time safeguards staff; ✓ Environmental Safeguards Specialist ✓ Social Safeguards Specialist ✓ Registered Occupational Health and Safety (OHS) Expert ✓ Community Liaison officer to act as link between the community and contractor and to support the social specialist. • Will Prepare the C-ESMPs informed by the proponent's ESMMP and other plans before commencing construction; • Will Operationalize and implement the C-ESMPs; • Carries out day to day management of ES, H& S risks; and • Reports on incidents and accidents to the Resident Engineer and regulators.

8.2 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 plan
- Grievance Redress mechanism
- Labor influx management plan

8.2.1 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 Land Owner 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 REREC and the neighbors e.g., the wayleaves agreements signed between REREC 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 the 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

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.

8.2.2 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.

8.2.3 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.

8.2.4 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.

8.2.5 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.

8.2.6 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.

8.2.7 SEA/SH Prevention and Response Action Plan

The contractor will prepare a SEA/SH Prevention and Response Action Plan that will include a GRM 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 GRM for use by workers and community members (as appropriate).
- The GBV GRM should allow for anonymous incident reporting and should be GBV survivor-centric
- Sensitize community members and workers on contractor GRMs
- 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

8.2.8 Stakeholder Engagement 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

8.2.9 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

7.2.10 Grievance Redress Mechanism and Grievance 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.

Grievance mechanisms should receive and facilitate resolution of the affected institutional or communities' concerns and grievances. Community concerns should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities, at no cost and without retribution. Mechanisms should be appropriate to the scale of impacts and risks presented by a project. Grievances can be an indication of growing stakeholder concerns (real and perceived) and can escalate if not identified and resolved. The management of grievances is therefore a vital component of stakeholder management and an important aspect of risk management for a project. Projects may have a range of potential adverse impacts to people and the environment in general, identifying grievances and ensuring timely resolution is therefore very necessary. As such the project has developed a grievance management process to serve as a guide during project implementation.

The Land Acquisition Tribunal established under the Land Act 2012 (Part VIIIA 133A) 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.

8.2.9.1 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)-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.

8.2.9.2 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.

8.2.9.3 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

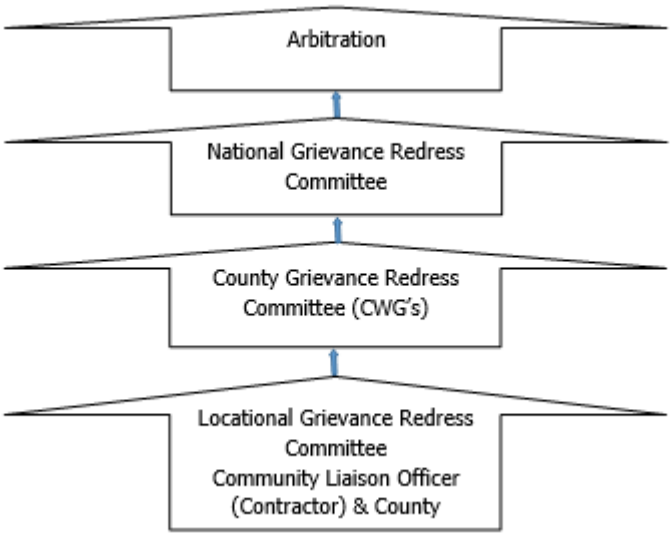


Figure 8-1: KOSAP Grievance Redress Mechanism

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 Oropoi

A Local grievance redress committee was constituted during the baraza held on 20/01/2022 consisting of 7 members. 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. 2 Youth representatives;
3. 2 Female representatives; and
4. 2 Male representatives.

7.2.11 STAKEHOLDER ENGAGEMENT AND GRIEVANCE MANAGEMENT POST ESIA

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

7.2.11.1 Objectives and Principles of Stakeholder Engagement post ESIA

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

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

- Ensure the affected persons are provided opportunities to express their views on project risks, impacts and mitigation measures, and response provided.
- Begin consultations early even before construction begins because there is a lapse of time between ESIA consultations and implementation time.

Identification of environmental and social risks and impacts should continue 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.

9 IMPACT SUMMARY AND CONCLUSION

9.1 INTRODUCTION

This chapter gives a summary of impacts conclusion and recommendations

9.2 SUMMARY OF IMPACTS IDENTIFIED AND ASSESSED

9.2.1 Pre-construction Phase Impacts

A number of impacts have been identified as a result of the pre-construction of the proposed Oropoi project. The impacts in this phase will be associated to land acquisition and stakeholder engagements.

The significance of the land acquisition is minor prior to the application of appropriate mitigation measures, while that of stakeholder engagement is of major significance. With the application of appropriate mitigation measures, the significance of all the identified negative impacts associated with this phase will be reduced to minor or negligible.

9.2.2 Construction Phase Impacts

A number of impacts have been identified as a result of the construction of the proposed project. Of these, impacts on local economy and employment 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 labour 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.

9.2.3 Operational Phase Impacts

A number of impacts have also been identified to be associated with the operational phase of the proposed l solar project. Of these, impacts on Economy and Employment 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.

9.2.4 Decommissioning Phase Impacts

A number of impacts have been identified as a result of the decommissioning of the proposed Oropoi project.

The significance of the identified negative impacts associated with the pre-construction phase is moderate to 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 decommissioning phase will be reduced to minor or negligible.

9.3 CONCLUSION AND RECOMMENDATIONS

An Environmental and Social Management and Monitoring Plan (ESMMP) has been prepared to ensure that social and environmental impacts and risks identified during the ESIA process are effectively managed during the construction and operations of the Project. The ESMMP specifies the mitigation and management measures to which the Project Proponent and the Contractor will be committed and shows how the Project will mobilize organizational capacity and resources to implement these measures. The ESMMP also shows how mitigation and management measures will be scheduled and will ensure that the Project complies with the applicable laws and regulations within Kenya, as well as the requirements of WB OPs on environmental and social sustainability.

The Project Proponent and Contractor should accommodate the mitigation measures recommended during the ESIA process to the extent that is practically possible, without compromising the economic viability of the Project or having a lasting impact on the environment.

In summary, based on the findings of this assessment, the consultant finds no reason why the proposed Project, should not be moved to the next stage of Project planning and development, contingent on the mitigations and monitoring for potential environmental and socio-economic impacts as outlined in the ESMMP.

10 REFERENCES

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

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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
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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
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21. Community Land Act, 2016
22. The Land Registration Act, 2012
23. The Land Act, 2012
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25. The Constitution of Kenya, 2010
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11 APPENDICES

List of appendices	
APPENDIX 1	Minutes Of The Meeting Held During ESIA Process
APPENDIX 2	List of Attendance
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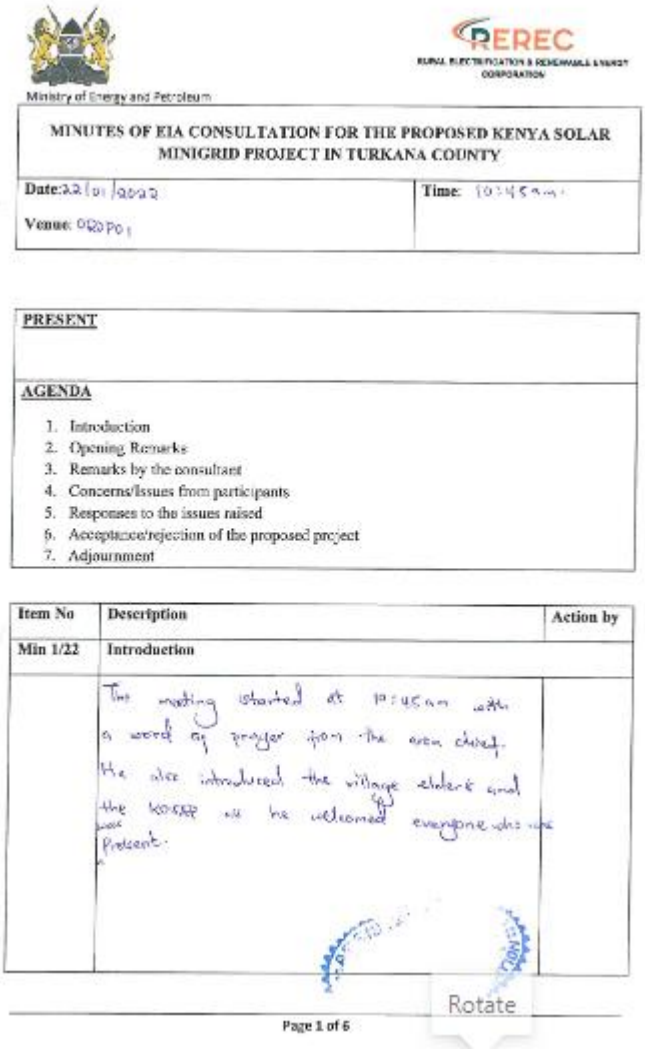
APPENDIX 6	Nema Firm Of Experts Licence And Lead Expert License

APPENDIX 1 MINUTES OF THE MEETING HELD DURING ESIA PROCESS



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

Date: 22/01/2022	**Time:** 10:45am
Venue: OLOPOI	

PRESENT

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**	
	The meeting started at 10:45am with a word of prayer from the area chief. The ward administrator introduced the village elders and the team was welcomed by everyone who was present.	

