ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED MKWIRO VILLAGE MINI-GRID POWER PROJECT WITHIN WASINI ISLAND, LUNGA LUNGA CONSTITUENCY, KWALE COUNTY

GPS COORDINATES:

NORTHINGS: **$4^0$39' 56.184''S**
EASTINGS: **39^0 23'46.494''E**
ELEVATION: **23M**

ESIA FINAL REPORT

SUBMITTED BY: RURAL ELECTRIFICATION AND RENEWABLE ENERGY CORPORATION (REREC)

REPORT PREPARED BY: DR. JOSEPH K. KURAUKA

DECEMBER, 2019

DOCUMENT AUTHENTICATION

I…**Dr. Joseph K. Kurauka** as Environmental Lead Expert to:

Proponent…Rural Electrification and Renewable Energy Corporation…on Project: Environmental and Social Impact Assessment Study report for the proposed Wasini village mini-grid power project in Wasini/Mkwiro Sub-Location, Pongwe/Kidimu Location, Lunga Lunga Constituency (Sub-County), Kwale County.

Do hereby certify that this report was prepared on the information provided by the Rural Electrification and Renewable Energy Corporation (REREC) as well as that collected from other primary and secondary sources and on the best understanding and interpretation of the facts by the environmental assessors. It is issued without any prejudice.

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ESIA Lead Expert

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MANAGER, RENEWABLE ENERGY RESOURCES

FOR RURAL ELECTRIFICATION AND RENEWABLE ENERGY CORPORATION (REREC)

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ABREVIATIONS AND ACRONYMS

AEZ	Agro-ecological Zones
CEO	County Environmental Officer
CO	County Officer
DRSRS	Department of Resource Surveys and Remote Sensing
EA	Environmental Audit
EHS	Environmental Health and Safety
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ERB	Electricity Regulatory Board
ERC	Electricity Regulatory Commission
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Safeguards Framework
ESP	Economic Stimulus Program
GoK	Government of Kenya
KP	Kenya Power
KPLC	Kenya Power and Lighting Company
KTDA	Kenya Tea Development Agency Limited
KWS	Kenya Wildlife Service
LH	Lower Highland
LM	Lower Midlands
MoAL&F	Ministry of Agriculture Livestock and Fisheries
MENR	Ministry of Environment
MoE&P	Ministry of Energy and Petroleum
MoF&W	Ministry of Forestry and Wildlife
MoH	Ministry of Health
MoW&I	Ministry of Water and Irrigation
NEAP	National Environmental Action Plan

NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
FO	Fisheries office
NPEP	National Poverty Eradication Plan
OHS	Occupational Health and Safety
PAPs	Project Affected Persons
PEC	Poverty Eradication Commission
PMs	Project Managers
PRSP	Poverty Reduction Strategy Paper
REP	Rural Electrification Program
RET	Renewable Energy Technologies
RPF	Resettlement Policy Framework
SME	Small and Medium Enterprises
TOR	Terms of Reference
REREC	Rural Electrification and Renewable Energy Corporation
WRMA	Water Resources Management Authority

ACKNOWLEDGEMENT

We, the ESIA Study experts for the proposed mini-grid power project within Mkwiro village, Pongeni/ Kikoneni Sub-Location, Pongwe/Kidimu Location, Lunga Lunga Constituency, Kwale County wish to thank the Chief Executive Officer of Rural Electrification and Renewable Energy Corporation (REREC) for awarding us the opportunity to carry out the ESIA. We further acknowledge technical support provided by Renewable Energy Team namely Eng. Muriithi (Manager, Renewable Energy), Ms. Peninah Karomo (Environmental officer), and Mr. Henry Nyapara REREC supervisor, Kwale County.

Finally, Mr. Martin Kiogora, County Director of Fisheries (based at Shimoni fish landing site), Kwale County relevant departments, especially, Chief of staff Mr. Packia, Assistant Chief Wasini Mrs. Bey Juma and the local community within the proposed mini-grid project location. We are most grateful to the Research Assistants led by Mr. Lali Mohammed assisted by Mr. Hamisi Salim, Mr. Justus Baya and Ms. Jesicca Salama.

Many other individuals; professionals and other interested partners that immensely contributed to the ESIA study of the proposed mini-grid power project; directly and indirectly and the list is too long to produce here. To them all, we say thank you very much for their constructive efforts, support, cooperation and understanding.

FOREWORD

This report presents the major findings of the Mkwiro village, Pongeni/Kikoneni Sub-Location, Pongwe/Kidimu Location, Lunga Lunga Constituency, Kwale County ESIA survey on the current situation of environmental socio- economic development on specific thematic areas that was undertaken between April and May 2017. The survey was undertaken in the Wasini village within Pongwe/Kidimu using a combination of methodologies including questionnaires for the household survey component, focus group discussions and key informant interviews, and was buttressed with existing relevant literature. The questionnaire was administered to 45 randomly sampled households. The survey incorporated the use of qualitative data collection techniques to tease out key issues affecting citizen's awareness, knowledge and practices relating to development (projects) in the area.

The main objective of the survey was to generate baseline data so as to find out the environmental socio- economic status of the project area, which commissioned this study, and other development partners in the area. The study was necessitated by the desire of the constituency to fill the information gap of the state of development, especially of education, health, information and technology, water and sanitation, agriculture or food security and insecurity; as well as to establish the internal gaps and challenges within the constituency management.

The findings of the ESIA provided in-depth and holistic information on the status of various development issues in the project area and the entire sub-location. The issues were prioritized as follows: lack of electricity connectivity therefore leading to low education standards in the area; scarcity of potable water; inadequate health facilities; poor road infrastructure and sanitary facilities, and food insecurity. There is limited network coverage by the mainstream mobile telephony service providers. The state of poverty was particularly notable in Wasini Island. It is my sincere hope that these findings will not only be a useful resource for planning by the constituency but also a rich supply of information for all stakeholders (government and development partners) working in this constituency. Finally, it is expected that the constituency will learn from the capacity gaps and challenges identified in this report to develop impactful interventions as well as embracing good practices in managing the available resources.

The Kenya Government has set its development agenda as outlined in the Kenya Vision 2030 with the aim of giving Kenyans better standards of living through various strategic interventions. These strategic interventions will only be achieved through transparent utilization of public resources, and providing all Kenyans with opportunities to participate in deciding on how public resources should be best employed to fight the two main challenges: poverty and unemployment, facing the nation. The key strategies for achieving the stated goals are articulated in various key policy documents including the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) 2003-2007, the Poverty Reduction Strategy Paper (PRSP), MDGs, the Medium Term Expenditure Framework (MTEF), the National Development Plan 2002-2008 and Kenya Vision 2030 among others. The Kenya Vision 2030 has also outlines strategies that are aimed at reducing poverty among the vulnerable groups. This calls for prudent management, control and direction of all matters related to Constituency affairs so as to ensure compliance with requirements set out in Constituency Development Act (CDF) Act.

Lunga Lunga constituents are fully determined to participate effectively in domesticating the objectives of Vision 2030 in their development planning. The Constituents now directly influence, through local Constituency Development Committees, the formulation and implementation of

development programs and activities in the Counties. However, it is recognized that as the constituencies implements these programs, it is be confronted with a myriad of challenges, among them being: poor education standards; chronic water scarcity; poor health standards; food insecurity; poor infrastructure (especially roads and electricity) development and communication (especially internet connectivity); and insecurity stemming from tension brought in by outsiders in the main Islands. Meanwhile, poverty among the constituents continues to be a cross-cutting issue, along with unemployment among youth.

EXECUTIVE SUMMARY

The Rural Electrification and Renewable Energy Corporation (REREC) is proposing to construct a mini-grid power project along the main canal of the Wasini island, the canal drawing water from River within the Fisheries office land. The proposed mini-grid power project is expected to supply energy within REREC target beneficiaries, while enabling them to achieve self-reliance. The mini-grid power project is also envisaged to serve the surrounding communities as well as provide employment which will improve the socio-economic status of the local community. The mini- grid installation being developed has potential to produce **60 kWh** annually. The construction is estimated to cost **Kshs. 211,555,555.00**. The estimated cost of Environmental Mitigation Measures is **Ksh. 1,150,000** (Tables 14 and 15).

In conformity with The Environment Management and Coordination Act 1999 (Amendment - 2015), such a project is subject to Environmental and Social Impact Assessment (ESIA) before commencement. The purpose of the ESIA study was to investigate potential impacts of the proposed mini-grid power project on the biophysical, social and natural environment in Wasini/Mkwiro Sub-Location, Pongwe/Kidimu Location in particular and the country in general. The study has proposed mitigation measures, including an Environmental and Social Management Plan (ESMP).

The proposed mini-grid project is a hybrid system utilizing solar energy and generators, a phenomenon associated with solar-power development. There will be minimal disturbance to vegetation cover since the proposed mini-grid project will cover a small site area. The environmental concerns and engineering requirements of the proposed mini-grid project were taken into account during the project conceptualization, design and development to address and sustain existing ecological balance and significantly reduce costs of mitigating potential impacts.

The ESIA study employed several methods and techniques in data collections including:

i. Literature review;
ii. Consultations with REREC management in Nairobi and its field management in Pongwe/Kidimu Location, Kwale County;
iii. Discussions with Kwale County Departmental Officers;
iv. Consultations and public Participation (CPP) using key informants and *baraza;*
v. Focus group discussions with residents (males, females and youth);
vi. Households socioeconomic survey, and
vii. Observations, short video clips and photography.

Data collection instruments used in the study were:

i. Checklist (for preliminary survey);
ii. Discussions guide for County departmental heads;
iii. Focus group discussion guides for use with various groups drawn from the community;
iv. Household, questionnaire for heads of households;
v. Questionnaire for REREC field officers;
vi. Observations guide for site walkthrough inspection; and
vii. Data analysis, using SPSS, tabulations and line graphs to facilitate interpretations

The main findings of the study were as follows:

The local community has an overwhelming support for the project. There is a high expectation of employment for the youth and improvement in the household incomes, infrastructure and general delivery of social services. Other benefits envisaged to accrue from the proposed mini-grid project are as follows:

1. More business opportunities,
2. Increased mobility at night due to flood light availability,
3. Improved and increased services at the health facility,
4. Increased and improved state of schools leading to better education, and
5. Creation of job opportunities leading to improved livelihoods.

6. Affected residents/ community members are concerned about the following:
   i. Land-use systems management,
   ii. Potential negative environmental impacts e.g. oil spillage from generators,
   iii. Loss of vegetation, and
   iv. Employment consideration to the local residents.

Stakeholders (community) and Neighbors (hotel and KFS) Comments

Anticipated positive impacts of the proposed mini-grid project:

- Job creation-long-term and short-term through opportunities associated with electricity supply such as fish and farm produce storage, welding, barber, saloon business;
- Will lead to improvement of infrastructure in the area like access roads, schools, health facilities;
- Increased mobility at night due to flood light availability;
- There will be minimal displacement;
- Local material supplies;
- Up-scaling electricity access to the poor especially the vulnerable groups;
- Social inclusion;
- HIV/AIDS education and awareness;
- Benefits to education;
- Improved standard of living;
- Promote ICT initiatives in the area;
- Increase in revenues;
- Improved security; and
- Improved communication network in the area.

Predicted negative impacts mini-grid project

- Impact on natural vegetation and biodiversity (although extensive tree cutting will not be necessary. Any tree cutting will be kept to a minimum, and avoided wherever possible); There is no impacts on vegetation since the surrounding is composed mainly by shrubs.
- Impacts on air quality from vehicle exhaust emissions;
- Risk of sparks/fire from live conductors;
- Solid waste;
- Land Acquisition/displacement;
- Electric shocks and electrocution of people;

- Occupation safety and health hazards;
- Public health risk;
- Construction material sourcing-wooden poles;
- Oil Leaks from transformers;
- Noise during construction;
- Contamination from CCA and creosote-treated poles;
- Possible water and soil pollution from oil spillages from generators; and
- Soil erosion during the construction of the power line.

Proposed environmental and social impacts mitigation measures

After environmental and social screening, mitigation measures were proposed for each adverse impact identified during the screening process–with a particular focus on the, disposal of obsolete batteries for photovoltaic systems, Occupational (and Public) Health and Safety issues, minimizing impacts on avifauna (particularly during nesting periods), minimization of vegetation loss at the proposed mini-grid project site and along the distribution line, and safe disposal of PCB and creosote and CCA-treated poles. Any trees cut along the lines or at the generation sites will be replaced. More measures to be taken include:

- ✓ Soil erosion control measures should be undertaken;
- ✓ Relocation for those farmers whose lands will be affected;
- ✓ Minimal cutting of trees while erecting power distribution lines;
- ✓ The power line should be designed considering environmental and safety standards;
- ✓ Project management committee should include the locals and should have no political, and manipulation as this has led to collapse of many projects.

Proposed budget for the environmental impacts mitigation measures

In addition to the mitigation measures provided in the table 14 and 15 will cost about Ksh. 1,150,000 during construction, operational and decommissioning activities of the proposed mini-grid. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined.

Recommendations from the neighbors

- ✓ The project should go on; the central government should engage county government in this project to avoid political sabotage, and

- ✓ Residents should be involved all through and where the skills needed are locally available the residents should be accorded the first priority.

Duties of the Proponent

It will be the duty of the proponent to ensure that all legal requirements as pertaining to project development are met as specified by the law, including World Bank Safeguards and specifically

OP 4.01 (Environmental Assessment):

- ✓ The proponent shall hand over the site to the contractor for implementation of the project after the social and environmental mitigation measures that are the responsibility of the proponent has been completed, especially compensation matters.
- ✓ The proponent is also the one to fund the project.
- ✓ The proponent will ensure that the ESIA is submitted to NEMA and a license is obtained.
- ✓ The proponent is also the one who has initiated the project and will also ensure its satisfactory implementation.

Duties of the Contractor:

- ✓ Implementation of the contractor related aspects of the ESMP and regularly reporting back to the mini-grid Project proponent.
- ✓ Maintaining the required level of stakeholder engagement and communication, including providing project schedule information to the public, accepting and resolving public grievances, advertising and hiring local workers.
- ✓ Maintain a working grievance redress mechanism.
- ✓ Ensure that the project has children protection champions.
- ✓ Prepare and maintain an approved Time and Progress chart, showing clearly the period allowed for each section of the work
- ✓ The contractor is to comply with all regulations and by-laws of the local Authority including serving of notices and paying of the fees.
- ✓ During the night, public holidays and any other time when no work is being carried out onsite, the contractor shall accommodate only security personnel and never should a labor camp be allowed on-site.
- ✓ The proponent shall define the area of the site, which may be occupied by the contractor for use as storage, on the site
- ✓ The contractor shall include all recommendations from ESIA into the contract.
- ✓ The contractor shall provide at his own risk, and cost all water required for use in connection with the works including the work of subcontractors, and shall provide temporary storage tanks, if required
- ✓ The contractor shall make his own arrangements for sanitary conveniences for his workmen.
- ✓ Any arrangements so made shall be in conformity with the public health requirements for such facilities and the contractor shall be solely liable for any infringement of the requirements.
- ✓ The contractor shall be responsible for all the actions of any subcontractors in the first instance.
- ✓ The contractor shall take all possible precautions to prevent nuisance, inconvenience or injury to the neighboring properties and to the public generally, and shall use proper precaution to ensure the safety of wheeled traffic and pedestrian.
- ✓ All work operations which may generate noise, dust, vibrations, or any other discomfort to the workers and/or guest of the client and the neighbors must be undertaken with care, with all necessary safety precautions taken.

- ✓ The contractor shall take all effort to muffle the noises from his tools, equipment and workmen to not more than 70dBA.
- ✓ The contractor shall upon completion of working, remove and clear away all plant, rubbish and unused materials and shall leave the whole site in a clean and tidy state to the satisfaction of the Proponent. He shall also remove from the site all rubbish and dirt as it is produced to maintain the tidiness of the premises and its immediate environs.
- ✓ No shrubs, trees, bushes or underground thicket shall be removed except with the express approval of the Proponent.
- ✓ No blasting shall be permitted without the prior approval of the Proponent and the local authorities.
- ✓ Borrow pits will only be allowed to be opened up on receipt of permission from the Proponent.