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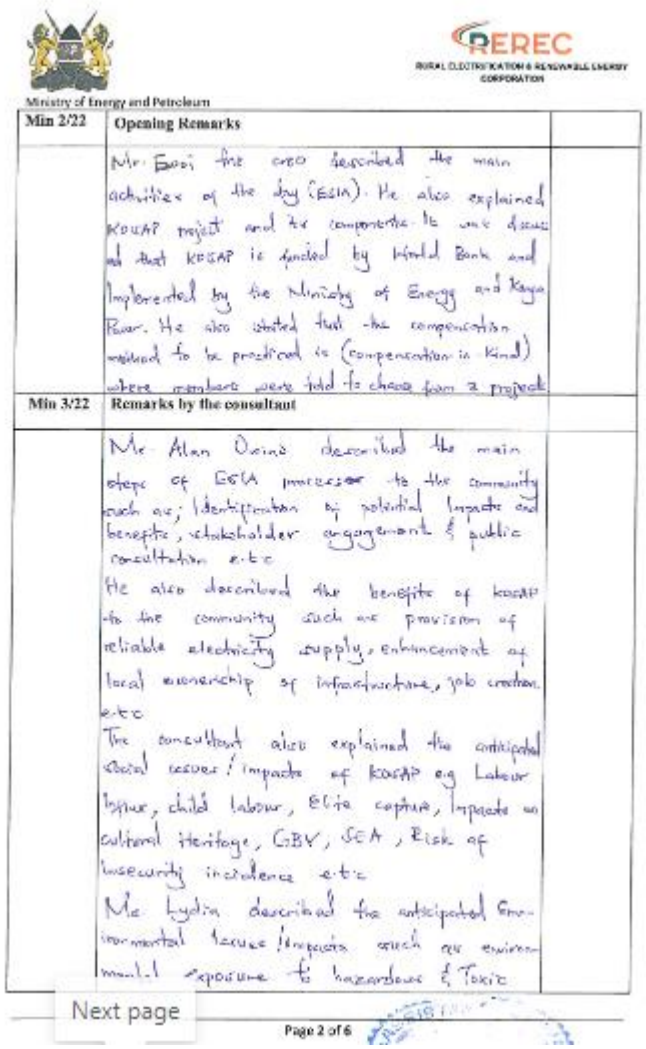

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Min 2/22	**Opening Remarks**	
	Mr. Esoi the CEO described the main activities of the day (ESIA). He also explained KOWAP project and its components. He also discussed that KESAP is funded by World Bank and Implemented by the Ministry of Energy and Kenya Power. He also stated that the compensation method to be practiced is (compensation in Kind) where members were told to choose from a project	
Min 3/22	**Remarks by the consultant**	
	Mr. Alan Ouma described the main steps of ESIA process to the community such as; Identification of potential Impacts and benefits, stakeholder engagement & public consultation e.t.c He also described the benefits of KOWAP to the community such as provision of reliable electricity supply, enhancement of local ownership of infrastructure, job creation e.t.c The consultant also explained the anticipated social issues / impacts of KOWAP e.g Labour Issue, child labour, Elite capture, Impacts on cultural Heritage, GBV, SEA, Risk of insecurity incidence e.t.c Ms. Lydia described the anticipated Environmental Issues / Impacts such as environmental exposure to hazardous & Toxic	

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	material operations of utilized by generator, occupational health & safety Risks, Impacts on local diversity & air quality etc The consultants also discussed the mitigation measures such as; vegetation replanting to offset cleared vegetation, Implimentation of specific intervention for the vulnerable to have equal access to project benefits & opportunities etc	
Min 4/22	**Concerns / Issues/Recommendations from participants**	
	Dorcas Kasi was concerned on whether women would be considered for employment she was also concerned on whether the unskilled within the community will be given jobs Mr. Abdi Ekomea was concerned on the payment method for the energy. He was also concerned on whether the community will hire an electrician for wiring or not Mr. Kasi John was appreciative and brought forward the issue on compensation/medical cover for the casual labourers at the site.	

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	Madam Abal was concerned on the balance to be covered by the project. Mr Ebei brought forward the issue of the community being illiterate, and lack of knowledge on matters of accidents eg fire accidents, electrical shocks, injuries. Mr. Aciapi was concerned on the issue of waste disposal, generated as a result of the project.	
Min 5/22	**Responses to concerns/issues raised**	
	The community's concerns/issues were responded to; it was discussed that; Korosip is in the initial stages, (EIA) and as soon as the reports have been submitted to the Authority and the approval is given, the project will commence.	

ASSISTANT CHIEF
LOIYUDIK SUB-LOCATION

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The project encourages public participation and empowerment of the community. Skilled and non-skilled opportunities will be available & shall be distributed fairly.

- The project will be undertaken by qualified and experienced contractors that will be carefully be selected by Kenya Power in conjuction with Ministry of Energy to ensure the implementation will follow set out guidelines.
- The workforce will be given training to minimize practices use of designated toilets for waste disposal and encourage the use of toilets, any soil potentially contaminated by chemicals, oils, fuels will be collected & disposed of by a NEMA authorized waste handlers
- The power will be supplied in form of token and every household will pay according to their consumption rate, for the power connection fee each household will pay one thousand Kenya Shillings (1000)
- The Kenya Power will offer training on the usage of electricity & other technologies to the community. The members were urged to take part in the training in order to avoid accidents in future.

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Min 6/22	**Acceptance/Rejection of the project**	
	All Members accepted the project. They also agreed on their prioritized community project ie water project (Equipping the community water borehole and piping water to the community water tank located at the village)	
Min 7/22	**Adjournment**	
	The meeting adjourned at 12:53 pm with a word of prayers from a village elder.	

Minutes Prepared By:
Name: ..... Date: 21/6/2022
Position: ESIA Expert ..... Signature: .....

Minutes Confirmed By:
Name: ..... Date: .....
Position: ..... Signature: .....

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APPENDIX 2 LIST OF ATTENDANCE

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: Olopi

Date: 20/01/2022   Baraza   Time: 11:10 AM

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	LOPIE LEMUKWAL		M		
2.	ANGELA LEMUKWAL		M	32109421	
3.	LOWANGIRO AUKON		M	10122649	
4.	EMOJA KUYA		F		
5.	LOPUA LOKAI		F		
6.	LOMOKARI EMURIA		F		
7.	LOKALESO KALOI		M		
8.	IKON LEMUNAKIPI		F	33842843	
9.	LOKWAI ESEKONO		F		
10.	NASURU KELEMENTINA		F	27388701	
11.	SAMUEL NGIMINAE		M	37643480	
12.	NANGIRO ALEPER		F	33247438	
13.	LOLARIN LOPIE		M	25280924	
14.	EKEA LOJERE LOCHOO			1032256382	

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Baraza.

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REREC

Kenya Power

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

Venue: Elopoi

Date: 20/01/2019 Baraza Time: 11:40 AM

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	JANE NATUKOI		F	44801950	[signature]
2.	AKENO ESIKON		F	24589916	[signature]
3.	AKIRU EWESIT LOMOSINGO		F	29781019	[signature]
4.	KAPETA MODONGOR		F	27388585	[signature]
5.	ERENG OCHOL		F	29783294	[signature]
6.	EREGAE EBENYO		M	11512576	[signature]
7.	Florida Lobali		F	16107774	[signature]
8.	ABULE MERI		F	29760345	[signature]
9.	AMURIA LOPEYOK		F	10294340	[signature]
10.	KAIKOR NGIPETO		F		[signature]
11.	EKOM EREGAE		F	29387682	[signature]
12.	SARAH AKIRU		F	0727565596	[signature]
13.	EBWANGET FRANCIS		F	4205275	[signature]
14.	AKIMET LOKASIEN			01483307	[signature]

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

Venue: Baraza

Date: 21/8/2023 Time: 11.10 AM

List of Participants Baraza

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	PIREE LOKAMARKIT	NPR	F	24512558	
2.	LOTUEI EKAL	BUSINESS	F	27771045	
3.	AKODOKOP ALOS		F	24508756	
4.	NAKALE MOROKAI		F	33785959	
5.	EPUTO EITON		F	12911801	
6.	AMOCHA LOKWAWI		F	01 47081	
7.	JOLSILIM EKUWAM	BUSINESS	F	33451975	
8.	ANOMAT LOKUWAM		F	32109710	
9.	NAPETO LONGOL	BUSINESS	F	33351066	
10.	AKITELA LOTHAN		F	13647044	
11.	EMANIKOR LOKAMAR	BUSINESS	F	34652304	
12.	LONGOLE LOSOT	BUSINESS	F	18647038	
13.	NAWI ARUPE		F	33032279	
14.	AKAI EMURIA		F	29783343	

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

Venue: Oropoi

Date: 21/01/2022

Time: 10:10 Am

List of Participants

Baraza.

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	ACHOKO LOKAI	Oropoi	M		[signature]
2.	MAIDA EYOMO	Oropoi	M		[signature]
3.	LOBUOSI ARIONG	"	M		[signature]
4.	ACHIPI AMODENGOR	"	M		[signature]
5.	LOLET EMURIA	"	M	0702350082	[signature]
6.	LONGOLE LOMINYIYO	"	M		[signature]
7.	NACHIEI EKENO	"	F		[signature]
8.	LIDIA AWEST	"	F		[signature]
9.	LOKARACH LONGUAI	"	F		[signature]
10.	AWESIT EKOMWA.	"	F	32109695	[signature]
11.	AKENO EMURIA.	"	F	24127453	[signature]
12.	KAMOLE ANGUCH	"	F	32128935	[signature]
13.	MORUNGANG LOTUKEP	"	M		[signature]
14.	EBUWANGIT LOPAN	"	M		[signature]

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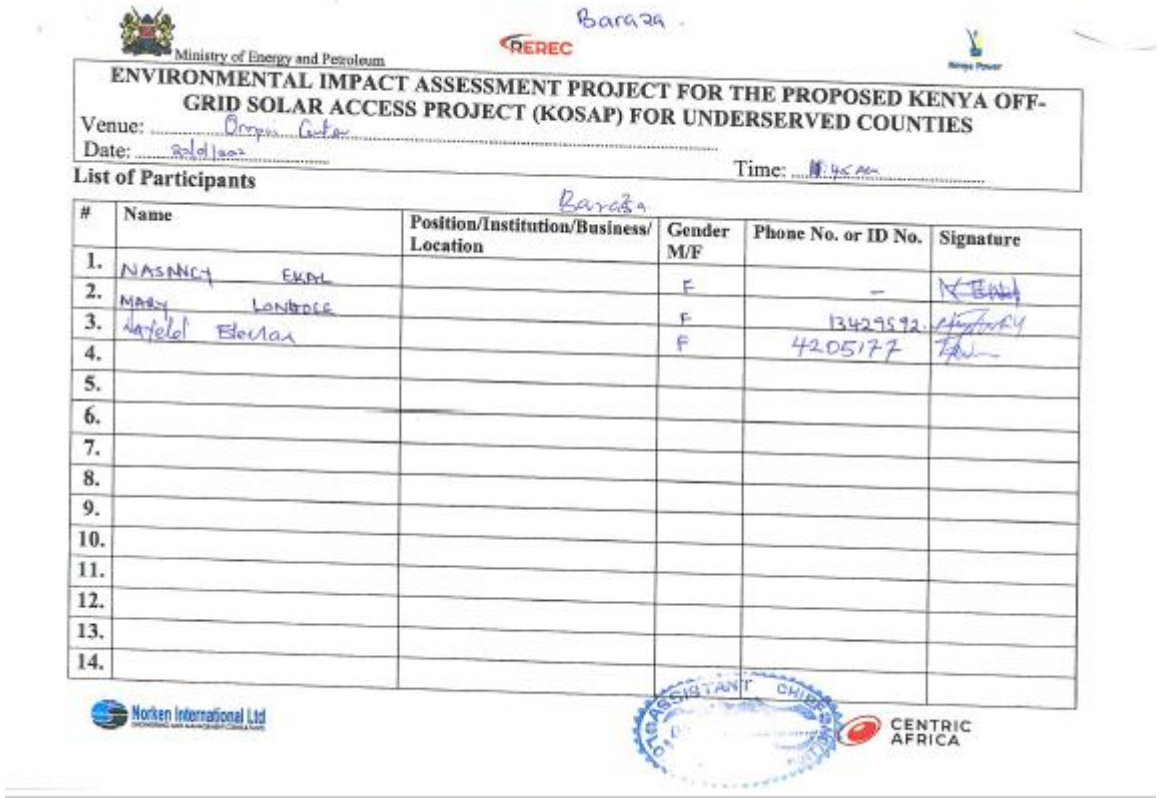

Ministry of Energy and Petroleum

REREC

Baraza

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

Venue: Baraza Center

Date: 8/8/2022 Time: 11:45 AM

List of Participants

Baraza

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	NASNICY EKAL		F	-	
2.	MARY LONDOLE		F	13429592	
3.	Gafelol Ekalan		F	4205177	
4.					
5.					
6.					
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14.					

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APPENDIX 4 – FOCUS GROUP DISCUSSION PARTICIPANTS LISTS

1. **Male**

MEN FGD

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

Venue: OROPOI

Date: 21/01/2022 Time: 9:30

List of Participants

FGD OROPOI MEN

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Akales Namorukai	KPR Elder / Oropoi	M	26557542	
2.	Edmond Logwee	KPR / Oropoi	M	34068012	
3.	Alfred Ekuwam	Elder Oropoi	M	10986896	
4.	Joseph Enesit	Elder / Oropoi	M	3912076	
5.	Rafael Ekomwa	Elder / Oropoi	M	0148808	
6.	Abdulae Kaleba	Elder / Oropoi	M	24297995	
7.	John Lokuwam	Elder / Oropoi	M	20528321	
8.	Godfrey Lokwee	church leader / Oropoi	M	29387421	
9.	Desmond Ekutan	CHW / Oropoi	M	27111442	
10.	Emoli Emesi	Elder / Oropoi	M	-	
11.	Ekeno Lominyo	Elder / Oropoi	M	29783425	
12.	Chilakery Ens	K.P.R / Oropoi	M	-	
13.	David Ekiru	Elder / Oropoi	M	29762377	
14.	Amros Reikan	Elder / Oropoi	M	-	
15					

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Male FGD
MEN

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: Oropoi Centre

Date: 21/01/2017

Time: 11:10pm

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Elias Ekiru	Co-ordinator / Oropoi	M	26941004	
2.	Lokichar Keem	Youth leader / Oropoi	M	27689725	
3.	Abdulaziz Namoyichai	Moslim / Oropoi	M	31456130	
4.	Nakadeli Emusia	Youth / Oropoi	M	27110007	
5.	Sammy Ekero	Youth / Oropoi	M	0701352505	
6.	Godfree Lokwee	Church leader / Oropoi	M	29387421	
7.	Alfred Ekomwa	Elder / Oropoi		10986896	
8.	Johnmark Ekalale	Student / Oropoi	M	0727568581	
9.	Desmond Ekutan	CHW / Oropoi	M	27111442	
10.	Ekeny Ekai	Oropoi	M	37600278	
11.	Collins Emoni	Youth secretary / Oropoi	M	37643460	
12.	Edmond Logwee	K.P.R. / Oropoi	M	34068012	
13.	Ekai Lokolo	Student / Oropoi	M	0702350082	
14.	Samuel Emoja	Student / Oropoi		[illegible]4250	

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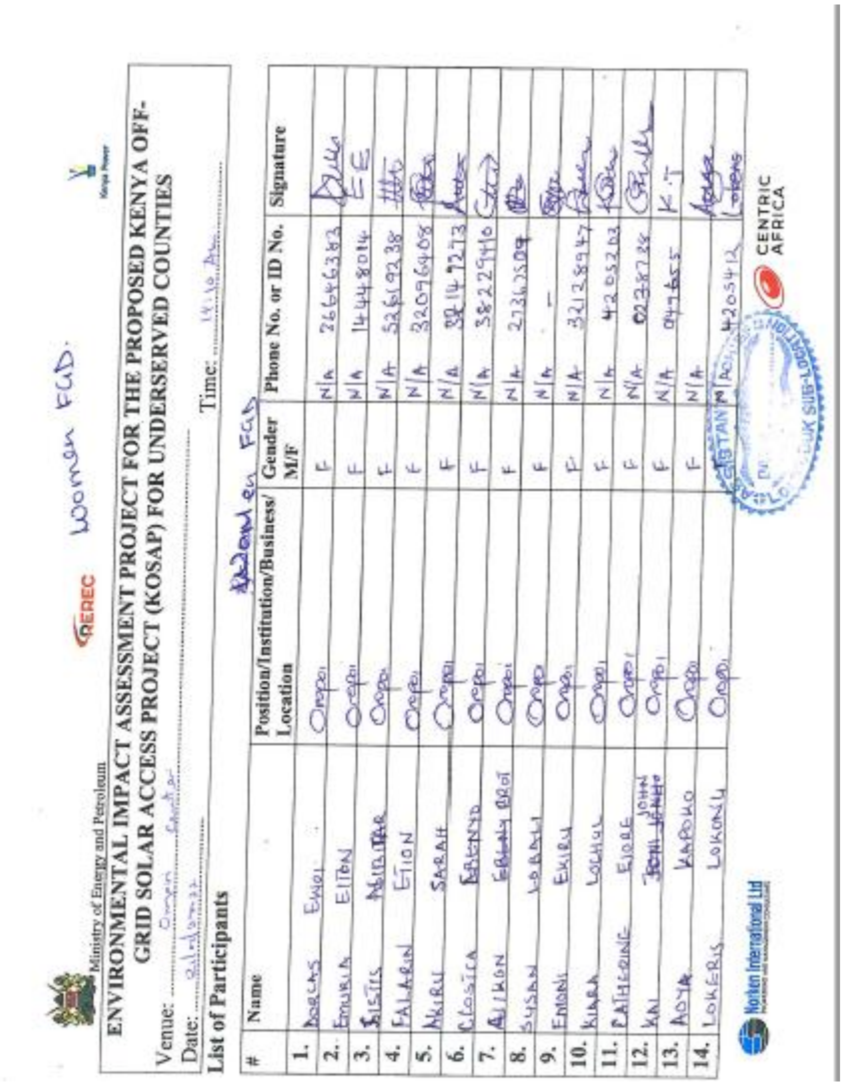
CENTRIC AFRICA

ASSISTANT CHIEF ... UDUK SUB-LOCATION

2. Female



Ministry of Energy and Petroleum

REREC Women FGD.

Kenya Power

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

Venue: Oropoi Center

Date: 21/07/2022

Time: 14:10 Am

List of Participants

Women FGD

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	DORCAS EWOI	Oropoi	F	N/A 26646383	[illegible]
2.	EMURIA EITON	Oropoi	F	N/A 14448014	EE
3.	SISTIS NGIBITAR	Oropoi	F	N/A 32619238	[illegible]
4.	FALARIN ETION	Oropoi	F	N/A 32096408	[illegible]
5.	AKIRU SARAH	Oropoi	F	N/A 38149273	[illegible]
6.	CLOSICA EBENYO	Oropoi	F	N/A 38229410	[illegible]
7.	ALIKON EBENY BROT	Oropoi	F	N/A 27363509	[illegible]
8.	SUSAN LOBALI	Oropoi	F	N/A	[illegible]
9.	EMONI EKIRU	Oropoi	F	N/A —	[illegible]
10.	KIARA LOCHUL	Oropoi	F	N/A 32128947	[illegible]
11.	CATHERINE EJORE	Oropoi	F	N/A 4205203	[illegible]
12.	KAI JOHN JOHN LENGO	Oropoi	F	N/A 0238728	[illegible]
13.	AOYA KAPOKO	Oropoi	F	N/A 047655	K.T
14.	LOKERIS LOKONYI	Oropoi		N/A 4205412	Aoyga Lokeris

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Women FGD.

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: Oropoi Center

Date: 21/10/2024

Time: 11:14am

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	JOYCE LOBALI	Oropoi	F	N/A 14458062	Joy
2.	AMOCHA LOKWAWI NANGIRO	//	F	N/A 0147080	Amocha
3.	ABONGON LOOCHOL EPUYO		F	N/A 21458355	[illegible]
4.	LOWOTON MORUKAI LOKORIMA	//	F	N/A 4205062	Lowoto
5.	AKITELA EWESIT EPUYO		F	N/A 21404988	AKE
6.	EPORON KARLLAE ALOLI	//	F	N/A 4777556	EK
7.	ABONGON EKITELA EKIDOR		F	N/A 32128717	[illegible]
8.	NATIR NAKALI NAKANG	//	F	N/A 4777277	NNN
9.	EBWANGET FRANCIS LOCHU		F	N/A 4205275	[illegible]
10.	PIREE LOKAMARIKIT	//	F	N/A 24512558	Piree
11.	ANNA PEDO LOMORUKAI		F	N/A 4775333	Anna
12.	LUCY AROT	//	F	N/A 34038002	[illegible]
13.	ELASTICA NUANON	//	F	N/A 30286529	Ea
14.	JACKLINE LOJAO	//		N/A 33847397	[illegible]

ASSISTANT CHIEF … SUB-LOCATION

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Ministry of Energy and Petroleum

REREC

Women FGD

Kenya Power

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

Venue: Ompom Cuda

Date: 24/12/2011

Time: 11:10 Am

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	ARILNE LONGOLE		F	N/A 29224608	[signature]
2.	EMURIA EKAL EWOTON		F	N/A 3218724	[signature]
3.	AKIRU MUCHU		F	N/A 27478734	[signature]
4.	LOPIE ABUCE EDUKINU		F	N/A 16113922	[signature]
5.	LOSIEM EROTO		F	N/A –	[signature]
6.	NATAPAR EROMWA		F	N/A 14448187	[signature]
7.	KATKOR LORIBONG LONGORORO		F	N/A 32128711	[signature]
8.	LOPEYAR LOWANGURO AUREN		F	N/A 32128962	[signature]
9.	DURUKO ETION EPUYO		F	N/A 4205199	[signature]
10.	APAKAN KWUYA LOWOTO		F	N/A 4777278	[signature]
11.	INGOLAN EPUYO LOPWARU		F	N/A 14448005	[signature]
12.	IKAL LONGOLETIANG LOPACHO		F	N/A 29387101	[signature]
13.	ENGOR NAROOT LONGOR		F	N/A 4777276.	[signature]
14.	AMOOJI KUYA LOWOTO			N/A ..09581	[signature]

ASSISTANT CHIEF ... SUB-LOCATION

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Ministry of Energy and Petroleum

REREC Women FGD.

Kenya Power

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

Venue: Oropoi Centre

Date: 21/10/2022

Time: 14:10 Am

List of Participants

Women FGD

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	DORCAS EWOI	Oropoi	F	N/A 26646383	
2.	EMURIA EITON	Oropoi	F	N/A 14448014	EE
3.	SISTES ABIBITAR	Oropoi	F	N/A 32619238	
4.	FALARIN ETION	Oropoi	F	N/A 32096408	
5.	AKIRU SARAH	Oropoi	F	N/A 38147273	
6.	CLOSICA EBENYO	Oropoi	F	N/A 38229410	
7.	ALIKON EBENY BROT	Oropoi	F	N/A 27367509	
8.	SUSAN LOBALI	Oropoi	F	N/A —	
9.	EMONI EKIRU	Oropoi	F	N/A 32128947	
10.	KIARA LOCHUL	Oropoi	F	N/A 4205203	
11.	CATHERINE EJORE	Oropoi	F	N/A 0238728	
12.	KAI JOHN JOHN	Oropoi	F	N/A 047655	K.T
13.	AOYA KAPOKO	Oropoi	F	N/A	
14.	LOKERIS LOKONI	Oropoi	F	N/A 4205412	

ASSISTANT CHIEF ... LOK SUB-LOCATION

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FGD women.