- ✓ The standard of workmanship shall not be inferior to the Kenya Bureau of Standards where existing. No materials for use in the permanent incorporation into the works shall be used for any temporary works or purpose other than that for which it is provided. Similarly, no material for temporary support may be used for permanent incorporation into the works.

- ✓ Disposing of the waste generated during construction activities according to the agreement with the local county government.

Having considered the data collected, analyzed and collated information that is available, it is the experts considered opinion that:

i. The project **DOES NOT** pose any serious environmental and social concerns, other than those of minor scale that accompany most development activities.

ii. The positive impacts of the project outweigh the negative ones, which will be adequately contained by following the prescribed environmental management and social impact management plans; and

iii. As such the project should be allowed to commence, and activities be managed within the provided Environmental Management Plan and sound environmental management practices that are internationally recognized.

CHAPTER 1: INTRODUCTION

1.1 Project Background

The Kenya Electricity Modernization Project (KEMP) – to be financed by the World Bank Group aims to support the Government's initiatives of ensuring increased electricity access to Kenyans, particularly among low income groups in peri-urban and off-grid areas. According to the Ministry of Energy and Petroleum (2007), the current sources of electrical power generation are: hydro 3,025 Gwh (51.2%), thermal oil 1,819 Gwh (30.8%), geothermal 1,046 Gwh (17.7%), cogeneration 6 Gwh (0.09%), wind 0.3 Gwh (0.01%) and imports 11 Gwh (0.2%). Petroleum fuels are imported in form of crude oil for domestic processing and also as refined products, and are mainly used in the transport, commercial and industrial sectors. The domestic consumption of petroleum products are as follows: light diesel oil 1,035,600 tonnes (34.1%), fuel oil 664,600 tonnes (21.9%), aviation spirit and jet fuel 595,300 tonnes (19.6%), motor spirit 358,200 tonnes (11.8%), illuminating kerosene 279,200 tonnes (9.2%), liquefied petroleum gas 64,600 tonnes (2.1%) and heavy diesel oil 40,700 tonnes (1.3%). The Kenya Electricity Modernization Project (KEMP) that is financed by the World Bank Group aims to support the Government's initiatives of ensuring increased electricity access to Kenyans, particularly among low income groups in peri-urban and off-grid areas for example MkwiroVillage in Pongwe/Kidimu Location, Kwale County. Mini-grid project has been designed to supply electricity to households.

1.2 This Environmental and Social Impact Assessment (ESIA) Study report

This Environmental and Social Impact Assessment (ESIA) Study report was carried out in conformity with the requirements of the Environmental Management and Co-ordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003 and the new Wastes disposal Regulations. According to section 58 and 138 of the EMCA, 1999 and section of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), major development projects require an Environmental and Social Impact Assessment be conducted and a report submitted to the National Environment Management Authority (NEMA) for review and eventual licensing before the commencement of development. In preparing this report, reference has been made to environmental guidelines of Kenya, World Bank guidelines and other International Conventions on the Ecosystems.

1.3 Project Objectives

The broad objectives and scope of this report were to:

i. Study the baseline environmental conditions within Wasini island, such as biological, physical and socio-economic environment;

ii. Study the positive and negative impacts of the proposed mini-grid power project -on the society living within the influence of the location including, but not limited to, job creation and improvement in the livelihood;

iii. Assess environmental and social impacts of the project and suggest suitable mitigation measures for the adverse impacts;

iv. Study the project conditions and requirements in terms of location, construction and operation requirements;

v. Study issues arising from the proposed mini-grid project for example resident relocation (along the power line), deforestation, rehabilitation of vegetation affected and physical environment; and

vi. Prepare an environmental management plan for implementation and monitoring of mitigation measures along with budgetary estimates, institutional and reporting requirements.

The environmental and social impact assessment was carried by licensed ESIA/EA Lead Expert to carryout ESIA by the National Environmental Management Authority (NEMA) as provided in Environmental Management and Coordination Act (EMCA) sections 58 and 68 and Environmental and Social Impact Assessment and Audit Regulations of 2003. This ESIA was carried out by persons indicated in the table 1 below:

Table 1: Team of consultants and assistants involved in the ESIA assignment

S/No	***Name of Consultant or Assistant***	***Position***
1.	Dr. Joseph Kurauka	Lead Expert/ Team Leader
2.	Ms. Rosemary Gachengu	ESIA Field Associate
3.	Mr. Lali Mohammed	ESIA Field Assistant
4.	Mr. Justus Baya	ESIA Field Assistant
6.	Mr. Hamisi Salim	ESIA Field Assistant
7.	Miss. Jesicca Salama	ESIA Field Assistant

1.4 Project Justification

At national level, biomass (mostly wood fuel) accounts for about 68 percent of the total primary energy consumption, followed by petroleum at 22 percent, electricity at 9 percent and others at about less than 1 percent. In rural areas, the reliance on biomass is over 80 percent. Only approximately 15 percent of Kenyans have access to grid electricity. Access to affordable modern energy services is constrained by a combination of low consumer incomes and high costs. In the rural areas where only about 4 percent of the population has access to electricity, the scattered nature of human settlements further escalates distribution costs and reduces accessibility. The majority of Kenyans live in rural areas where traditional biomass (mainly wood fuel) has remained the leading source of energy (both for cooking, and at times for lighting). However, the potential of biomass has not been effectively utilized in the provision of modern energy for a variety of reasons. One is the failure to exploit the opportunities for transforming wastes from agricultural production and processing into locally produced modern energy. High incidence of poverty is another constraint to shift from traditional to modern biomass energy utilization.

Continued over-dependence on unsustainable wood fuel and other forms of biomass as the primary sources of energy to meet household energy needs has contributed to uncontrolled harvesting of trees and shrubs with negative impacts on the environment (deforestation). Environmental degradation is further exacerbated by climate variability and unpredictability of rainfall patterns. In addition, continued consumption of traditional biomass fuels contributes to poor health and lower life expectancy and productivity among users due to excessive products of incomplete combustion and smoke emissions in the poorly ventilated houses common in rural areas. Biogas is an energy technology that has the potential to counteract many adverse health and environmental impacts connected with traditional biomass energy in Kenya.

Kenya's daily average solar insolation is estimated to be about 4-6 kilowatt hours per square meter, which is considered one of the best for solar electric energy production in sub-Saharan Africa. Depending on the conversion efficiency of solar modules, 10-14% of this energy can be converted to electric power. However, there are regional and seasonal differences in the solar resources of the country. According to Energy Regularity commission (ERC), in the early years of photovoltaic (PV) development in Kenya, solar systems were relatively larger, complicated and expensive. Most of them failed because of lack of capability for appropriate installations and maintenance. Despite this significant success was achieved in the commercial diffusion of battery-based solar home systems, driven by a desire for TV viewing of the rural community.

In addition, electricity demand in Kenya is significantly rising mainly due to the accelerated productive investment and increasing population. Over 85% of the population relies on traditional fuels such as wood, charcoal, dung, and agricultural residues for cooking and heating. Moreover, Kenya relies heavily on imported petroleum for local consumption. In 2007, Kenya imported 57,000bbl/day of crude oil. The primary energy supply is dominated by indigenous biomass use, which mainly supplies households and SMEs. However, many rural areas are not reached by grid-based electrical power, nor is there adequate distribution of gas or other cooking and heating fuels. A weak transmission and distribution network, low countrywide electricity access and over-reliance on hydropower which is vulnerable to weather caprioles, are some of the challenges facing the electricity sector. Significant opportunities exist for improving energy supplies in all sectors, in particular the industrial sector.

Development projects recommended under Vision 2030 and overall economic growth will increase demand on Kenya's energy supply. Currently, Kenya's energy costs are higher than those of her competitors. Kenya must, therefore, generate more energy and increase efficiency in energy consumption. The Government is committed to continued institutional reforms in the energy sector, including a strong regulatory framework, encouraging private generators of power, and separating generation from distribution. New sources of energy will be found through renewable energy sources, and connecting Kenya to energy-surplus countries in the region.

The Wasini island mini-grid-power development in Wasini village is designed primarily to address energy demands at the local level and creating income generation activities. Shimoni shopping center is being developed as a hub of business growth in the lower parts of Kwale County, with for example fish and other farm produce processing plants suffer huge economic losses due to unreliable power supply. The proposed project therefore, will provide immense benefits not only to domestic consumers but also existing and upcoming small medium

enterprises and institutions. Energy is one of the infrastructural enablers of the three "pillars" of Vision 2030. The level and intensity of commercial energy use in a country is a key indicator of the degree of economic growth and development. Kenya is therefore expected to use more energy in the commercial sector on the road to 2030. As incomes increase and urbanization intensifies, household demand for energy will also rise. Preparations have been made to meet this growth in demand for energy under the Vision.

Commercial energy in Kenya is dominated by petroleum and electricity as the prime movers of the modern sector of the economy, while wood fuel provides energy needs of the traditional sector including rural communities and the urban poor. At the national level, wood fuel and other biomass account for about 68% of the total primary energy consumption, followed by petroleum at 22%, electricity at 9% and others including coal at about less than 1%. Solar energy is also extensively used for drying and, to some extent, for heating and lighting. Electricity remains the most sought-after energy source by Kenya society and access to electricity is normally associated with rising or high quality of life.

However, its consumption in Kenya is extremely low at 121 kilowatt hours (khw) per capita (compared to 503khw in Vietnam or 4,595khw for South Africa) and national access rate at about 15%. The access rate in the rural areas is estimated at 4%. All that is changing rapidly as the country invests more resources in power generation, which in addition to policy and institutional reforms in the sector, brings in new providers. Most fish processing industries and other factories have been experiencing power supply problem hence incurring losses when they turn to other sources of energy. The proposed project will target local community, fish processing, other factories and potential institutions for energy supply and also the local community.

1.5 Project Implementation

The Ministry of Energy (MoE) through Rural Electrification and Renewable Energy Corporation (REREC) will be responsible for overall coordination and oversight of the project construction. The mini-grid project will be managed by the Kenya Power and Lighting Company (KPLC) during operational phase. The ministry will be involved in;

i. Definition of areas to be electrified based on technical and policy development priorities,

ii. Consolidating information from implementing agencies,

iii. Monitoring the implementation of project, and

iv. Evaluating the project.

The Ministry of Energy and Petroleum was first established in 1979 to oversee the development and implementation of policies to ensure energy from various sources was made available to meet demand. The Ministry plays a largely facilitative role in energy supply, which includes taking leadership in the development of policy as well as legal and regulatory framework for the sector. In addition it has an oversight responsibility over the provision of reliable and adequate energy generation and distribution.

The Ministry has 10 Energy Centres spread around the country and has a core staff complement of approximately 270, spread across three core departments - Geoexploration; Electric Power and Renewable Energy and three support departments that is Planning, Finance and Administration. The Energy Centres provide basic information and technical advice on biogas and materials needed and also conduct demonstrations. They may also refer potential customers to credible local technicians. It is estimated that through the ministry's biogas promotion program about 1300 biogas plants have been established, but there are no records available to verify this estimate. It is also estimated that through the ministry's efforts about 50 biogas units are constructed every year.

The MoEP will hire, on a competitive basis, a Project Coordinator to consolidate the information prepared by the implementing agencies and will report to the Principal Secretary, MoEP. The Rural Electrification and Renewable Energy Corporation an agency of government under the MOEP will implement Component C2 of the project. Its mandate under the draft Energy bill is to be expanded to include promotion and development of renewable energy resources (excluding large scale). The REREC will be supported by a Technical Advisory Service (Consultant) for implementation of component of the project. REREC will prepare the needed safeguards instrument, in this case the EIA/EMP, in accordance to the ESMF. REREC will screen proposed mini-grid projects to determine their viability and feasibility. Once a sub project is proposed for funding, REREC will prepare a ToRs for the ESIA/EMP consultant.

CHAPTER 2: METHODOLOGY

2.1 Introduction

The successful implementation of a project of the magnitude and importance as the ESIA of the proposed mini-grid power project required careful planning, strict adherence to time and budget allocations. Based on our extensive experience in carrying out ESIAs for large infrastructural development projects and power supply projects of this nature, and our good understanding of the scope of work for the successful execution of the ESIA of the proposed mini-grid power project.

In conformity with the EMCA, 2015 and the ESIA Regulations, REREC has accordingly engaged the services of the registered experts to conduct the necessary study and prepare an ESIA report. For the purpose of this study and preparation of the report, the following approaches and methodologies were employed:

i. Desktop studies which involved thorough review and analysis of literature for acquisition of secondary data;
ii. Environmental screening, in which the project was identified as among those requiring Environmental and Social Impact Assessment under schedule two (2) of EMCA, 1999;
iii. Environmental scoping that provided the key environmental issue at the site of construction;
iv. Physical inspection of the site and surrounding areas during which necessary photographic evidence at the sites was captured for the report;
v. Conducted interviews involving all necessary stakeholders for collection of primary data;
vi. Administration of household questionnaires to the community around the proposed site;
vii. Conducted public meetings with the community members in the location to collect views of the people;
viii. Identification of potential impacts;
ix. Confirmation and sharing of findings with various stakeholders in the Stakeholders' Workshop, including County Heads of Departments and opinion/community leaders; and
x. Reporting.

In planning for this assignment, we have taken note of the following important considerations:

- ✓ The need for thorough familiarity with the local legislation and Environmental Impact and Audit regulations, 2003), and EMCA, 2015 amended, Energy Act, No 12 of 2006, etc.,) and agency/partner expectations;
- ✓ The need for extensive knowledge of the project, the immediate project area and overall area of influence; and
- ✓ The need for extensive local expertise as well as international experience and thorough knowledge of international (e.g. World Bank, United Nations) best practices.

2.2 ESIA assignment Approach and Work Plan

This project approach and work plan is made up of overlapping tasks that are listed below. These tasks are also outlined in the attached project schedule:

Task 1:Project Planning and Mobilization;
Task 2:Project Justification;
Task 3:Project Description;
Task 4:Description of the Environment through desktop review;
Task 5:Legislative and Regulatory Consideration;
Task 6:Determination of Potential Environmental Impact;
Task 7:Occupational Health and Safety Concern;
Task 8:Development of Management and Monitoring Plan;
Task 9: Comparison of Alternatives; and
Task 10: Deliverable.

The details of the implementation plan for each of the above tasks are described in the following sections. All of the elements called out in the scope of work. The tasks have been arranged chronologically, following the proposed mini-grid project timeline.

Task 1: Project Initiation and Mobilization
After the contracting, the Consultant attended a project commencement meeting with the REREC. The purpose of the meeting was three fold: a discussion of Clients expectations; a review of our approach for the EIA; and efficient mobilization. Reconnaissance shall be undertaken to the site as part of the Inception Phase to obtain visual information about the site, activities and resources and other relevant information that assisted in project execution. During the visit, affected communities were sensitized on the project and the need to schedule a proper consultation meeting with the community heads in effort to solicit their buy-in to the project.

Task 2: Project Justification
The proposed intervention will improve access to renewable energy for the residents. It will provide safe, clean, nearby water and improved home environmental sanitation for residents. The Consultant reviewed all available literature and discuss in detail the justification for the project.

Task 3: Project Description
The objective of the project is to improve the clean energy access for the local residents by providing. A full description of the overall project and its existing settings was carried out to include location; general layout; unit process description and diagram for rehabilitation/new components; population served, present and projected; number and types of affected households; water supply characteristics, adjacent facilities, natural, or cultural facilities close to project site; existing/new road or other supportive infrastructure, pre-construction and construction activities; site management, operations and maintenance. The ESIA took into consideration the environmental impact of each structure as well as the cumulative impacts on the environment.

Task 4: Description of Environment

Our team conducted desk review to describe in detail the existing environmental characteristics of the study area. Following the desk review possible data gaps were identified and supplemented with field assessment and public consultations with the community who are likely to benefit from the project, project affected persons (PAPs) and relevant County and National Institutions. Published and unpublished report, development plans and maps in order to compile relevant baseline biophysical and socio-economic information about the study area. The biophysical information to be compiled include:

i. Climate, Topography, land use, landscaping, soil cover, water quality and available infrastructure serving the local people.
ii. Terrestrial communities in areas affected by construction, facility sitting, land application or disposal; rare or endangered species; sensitive habitats, including parks or reserves, significant natural habitats; species of commercial importance in land application sites.
iii. We collected information on the socioeconomic profile. The information that was compiled include:

- ✓ Social environment: present and projected populations; cultural heritage sites on or near proposed infrastructure interventions, education, labour force;
- ✓ *Energy sources:* access to reliable renewable energy is a major challenge because most residents depend on fuelwood; and
- ✓ *Health situation:* public health issues specific to water supply and water quality in addition to existing bad infrastructure.