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: Oropoi Center

Date: 21/01/2022

Time: 11:6 Am

List of Participants

FGD women

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Ideki Etapan	Oropoi	F	21403221	IEY
2.	Gastoe Lokisiama	Oropoi	F		
3.	Emdok Ekegat	Oropoi	F	33530965	
4.	Nawiteya Apelile	Oropoi	F		
5.	Kilimak Lochoto	Oropoi	F		
6.	Alcac Echoto	Oropoi	F		NAP
7.	Arsa Ekal	Oropoi	F		KILS
8.	Ikong Namoruai	Oropoi	F		
9.	Abong Losikiria	Oropoi	F		EKAL
10.	Abuk Ediongo	Oropoi	F		
11.	Lolem Etapak	Oropoi	F		
12.	Natapak Gasinyero	Oropoi	F	35160959	
13.	Nalim Ewoi	Oropoi	F	21260018	Lolem
14.	Nadago Emaukor	Oropoi	F	28530270	

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3. Youth

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REREC

Youth FGD

Kenya Power

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

Venue: Oropoi Centre

Date: 20/01/2022

Time: 11.10 Am

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	BEATRICE NGOROTOK EJOTT	Oropoi	F	N/A 20654027	[signature]
2.	KANDETA MODONGOR MELIKITA	"	F	0799849820 21388584	[signature]
3.	FLORIDA EJORE LOBALI		F	N/A 16107784	[signature]
4.	AKIRU EWESIT LOMOSINGO	"	F	N/A 29781019	[signature]
5.	AWOTON EKWIAN NGITARA	"	F	N/A 4205159	[signature]
6.	LUCY EPETET TIOKO	"	F	N/A 32128978	[signature]
7.	EKALE NAKALEI AMUNYON	"	F	N/A 9524892	[signature]
8.	NAKWANI EBEI KANAMOI	"	F	N/A 21158332	[signature]
9.	ERENG OCHOL	"	F	N/A 29782294	[signature]
10.	LEHUKWEL LOKALEI LOTIAK	"	F	N/A 20359476	[signature]
11.	AROT NAKALE LOKIRIMA	"	F	N/A 4205216	[signature]
12.	AKENO EJIKON LOMUBIA	"	F	N/A 24589916	[signature]
13.	EKOM EREGAE PORDOK	"	F	N/A 2938682	[signature]
14.	JENIFAH OYEN LOMARA	"	F	N/A 24906214	[signature]

ASSISTANT CHIEF ... SUB-LOCATION

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Ministry of Energy and Petroleum

REREC Youths FGD

Kenya Power

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

Venue: Oropoi Centre

Date: 21/01/2022 Youths Time: 11:10 AM

List of Participants

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	Ejarae Egoilo	K.P.R. / Oropoi	M	–	
2.	Lodia Apagolekirion	Local / Oropoi	M	–	
3.	Ebei Lokopasai	Oropoi	M	31987799	
4.	Nakadio Lochodo	Pastoral ladies / Oropoi	M	–	
5.	Ekunam Ebosagan	Elder / Oropoi	M	–	EE
6.	Ejupe Eduig	Oropoi	M	–	
7.	Alep Emukia	Elder / Oropoi	M	–	Eduns
8.	Ekitela Namoroukai	Elder / Oropoi	M	–	
9.	Nyaga Ekomwa	Pastoralist / Oropoi	M	–	
10.	Napetet Nagiria	Oropoi	F	–	
11.	Akidor Nancy	Oropoi	F		Nancy
12.	Akal Arupe		F		
13.	Lokaraach Ebuy		F		
14.	Ekutan Lope		F		Lope

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ASSISTANT CHIEF ... KATUDUK SUB-LOCATION

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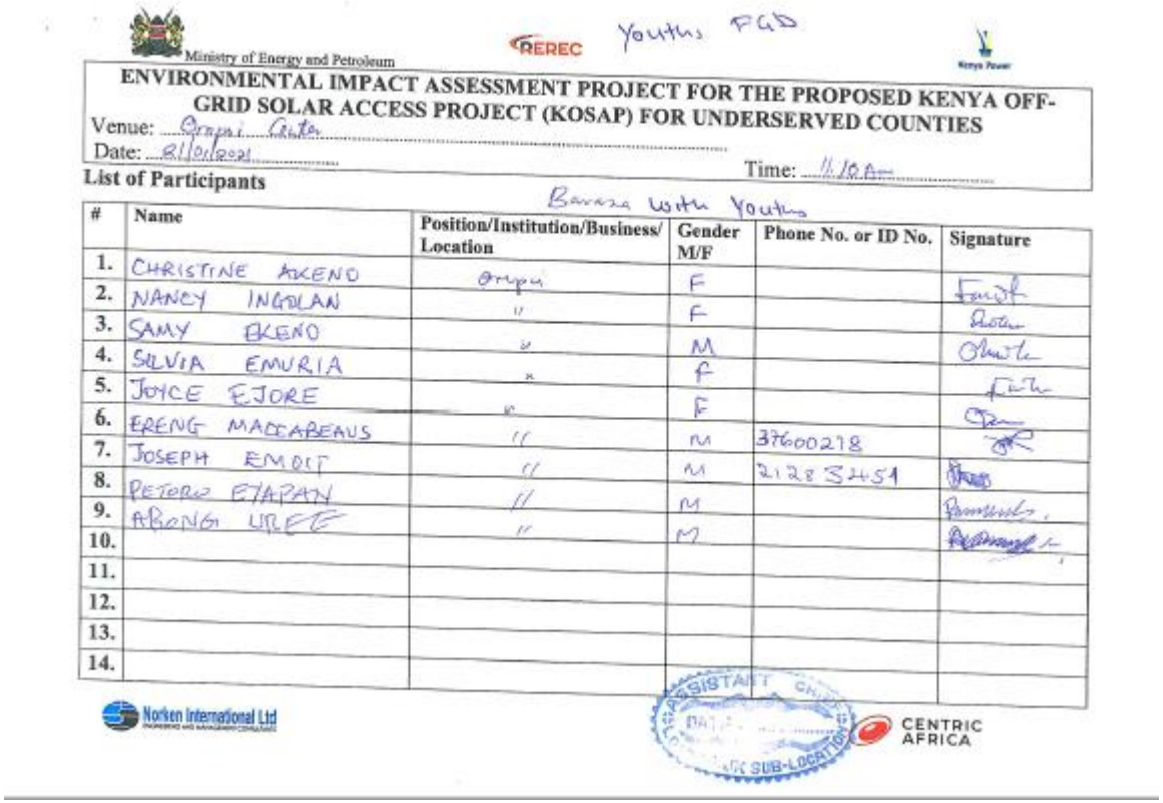

Ministry of Energy and Petroleum

REREC

Youths FGD

Kenya Power

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

Venue: Oropri Center

Date: 21/01/2021 Time: 11.10 AM

List of Participants

Barraza with Youths

#	Name	Position/Institution/Business/ Location	Gender M/F	Phone No. or ID No.	Signature
1.	CHRISTINE AKENO	Oropri	F		
2.	NANCY INGOLAN	"	F		
3.	SAMY EKENO	"	M		
4.	SILVIA EMURIA	"	F		
5.	JOYCE EJORE	"	F		
6.	ERENG MACCABEANS	"	M	37600278	
7.	JOSEPH EMBIT	"	M	21283451	
8.	PETERS ETAPAN	"	M		
9.	ABONG UREE	"	M		
10.					
11.					
12.					
13.					
14.					

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ASSISTANT CHIEF

SUB-LOCATION

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APPENDIX 3 MINUTES OF MEETING HELD DURING LAND IDENTIFICATION PHASE

MINUTES OF COMMUNITY CONSULTATION MEETING

Minutes of the community consultation meeting held on 20/03/2021 at Oropoi market centre, from 10.30 am

AGENDA

- Public forum: Welcoming and opening remarks
- Project information: KOSAP and the Oropoi mini grid
- Project Land requirements: Disclosure of community rights and entitlements to compensation, the options and implications)
- Project Technical Description, Wiring, Connection and Payments
- Potential environmental and social risks and impacts: positive and negative impacts and project opportunities.
- Grievance Redress Committee
- Focus Group Discussions: Men, Women and Youth.
- Review of feedback from FGDs by all community members.

In attendance (refer to annexed list of participants)

MIN 1.0 WELCOMING AND OPENING

The meeting started at 10.30am and was opened with a word of prayer. In his remarks the Chief Lukumong (Oropoi Location) Mr. Philip N. Alos said there were very many facilities in the area which could benefit from electricity and mentioned some of them as the local Catholic mission, Police Post, business premises and households.

He then went on to explain that the mission of the KOSAP team was to sensitise the community on the proposed project. . He said if electricity is installed it will bring a lot of development to the area. He told participants that the day's main agenda was to discuss the proposed project.

Abdul Aziz was requested to translate the deliberations at the Baraza from Turkana language to Kiswahili/English and vice-versa so that everyone can participate fully.

Philip then invited the visitors to address the Baraza. The visiting team introduced themselves as follows;

1. Kioko Maithya - Social Safeguards Officer - REREC
2. Irene Kawira - Senior Environmentalist - REREC
3. Caleb Ewoi - CREO - MOE
4. Agnes Gachoki - Senior Surveyor - REREC
5. Lawrence Lorika (lodwar) - Technician - KPLC
6. Myra Mukulu - Technical Advisor Cook Stoves - MOE

2.0 KOSAP AND OROPOI MINI GRID

Ms Myra Mukulu informed the participants that the proposed project is part the Kenya off Grid Solar Access Project (KOSAP) which is funded by the World Bank and is being implemented by the Ministry of Energy, the Kenya Power and Lighting Company (KPLC) and the Rural Electrification and Renewable Energy Corporation (REREC). MoE will provide overall coordination of the Project including responsibility for safeguards due diligence, and compliance monitoring. REREC will implement the mini grid and will be responsible for the implementation of Resettlement Framework Plan, Environmental Social Management Framework and Social Assessment. She said the Government is committed to providing electricity to communities that have not been served by the national grid such as Oropoi because it recognises energy as a key development enabler.