Plate 1: Vegetation cover within the proposed mini-grid project area

2.3 Field Visits

Our team conducted field visit in the study area in order to collect site-specific information on the biophysical and socio-economic environment and to crosscheck the secondary data. While

at the site, environmental data was recorded and potential impacts were identified. In addition, environmental features relevant to the study were noted and photographs of key features were taken.

Plate 2: One of the stakeholders involved during consultation and public participation

2.4 Socioeconomic Survey

We undertook socioeconomic survey in **45** sampled households targeting all Wasini village. This was 18% of all the 25 households in the village. The main sampling unit of the survey was the household. Our team consulted the area assistant chief and village elders to identify the villages and households in the project's zone of influence and to introduce the enumerators to the households identified. The socio-economic investigation provided more detail information about current conditions and trends in communities within and around the project area. Enumerators were sought within the project area. The resultant data was coded uniformly for data entry purposes. Quantitative data was analyzed using simple and relevant statistical methods such as average, percentage and frequency distribution.

Plate 3: Interviewing a community member within proposed project area

Plate 4: Interviewing a local shopkeeper likely to benefit from electrification project

2.5 Detailed and in-depth Literature Review

A thorough review of the project appraisal documents was undertaken, focusing on project description- project development objective and key indicators, project components, project target areas, institutional and implementation arrangements, and monitoring and evaluation of outcomes. Some key baseline information on Kenya's recent macroeconomic developments especially in the energy sector development was reviewed from project documents. The review also covered Kenya's policy, legal, regulatory and administrative frameworks relevant to the proposed mini-grid project. The World Bank Operational Safeguard Policies were reviewed to identify the likely policies to be triggered by the proposed mini-grid project. The team also reviewed the Kwale County Integrated Development Plans (CIDP).

The literature review further encompassed the overview of Kenya's physiographic and climatic issues, the state of the general environment and population and population dynamics throughout the country. Review on the existing baseline information and literature material was undertaken and helped in gaining a further and deeper understanding of the proposed mini-grid project. A desk review of Kenya's legal framework and policies related to electronic wastes was also conducted in order to the relevant legislations and policy documents that should be considered during project implementation. Among the documents that were reviewed in order to familiarize and further understand the project included:

World Bank Related Documents

i. Aide Memoires;

ii. World Bank Safeguards Policies;
iii. Project Concept Note;
iv. Project Appraisal Document;
v. World Bank Group Environmental, Health, and Safety Guidelines (known as the "EHS;
vi. Guidelines"). ***http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines***; and
vii. IFC Performance Standards.

A comprehensive review of all Kenyan laws, regulations and standards governing environmental quality, industrial/pollutant discharges to surface waters and land, water reclamation and reuse, worker health and safety and endangered species and land use control was carried out. We reviewed the Environmental Management and Coordination (Amendment) Act, 2015. Relevant national policies, laws and regulations, and WB OPs, IFC PS were also reviewed as discussed in chapter six (6).

2.6 Public Consultation

Public participation is critical to the success of a development project; it a legal requirement for inclusion in an EIA process. Public consultations were undertaken through key informant interviews and public meetings. The consultations focused on enhancing the long-term success of the project by, establishing a systematic dialogue with, and earning the trust of the surrounding communities and other stakeholders.

Our approach to public consultation was interactive, and involved the following key steps:

- ✓ Identify stakeholder groups.
- ✓ Conduct preliminary meetings/interviews/research and assess stakeholder interests/concerns;
- ✓ Develop stakeholder interaction strategy;
- ✓ Provide information to stakeholders about the project and anticipated environmental and socio-economic impacts;
- ✓ Provide feedback to project team to incorporate stakeholder issues into project planning and decision making.
- ✓ Stakeholder engagements would be conducted in a clear, transparent manner that provides the public and all participants with a realistic understanding of the project and the range of possible outcomes. This approach would clearly clarify the limits of the stakeholder's influence in the final decision-making process, since this ultimately rests with the Client. This clear definition of the realities of the situation; would engender a sense of trust about the engagement process.

Table 2: Level of Engagement

Levels of Stakeholder Engagement	
Inform	To provide the stakeholders with balanced and objective information to assist them in understanding the problems, alternatives, opportunities and/or solutions.
Consult	To obtain stakeholder feedback for decision-makers on analysis, alternatives and/or decisions
Involve	To work directly with the stakeholders throughout the process to ensure that their concerns and aspirations are consistently understood and considered in decision-making processes
Collaborate	To partner with the stakeholders in each aspect of the decision including the development of alternatives and the identification of the preferred solution.

2.7 The Proposed Project Key Stakeholders

The project has the following stakeholders:

i. Local community in Mkwiro village

Individuals or groups in the affected community will want to know what is proposed; what the likely impacts are; and how their concerns will be understood and taken into account during mini-grid construction, operational and decommissioning phases. They will want assurances that their views will be carefully listened to and considered on their merits. The members of the community will want project proponent to address their concerns. Consultation of the local community in Mkwiro village will also enable them to have knowledge of the local environment and community that can be tapped and incorporated into baseline data.

ii. County Government

The Kwale County Government relevant departments of physical planning, environment and energy were consulted to have their policy and regulatory responsibilities addressed in impact analysis and mitigation consideration. An effective public involvement programme can mean the proposed project may be less likely to become controversial in the later stages of the process.

iii. Ministry of Industry, Trade and Co-operatives (MoITC)

Provision of in-kind support for overall project coordination, inter-ministry communication facilitation, policy matters, and identification/coordination of industry/capacity building institution.

iv. Ministry of Energy and Petroleum (MOEP)

Provision of national-wide expertise on renewable energy application for productive uses and in-kind support for overall project coordination, policy matters, and identification/coordination of capacity building institution;

v. The National Treasury

The National Treasury will offer guidance in relation to public and private partnership, the private firms will be involved in technology adoption and transfer, and there is a room for public and private partnership as the project progresses;

vi. Ministry of Agriculture

The Ministry will support implementation of the pilot phase and fast-tracked escalation of the technology application to other areas.

vii. Institutional partners for capacity building and knowledge management

Development of training sessions for awareness, assembly, operation/maintenance, localization, site selection, system designing and planning; Ownership, organization and regular provision of training sessions during and after the project; Organizations of training of trainers, vocational training of O&M but also value addition using invested productive assets with involvement of financial institutions, civil society etc.; collection, analysis and sharing of data.

Task 6: Determination of Potential Environmental Impact

The goal of this task was to establish, qualitatively and quantitatively to the greatest degree possible, a cause and effect relationship between the proposed mini-grid project activities, operations, accident scenarios, and potential environmental effects. The generalized approach is presented in Figure 1. Both negative and positive impacts were identified according to project phase (e.g., design, construction, operations etc) and assessed. The magnitude, extent, duration, frequency, degree, and significance of each predicted impact on the physical, biological, and socio-economic features of the environment were assessed. The team also identified and assessed the potential implications of the project for human health and safety, focusing on workers associated with the project construction and operation and other people potentially exposed to or affected by any element of the project.

Plate 5: Wasini/Mkwiro villages island coastal line

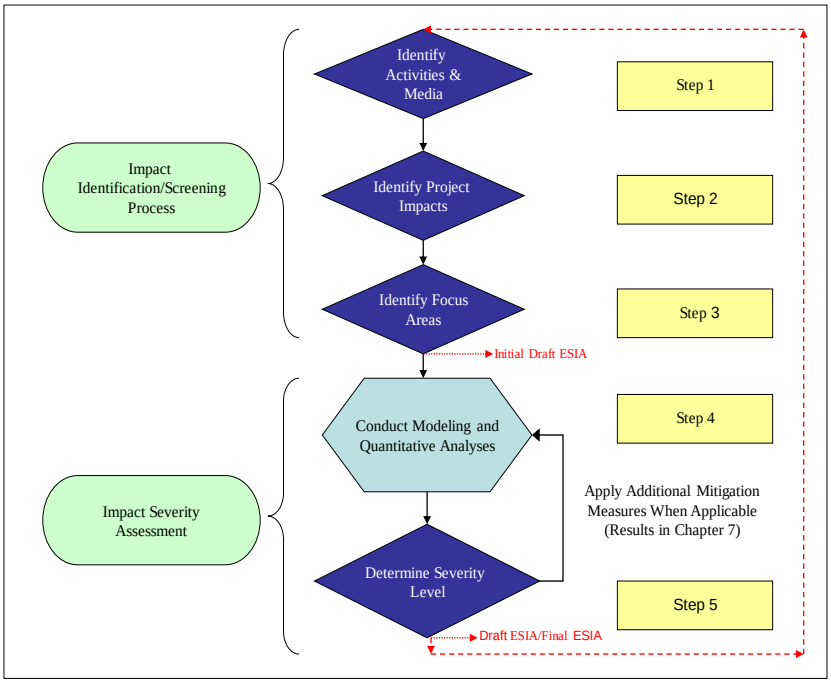

Figure 1: Generalised Impact Assessment Methodology

2.8 Identification of Impacts

Under this activity, a full list of the potential environmental and socio-economic impacts associated with the power projects to be developed. This was based on information collected and developed in the foregoing tasks regarding: study area baseline characteristics, construction activities, materials handling and possible emissions, and possible accident scenarios. The characteristics and relative sensitivity of habitats within the study area were also be taken into account. To ensure a comprehensive evaluation, the impact assessment team relied on a variety of measures to identify and weigh likely impacts. These include:

- ✓ Overlaying project components on maps of existing conditions to identify potential impact areas and issues;
- ✓ Consultation with local experts and residents;
- ✓ Experience from similar projects worldwide;
- ✓ The World Bank Environmental Assessment Sourcebook; and
- ✓ Authoritative texts on performing EIAs.

Our team utilized sectoral checklist and the Leopold matrix to identify and assess potential risks. Leopold matrix is a very useful tool for impact identification and it can provide a valuable means for impact communication by providing a visual display of the impacted items and of the major actions causing impacts. Our socio-economic impact assessment included the evaluation of the proposed mini-grid project on the adjacent communities likely to be impacted by the project over the short and long term. These included economic and cultural activities (for example, fishing, tourism and recreation) in the area of influence.

Assessment of Impact Significance and Severity Ranking

The severity of impacts was assessed quantitatively where possible and appropriate, and otherwise semi-quantitatively or qualitatively. Based on our experience on similar projects and the associated impact types, the degree of most impact types was assessed semi-quantitatively or qualitatively because quantitative scales are not applicable or useful for most of the impact types encountered. Factors considered in assessing the degree of each identified impact included:

- ✓ Whether an impact is positive, negative, or neutral;
- ✓ Duration, the length of time over which the impact occurs, and the estimated length of time required for a population or resource to recover from the impact (reversibility);
- ✓ Frequency, the number of times an impact is likely to occur, and the occurrence pattern (once, intermittent, continuous);
- ✓ Aerial extent, the geographic area potentially affected by the impact; and
- ✓ Magnitude, the percentage of a resource or population that may be affected.
- ✓ We applied significance criteria in conjunction with likelihood criteria within a risk matrix to assess the relative significance of impacts, the potential likelihood of the impact occurrence and subsequently assign each identified impact a "severity rating" (Figure 1).

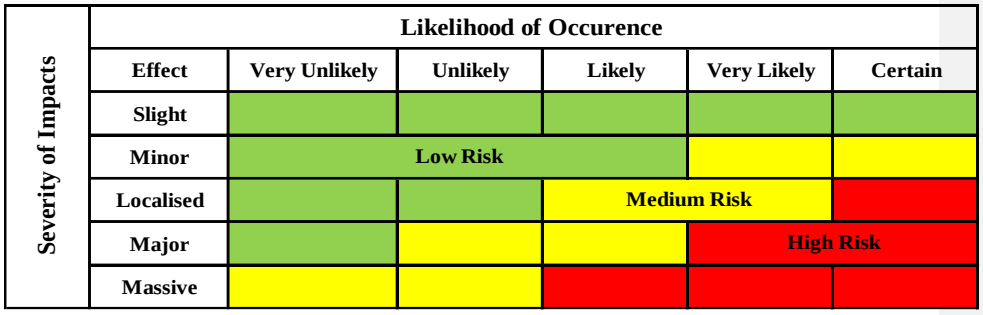

Figure 1: Impact Assessment Matrix

Task 7: Occupational Health and Safety Concerns

Occupational Health and Safety (OHS) mitigation measures will be designed to record and report on incidents, severity and frequency ratings, unsafe conditions, steps to minimize unsafe conditions. All occupational health and safety concern that may be encountered during all phases of the project have been assessed.

Task 8: Environmental Management and Monitoring Plan (EMMP)

Our team prepared an EMP with a comprehensive mitigation plan. The EMP recommended a set of mitigation, monitoring and institutional measures to eliminate, minimize or reduce to acceptable levels of adverse environmental impacts and/or maximize socio-economic benefits. The EMP includes:

- ✓ A full description of the mitigation measures was implemented in order to prevent, reduce or otherwise manage the environmental effects of the project;
- ✓ How the measures referred to above will be implemented; and
- ✓ Any other information that may be prescribed by the regulatory agency.
- ✓ Training and development for capability building;
- ✓ Monitoring programme–parameters to be monitored including timeframe, implementation requirement, staffing and cost for completing each action,

Task 9: Comparison of Alternatives

The environmental impact study involved a review of the project engineering documents, feasibility studies, technology selections, construction techniques, operating and maintenance procedures and investigations regarding all environmental issues. We carried out a comparison of any other options that have been considered and studied. From the review and assessment, a number of alternatives were identified. This may include:

- ✓ Location or site alternatives,
- ✓ Process or technology alternatives,
- ✓ Temporal alternatives, and
- ✓ No-go alternative.

2.9 Project Management and Reporting

This section addresses monthly reporting requirements, special reports. Ongoing Project Management has been indicated as **Task 0** in the project schedule.

2.10 Staff Training Plan

The accomplishment of the training plan utilized a two-pronged approach that addresses the training needs of the identified groups of Kenyan personnel. The training plan would employ a

mix of both classroom instruction and orientation coupled with an extensive amount of on-job-training under the guidance and tutelage of experienced technical personnel. For this project, formal training and "hands on" learning activities were conducted at specific work locations.

For full effectiveness, trainees shall be provided with suitable and appropriate opportunities to practice and develop their newly acquired skills in their respective job scope. This gives us the opportunity to assess performance and competence of the trainees. By enhancing and improving worker skills, work tasks were safely and effectively executed to the standards required by the Project. The curriculum for each group was defined, with specific training agendas developed for each individual as dictated by their level of experience and knowledge and the individual's discipline.

CHAPTER 3: PROJECT DESCRIPTION

3.1 Background Information

The off grid sub-component will be implemented by REREC and will support the implementation of off-grid electrification solutions in areas whose connection to the national grid is financially not viable in the short and medium term. Electrification of those areas will be implemented through mini-grids supplied by hybrid generation systems, combining renewable resources (solar or wind) and thermal units running on diesel. This sub-component will use a PPP approach. The selection of project areas is based on the number of potential users and their demand, supported by an ongoing market sounding, a demand survey and pre-feasibility studies being carried out by REREC.

Typically, the schemes will be implemented in villages of 150-400 prospective users and approximate demand of 250-500kVA. The hybrid generation system will be implemented by an Independent Power Producer (IPP) with a Purchase Power Agreement (PPA) with KPLC. The construction of the distribution infrastructure will be implemented by REREC. To achieve this objective REREC was mandated to look for appropriate sites to implement these projects and various sites were selected in Coast and Western Region. We carried out site identification and inspection in Kwale County, Wasini Island. This brief report will mainly focus on the findings of proposed Mkwiro mini-grid project.

3.2 Project Location

The site which we were shown by the area Assistant Chief, area Chief among other village elders is located in Wasini/Mkwiro Sub-Location Mwambao Location Kwale County (Coordinates S 04° 39.315´; E 039° 21.719´: Elevation 23m). The project area refers to the geographical area where the mini-grid is to be implemented and is inclusive of the load centre as well as the targeted local community beneficiaries of the project. The load centre is the Mkwiroin which, power generated from the mini-grid will be set up for use. The inhabitants of this village represent the direct local community beneficiaries.