She said KOSAP entails the following components;

1. Provision of electricity through solar mini grids to households, enterprises and community facilities,
2. Provision of energy services through solar home systems for and clean cooking technologies for households
3. Provision of solar power to electrify boreholes as well as to power community facilities
4. Community engagement and education as well as capacity building and institutional support for the national and county Governments

She further, said KOSAP is being implemented in 14 counties. In Turkana County 23 minigrid sites, 98 stand-alone solar facilities (public facilities) and 38 boreholes (solarisation) had been identified. One of these minigrid sites is Oropoi.

She noted that the agenda of the visit was to; undertake an environmental and social screening of the proposed project site, to sensitize the community on the project land requirements and community rights and entitlements, explain the Project Technical Description and connection requirements, discuss potential environmental/social risks and impacts and mitigation and sensitize members on grievance redress mechanism.

3.0 PROJECT LAND REQUIREMENTS: RIGHTS AND ENTITLEMENTS OPTIONS AND IMPLICATIONS

The Surveyor, Ms. Agnes Gachoki told the Baraza that the main purpose of the Baraza was to seek community consent for land donation for the project. Land required for the construction of the Mini grid is 1.214 hectares. In Oropoi, Land falls under the Community land category. It is yet to be registered, has no title but is jointly owned by the community. Its use and management is governed by the Community Land Act 2016.

She explained the various forms of acquiring interest in land including; allocation, land adjudication process, compulsory acquisition, settlement programs, transfers, donation and long-term leases. The Surveyor informed the meeting that if they opted to consent to donation of the project land following VLD criteria has to be met;

VLD criteria

1	**The infrastructure must not be site specific.**
2	The impacts must be minor, that is, involve no more than 10 percent of the area and require no physical relocation.
3	The land required to meet technical project criteria must be identified by the affected community, not by line agencies or project authorities
4	The land in question must be free of squatters, encroachers, or other claims or encumbrances.
5	Verification (for example, notarized or witnessed statements) of the voluntary nature of land donations must be obtained from each person donating land.
6	If any loss of income or physical displacement is envisaged, verification of voluntary acceptance of community-devised mitigatory measures must be obtained from those expected to be adversely affected.
7	If community services are to be provided under the project, land title must be vested in the community, or appropriate guarantees of public access to services must be given by the private titleholder.
8	Establishment of Grievance mechanisms

Agnes also told the community on their rights and entitlements to the following;

1. They can refuse to donate the land.
2. They can opt to seek compensation for the project land.
3. They can refuse or accept the project.
4. The right to resettlement assistance in addition to compensation for affected assets, where the more vulnerable individuals/households have been identified among them.
5. The right to livelihood restoration measures where the project has impacted their livelihood strategies, if they choose compensation.

The surveyor further informed the meeting that there were several options on land compensation;

a) Payment of cash for the land that has been identified for the project. For this to take place the land is has to be valued first. All monies payable as compensation for acquisition unregistered community land are then held in trust by the county government. Any such monies shall be deposited in a special interest earning account by the County Government and shall be released to the community upon registration of the community land.
b) Compensation of land for land. The community would identify a similar piece of land in value to the project site and request that the same is purchased for the community.
c) A further option is compensation in kind. This option is for the community to grant land for the project and request for compensation in kind. This could be in the form of a project for the benefit of the community like the construction of classrooms or a borehole. This is the most preferred option.

She said the surveyor will need to pick exact GPS points of the land proposed for the project and with community consent the land will be registered in the name of the implementing agency. The surveyor encouraged the community to make an informed decision that collectively involved every member of the community the elders, men, women, the marginalised and PLWDs. Any land donation would have to be signed by at least five representatives nominated by the community. She disclosed to the meeting what the term advance possession on land issues meant and requested them to consider allowing the implementing agency to take possession of the parcel and commence construction of the project even as the land transfer process is going on.

4.0 PROJECT TECHNICAL DESCRIPTION, WIRING, CONNECTION AND PAYMENTS

Mr. Lawrence Lorika from KPLC told the meeting the proposed mini grid will comprise a solar system and a thermal unit (generator). The Mini-grid will have a capacity of 31KVA and PV 104kwp). He said all potential customers will be mapped for connection. Energy meters will be installed by KPLC staff and the locals living within the required 3 km radius would be connected to power. He said to be connected one will be required to pay a one-off connection fee of kshs.1000 as opposed to other places like Lodwar, Kitale and other big towns whereby they pay kshs.15000 or more.

Power would not be for free, and residents will be buying tokens to facilitate their needs as far electricity is concerned. Tokens can be purchased in amounts of Kshs 50 and above. Purchase is done through a vendor or directly purchasing and paying through the mobile money platforms. The token purchased through this 'Pay As You Go' (PAYG)) mechanism, will last according to the individual power usage. If you have more load for example ceiling fans and air conditioners in your shop, it will last for short period of time.

He told the Baraza that power distribution will involve passing of electrical lines along the roads in order to reach their houses, business premises and public facilities and requested the community grant way leave consent.

He said the project land where the powerhouse comprising solar panels, diesel generator, batteries and inverters will be installed will be fenced of as a safety measure and access will thus be restricted to people and animals. The minigrid system would be operating throughout the day and night. In case of overload, cloudy day or low battery, the generator will automatically kick in to supply power.

MIN 5.0 SOCIAL AND ENVIRONMENTAL ISSUES

The Environmental specialist Ms Irene Kawira Mate said that there were many benefits that would accrue to residents due to the supply of power to the area. She cited some of them as:

Potential positive impacts:

1. Improved educational standards as a result of longer study hours for leaners.
2. Enhanced heath care as Clinics/dispensaries can operate at night and store perishable drugs and vaccines
3. Employment of locals during the construction phase
4. Increased information access and entertainment (TV, Radio, Internet phones and computers).

5. refrigeration of food products like meat and milk thereby increasing their shell life
6. Opportunity for locals to establish business ventures like hairdressing, photocopy and welding.

Potential negative impacts:

1. The land that is currently in use for grazing will now no longer be accessible to the residents as it would be fenced off.
2. The risk of electrocution due to lack of proper handling and care. The Contractor shall however educate the community on safety precautions.
3. Labour influx leading to sexual exploitation and harassment.
4. Environmental contamination may arise due to disposal of used batteries, inverters and other materials.
5. Increase in cases of Gender Based Violence and sexual harassment of workers

She affirmed that the project beneficiaries were the Yapakunur Clan, a major sub-tribe of the Turkana language group who are Indigenous people and are the only VMG residing near the sub-project area thus the sole project beneficiary. Construction of the mini grid could restrict the access of VMGs to grazing land thus affecting availability of pasture, and consequently their main source of livelihoods, and forcing families to relocate grazing activities elsewhere. Consequently, a VMGP may not be required. The project can include specific interventions in the final ESMP to ensure the community has access to culturally appropriate benefits. The project will strive to minimize adverse impacts on the indigenous people and ensure that they fully and continuously participate in the consultation process and receive culturally appropriate benefits from construction of the mini grid. The ESIA study would be conducted before the onset of the project and an ESMP developed outlining viable mitigation measures.

Screening would be undertaken to ensure that the project is designed and implemented in an environmentally and socially sustainable manner, taking into account Kenya's relevant sector legislation as well as World Bank Safeguard Policies. This would be undertaken using screening checklists in reference to requirements of the Environmental Management and Coordination Act, 1999 (amended 2019) and KOSAP-Environmental and Social Management Framework (ESMF). The screening process would consider potential impacts of the project and propose viable mitigation measures. She assured the community that temporary or minor impacts which are foreseen during project implementation will be sufficiently mitigated.

6.0 GRIEVANCE RESOLUTION COMMITTEE (GRC)

Ms Mate informed the Baraza on the need for constitution of a locational Grievance Resolution Committee (GRC) for purposes of resolving any grievances that may arise in the lifetime of the project as guided by project frameworks. The local GRC will be the first stop shop for resolution of project related disputes and grievances for project affected persons and interested parties. The GRM should be culturally appropriate, inclusive, and accessible and developed in consultation with Oropoi community. Grievances which cannot be resolved by the local GRC shall be escalated to the sub-county GRC and the National GRC respectively. Any unresolved matter can then be referred for arbitration or to a court of law. World Bank's GRS is also available to stakeholders to lodge their grievances. The GRC should constitute representation from all genders, youth and vulnerable persons. It should be structured in such a way that

it provides multiple channels for lodging grievances, ensure anonymity and confidentiality. The following details shall be recorded for each grievance reported; and a close-out form issued to indicate the grievance registered has been closed.

a) Date of compliant
b) Name of complainant
c) ID of complainant
d) Telephone contact of complainant
e) Nature of complaint
f) Name of the Person handling the complaint
g) Contacts of person addressing the complaint
h) Action taken
i) Date of conclusion of complaint

Existing indigenous grievance redress mechanism

Conflicts occasionally arise within individuals and families. The Oropoi community like in all other parts of the Turkana society is endowed with elaborate and systematic traditional mechanisms of conflict management. When disputes occur, they are referred elders (*Ng'akasukou*). The elders then summon involved parties and witnesses to the meeting point (*Ekitoe Ng'akasukou*).The elders will listen to the conflicting parties/individuals, weigh adduced evidence and pronounce the verdict accordingly.
Any matter that is not resolved or when the parties are not satisfied they can report to the chief or seek discourse in a court of law.

The summary of the comments/remarks from the community in the meeting held at Oropoi on 20/03/2021

QUESTION/COMMENTS ANSWER/REMARKS

QUESTION/COMMENTS	ANSWER/REMARKS
Elias Ekiru (Youth) I am very delighted about this project. This land are you going to own it or owners will be community? Want to know about this project, is it government owned or private business? **Ekitela Longoli** I support this project. All other areas have power it is oly Oropoi that doesn't have. You people are used to lying to us, you are not the first to come here and lie that you will use local labour but later you bring workers from outside.	**Agnes Gachoki** The project is being implemented by the government of Kenya. We are requesting for transfer of the title of land to the implementing agency. **Irene Kawira** Locals will be prioritised in provision of unskilled labour. Inspections will be undertaken continuously with the contractor to verify employment records

7.0 FOCUS GROUP DISCUSSIONS

After the main meeting women, men and youth convened for separate discussions (FGDs) where they could freely express with and among themselves and provide insights (hopes, fears, aspirations and expectations in relation to the mini grid and the land question).

FGD-MEN

The main objective of this discussion was to get gather and document how men thought/felt about the issues discussed during the main meeting including; environmental and social screening of the project site, land requirements and community rights/ entitlements, Project Technical Description and connection requirements, potential environmental/social risks and impacts, mitigation and grievance redress mechanism. The FGD would also provide them an opportunity to air their issues/give their opinions on the project.

Kioko them the FGD was a good avenue for the elders to express their opinions and freely ask any questions they might not have been unable to ask in front of the youth and women, He said that at the end of the FGD discussion the group should come into consensus on issues discussed in the earlier meeting and select a representatives to the GRC. Matters agreed on and selected representatives would then be presented to the main meeting for adoption.