Mkwiro mini-grid project site is located within Pongwe/Kidimu location, Shimoni division, Lunga Lunga sub-county, Kwale County. It is approximately about 10 km from Shimoni shopping center which is the major commercial centre of the Wasini Island area. Mkwiro village has no electricity and is separated from Shimoni mainland by a three kilometer stretch of the ocean making it impossible for residents to develop. Fisheries offices are located approximately three kilometers at Shimoni center from Mkwiro. The village can only be accessed by use of boats located at the harbor at Shimoni fish landing site.

3.3 Site Identification and Inspection

The site was selected following a feasibility study for mini-grid power potential of the country by the Rural Electrification and Renewable Energy Corporation in conjunction with World Bank through with the aim of introducing mini-grid power systems which can generate electricity to serve off grid communities. The exercise was carried out by a team of experts from different departments from both Kenya Power and Lighting Company Ltd (KPLC) and Rural Electrification and Renewable Energy Corporation (REREC).

Table 3: Site Identification and Inspection Team Involved

OFFICIAL		DEPARTMENT	POSITION
1	Peninah Karomo	REREC- Renewable Energy	Environment officer
2	Samuel Abaya	KPLC -SHE	Socio - Economist
3	Manuel Okoth	KPLC –Off-Grid	Engineer

The survey included:

i. Conducting basic survey looking at the existing business and energy policies as well as the market situation in the country,
ii. Evaluation of potential greenhouse gas (CO_2) reduction by the systems once installed,
iii. Evaluation of technical feasibility of the site,
iv. Planning and financing for the business, and
v. Development of business models and proposals.

Why Mkwiro mini-grid project site in Wasini Island?

1. Fits Technical Criteria i.e.
   - ✓ Receives substantial sunshine a daily,
   - ✓ Located 3 meters above sea level, and
   - ✓ Marginalized.
2. Potential users from tourism activities,
3. Close Proximity to Mombasa (80.6 km) for demonstration and incubation for localization, and
4. Community Interests will be addressed with fisheries office Facilitation.

3.4 Project Description

The Kenya Electricity Modernization Project (KEMP) – to be financed by the World Bank Group aims to support the Government's initiatives of ensuring increased electricity access to Kenyans, particularly among low income groups in peri-urban and off-grid areas. The existing and new distribution transformers (pole-mounted) shall be optimized through extension of the low and medium voltage network to reach households located in the vicinity of these transformers. Environmental Social Impact Assessments (ESIAs) and or Environmental Management Plans (EMPs) will be prepared as required by NEMA and World Bank guidelines.

3.5 Project Development Objective (PDO)

The Project Development Objective (PDO) is to:

i. Increase access to electricity
ii. To improve reliability of electricity service; and
iii. To restore KPLC's financial sustainability.

Description Project Sub-component C2: Off-Grid Electrification.

This sub-component will be implemented by REREC and will support the implementation of off-grid electrification solutions in areas whose connection to the national grid is financially not viable in the short and medium term. Electrification of those areas will be implemented through mini-grids supplied by hybrid generation systems, combining renewable resources (solar or wind) and thermal units running on diesel. This subcomponent will use a PPP approach. The selection of project areas is based on the number of potential users and their demand, supported by an ongoing market sounding, a demand survey and pre-feasibility studies being carried out by REREC. Typically, the project will be implemented in Mkwiro of 150-400 prospective users and approximate demand of 250-500kVA. The hybrid generation system will be implemented by an Independent Power Producer (IPP) with a Power Purchase Agreement (PPA) with KPLC. The construction of the distribution infrastructure will be implemented by REREC.

Component D: Technical Assistance and Capacity Building
This component will finance consultancy services, feasibility studies for new investments, training actions and other activities.

3.6 Environmental and Social Requirements

In order to reduce, minimize and mitigate adverse impacts and undue harm of its development projects to the environment, all World Bank financed projects are guided by environmental and social policies and procedures commonly referred to as safeguards instruments**.** The KEMP Project triggered the following environmental and social safeguard policies of the World Bank. Safeguard OP 4.01: Environmental Assessment; OP 4.04: Natural Habitats; OP 4.11: Physical Cultural Resources, OP 4.12: Involuntary Resettlement; and OP 4.10: Indigenous Peoples. The following safeguard policy instruments have been prepared and publicly disclosed for the different sub-components.

Table 4: Safeguards Documents

KEMP Project Component	**Policy Instrument**
A1. Upgrade of the Supervisory Control and Data. Acquisition/Energy Management System (SCADA/EMS). A2. Distribution system enhanced flexibility.	Environmental and Social Management Plan (ESMP)
C1. Peri-urban electrification	Environmental and Social Management Framework (ESMF) Resettlement Policy Framework (RPF)
C2: Off-grid electrification	Environmental and Social Management Framework (ESMF) Resettlement Policy Framework (RPF) Vulnerable and Marginalized Framework (VMGF)

Sub- component C2 Off grid electrification has triggered the following policies relevant to this ESIA
1. OP 4.01 (Environmental Assessment),

2. OP 4.10 (Indigenous Peoples) - the Wakifundi;
3. OP 4.12 (Involuntary Resettlement) – there will be no involuntary resettlement,
4. OP.4.04 (Natural Habitats), and
5. OP.4.11 (Physical Cultural Resources).

International Finance Corporation (IFC) Performance Standards relevant to this ESIA
Performance Standards reviewed and relevance in the proposed Mkwiro Village mini-grid project.
PS 1: Assessment and Management of Environmental and Social Risks and Impacts Performance Standard.
PS 2: Labor and Working Conditions Performance Standard.
PS 3: Resource Efficiency and Pollution Prevention Performance Standard.
PS 4: Community Health, Safety, and Security Performance Standard.
PS 5: Land Acquisition and Involuntary Resettlement Performance Standard – land at the proposed project site.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources Performance Standard.
PS 7: Indigenous Peoples Performance Standard - the Wavumba.
PS 8: Cultural Heritage.

3.7 Power generation plant, design methodology

The goal of the hybrid PV/Diesel system is to supply the needed electricity on the basis of solar energy stored in batteries and the support from a Diesel generator, in order to reach a PV energy share in the final mix of at least 95%. Presence of the diesel genset gives the possibility to limit the sizing of PV fields and battery bank and provide emergency supply in case of PV or battery system failure. HOMER software was used for the simulation and optimization of hybrid systems studied. This tool allows an accurate calculation of the placement of solar energy for each day of the year according to the daily load curve, itself weighted by seasonal variations and properly-set random statistical variations in order to model actual loads. The sizing of the PV array, battery, PV inverters and bidirectional inverter-charger result of optimization to be made according to the shape of the load pattern.

The solar resource data used is the Climate-SAF PVGIS baseline data. They are based on calculations of satellite images by CM-SAF (MeteoSat geostationary and Polar EUMetSat). The database contains historical data for 12 years. The spatial resolution is 1.5 minutes of arc (approximately 3 km at 0°N 0° W). The results of simulation process with HOMER software allow defining all the characteristics of the key components of the generation plant (PV array, inverters, battery bank, Diesel genset) and to assess their performances and lifespan. The proposed mini-grid is a modular and replicable layout, taking into consideration the local constraints identified during the field visits.

3.8 Hybrid Plant Main Components

3.8.1 Solar Field

The solar one (1) acre field is the main source of electricity production corresponding to 95% of the used electric energy at year 5 (year 2022). The proposed design has modules oriented to the North with 10° tilt. Solar Modules for the construction, recommended is the use of standard modules with following characteristics:

- ✓ Standard 60 cells modules. Size, ca. 1 m x 1.65 m - Efficiency higher than 16.2 %
- ✓ Polycrystalline or monocrystalline silicon cells. These are the main technologies so far, with long term field experience.
- ✓ Aluminum framed modules or glass/glass frameless modules - Renowned supplier with large module production capacity (> 1GWp/year)
- ✓ Minimum wind load 4000 Pa in accordance with IEC 61215 - Maximum system voltage of 1000 V minimum. 1500 V would be a plus.
- ✓ Minimum 10-year product warranty, and
- ✓ Performance warranty at least 80% of nominal power after 25 years.

Linear performance warranty over the first 25 years. For module transportation, recommended shipping by boat to Mombasa harbor and transport by the sea on boat or a barge from Mombasa to the island. It was recommended that to avoid road transportation because the vibrations caused by bad roads would cause micro-cracks in the cells. This would lead to loose module field performance in the range of 3 to 15%. For electrical connection, the connector of each string end has to be plugged to a connector from the same supplier. This is to avoid early degradation of electrical contact due to oxidation of two different connectors.

3.8.2 Solar Module Racks

Modules racks for free field plants are often made of galvanized steel to minimize the investment cost. But because of the corrosive environment on the islands, we recommend to use aluminium substructures. The sizing of the substructure as to take into account the wind loads. The foundations can be made of concrete blocks, earth screw or ramming poles with or without concrete casting. The sizing of foundations has to take into account the solar substructure design, the wind loads and the geotechnical characteristics. Fixations of framed modules are usually done by module clamps. To minimize the module deformation and degradation during windy events, it is highly recommended to fix the modules with clamps on the long module side. The use of slide-in systems maintaining the modules on their short side is not recommended. The modules can be installed in landscape or portrait position on the module racks.

3.8.3 Diesel Generator Set

The Diesel Genset as to feature auto-start and remote monitoring system. It has to be able to run without an on-site operator. Recommended is to install a fuel tank sized to supply a minimum of 1 to 3 months in standard conditions. Recommended is to install a genset with a sound poof enclosure to minimize noise pollution.

3.8.4 Battery Bank

Use of lead-acid OPzS type batteries with gas recombination systems is recommended. This optional system recombines O2 and H2 gas into H2O reducing the need of maintenance. The batteries have to be delivered with separate electrolyte minimizing single battery unit weight for transport to plant site. OPzS stands for:
O = Ortsfest (stationary)
Pz = PanZerplatte (tubular plate)
S = Flüssig (flooded).
Other batteries can be considered:

- ✓ OPzV type, "gel" lead-acid batteries are "maintenance less" but the unit weight is higher and the lifetime is sensitive to high temperatures.
- ✓ 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.

3.8.5 PV inverters

Use of PV inverters was recommended with following characteristics:

- ✓ Outdoor type inverters, so that they have a good resistance to the corrosive ambient air.
- ✓ Output rated power between 20 and 60 kW per unit. This is to limit the number of inverters and avoid heavy units that would be more complicated to replace.
- ✓ Inverters adapted to continuous operation in high temperature conditions.
- ✓ We recommend installing these inverters in a building to protect them from direct sunlight, humidity and theft risks.

Design ratio: PV field rated power should not be higher than 115% of the total PV inverter output rated power. This is to limit the risk of overheating by limiting the currents. 3.8.6 Battery inverters

Battery inverters are used to convert and regulate the current going in and out of the battery. We recommend using battery inverters with following characteristics:

- ✓ Outdoor type inverters, so that they have a good resistance to the corrosive ambient air.
- ✓ Inverters adapted to continuous operation in high temperature conditions.
- ✓ Design recommends installing those inverters in a building to protect them from direct sunlight, humidity and theft risks.

3.8.7 Remote Monitoring and Command System

To monitor the hybrid production system and adjust the parameters remotely, a communication system has to be installed at the plant. This system will have following characteristics:

- ✓ Internet communication modem via GPRS and/or satellite.
- ✓ Monitoring and adjustment of the main inverters parameters
- ✓ Monitoring and adjustment of the main gensets parameters
- ✓ Meteo-station including o Measurement solar cell with same orientation and tilt as the modules.
- ✓ Module temperature measurement at the back of one module.
- ✓ Wind mast 10 meters.

- ✓ To get data helping to consider the wind energy as a future additional source for a system extension.
- ✓ Ambient air temperature measurement cell.
- ✓ Indoor air temperature measurement in the different buildings.
- ✓ Production meter monitoring, and
- ✓ Data logger to keep data collected during minimum 3 months in case of internet communication failure

Buildings

The building designs should be adapted to local conditions and specific use:

- ✓ Avoiding metallic parts sensitive to corrosion (metallic grille for ventilation or fencing)
- ✓ Wooden roof structure.
- ✓ Rooftops made of "Decra" type tiles.
- ✓ Large rooftops to protect the alls from sun and rain.
- ✓ Thermal isolated rooftops.
- ✓ Use of vented concrete blocks for ventilation. - Natural ventilation adapted to the use of each building

Battery Building

The battery building is designed to keep batteries cool and ventilated, avoid water entries from rain. So we proposed walls based on plain blocks to increase the thermic inertia of the building. Natural ventilation is made by vented blocks on the upper parts of the walls.

Inverters Building

The inverters buildings are designed to keep the inverters out of rainwater, heat and very well ventilated. So we proposed walls with large ventilations made with vented blocks on the upper and lower parts of the walls. The mid height part of the wall is made of plain blocks to fix the inverters to the wall.

Diesel Genset Building

The Diesel genset building is designed to keep the genset out of rainwater and heat and very well ventilated. So we proposed walls based on vented blocks.

3.9 Power Generation Plant Sizing for Wasini Island

Assumptions - Solar Resource The data shows quite high daily radiation values over the year with maximum monthly averages over 6 kWh/m²/day from September to March and minimums near 5 kWh/m²/day from May to July.

Solar Fraction
One of the main parameter by design of a hybrid system is the share of the solar energy in the production mix. To limit the operation and maintenance costs especially on islands it was decided in accordance with REREC to aim a minimal solar energy share of 95% of the used energy mix.

Diesel Generator Set
The generator is sized with a minimum capacity of 100 kW in order to supply most of the users in case of failure of the solar or the battery system. The genset is mainly used in normal system condition (without failure) to charge the batteries in case there is a high depth of discharge (Cycle charging mode). The following efficiency curve of the genset has been adjusted by HOMER taking into account different fuel consumption values coming from genset datasheets.

3.10 Hybrid System Design and Distribution lines

System Architecture and sizing - The simulations with Homer give a classification of different sizing configurations.

3.10.1 Methodology

The objective was to determine the capital cost estimate for power distribution infrastructures, including MV (Medium Voltage) and LV (Low Voltage) distribution lines, MV/LV distribution transformers. In-house developed GIS-based grid design software GISELEC® was used to build the preliminary design of these components and estimate the capital cost. GISELEC® is dedicated to performing electrical and mechanical studies within the design process of LV and MV networks.
It is based on:

- ✓ Localization of distribution transformers at the load centroid in order to minimize voltage drop and energy losses
- ✓ Determination of conductor sections to hold the distribution constraints across the lifetime of the infrastructure (calculation of transit power and voltage drop) The sizing of the equipment is based on a spatial analysis of the load distribution. The software computes information and GIS data collected during the field visits (location of consumption points).
- ✓ The software inputs are:
- ✓ Load forecasting parameters
- ✓ Load locations
- ✓ Base maps (paths, buildings, rivers, etc.)
- ✓ Material specifications
- ✓ Calculation electrical and mechanical hypothesis

The sizing of the infrastructures for power distribution is done, for each locality, as follow:

- ✓ Layout of the LV lines, LV conductor sizing
- ✓ Sizing of the MV grid (if applicable): determination of the number and location of the distribution transformers, line layout
- ✓ Sizing of the MV line conductors (if applicable) based on the peak demand of all the LV branches.
- ✓ Sizing and positioning of poles to support both the overhead MV and LV lines.

3.10.2 Technical standards and components specifications:

Technical standards:

The sizing of the Grids in this project was done using the guidelines in the Kenyan grid code for the electrical hypothesis and the indications in the code of practice for the Kenyan standard KS 1876-1:2010 for the mechanical part. The grid sizing in this project takes into account the growth of consumption per locality for the next 10 years as demonstrated in the demand analysis.