During the meeting the Men agreed to voluntary land donation and selected the following as their representatives in the GRC;

Name	ID number	Telephone number
Amoni Leju Meri	8599841	Not Available
Lokaale Loolia Loweetmoe	27656587	0791514705
Joseph Emoit	21283451	0757103823

Question, Suggestions, feedback and responses for Focus group discussion with men

QUESTION/COMMENTS	ANSWER/REMARKS
Lokamiter Lokoel There are a lot of problems in this area. We have water scarcity. There is only one borehole around, can this project assist to construct other boreholes? During times of famine the situation gets worse. Can our youth be employed in the project?	**Lawrence Lorika** Noted. The KOSAP team shall inform the ministry on the community request for a borehole. The community shall be continually educated to ensure safety of residents and property.
Francis Lokamar Electricity is very dangerous and I am concerned about our safety. I used to live in Mombasa and I witnessed many calamities brought about by electricity. Residents don't know about the dangers and they should be educated	**Lawrence Lorika** Awareness creation on basic electrical safety shall be undertaken. Adults should also ensure that children do not play or climb trees near electric lines on a power pole or where the lines enter a house. Wiring should also be undertaken by a qualified electrician.
Lokale Luiya Am happy of the project. Let it start immediately. But now when you give me power and I don't even have power how will electricity solve those other problems.	**Lawrence Lorika** Noted.

FGD WOMEN

The women seemed not to have understood the issue. Therefore Myra repeated the introduction of the project and the benefits as well as the need to have voluntary land donation so as to construct KOSAP minigrids. Thereafter the women asked questions

Name of Person making the contribution (e.g. comment or question)	Question, Comment, Suggestion	Feedback/Responses by project team	Response by agency on how feedback will be used or acted upon
Margaret Nakaru	People are living on the land selected, if we take the land for the project where will they go?	Myra responded that the minigrid will be located in such a way that it does not displace people	Ensure that contractors do not displace anyone during construction
Kaikor Nepeto	The minigrid should be located such that it reaches places like Oropoi primary school, the forest and the catholic mission. Nevertheless	Agnes responded that this feedback is noted	Take into consideration the proposed locations during construction

After the discussions in the FGD for women, Myra requested that they elect 2 women who will be in charge of communicating any grievances to the Ministry of Energy and implementing agencies.

The women nominated were:

Name	ID number	Telephone number
Lucy Aroto	34038002	0723928407
Margaret Nakaru	4777247	0796686224

FGD YOUTH

The youth said they had understood the issue and there were no questions asked
They nominated the following to the GRC;

Name	ID number	Telephone number
Socaseica Igule	30236529	0723872307
Abdulaziz Ekai	31450130	0742747413

8.0 REVIEW OF FEEDBACK FROM FGDS BY ALL COMMUNITY MEMBERS

After the FGDs the participants convened back to the main meeting to review the respective resolutions from the FGDs. During the meeting they expressed their support towards the project saying the benefits to the area shall be enormous. They mentioned the opportunity to light their homes, establish income generating business ventures and employment as some of the major benefits.

They resolved to freely donate land for the project, validated the nominees to the GRC and elected officials to lead the identification of project land and sign the land donation form on their behalf.

The community validated the nomination the following as members of the GRC:

No	Name	Design.	1D No.	Mobile No.
1	Amoni Leju Meri	MEN	8599841	Not Available
2	Lokaale Loolia Loweetmoe	MEN	27656587	0791514705
3	Joseph Emoit	MEN	21283451	0757103823
4	Lucy Aroto	WOMEN	34038002	0723928407
5	Margaret Nakaru	WOMEN	4777247	0796686224
6	Socaseica Igule	YOUTH	30236529	0723872307
7	Abdulaziz Ekai	YOUTH	31450130	0742747413

APPENDIX 4 ATTENDANCE SHEET_ MEETING HELD DURING LAND IDENTIFICATION PHASE

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SITE ...Oropoi...

MEETING VENUE...Oropoi...

DATE...20/3/2024

Plenary

LIST OF ATTENDANCE/PARTICIPANTS LIST

No	NAME	Identification number –ID No	Mobile No.	Gender Male/Female	Village	Do you agree to donation of land Yes/no	SIGN.
1.	BRADFORD ETABO	33991913	0799484096	Male	[illegible]	Yes	[signature]
2.	Elias Ekal	26941004	-	M	[illegible]	Yes	[signature]
3.	FRANCIS EKAI	27164490	0716014325 ~~27164440~~	M	[illegible]	Yes	[signature]

4.	Lorichar	Keeu	27689725	0715191656	M	Anuuaeum	Yes	
5.	Losegai	Ekal	31742555	0759434729	M	Achukudiat	Yes	
6.	Ikaro	Ellix	–	07	F	Anuuaeum	Yes	
7.	SYLVIA	Lechuro	25165571	–	F	Anuunion	Yes	
8.	SUSAN	ABENYO	29224662	–	F	Lorcilam	Yes	
9.	Ekitela	Kootan	34043908	–	F	Nakasipan	Yes	
10	Sakara	Akiru	31187273	0727365596	F	Achuchuwit	Yes	
11	Fridah	Naraabi	–	0799372274	F	Achuchuwit	Yes	
12	sharon	Akuwam	–	0790226473	F	Achuchuwit	Yes	
13	Melvin	Keeu	27376189	0798794022	F	Achuchuwit	Yes	
14	Valarie	Ngisiro	33112167	0798385803	F	Lokitoan	Yes	
15	Echoto	Lolosirigo	14998090	–	F	chuchuka	Yes	
16	Natuka	Namoropikai	34431555	–	F	chuchuka	Yes	
17	Akadeli	Ekitela	–	–	F	Kosuroi	Yes	
18	Pise	Lokomarigirib	–	–	F	Aiores	Yes	

19	Aweet Eborto	33717724	–	F	Chuchuka	Yes	[illegible]
20	Florida Ejore	161077824	–	F	Anuakan	Yes	
21	Nancy Modo	38516137	–	F	Anuakan	Yes	
22	Abongor Lochia	–	–	F	Kimukia	Yes	
23	Eberito Akorinyang	–	–	F	Kimuka	Yes	
24	Adunga Ekeyne	–	–	F	Kimuka	Yes	
25	Tenullah Asis	29387723		F	Kimuka	Yes	
26	Lokong Ekwort	–	–	F	Lokitaung	Yes	
27	Sahara Logiloe	38255257		F	Anolis	Yes	
28	Longole Keen	–	–	F	Kakukoe	Yes	
29	Mary Aulsja	–	–	F	Kosuro	Yes	
30	Christos Esekuo	13649679	0724259497	M	Chochuka	Yes	
31	Amukia Lokansa	–	–	F	Kimukia	Yes	
32	Emusi Ekal	–	–	F	Anouakan	Yes	
33	Akinus Ackela	–	–	F	Kimuka	Yes	

3

34	Kagete Excel	–	–	F	[illegible]	Yes	
35	Nasisu Nakuk	–	–	F	[illegible]	Yes	
36	Ilaby Etabo	–	–	F	[illegible]	Yes	
37	Nakaso Lostaul	–	–	M	[illegible]	Yes	
38	Echoto Abong	–	–	M	[illegible]	Yes	
39	Use Ekeno	F	–	F	[illegible]	Yes	
40	Agnes GACHIRI	10599222	0722582861	F	NCB	N/A	
41	IRENE KAWIRA	26961056	0729081220	F	HCB	N/A	
42	KIOKO MAITHYA	10924666	0722176597	M	NMB		
43	LAWRENCE LOKAMAR	23363661	0716-062907	M	Lodwar		
44	Myra Mukulu	21796290	0722693205	F	Nairobi	N/A	
45	Caleb Ewoi	26058413	0704871688	M	Lokichar	–	
46	DR Joseph Lolepo	21166556	0791654328	M	[illegible]	Yes	
47							
48							

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ENVIRONMENTAL, SOCIAL SCREENING AND LAND ACQUISITION FOR PROPOSED SOLAR MINI-GRID FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

SITE ..... LOPOI .....

MEETING VENUE..... BAO OLI .....

DATE..... 20/02/2021 .....

PLENARY

LIST OF ATTENDANCE/PARTICIPANTS LIST

No	NAME	Identification number –ID No	Mobile No.	Gender Male/Female	Village	Do you agree to donation of land Yes/no	SIGN.
1.	Caleb Ewoi	28058415	0714576688	M	Loolua	Yes	
2.	PHILIP. N. LOCH	12911401	0719833362	M	Longidot	yes	
3.	DESMOND. E. ELAPAN	27111442	070816 1155	M	LOPOI	YES	

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4.	LOMOE SAEL JOEL	25522413	0790189498	MALE	OROPOI	YES	Joel
5.	EDMOND LOGWEE	34068012	0746289706	MALE	OROPOI	YES	
6.	LOCHIMOE EDUNG	28073 189	N/A	MALE	OROPOI	YES	
7.	EMOIT ESEKON	21283451	0727103823	MALE	OROPOI	YES	
8.	FRANCIS LOKAMAR		N/A	MALE	OROPOI	YES	FRANSO
9.	LOKAALE LOOLIA	27656587	0791514705	MALE	OROPOI	YES	
10.	EKITELA LONGOLI IPOO	9006801	N/A	MALE	OROPOI	YES	
11.	LOKAAMITA LOKOEL		N/A	MALE	OROPOI	YES	
12.	EMONI EMERI		N/A	MALE	OROPOI	YES	
13.	DIKO ASUKU		N/A	MALE	OROPOI	YES	
14.	KAPETA LORIAMAKITO		N/A	MALE	OROPOI	YES	
15.	LOTYENG LOKUYAM		N/A	MALE	OROPOI	YES	
16.	LOLIMA LOKIRIAMA		N/A	MALE	OROPOI	YES	
17.	KOOYEN TIAGA		N/A	MALE	OROPOI	YES	
18.	ETAAN AEMUN		N/A	MALE	OROPOI	YES	

19	GODFREY LOKWEE	29387401	07 36 57 37	MALE	OROBI	YES		
20	DOMINIC EBANGON	32485248	0769,3933	MALE	OROBI	YES		
21	SOLOMON AKUUTA	25511138	N/A	MALE	OROBI	YES		
22	FRANCIS EMURIA	27497381	07455X257	MALE	OROBI	YES		
23	AKOL MUSA		07907082	MALE	OROBI	YES		
24	NAKAALE NAMOEKAT	33785959	N/A	FEMALE	OROBI	YES		
25	AKIRU LOKOEL	29387596	N/A	FEMALE	OROBI	YES		
26	PEKAN NAMOTO		N/A	FEMALE	OROBI	YES		
27	EMANIKOR LOKIRIA		N/A	FEMALE	OROBI	YES		
28	ENGESIT EKOMWA		N/A	FEMALE	OROBI	YES		
29	LOKWAMOE LOLIMA		N/A	FEMALE	OROBI	YES		
30	ASINYEN LOYOLEM		N/A	FEMALE	OROBI	YES		
31	ENTUDUK LOLIMA		N/A	FEMALE	OROBI	YES		
32	NABWAL EJOOT		N/A	FEMALE	OROBI	YES		
33	EKITELA LOTAAN		N/A	FEMALE	OROBI	YES		

34	EKOMWA LOKASIRIM	0148308	N/A	MALE	OROPOI	YES	
35	LOKAALEI EBLWANGIT		N/A	MALE	OROPOI	YES	
36	NAMUYA LOOLEM		N/A	FEMALE	OROPOI	YES	
37	SUSAN EJORE		N/A	FEMALE	OROPOI	YES	
38	ADIPO ISONGON		N/A	FEMALE	OROPOI	YES	
39	TIOKO EKAI		N/A	FEMALE	OROPOI	YES	
40	EKAL ARUPE		N/A	FEMALE	OROPOI	YES	
41	ANOMAT LOKUWAM		N/A	FEMALE	OROPOI	YES	
42	ABEI IKOEL		N/A	FEMALE	OROPOI	YES	
43	ENGIOREK NADONGO		N/A	FEMALE	OROPOI	YES	
44	AKAI EMURIA		N/A	FEMALE	OROPOI	YES	
45	EBENYO EBEI		N/A	FEMALE	OROPOI	YES	
46	MARGRET EREGAE		N/A	FEMALE	OROPOI	YES	
47	LOOKOR LOKIRIAMA		N/A	FEMALE	OROPOI	YES	
48	EPORON PEIKAN		N/A	FEMALE	OROPOI	YES	

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49	FR. VICTOR MWEKJASIZE	B1035722	0706903988	MALE	OROPOI	YES	~~Victor~~
50	NAKAALEI LOGETEI		N/A	FEMALE	OROPOI	YES	me
51	MARGRET NAKARU		N/A	FEMALE	OROPOI	YES	me

52. LUCY AROT 34038002 0723928407 FEMALE OROPOI YES ~~FMS~~
53. ACHUKA ETOOT —— N/A FEMALE OROPOI YES
54. NANYUDUK EBEI —— N/A FEMALE OROPOI YES
55. LOYELEI ETOOT 20788825 N/A MALE OROPOI YES
56. ATA ANNA LOKOL —— N/A FEMALE OROPOI YES
57. KAIKOR NGIPETO —— N/A FEMALE OROPOI YES Akiru
58. SUULE LOKOEL —— N/A MALE OROPOI YES
59. EKENO LOMINYIO 29783425 N/A MALE OROPOI YES
60. NAKAALE LOTORE —— N/A FEMALE OROPOI YES

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SITE ..... OROPOI .....

MEETING VENUE..... OROPOI .....

DATE..... 2013/21 .....

FGD – MEN

LIST OF ATTENDANCE/PARTICIPANTS LIST -FOCUSSED GROUP DISCUSSIONS

No	NAME	Identification number –ID No	Mobile No.	Gender Male/Female	Village	Do you agree to donation of land Yes/no	SIGN.
1.	LAWRENCE LOKAMAR	23663761	0716062709	M	LOKUSH	Yes	
2.	LONGOR EKUJI			M	NATIRA	Yes	
3.	EKEND LOMINYO DURIKO	29783425		M	KOSROI	Yes	

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4.	LOKABUK LOKUYAN			M	NATIRA	Yes	
5.	ETABAN AYEMON EPOKO			M	LOKITOKUI	Yes	
6.	EPORON PETZAN			M	LOKITOKUI	Yes	
7.	EJEKON LOKEM			M	NAMANIKO	Yes	
8.	SUULE LOKOEL			M	NAKWAJEM	Yes	
9.	ANGELA LEMUKOL EKIDOR	3210962		M	KOSUROI	Yes	
10	PULUKOL EBUR LOCHODO	12909267		M	NATURA	Yes	
11	LOTIANG LOKUYAM	29685369		M	NATIRA	Yes	
12	LOBUIN LOKIRIAM			M	NATURA	Yes	
13	LOKOEL LOKOSEL			M	NATIRA	YES	
14	LOPETE LOWUKOL			M	NATURA	Yes	
15	LOKAEL LOWOYA			M	NATURA	Yes	
16	EBEI KANAMOT			M	NATURA	Yes	
17	FRANCIS LOKAMAR			M	NATIRA	Yes	FRANSIS
18	ERAL KARIWO			M	NATIRA	Yes	

2

19	EKITELA LPOO	9006801		M	NATIRA	yes	
20	LOKEDER LOKORIKWANG			M	NATURA	yes	
21	LOKAMUTA LOKOOL			M	Dropoi	yes	
22	JIKOO AENIKU			M	Dropoi	yes	
23	EPUU LOOYEN			M	Dropoi	yes	
24	FR VICTOR MWEKWASIZE	B1035722	0706903988	M	DROPOI	YES	
25	ALEPU NATIANG			M	NTKUM SUNGUT	yes	
26	KAPETA LORIAM KITOO			M	NATURA	yes	
27	AMONI EMERI			M	NAKWASEN	yes	
28	KOOMAN ETAGA			M	NATURA	yes	
29	AKUTAN LOKUTALOK	27766064		M	Dropoi	yes	
30	JOSEPH EMOIT	27283451	0777103823	M	KOSROI	yes	
31	EBENYO KOKHODA			M	NATURA	yes	
32	EKAI ACHWARA			M	Dropoi	Yes	
33	KIOKO MAITHYA	10924666	0722176597	M	ISRB	YES	

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SITE ...Orropoi...

MEETING VENUE...Oropoi..................

DATE 20/3/2021.........

LIST OF ATTENDANCE/PARTICIPANTS LIST -FOCUSSED GROUP DISCUSSIONS FGD women

No	NAME	Identification number –ID No	Mobile No.	Gender Male/Female	Village	Do you agree to donation of land Yes/no	SIGN.
1.	Akino Gnc Holly.	4599322	0722353869	F	NBB	N/A	[signature]
2.	AROT LUCY ERUKUDI	34088002.	0723928407	F	OROPOI	YES	[signature]
3.	LOKAMAR EKIRU EDUK.	29964162	N/A	F	"	Yes	[thumbprint]

1

4.	AKUWAM AKIRU LOKAI	29707019	N/A	F	OROPOI	46	(thumbprint)
5.	LOROT LOKAMAR IMO	29596165	N/A	F	OROPOI	45	(thumbprint)
6.	NAKOLE LOKAMUTA LOKER	29710572	N/A	F	〃	45	(thumbprint)
7.	NABOR AGWI EKOMA	23380125	N/A	F	〃	465	(thumbprint)
8.	APUA LOKAM LOWOI	24345169	N/A	F	〃	45	(thumbprint)
9.	MAGARET LOKIPE LOWOI	29717205	N/A	F	〃	45	(thumbprint)
10	INGOLAN KAPELO	21120930	N/A	F	〃	45	(thumbprint)
11	AKAI LOREEL LOKONG	29359596	N/A	F	〃	45	(thumbprint)
12	AKALI PULUKOL EBE	31418724	N/A	F	〃	40	(thumbprint)
13	NATING EKAL IBUWAN	29387222	N/A	F	〃	460	(thumbprint)
14	ADETA NAJIKIRIA	29758326	N/A	F	〃	45	(thumbprint)
15	LOMUIA PULUKOL	23854492	N/A	F	〃	45	(thumbprint)
16	LOREEL LOKADEA	29663708	N/A	F	〃	45	(thumbprint)
17	LOGILAE EKAL	4[illegible]5245	N/A	F	〃	45	(thumbprint)
18	NGAJEE EGIRO LOTAN	29[illegible]3 4011	N/A	F	〃	45	(thumbprint)

2

19	RUTH LOTOKO LOTUKO	21629652	N/A	F	Okapoi	YES	
20	ALOCH ENGOR KATABOI	28136227	N/A	F	"	YES	
21	ADAPAI UMF WALIM	29438352	N/A	C	"	YES	
22	ROKI EGIRON	//	N/A	F	//	YES	
23	NATIR LOBETOW	–	N/A	F	"	YES	
24	AKADELI EKAALE	–	N/A	F	"	YES	
25	NAKIE EGIRON	–	N/A	F	"	YES	
26	LOCHUCH AMONEA	–	N/A	F	"	YES	
27	AKAALES EGIRON	–	N/A	F	"	YES	
28	AROOGO EKEA	–	N/A	F	"	YES	
29	LOKAALA EGIRON	–	N/A	F.	"	YES	
30	ASUGURU ASUROI	–	N/A	F	"	YES	
31	NATAPAR NAANGOR	–	N/A	F	"	YES	
32	NAUKOT IMO	–	N/A	F	"	YES	
33	AMUNYEN NGIMARE	–	N/A	F	"	YES	

3

34	NAPUUTE EWEET	–	N/A	F	OROPOI	YES	
35	NABOR EKENYA	21380123	N/A	F	OROPOI	YES	
36	AKAI LOYELEI	33785192	N/A	F	OROPOI	YES	
37	EDAPAL LOCIENG	–	N/A	F	"	YES	
38	ATAANA OME	–	N/A	F	"	YES	
39	NAKALI LOKAABUK	–	N/A	F	"	YES	
40	IKAI LOKAALE	–	N/A	F	"	YES	
41	ATELET LOKAARAN	–	N/A	F	"	YES	
42	LOSIKE LOKAALE	–	N/A	F	"	YES	
43	EPETON LONGOR	–	N/A	F	"	YES	
44	LOPETOK AKUTAN	–	N/A	F	"	YES	
45	IGHOM PUKOL	–	N/A	F	"	YES	
46	EBWANGAN LOCHUURO	–	N/A	F	"	YES	
47	NAUNYET NANGOR	–	N/A	F	"	YES	
48	AMODOI LOKOSEN EBUR	29437636	N/A	F	"	YES	

4

49	MARGRETE NAGUM.	—	N/A	F	ORGPOT	YES	
50	MAAROK LOKOSEN	—	N/A	F	11	YES	
51	ASURO LOKOSEN	—	N/A	F	11	YES.	
52	Myra Mukuku	21796290	0722659305	F	11	N/A	Mukuku

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FGD women Oropoi 20/3/2021

	Name	ID	mobile	Gender	village	Y/N	Sign
19	Margaret Nakaai	4977247	0796686224	F	Oropoi	Yes	
20	Kalkor Nepeto			F	Oropoi	Yes	
21	Anyuduk Ebei			F	Oropoi	Yes	
22	Lakeng Lojere			F	Oropoi	Yes	
23	Achukua Etot			F	Oropoi	Yes	
24	Nakale Logetei			F	Oropoi	Yes	
25	Nakale Lojerei			F	Oropoi	Yes	
26	Margaret Napale			F	Oropoi	Yes	
27	Ameto Loferei			F	Oropoi	Yes	
28	Nakwawi Ereng			F	Oropoi	Yes	
29	Akai Koten			F	Oropoi	Yes	
30	Abei Ikoel Munyo	32134422		F	Oropoi	Yes	
31	Akai Emuria	29783343		F	Oropoi	Yes	
32	Egilelan ekaraan	14448026		F	Oropoi	Yes	
33	Logwaton Amurkai			F	Oropoi	Yes	