The electrical hypothesis and components specifications adopted for this study are as follows:

- ✓ The LV is at 415 V three phase system.
- ✓ The MV is at 11 kV three phase system.
- ✓ The maximum voltage drops allowed are limited at 10% for the MV lines and 6% for the LV lines.
- ✓ The LV wires used in this project are: Aluminum ABC (Aerial Bundle Conductor) cables of 4*16, 3 * 35 / 50 / 70 mm² + 54,6 mm².
- ✓ The MV wires allowed in this project are All aluminum alloy conductor: Aster 22mm², Aster 34,4 mm² and Aster 54,6 mm².
- ✓ The MV/LV three phase transformers: 25/50/100 kVA. The mechanical hypothesis used for this study are as follows:
- ✓ Poles used to support LV lines are: Ecopole 225 and Ecopole 300 for a height ranging from 8 to 11 meters. The Kenyan standards to be taken into consideration in regards to composite poles is KS 2513: 2014.
- ✓ Climate conditions to be considered for the study are based on daily wind and temperature data for the last 10 years.

3.10.3 Mkwiro Grid Design

The island of Wasini consists of three different localities with each having its own specifications regarding number of customers, their density and their type in terms of power demand profile.

Mkwiro village Grid Design: Located in the North-West part of the island, this village contains various types of customers namely high-power demand houses, restaurants desalination plants, schools and a Hotel. The PV plant is also located on this part of the island and consequently the MV grid will have its origin based in this village.

This village is also characterized with a high density of houses alongside the beach. To make sure all 100% population is within reach of the LV grid, we have separated the village into two zones: the first one regrouping all customers at the plant. The second part only contains the desalination plant, public services situated near the plant and other high consumption customers. The second zone will be supplied directly in low voltage by the PV plant. The first zone will be supplied the required power through a MV/LV transformer.

3.11 Project Input

Material input for the construction of mini-grid power project site and its function are presented in Table 5 below.

Table 5: Proposed mini-grid project input

No.	Project Component	Activities	Materials	Equipment
1.	Site preparation	Site clearing (Power line and site)	None	Tractors, Slashers, Shovels, Jembes, wheel-barrows
		Foundation work	Hardcore backfill	Vibrator
		Leveling	Stone chips	Spades and Vibrator
		Grading of access road	Murram, gravel, sand, bitumen	Grader, mixer
2.	The power-house to be used is refitted shipping container that will be simply placed on the site.	Digging foundation	None	Shovels, jembes, wheelbarrows
		Laying of foundation	Building stones, cement, sand water	Masonry equipment
		Walling	Cement, sand, gravel/ballast	Masonry equipment
		Installation of electric security fence	Strand cable, clips and fasteners, support poles (all made from galvanized steel)	Manual equipment
3.	Mini-grid foundation.	Construction of foundation	Four bid stones being placed at the edge of the container.	Manual equipment
4.	Mini-grid site	Roofing	Iron sheet or tiles, wood	Manual
5.	Power Generator room	Construction of turbines and generator room (s)	Concrete, sand and gravel	Manual equipment
		Roofing	Painted GI sheets for roofing materials	Manual equipment
6.	Power Supply	Connection of electricity	Poles and transmission cables	Manual equipment
7.	Water	Construction of water storage tanks	Concrete, sand and gravel	Manual equipment
8.	Stand-by Power Generator	Contingent power generation	Diesel	Diesel generator
		Refilling	Diesel	Manual equipment

3.12 Project Output

The experts give the following as the main project output:

a). Waste Output:

i. Transformer,
ii. Battery inverters,
iii. Solar modules,
iv. Battery inverters,
v. Electrical materials,
vi. Poles,
vii. Domestic waste from staff houses,
viii. Waste associated with visitors (accessories, waste paper, plastics, batteries, cigarette heads and textile among others),
ix. Waste oil,
x. Oil and air filters,
xi. Containers (plastic/papers),
xii. Garden waste,
xiii. Used rugs,
xiv. Wooden pallets, and
xv. Used parts (generators, broken metals etc).

b). Other outputs include:

i. Noise emissions from turbines and power generator, construction machinery, motor vehicles, among others, and
ii. Air emissions from power generator (Carbon Dioxide (CO_2), Carbon Monoxide (CO), Nitrogen Oxide (NO_x), Nitrogen Dioxide (NO_2), and PPM e.t.c.).

Plate 6: Vegetation cover within the proposed site

Plate 7: Proposed route to the site

CHAPTER 4: BASELINE INFORMATION OF THE LOCATION

4.1 Introduction

The coastal Kenya is situated to the south from the equator. Kwale has marine ecosystems namely coastal forests especially the mangrove species, wetlands, estuaries, sand dunes and sandy beaches, coral reefs and sea grass beds that support a variety of aquatic and terrestrial fauna and flora species. Other physical environmental features discussed in this section are hydrology and drainage, climate, soils, geology and topography of the Kenyan Coast.

4.2 Location of the proposed mini-grid project

The project area refers to the geographical area where the mini-grid is to be implemented and is inclusive of the load centre as well as the targeted local community beneficiaries of the project. The load centre is the Mkwiro in which, power generated from the mini-grid will be set up for use. The inhabitants of this village represent the direct local community beneficiaries. Mkwiro is located within Pongwe/Kidimu location, Shimoni division, Lunga Lunga Sub-county, Kwale County. The village is located 2.9 km from Shimoni harbor which is the main commercial centre of the entire location. Mkwiro village has no electricity and is separated from Shimoni mainland by a three kilometer stretch of the ocean making it impossible for residents to develop. Fisheries offices are located three km at Shimoni center from Mkwiro Village. The village can only be accessed by use of boats located at the harbor in Shimoni.

4.3 County Background Information

4.3.1 Biophysical conditions

Topography

The topography is characterized by a foot Plateau which is behind the Coastal Plain. The plateau has a flat plain surface with high potential permeable sand hills and loamy soils. This zone is composed of Jurassic rocks and sandy hills. The county also is known for its white sand beaches. These land formations is a build up of eroded reef material, i.e. coral sand when it is deposited on the inshore side of the reef.

Rainfall

Kwale County, the total annual rainfall varies from 900 mm-1500 mm per annum. The county rainfall pattern is bi-modal with short rains being experienced from October to December, while the long rains are experienced from March/April to July. The total annual precipitation varies from 900mm– 1,500mm per annum along the coast to 500mm to 600mm per annum in the hinterland. The average annual rainfall ranges from 600mm in the hinterland to 1200mm at the coastal belt.

Temperatures

Kwale County, the total annual rainfall varies from 900 mm-1500 mm per annum with average temperatures range from 26.3 ^{o}C to 26.6 ^{o}C in coastal lowlands, 25.0 ^{o}C to 26.6 ^{o}C in coastal uplands and 24.60 ^{o}C to 27.50 ^{o}C in the hinterlands. Climate change has impacted significantly fishermen due to changes increased tides in the ocean and decline of some particular aquatic resources. Patterns of water and tides-high water marks, therefore, fish landing sites destroyed, prolonged drought and flooding has affected the many landing sites. In addition, loss of

vegetation cover in the upper catchment areas has also led to decline in rainfall therefore, significantly reducing livelihoods of the local community that is dependent on rain-fed agriculture. Crop failure has been reported in Kwale County especially Msambweni and Kinango constituencies.

Soils, Geology and topography

The Kenyan coast has rocks made of sediments from tertiary, cretaceous, Jurassic; Triassic to the Precambrian ages. The region is underlain by basemen coral rocks system with exception of occasional patches of reddish sand soils and black loam soils. Occupying over a half of the county, the region is semi-arid and the soils are generally poor. Ground water resources are found in Cretaceous and volcanic sediments since they enhance percolation of coastal aquifers. In coastal region, most rock formations have a shallow water table between 20 and 30 m with varying salinity. Poor quality water is found in areas covered with Pleistocene limestone and Jurassic shales.

There are four topographical features namely coastal plains, foot plateau, coastal uplands and Nyika plateau. Nyika is 600 m above the sea level; it is high ground with Duruma sand stone series and older rocks to the west. Foot Plateau lies between 140 m and 600 m above the present sea levels and coincides with the relatively younger Jurassic rocks. Coastal plains represent the lowest ground rising from sea level to 140 m. Coastal uplands rise steeply from the foot plateaus. Kwale county coastal uplands have sand stone namely Shimba hills (420m above sea level), Dzombo hills, Tsimba hills and Mrima hills.

Sand Dunes and Beaches

Sand dunes and beaches are formed by sediments from eroding corals, shells and river deposits. They are a breeding, feeding and nesting habitat to a variety of fauna such as the crabs, birds, turtles. Sand dunes in Kwale County are a source of fresh water for the county and environs. Socio-economic benefits derived from sand dunes and beaches are tourism, harvesting of sand and mineral exploration. There are a number of private owned beaches and public beaches along the coastal shores in the five counties. Private beaches are well maintained and cleaned compared to public beaches. Public recreation beaches and beaches used as fish landing sites are however polluted by solid waste- plastics and nylon. Some of the Public recreation sandy beaches include Tiwi, Diani, Msambweni, Kinondo, Shimoni, Wasini Island.

4.3.2 Socio-economic conditions

4.3.2.1 Population patterns

Mkwiro village has a total population of 1,800 persons in 257 households. Average household size is 7 persons. The island is inhabited by Wakifundi, Digo, Wavumba, Luhya, Girima. Wasini, Mkwiro and Nyuma Maji tribes. Wakifundi are classified as indigenous. Males account for 49% and females for 51%.The growth rate is 0.8%, with ages between 0–14 years taking 33.8%, ages 15 – 64 taking 59.7% and ages over 65 years amounting to 6.5%. Dependants (those below 15 years and above 64 years) constitute 43% of the total population. This calls for increased productivity of labour in order to support the dependants and development of such basic services as education, health, shelter and nutrition.

4.3.2.2 Fishing

Fishing is the main economic activity in Pongwe/Kidimu ward Mkwiro. This is made possible because the area is surrounded by a large water surface namely, the Indian Ocean. Main Species caught include; scavenger fish, white/re snappers, parrotfish, rabbit fish, rays, rockfish, squid/octopus, lobster, prawns tuna, surgeonfish, barracuda, kingfish, crabs and goatfish. The highest value fish species is the lobster fish where the fisherman gets Ksh. 800 per KG. Fishing gears used in Wasini inclde; Gill net, reef net, Basket traps, fishing line ,ring net, beach seine, fence trap, sail lining and scuba diving. There are approximately 220 fishermen within the Mkwiro, of which 120 of them are Beach Management Unit (BMU) members. There are about 10 traders for Wasini and they sell mostly to Shimoni and Ukunda for consumption. There are also approximately 5 dealers who are involved solely in processing, they collect whole octopus for processing on behalf of bigger companies in Mombasa. Coolers are used to transport the fish to markets and hotels in Ukunda or Mombasa. Dealers provide facilities for long storage and sale to long distance markets. Although there is an ice plant with the Fisheries unit, it has limited storage and hence to preserve fish, many often result to boiling or sun drying. The deep freezers and ice boxes are given to the fish traders by processing companies like Trans-Africa Sea Harvest Crustacean. Whilst the catch may be high, the facilities are limited in terms of storage which can lead to losses as the fish have to be taken to Mombasa or dried. Smoking and drying of fish is done to increase shelf life and this gives time to access other markets (Ministry of Agriculture Livestock and Fisheries Kwale County).

4.3.2.4 Crop production

Agriculture is fairly practiced in Mkwiro mini-grid project. This is caused by lack of extensive farms enriched with loam soil. The area is predominant with coral basement rocks. For the few that farm in the Island, some of the major crops cultivated in the Island include cash crops such as coconut and cashew nuts. Some food crops include millet crop maize, cassava and cow peas. Horticultural crops such as cabbages and tomatoes also flourish in the Island. Sugar plantations in Msambweni, Kwale have provided employment to many local residents.

Plate 8: Sugar processing factory in Msambweni, Kwale

4.3.2.5 Livestock production

Livestock rearing is a very minor economic activity in Wasini/Mkwiro Sub-location. Few farmers in the location engage in dairy farming, sheep rearing, beef production as well as poultry. The main cattle breeds are Zebu and Boran for beef and Crosses of Ayrshire and Sahiwal for dairy. These products are mainly for subsistence use and surplus sold to traders from Shimoni and other neighboring towns.

4.3.3 Communication and Infrastructure in the Area

There are no roads leading to neither location nor site. The island has only footpaths of sharp old coral or sand. There are no auto cars, carts or bicycles. Cargo is transported by foot or by a wheelbarrow with a solid tyre. Transport is over the paths, or via the beaches. Residents access amenities through footpaths within the Island and by use of motor or row boats from the Mainland a distance of 3 kilometers. There will be need for constructing an access road from the sea line to the proposed site facility. The population with access to fair rough roads account to 5%. A lot has to be done to improve the state of roads. Majority of the households have at least one radio where they are able to get information and at least 75% of the population own a mobile gadget where largely for the majority, their network provider is Safaricom.

4.3.4 Institutional Environment

Fish production in Wasini/ Mkwiro sub-loacation has attracted several institution and/or organizations such as Shimoni Fisheries , all with prime objective of improving fishing conditions and efficiency in the area through various intervention such as right inputs provision, capacity building, demonstrations of new technologies, remedial or mitigation measures of water pollution advocacy among other functions.

4.4 Soil Cover

This provides the only way to protect, feed and regenerate the soil as a habitat. It involves maintaining permanent soil cover of live or dead vegetal matter in the soil surface. Soil cover includes, grown cover crops, mulch cover, crop residues and green manure, which are grown or applied for the purpose of covering the soil surface with the purpose of reducing the soils degradation and conserving soils moisture and fertility. The cover crops preferred by farmers in the county are; maize and beans, cow peas, palms Other crops that flourish in Kwale County include cashew nuts, sugarcane, cotton, simsim, bixa and tobacco. These cover crops have suitably been adopted in the County and provide the anticipated benefits to the society.

4.5 Natural Resources

In Kwale County, there are a number of indigenous forests commonly known as Kayas which are sacred sites and are maintained by the Miji Kenda Councils of elders. There is Mangrove and other indigenous trees within the island. The size of the gazetted forest is 350.45Km2 and 1900Km2 for non-gazetted forest. The many indigenous forests facilitate ecotourism by providing tourists with nature trails, scenic attraction, animal viewing, and bird and butterfly watching. They also provide wood and timber for construction purposes as well as charcoal on which over 90 percent of rural households depend. The mangrove forests sustain bee-keeping that produces high quality honey and provide shelter to some fish species and oysters. Additionally, mangrove poles are used in the making of fishing traps and in construction.

Forests also provide raw materials for the manufacture of mosquito repellents, tooth brushes, glue, dyes, shampoos, soaps and rope.

Kisite-Mpunguti Marine National Park opposite Wasini Island that attracts many thousands of overseas and local tourists per year through Shimoni. The Kenya Wildlife Service monitors activities and there is a per visitor entry fee. Visitors can also indulge in dolphin and crocodile watching, snorkeling, diving, sailing, viewing of corals, bird viewing, game drives, nature walks, sundowner cruises, fishing, and cave exploration. There are thought to be 5 different species of mangroves around Wasini and Shimoni. The mangroves in the area are also believed to be in good condition because very few used them extensively. Since 2001, the mangroves have increased, as people are planting mangroves.

They believe that if there are enough mangroves this will form some protection from the high tides and it will boost fish and crab catch. There continues to be awareness on Mangrove plantation in Wasini Island. Residents in the area are more dependent on the mangroves as there are fewer other forests, and it may be more costly or time consuming to buy coal or timber from the mainland. The county has private ranches that supply dairy and beef products. Some of the ranches serve as private wildlife sanctuaries that host local and foreign tourists.

The island is close to a Kisite-Mpunguti which is a marine reserve. The reserve is a habitat and protects a variety of flora and fauna species. Aquatic fauna species in in the area are holothurians (sea cucumber), fish species such as the King fish, scavengers, Rabbit fish and Jack, octopus, molluscs and crustaceans such as crabs and prawns. The aquatic fauna are crabs, lobsters, prawns, marine animals and sea cucumbers. Other fish species include such as Tuna, red snapper, white snapper, Ornatus, lobsters, octopus, dugongs, star fish, dolphins, blue merlins, sharks, oysters, crabs, prawns, squids among others. Endangered species in the area include green turtle and hawksbill turtle, and the dugong. Marine vegetation in the county includes mangroves and sea grass beds. In addition, the island is surrounded by coral-reef. Major attractions include dolphins (bottle nose and humpback dolphins), sea turtles such as the green turtle and hawksbill, sea birds, and coral fishes.