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		ID	Mobile	Gender			
34	Epuyo Eituan			F	Orapai	Yes	
35	Nakale Morukai	33785589	-	F	Orapai	Yes	
36	Omok Nadongo			F	Orapai	Yes	
37	Nakoi Lokwai	11513412	—	F	Orapai	Yes	
38	Emuria Lodung'a	—	—	F	Orapai	Yes	
39	Echoto Lomosungo	31950682	—	F	Orapai	Yes	
40	Epua Moruyang'			F	Orapai	Yes	
41	Ebenyo Tioko		—	F	Orapai	Yes	
42	Nabwan Exot		—	F	Orapai	Yes	
43	Aramat Lokuwam		—	F	Orapai	Yes	
44	Asingen Lopelem		—	F	Orapai	Yes	
45	Naruyang Lopelem		—	F	Orapai	Yes	
46	Ajakar Lodunga		—	F	Orapai	Yes	
47	Susan Ejeri		—	F	Orapai	Yes	
48	Adipo Ibongoi		—	F	Orapai	Yes	

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		I.D	Mobile	Gender	village	Y/N	sign
49	Akizala Lotao		—	F	Oropoi	Yes	
50	Lokwamwae Elima		—	F	Oropoi	Yes	
51	Anyuduk Lalima		—	F	Oropoi	Yes	
52.	Lopitei Ekomwa		—	F	oropoi	yes	
53.	Maaj Lmoja	—	—	F	oropoi	Yes	

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REPUBLIC OF KENYA

MINISTRY OF ENERGY

KENYA OFF-GRID SOLAR ACCESS PROJECT (KOSAP).
ENVIRONMENTAL, SOCIAL SCREENING AND LAND ACQUISITION FOR PROPOSED SOLAR MINI-GRID FOR COMMUNITY FACILITIES, ENTERPRISES, AND HOUSEHOLDS.

SITE ..... OROPOI .....

MEETING VENUE..... OROPOI .....

DATE... 20/03/2021

LIST OF ATTENDANCE/PARTICIPANTS LIST -FOCUSSED GROUP DISCUSSIONS YOUTH

No	NAME	Identification number –ID No	Mobile No.	Gender Male/Female	Village	Do you agree to donation of land Yes/no	SIGN.
1.	NALUNIO EKAL	31742555	0759434729	M	ACHUCHU	YES	
2.	ERENG MACOMBEAUS	37600278	—	M	LOKITOKIN	Yes	
3.	NAKARU LOTAAN	2489813	—	M	LOKITOKIN	Yes	

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4.	ELIUS EKIKU	26941004	—	M	KIMUKOE	Yes	[illegible]
5.	EKUTAN EYAPAN	27811442	—	M	ACHUCHUKAIT	Yes	[illegible]
6.	NGASIKE EKOMWA	33912147	—	M	LOYANGALAN	Yes	[illegible]
7.	AKOL MUSA	—	0799079072	M	ACHUCHUKAIT	Yes	[illegible]
8.	ZAKIGHAR KEEM	27689725	0795191686	M	KANOM AKOM	Yes	[illegible]
9.	CARRISTOS EROMO	13647679	0724459400	M	ACHU...	YES	[illegible]
10	MARY	15189731	0701118915	F	KIMUKOE	Yes	[illegible]
11	JUDY LOKORIG	—	—	F	ACHUCHUKAI	Yes	[illegible]
12	Jemimah Namuya	29387729	0792876452	F	New site	Yes	[illegible]
13	COLLINS EMONI	37603562	0768429504	M	[illegible]	Yes	[illegible]
14	Emoni Ekiru	2692006	—	F	ONOPEI	[illegible]	[illegible]
15	IRINE LONGOLE	29224608	—	F	LOKITOKIN	Yes	[illegible]
16	SARAH LOGILAE	38255207	0704805227	F	NAKWASUGUN	Yes	[illegible]
17	SARAH AKIRU	32147273	0727565596	F	NACHUCHUKAIT	Yes	[illegible]
18	Caleb Ewoi	28058415	0714837688	M	Lodwar	[illegible]	[illegible]

2

19	Scolastica Igule	30236529	0723872307	F	Kalutai	Yes	
20	Valary Ngisiru	33912167	0798385803	F	Lokitokin	Yes	
21	Asekon Lobenyo	—	—	F	Lokitokin	Yes	
22	Susan Abenyo	29222602	—	F	Lokitokin	Yes	
23	Ipaso Etiiri	—	—	F	Anom Akim	Yes	
24	NATUKOI NAMORUKAI	34493555	—	F	ACHUCHUKAITS	Yes	
25	EKITELA KOOYAN	—	—	F	KIMUKOE	Yes	
26	AKARU MCHU	27478734	—	F	KIMUKOE	Yes	
27	PIRE LOKAMARKIT	—	—	F	KANAMAKIM	Yes	
28	NAKADELI EKITELA	29762344	—	F	KOSUROI	Yes	
29	EMANIKOR LOKIRIA	—	—	F	KOSUROI	Yes	
30	NANYAPID NAMUNGA	—	—	F	KOSUROI	Yes	
31	NAURIYEN EMANIKOR	—	—	F	KOSUROI	Yes	
32	LONAKORI EBENYO	—	—	F	KOSUROI	Yes	
33	REIKAN NAWOTO	—	—	F	KOSUROI	Yes	

3

34	FLORIDA EJORE	16107784	—	F	KANOMARIM	Yes	
35	NANCY MODO	38516137	—	F	KANOMARIM	Yes	
36	ESTHER NAMORUKAI	—	—	F	NAKWAJOM	Yes	
37	ABONGON LOOCHOL	—	—	F	NAKWAJOM	Yes	
38	AKITELA ENGEIT EPUYO	21404988	—	F	NAKWAJOM	Yes	
39	ELIZLE NAKALEI	—	—	F	KANOMARIM	Yes	
40	EMURIA EKAL	—	—	F	KANOMARIM	Yes	
41	NANGIRO ALEPER	—	—	F	NAKWAJOM	Yes	
42	AYANAE LOKONG	—	—	F	NAKWAJOM	Yes	
43	AMURIA ETIIR	—	—	F	KOSUROI	Yes	
44	AKAI LOKICHAR	—	—	F	KANOMARIM	Yes	
45	NACHUNGAE EREMYO	—	—	F	NACHUCHUKAIT	Yes	
46	IKUTAN LODUNGA	—	—	F	NACHUCHUKAIT	Yes	
47	LUCHY ERETET	32128979	—	F	KANOMARIM	Yes	
48	AKAALE LOPIE	14948034	—	F	KIMNGOE	Yes	

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49	CLEMENTINA NAPAK	27383701	—	F	KETHUCHUKATI	Yes	
50	ETABO BRADFORD	33791913	0799444076	M	LOKITOKIN	Yes	
51	AKENO EJIKON	13425816	—	F	KANDOMAKIM	Yes	
52	AKIDOR LOKWAMERI	-	—	F	KATHUCHUKATI		
53	BEATRICE NAPEYOK	20654527	0759695699	F	KANDOMAKIM		
54	IRENE KAWIRA	26961056	0729031220	F	MRB	—	

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APPENDIX 5 A-RAP

ABBREVIATED RESETTLEMENT ACTION PLAN (A-RAP)

1. Oropoi Sub-project Site

The Oropoi sub-project site is located 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 portion of land identified for the mini-grid by the group ranch is 1.214 hectares. The proposed site is uninhabited, has no structures, community facilities, or incumbrances. Consultations leading to the identification and selection of the sub-project site are captured in the Environmental and Social Screening report for Oropoi. *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 1956 (approximately 250 households). The land acquisition-related impacts are loss of land, some trees/shrubs/grass. Mitigation measures include in-kind compensation for loss of land and pasture, and designing power distribution lines to avoid impacting trees, crops, structures, and community facilities. No physical displacement is anticipated, however, there is minimal loss of pasture occasioned by the acquisition of land utilized by the community for grazing. The 1.214 Hectares identified for the sub-project will be acquired compulsorily by the 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 2-1 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 community chose borehole solar installation, piping of water to community water kiosk and as the first priority and construction of a maternity ward as the second priority.The value of the priority community project will be proportional to or higher than the value of land under acquisition. In addition, any 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	Communities utilizing unregistered community land, unregistered group	Compensation in-kind as prioritized by the community.	

ranches and registered group ranches (e.g., grazing, farming etc.).	ranches, and registered group ranches.		
3. Loss of /Damage to Assets on Land			
Trees	Community members on unregistered community land; community members utilizing public land; members of registered and unregistered group ranches and government entities.	During detailed design for power distribution lines and construction of the mini grid and community project, any crops, structures, trees, and community facilities shall be avoided to the extent possible. However, loss or damage to the above will be compensated/restored at full replacement cost,[1] in line with the provisions of the RPF.	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.		

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

Figure 1:

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

effectively participated in the consultations. *Refer to Chapter 5 of the ESIA on Stakeholder 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 Oropoi Locational Grievance Redress Committee (LGRC) constituting a chairperson, secretary, and three members, was formed through community consensus. The committee comprises representation from men, women, youth, persons with disabilities, and ethnic minorities. The LGRC is responsible for engaging PAPs and resolving complaints. *Refer to chapter 7 of the ESIA on the Grievance Redress Committees.* Further, the community will constitute the A-RAP Implementation Committee responsible for coordinating community engagements on the A-RAP and monitoring the implementation and closure of the A-RAP. The representation of the committee will consider gender, vulnerability, and intergenerational sensitivities.

4.3 Summary of Consultations on Land Acquisition and Compensation Options

Date	Objective	Implementing Entities	Land Acquisition and Compensation Aspects Discussed	Key Issues Raised	Responses Given
March 20th 2021	Environmental and Social Screening. Voluntary land donation (VLD). Constitution of the Locational Grievance Redress Committee (GRC).	Ministry of Energy (MoE) Kenya Power (KPLC) Rural Electrification and Renewable Energy Corporation (REREC)	Site identification and land allocation for the sub-project. Criteria for VLD. Community entitlements (forms of compensation and implications for each).	I am very delighted about this project. This land are you going to own it or owners will be community? Want to know about this project, is it government owned or private business?	The project is being implemented by the government of Kenya. We are requesting for transfer of the title of land to the implementing agency.
				People are living on the land selected, if we take the land for the project where will they go?	The minigrid will be located in such a way that it does not displace people. sure that contractors do not displace anyone during construction.

January 22nd 2022	Environmental and Social Impact Assessment.	Consultants MoE REREC KPLC	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 chose borehole solar installation, piping of water to community water kiosk and as the first priority and construction of a maternity ward as the second priority.	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 6 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 6 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 9001:2015 Certified

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/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.

ISO 9001:2015 Certified