4.6 Geographical Survey

4.6.1 Physiography

The project area is relatively rough terrain on the upper side and gradually descends to the ocean. It is at an altitude of about 23m above sea level.

4.6.2 Drainage

There is no storm water drainage channel and sewer system in the area but the Indian Ocean is within proximity to the site.

4.6.3 Seismicity

The proposed mini-grid project falls in Zone VI of seismic map of Kenya. Shimoni falls in a low seismic hazard area with peak ground acceleration (PGA) of 0.2 to 0.8 m/s^2 (Seismic Distribution Map (WHO) 2010).

4.6.4 Climatic Conditions

Lying about 500 km south of the equator in the Indian Ocean and with a general altitude documented to be around 100 to 462 metres above the sea level, Wasini is every year blasted by the vigour of the northeast monsoon Kaskazi, which brings the long rains. In the other half of the year the southwest monsoon Kusi brings the short rains. Wasini lies about 500 km. Farming takes place mostly during the long rains, April-July and short rains, September-November. About 1118 mm of precipitation falls annually. The temperature averages 23.5 °C. The Island experiences tropical humidity due to the high amounts of humidity that originate from the Indian Ocean (2010-2014), (Ministry of Agriculture, Kenya Soil Survey, Report D2, 1975,), (Kenya Meteorological Department, Kwale Weather Station).

4.6.5 Geology and Soils

Living coral reefs occur all along the length of the Island. Soils in the region show considerable variety. The porous parent rocks of sedimentary origin, generally give rise to soils of low fertility. However, patches of highly productive reddish sand and black loam soils have been observed in areas of alluvial deposits. The principal soil types in the region include a narrow strip of coastal sands towards with an exception of occasional patches of. Occupying over a half of the county, the region is semi-arid and the soils are generally poor (Ministry of Agriculture, Kenya Soil Survey, Report D2, 1975).

4.6.6 Construction Material Sources

The construction materials including wood, water, sand, stone and labour are easily available in the area.

Plate 9: Proposed mini-grid project area

4.7. Socio-Economic Set Up of the proposed Mkwiro mini-grid project location

4.7.1 Introduction

A structured questionnaire guide was used to collect responses from various categories of stakeholders during the proposed mini-grid project site visit. Copies of completed questionnaires are attached as appendix. The contents of the structured tool used in this baseline data collection has been described under methodology.

4.7.2 Respondents years lived in the proposed mini-grid project or neighbourhood

Most respondents interviewed indicated that they have lived within the proposed mini-grid project location for more the 30 years. However, a few indicated that they have lived in the proposed mini-grid project neighbourhood for less than 15 years.

4.7.3 Respondent' location with respect to the proposed mini-grid project

Out of the 49 respondents, 31% indicated that they are located north of the proposed project, 20% reported that they are located south of the proposed project, while 27% and 22% said they are located East and West of the proposed project respectively (Figure 2).

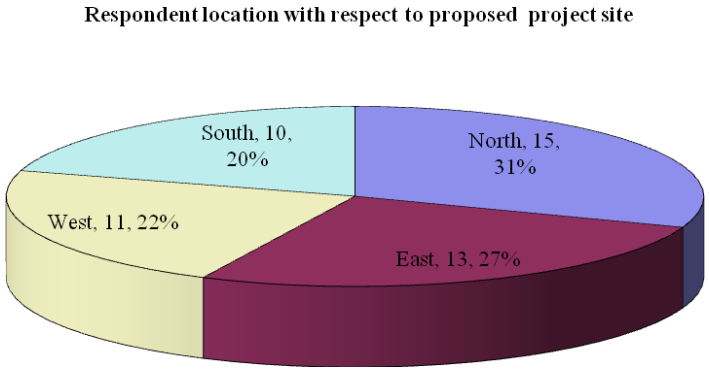

Figure 2: Respondents' location with respect to the proposed project

4.7.4 Responses on the proposed mini-grid project

All of the respondents indicated that they fully support the proposed mini-grid project in the area to enable them access to reliable electricity. In addition, majority of the respondents interviewed said that the proposed mini-grid project will therefore create employment opportunities and improved household sources of livelihoods such as small businesses that depend on electricity and cottage industries locally.

4.8 Social economic importance of the proposed mini-grid project

Majority of stakeholders (staff local learning institutions, community members who are also immediate neighbours of the proposed mini-grid project site) interviewed indicated that the proposed mini-grid project will contribute to creating employment opportunities, opening of

new industries, supply of power to education institutions, improved security, and other social economic benefits.

Table 6: Respondents general comments regarding potential environmental and social issues

S/No	*Category of respondents*	*Environmental and social issues*	*Comments/ Recommendations*
1.	Staff from various organizations	• Wastes management • Security	• Generally, environmental issues will be addressed by the respective contractors; • Management to fence the proposed mini-grid project Power-House with concrete perimeter wall; • Construction of sanitary facilities within the project area;
2.	Community members	• Wastes management • Employment opportunities	• Project to support the improvement of sanitation on the island; • Drainage system need to be well designed; • Resettlement of land owners in line with the provisions of the Resettlement Policy Framework Give priority to the local community on jobs and other local sourcing opportunities
3.	Other stakeholders	• Buildings •	• The proposed mini-grid project properly designs the buildings and facilities. • Proponent must carry out construction properly in order to reduce pollution and environmental degradation.

4.8.1 Household characteristics of respondents

The average household size of the interviewed neighbors is 1 person per household while gender of respondents interviewed were 28 (70) males, while 12 (30) were females.

4.8.2 Education level of respondents

The population within the proposed project area has some basic education. Primary recorded the highest number 8 (40%), secondary school level recorded the second highest number with 4 (25%) while tertiary colleges recorded 2 (10%). University recorded 3 (15%). Further, some of the proposed project respondents level of education recorded Madrassa education with 2 (10%) (Figure 3 below).

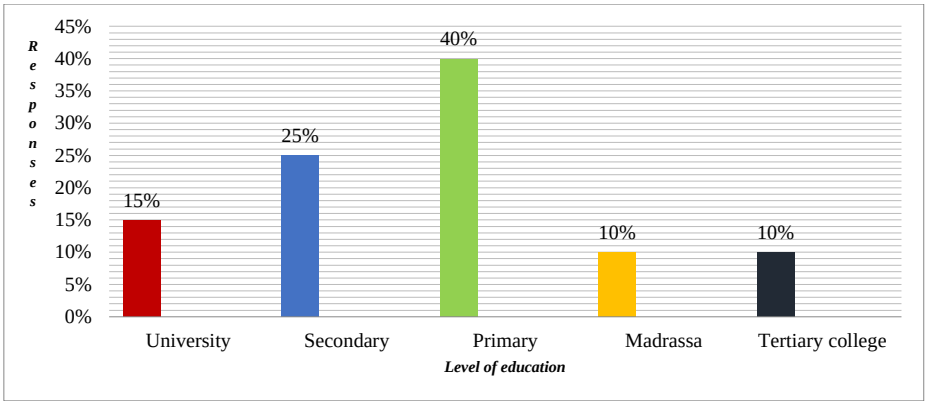

Figure 3: Respondents education levels

4.8.3 Marital status of the respondents in all sampled villages

Household field baseline study showed out of 20 respondents interviewed, a significant proportion 11 (55%) of the respondents during the time of interview said they were married; 7 (35%) of the respondents were single, while 2 (10%) were either widow or widowed (Figure 4).

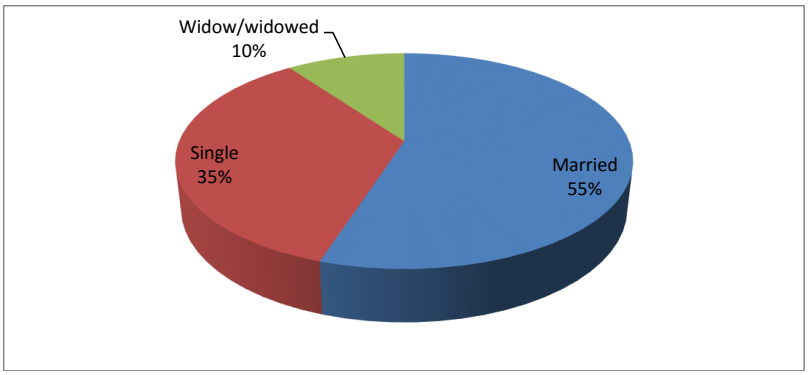

Figure 4: Marital status of the respondents all the sampled locations

4.8.4 Main source of livelihood of respondents in the sub-location

Out of the 20 individuals interviewed, most of them, depend on fisheries, another significant number is involved in tourism activities while the rest are employed (salaried or casuals) and involved in trading and retail. 8 (40%) of all the respondents interviewed indicated that they are fishermen; 6 (30%) engage in tourism activities. 4 (20%) were traders and/or retailers. However, a few 2 (10%) indicated that they are salaried employees. Community members are the most affected in case of any environmental related impacts within the mini-grid power project. Most of the neighbors felt that they will significantly benefit from the proposed mini-

grid power project through provision of employment opportunities to the community members, education opportunities in their neighborhood, supply of goods and items among other benefits (Figure 5).

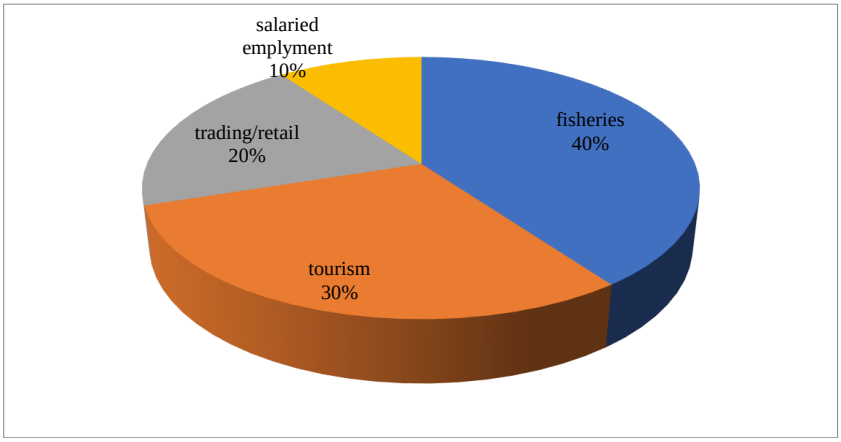

Figure 5: Main source livelihood community members

4.8.5 Respondents relationship to the household head

Out of the 20 respondents in this ESIA study, 8 (40%) of the respondents indicated that they household heads, while 5 (25%) and 4 (20%) reported that they are spouses and son or daughters of the household head respectively. In addition, 3 (15%) reported they were blood relatives (Figure 6 below).

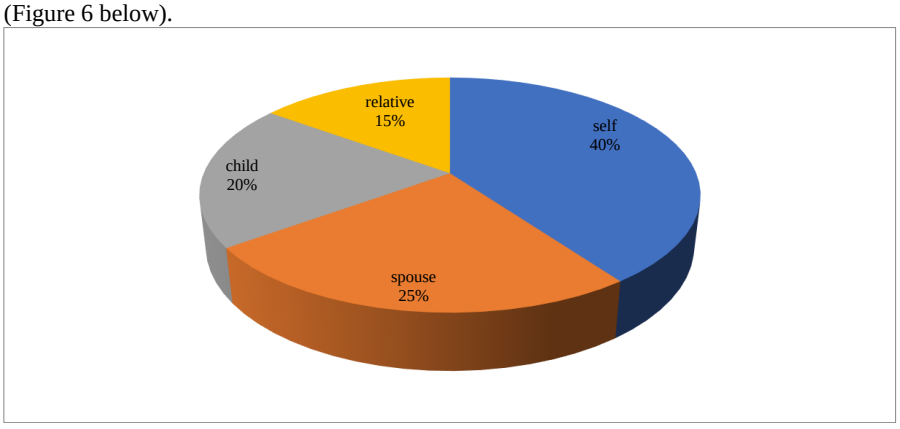

Figure 6: Respondents relationship to the household head

4.8.6 Age of the of respondents within proposed mini-grid project area

The age distribution of the average household respondents interviewed indicated skewed cohorts. Majority of respondents were between age cohorts of 31-40 years 5 (35%), 41-50 years 4 (30%), and between 51-60 years 3 (13%), 6 (15%) indicated that they are ages between, 18-30. There was a number 2 (7%) of respondents who indicated that they are above 60 years old. With a growing young population as well as declining elderly population indicates that the community is at the highest need for improved livelihoods as well as higher educational access that would spur economic development in the entire Kwale County. The population reduces fairly with those aged above 60 years make up a small part of the population (Figure 7 below).

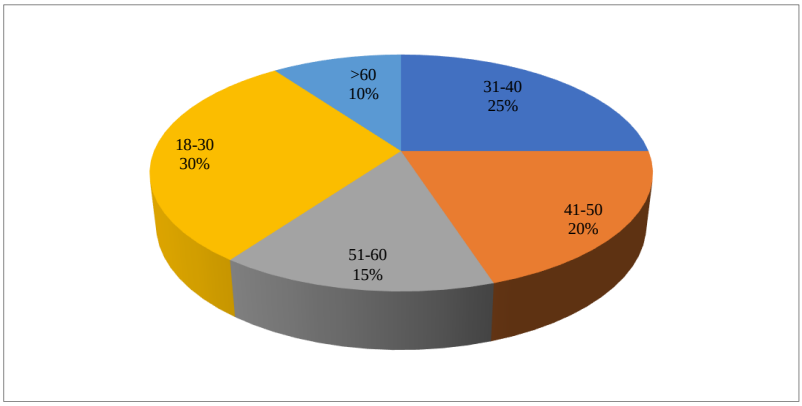

Figure 7: **Age of the respondents**

4.8.7 Land size in acres owned by the respondents in the sub-location

The proposed project site is an Island with the land being privately owned, except the area set aside for Kaya worship which is communal land (part of which has been donated for mini-grid implementation), and held in trust for the community by the county government. It is approximately 7 kilometers long and 3 kilometers across. The island has only footpaths of sharp old coral or sand. This has resulted to majority of the residents having less than 2 acres. Nine (39%) of the 20 respondents indicated that they own less than one acre of land, while majority of the respondents 6 (25%) reported that they own 1-1.5 acres of land. Furthermore, 6 (25%) said that they have 2 acres, while 2 (8%) and 1 (4%) indicated that they own 2.5-4 acres and above 5 acres respectively (Figure 8 below).

The average acreage of land owned by each household in the area is generally one acre, with a maximum of 7 acres and a minimum of 0.25 acres recorded. Majority of the households in the near future will own less than 1 acre of land in the location due to high population growth rate. This calls for proper planning to ensure that alternative sources of livelihood, value addition to the local farm produce and employment creation through small scale businesses for example, cyber café, barber shops, saloons, battery charging, and welding services among others.

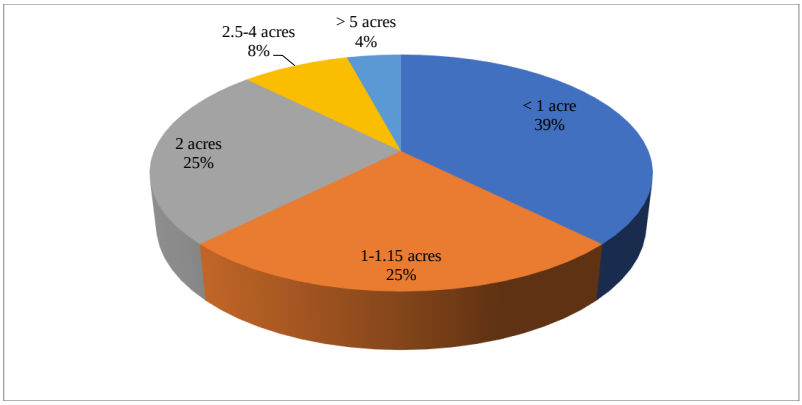

Figure 8: Respondents land size in acres

4.8.8 Main crops in the farms of respondents in the sub-location

Seven of the 20 respondents/farmers interviewed indicated that the main cash crop in their farms is coconut which constituted 33%, while 6 (29%) reported they farmed millet. 3 (14%) said the main food crop is the cashew nuts, 2 (10%) reported that green peas is their main crop, 2 (8%) reported that maize as their main crop while 1 (5%) of the respondents reported that they cultivate horticultural crops such as cabbages, tomatoes, fruits and other types of vegetables in their farms (Figure 9 below).

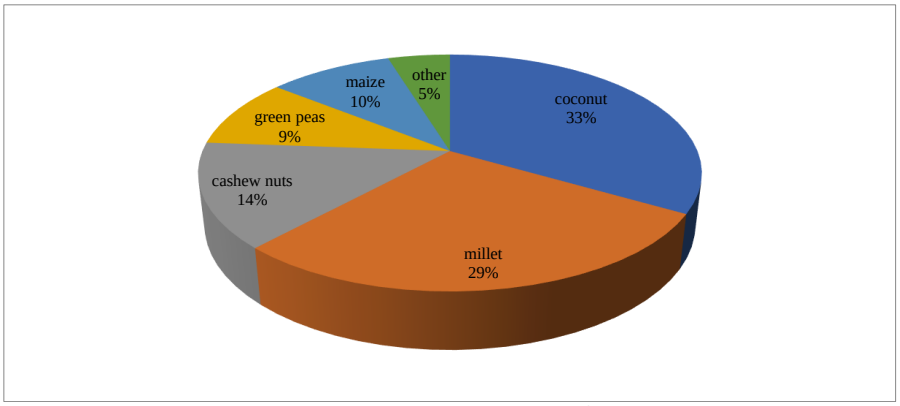

Figure 9: Main crops in the farm

4.8.9 Decision on household income spending of respondents in the sub-location

When asked who among the two spouses decides on household income spending, 24 (60%) of the respondents indicated that the husband makes decisions on how family income is spent, while 10 (25%) reported they jointly make decisions and 6 (15%) indicated the wife makes the decision (Figure 10 below).

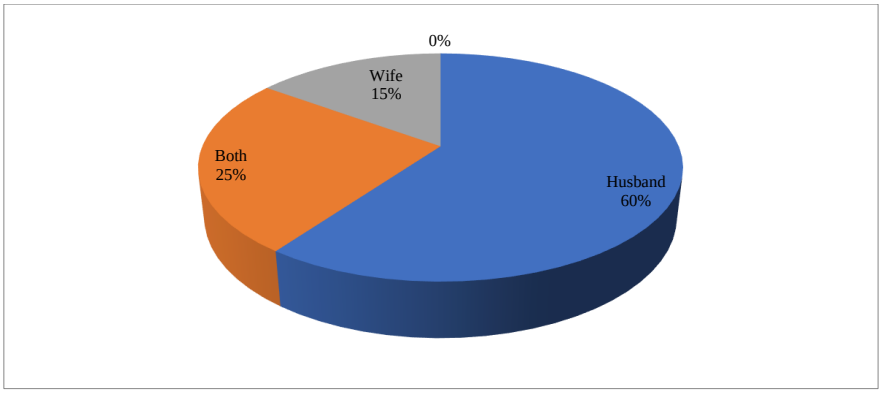

Figure 10: Decision on household income spending

4.8.10 Main kinds of livestock in the household

Twenty-three (46%) of the 40 respondents interviewed indicated they had poultry, while 18 (36%) reported they reared goats. 7 (14%) said they had cattle and a small percentage 2 (4%) reported to keep sheep. With little farm land and no ranches in the village, it was noted that very few residents kept any kind of livestock (Figure 11 below).

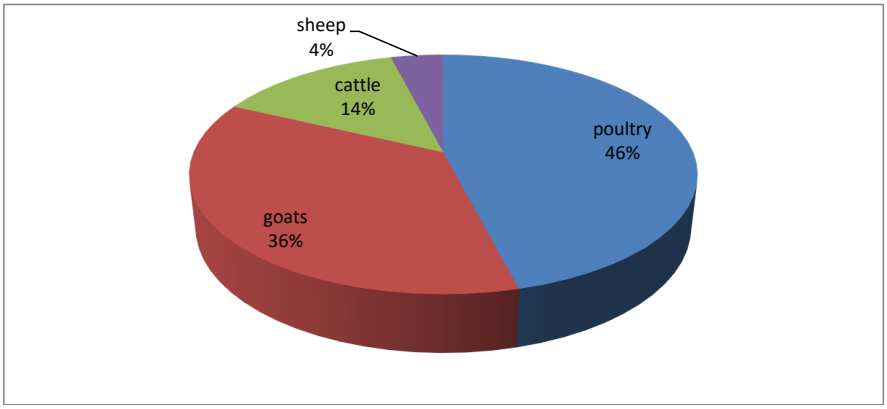

Figure 11: Main livestock in the households

4.8.11 Main kinds of fish caught

Fishing is the main economic activity of residents of the proposed projects. 90 % of the residents in the village depend on fishing to earn a living as well as a source of food. There are different kinds of fish caught in the area. Six of the 20 (30%) of the residents reported the Parrot fish as their main kind of fish, 4 (20%) indicated they mainly caught the white and red snapper. 3 (15%) reported the Rabbit fish their populous fish and another 3 (15%) reported the Barracuda

fish as the fish type they mainly caught while 2 (10%) said the King fish was their common type of fish. 2(10%) of the respondents reported they caught other types such as the Octopus, the Eel, the Moon fish, the Silver fish and even the shark (Figure 12 below).

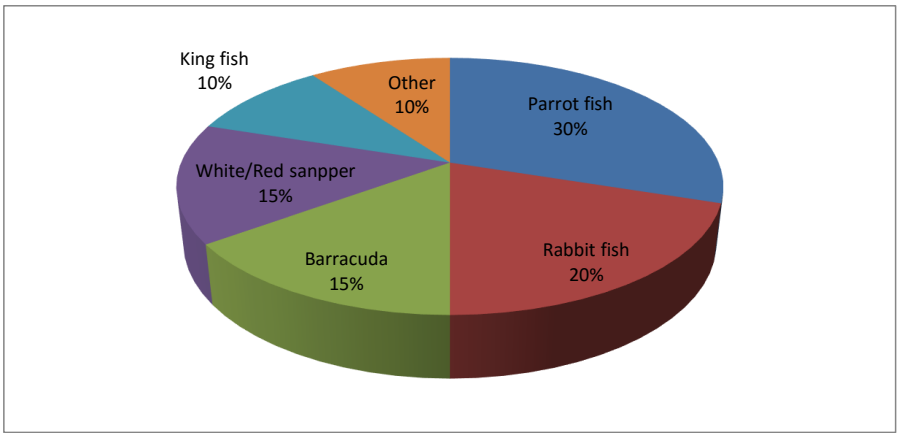

Figure 12: Main fish in the Island

4.8.12 Ownership of electrical equipment

The most common electrical appliance owned by the sampled household members is a radio which was found in 95% of the households. The average number of radios per household is 2 radios, a minimum of 1 and a maximum of 3. Eighty per cent of the households own a torch with the average number being 2 torches; the minimum being 1 touch and the maximum being 2 torches. Thirty two percent of the sampled households own rechargeable batteries with an average of 1 battery per household, a minimum of 1 and a maximum of 2. Twenty five percent of households own a colour TV, the average being 1 TV, minimum of 1 and a maximum of 2 television sets. Five percent of the households own an electric iron with each household owning only one while one per cent of the respondents interviewed own an electric cooker /coil with one per household.

With regard to purchase of electrical appliances men and boys are mostly involved in their purchase with over 80% in all the mentions. Men are also mostly involved in the purchase when involved alone and in very few instances women and girls are involved. With regard to use of electrical appliances, all family members mostly have access to and use of all appliances with over 88% in all the mentions. With regard to location of appliances, most are located in the sitting room in most households with the exception of the torches which are located in all the rooms and sometimes in the bedroom; the light bulbs are also mostly located in all the rooms and in the bedroom.

5.8.13 Energy and energy services of respondents in the sub-location.

Household main lighting energy

The main sources of energy used for lighting in the sampled households are kerosene which is used by 10 (50%) of the households, 9 (45%) use solar, while 1 (5%) of the household reported that they use firewood for household lighting. The implication of these results is that all members of the local community will benefit from the proposed project being that there is no electricity (Figure 13 below).

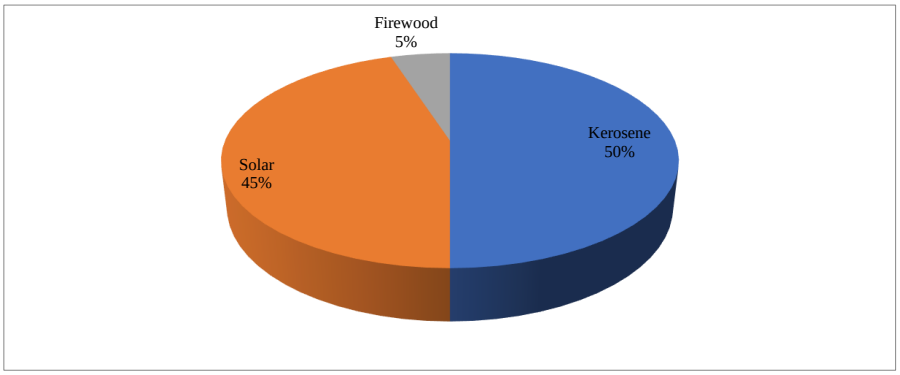

Figure 13: Household main lighting energy

Whether household main lighting energy is the preferred source

Only 3 (8%) of the respondents interviewed indicated that the main household lighting energy source being used in their households is the most preferred source, while 37 (93%) reported that the lighting energy source being used in their households is NOT the most preferred source.

Respondent's reasons for using preferred lighting energy

Eighty per cent of the respondents indicated that they are using the lighting energy because there is no electricity line nearby. 10 % reported that it is convenient and meets their needs. 5% indicated that it was cheap and available while another 5 % reported that there was a lot of firewood from the nearby bushes and shrubs (Figure 14). Further, 80% the respondents indicated that they are aware of the government efforts to connect them with electricity through rural electrification program, while 20% of the respondents sampled indicated that they are not aware of any government effort to supply them with power.

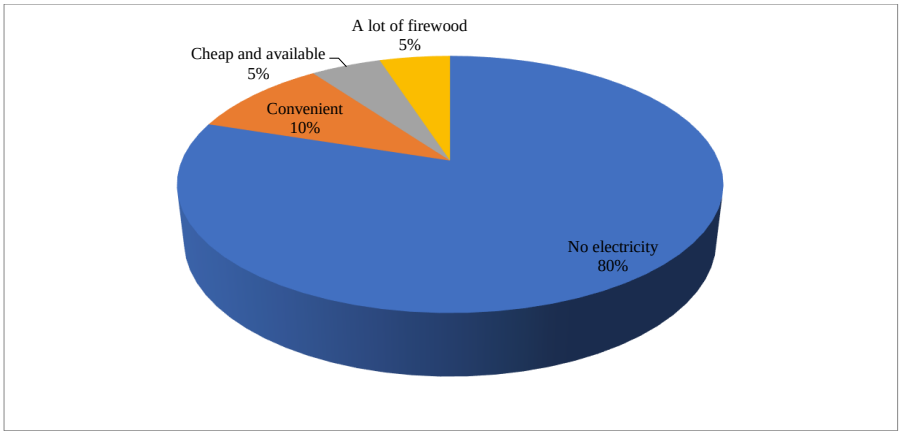

Figure 14: Respondents reasons for using currently preferred household lighting energy

Household main cooking energy of respondents in the sub-location

All the respondents reported that the main source of energy for cooking in the sampled households is fuel wood which is used by 17 (90%) of the households, 2 (7%) use kerosene, while 1 (3%) of the household reported that they use solar for household cooking and in their households. The implication of these results is that most members of the local community will benefit from the proposed project (Figure 15).

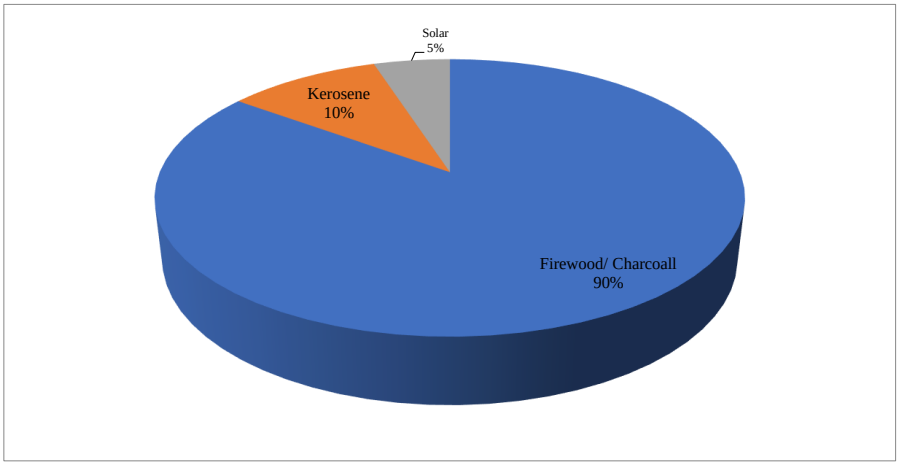

Figure 15: Household main cooking energy

Majority of households (88%) have noticed change in the type and volume of energy they consume in relation to their family needs, while 12% have not noticed any change. Use of

firewood and charcoal has led to possible environmental degradation due to cutting down trees and indoor air pollution.

Reasons given for the change include:

i. Demand for energy has increased in the household;
ii. Energy sources not enough to cater for family needs;
iii. High cost of energy sources;
iv. Firewood and kerosene are very expensive;
v. Cost of purchasing kerosene reduced drastically after purchasing a Solar Home System;
vi. Cutting down of trees is prohibited by the government; and
vii. Shortage of sources of energy in the market.

Over Ninety (98%) of the respondents said they would like to change to a different form of energy while 2% said they are satisfied with the kind of energy they are using comprising those already using Solar Home Systems.

Reasons given for not changing to energy type of choice are:

i. No electricity line in Mkwiro nor entire Island
ii. Lack of electricity connection fees;
iii. Electricity is expensive especially in cooking;
iv. Delay in connection/ lack of connection; and
v. Electricity is unreliable due to alleged blackouts.

4.8.14 Social and other amenities

It was reported from residents' responses and observation that there were very few amenities in Mkwiro, Wasini/Mkwiro Sub-location serving a population of approximately 1,500 people. There is 1 primary school and not a single secondary school neither a technical institution nor college. There are 2 ECD classes and 1 Madrassa school. Majority of respondents reported their highest level of education was primary school meaning there is a gap in Education that needs to be addressed.

With regards to health, there is 1 health centre and 98% of respondents reported that there were complicated diseases and birth deliveries the health centre could not handle. These cases have to be referred to the nearest hospital which is 50km away.

- ✓ Reasons the complications could not be handled;
- ✓ Lack of equipment and facility;
- ✓ Lack of expertise; and
- ✓ Non functioning equipment.

There are 5 general shops in the village where residents get to purchase basic items such as sugar, cooking oil, rice e.t.c. With 99% of the residents being Muslims, there are 4 Mosques serving the community. With no electricity in the area, all the above Social amenities use solar

energy or kerosene. The village being located in an Island, the proximity of the available amenities is relatively close to the residents with about 25 minutes walking time.

4.8.15 Source of water

During the dry season (84%) of households in Mkwiro mini-grid project area rely on public constructed water reservoirs in the Village used to tap water during the rainy season to be used during the dry season; while a few households depend on water from water vendors (11%) and another (5%) depend on water from boreholes/wells as shown on Figure 16 below.

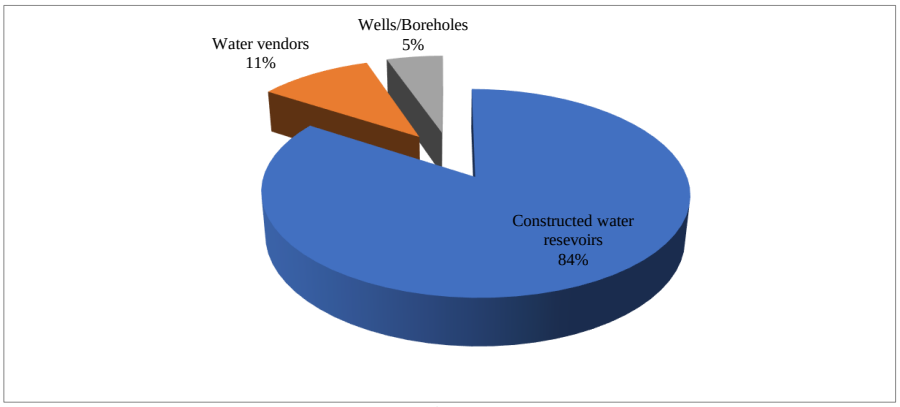

Figure 16: Source of water during dry season

During wet seasons

During the wet season majority 34 (85%) of households rely on Rain water from roof catchment; while a few households (10%) depend on Water Vendors and another (5%) use water from boreholes/wells for domestic use as shown on Figure 17 below.

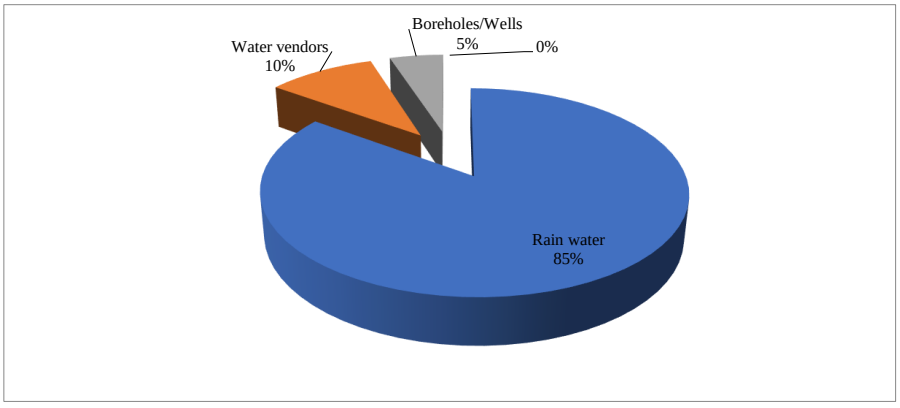

Figure 17: Source of water during wet season

4.4.16 Businesses operated at market centres

The main businesses as per the respondent's mentions include; Small scale hotels, Shops, M-pesa shops, Fish trading and Tourism which entails ferrying tourists from the mainland to the Island using motor boats and showing them around the village.

4.4.17 Value of electricity to improvement of livelihoods

The major ways that the respondent's think access to electricity will improve on the livelihoods of the people in their community include:

i. Boost business expansion,
ii. Reduced energy cost,
iii. Improve education standards,
iv. Create job opportunities/employment,
v. Technological advancements making work easier,
vi. Better and improved health standards,
vii. Ease and improve communication,
viii. Improve agriculture,
ix. Improve water supply, and
x. Increased mobility at night due to flood light availability.

4.8.18 Access to financial facilities by respondents in the sub-location

Thirty-five 35% of respondents said they have access to merry go round/ Table Banking/ Social networks as a financial facility while another 30% said they have access to Government funds such as CDF and LASDAP; 10% have access to SACCO's; Cooperatives and Micro Finance Institutions (MFI'S) while another 25% have access to from Commercial Banks (Figure 18 below).

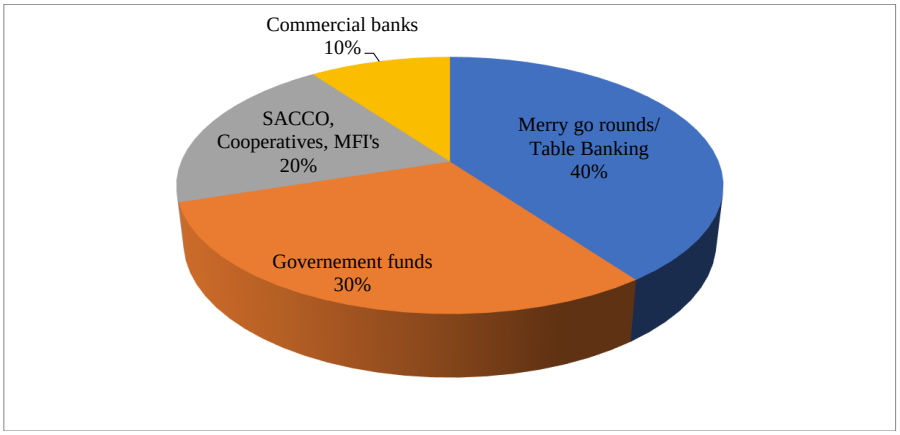

Figure 18: Access to financial facilities

4.8.19 Respondent's type of main house occupied

Materials used in construction of walls

Most of the respondents were occupying semi-permanent houses with materials used in construction of walls being 12 (60%) stones while 8 (40%) have used mud in their wall construction. This is because the area is located in rocky plains with quite a number of stone quarries.

Materials used in roofing the main house

Most of the respondents 11 (55%) were occupying semi-permanent houses with materials used in roofing their main house being iron sheet; 8 (40%) used grass or makuti; while 1 (5%) used bricks or concrete in roofing their main house (Figure 19).

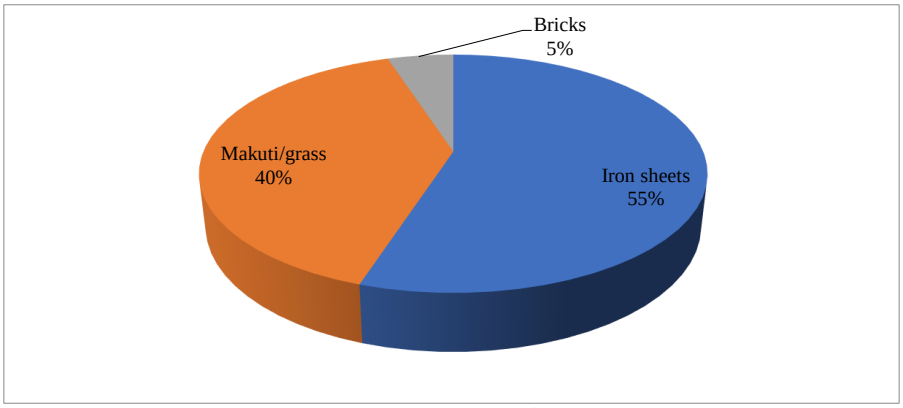

Figure 19: Materials used in roofing the main house

4.8.20 Common diseases affecting residents in the village

Thirteen (65%) of the respondents reported that malaria is the most common disease, 3 (15%) indicated that Flu and sinuses is a common disease, while ringworms and diabetes reported a similar record of 2 (10%) (Figure 20).

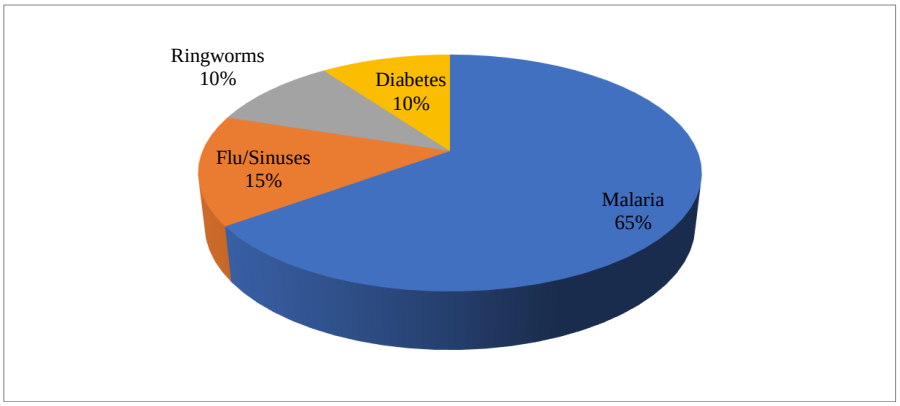

Figure 20: Common diseases affecting residents in the Mkwiro village

NB: These results are based on individual opinion and not clinical analysis/ data

4.9 Main benefits of the proposed Mkwiro mini-grid energy project

4.9.1 Improved Services Delivery

Access to energy services for the public facilities in health, education and agriculture leading to quality service delivery

4.9.2 Poverty Reduction

Poverty is wide spread mostly in the off –grid rural areas and this project will greatly benefit the rural poor to better their lives and diversify their sources of income through improved business opportunities and farming technologies.

4.9.3 Access to Modern Energy Services

Currently, only 35% of the households have electricity access from the national grid or mini-grids. The electrification rate is planned to be increased to 70 % by 2020 and 100 % by 2030. The population not connected is using wood as a source of energy contributing to further environmental degradation.

These low rates are a major constraint to higher rural non-farm incomes and an improved quality of life that can be gained not just from improved household lighting and communications, but also from improved service delivery in rural health, education and water facilities. Electricity access will replace kerosene lamps, which are expensive to operate. Kerosene is costly both for low-income households that buy it, and for governments that subsidize it. Comparing these two costs of consumption electricity bills seem to be cheaper than using kerosene for lighting by about Kshs 128. Therefore the Kenya Electricity Modernization Project means greater savings on the part of the households.

4.9.4 Employment and Wealth Creation

The project will provide some employment during construction and operational phases.

4.9.5 Social Inclusion

The national grid mainly serves the large urban areas and the relatively high population density rural areas. By providing electricity to the rural location, social inclusion of these communities will be enhanced (through improved communications and information access).

4.9.6 Education

Access to electricity at the household level and schools will create opportunities for children to study. For example children from households with electricity have an advantage because they have more time for study and doing homework in the evening as opposed to children from households without electricity. This benefit will in the end translate to better results. Additionally children in households with electricity can also access T.V. which gives them an advantage of benefiting from education programs being aired through such communication channels. Appropriate lighting through electricity will provide school going children in homes an opportunity to study after household chores especially girls who have to assist their mothers in preparing dinner.

4.9.7 Improved Standard of Living

The implementation of this project will result in connecting about 400 beneficiaries to electricity in off Grid areas. Access to electricity will change the standard of living of the people as they can use domestic appliances like iron boxes, fridges, television sets, washing machines to mention but a few. Use of electricity for lighting implies that the people will not be exposed to smoke arising from use of kerosene lamps, which predisposes people to respiratory diseases.

4.9.8 Security

There will be enhanced security in the off grid areas arising from well-lit social, commercial and individual premises. With the implementation of the sub-component, the level of security will increase. This is as a result of more security-lights which helps keep off opportunistic crimes and gender based violence.

4.9.9 Communications

Access to electricity will lead to improved communication for the beneficiaries. This will be enabled by the fact that charging of mobile phones will be easier and cheaper. Access also 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. Some of information beneficiaries receive include: information on markets, farm inputs, crop management and local affairs, nutrition, diseases, investments and entertainment among others.

4.9.10 Gender Considerations

In most Kenyan cultures the responsibility of sourcing and providing the household energy is left to the women. Therefore, on the demand side, especially in rural areas, there is need to relieve women from the burden of searching for energy, especially fire wood and to sensitize them on the environmental concerns involved. The government's national energy policy states; to promote gender equality within the energy sub-sectors both on the demand and supply.

i. To facilitate education and training for women in all energy aspects.

ii. To promote awareness on gender issues concerning men and women's social roles in the energy sector, including training on appropriate technologies.

iii. To promote awareness and advocacy on gender issues in the energy sector. Lighting and television will improve access to information, the ability to study, and extend the effective working day. This is more so because children can have extended time of study. The women will also benefit more due to access of information especially on health and nutrition since they also spend more time at home. The project will also enhance security in the rural areas as most homes will be lit up, a benefit that is more appreciated by women.

CHAPTER 5: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 The Kenya Constitution, 2010

Kenya has a new Supreme law in form of the New Constitution which was promulgated on the 27th of August 2010 and which takes supremacy over all aspects of life and activity in the New Republic. The Constitution is the supreme law of the Republic and binds all persons and all State organs at all levels of government. The Constitution of Kenya, 2010 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.

In relation to the environment, article 42 of chapter four, *The Bill Of Rights*, confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70. Chapter 5 of the document provides the main pillars on which the 77 environmental statutes are hinged. Part 1 of the chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. Of core importance is the definition of private land as land within the project area is largely privately owned, and would be acquired for irrigation purposes. The second part of this chapter directs focus on the environment and natural resources. It provides a clear outline of the state's obligation with respect to the environment, thus; *"The state shall-*

i. Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;

ii. Work to achieve and maintain a tree cover of at least ten per cent of the land area of Kenya;

iii. Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;

iv. Encourage public participation in the management, protection and conservation of the environment;

v. Protect genetic resources and biological diversity;

vi. Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;

vii. Eliminate processes and activities that are likely to endanger the environment; and

viii. Utilize the environment and natural resources for the benefit of the people of Kenya.

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

chapter. In conformity with the Constitution of Kenya, 2010, every activity or project undertaken within the republic must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. Section 69 (2), every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Every person has the right to a clean and healthy environment, which includes the right –

a) *To have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article69; and*

b) *To have obligations relating to the environment fulfilled under Article 70*

Section 69(2) every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Section 70 provides for enforcement of environmental rights thus:

(1) *If a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress in addition to any other legal remedies that are available in respect to the same matter.*

(2) *On application under clause (1), the court may make any order, or give any directions, it considers appropriate—*

a) To prevent, stop or discontinue any act or omission that is harmful to the environment;

b) To compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or c) To provide compensation for any victim of a violation of the right to a clean and healthy environment.

(3) For the purposes of this Article, an applicant does not have to demonstrate that any person has incurred loss or suffered injury.

5.2 Environmental Policy

The Kenya's environmental policy aims at integrating environmental aspects into the national development plans. The broad objectives of the national environmental policy include:

i. Optimal use of natural land and water resources in improving the quality of human environment;

ii. Sustainable use of natural resources to meet the needs of the present generation while preserving their ability to meet the needs of the future generation;

iii. Integration of environmental conservation and economic activities into the process of sustainable development; and

iv. Meeting national goals and international obligations by conserving biodiversity, arresting desertification, mitigating the effects of disasters, protecting the ozone layer and maintaining ecological balance on the earth.

ESIAs are carried out in order to identify potential positive and negative impacts associated with the proposed mini-grid project with a view to taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on ESIAs are contained in sections 58 to 67 of the Act. According to section 68 of the environmental management and coordination Act (EMCA) 1999, The Authority shall be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

Environmental auditing (EA) is a tool for environmental conservation and has been identified as a key requirement for existing facilities to ensure sustainable operations with respect to environmental resources and socio-economic activities in the neighbourhood of the facilities. The government has established regulations to facilitate the process on EIAs and environmental audits. The regulations are contained in the Kenya Gazette Supplement No. 56, legislative supplement No. 31, and legal notice No. 101 of 13th June 2003.

In the past, the government has established a number of National policies and legal statutes to enhance environmental conservation and sustainable development. The construction of the proposed mini-grid power project construction will need to observe the provisions of the various statutes that are aimed at maintaining a clean and healthy environment. Some of the policy and legal provisions are briefly presented in the following sub-sections.

6.3 Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999):

The key objectives of the Policy include: -

i. To ensure that from the onset, all development policies, programs and projects take environmental considerations into account,

ii. To ensure that an independent Environmental and Social Impact Assessment (ESIA) report is prepared for any industrial venture or other development before implementation, and

iii. To come up with effluent treatment standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that require a "sustainable development" approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness rising and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper

encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

5.4 Legal Aspects

The key national laws that govern the management of environmental resources in the country have been briefly discussed in the following paragraphs. Wherever any of the laws contradict each other, the Environmental Management and Coordination Act, 1999 prevails.

5.4.1 The Environment Management and Coordination Act 1999 (Amendment - 2015)

The Environmental Management and Coordination Act 1999 (Amendment - 2015) is an act of Parliament that provides for the establishment of an appropriate legal and institutional framework for the management of the environment. The act allows the cabinet secretary in charge of environment to gazette standards, regulations and guidelines for the proper management, conservation and protection of the environment. EMCA, 1999 has a general definition of hazardous waste in the Fifth Schedule which describes E-wastes as having five distinct characteristics i.e. explosivity, flammability, oxidizivity, toxicity and corrositivity. The E-waste contains compounds of metals classified as hazardous wastes by virtue of its constituents.

Section 5 of the E-waste Management Guidelines requires the E-waste generator to minimize E-waste and eliminate E-waste altogether as well as identifying and eliminating potential negative impacts of the product, enabling the recovery and reuse of the product, reclamation and recycling and incorporating environmental concerns in the design and disposal of a product. Sections 17-23 require the generators of hazardous waste to conduct an EIA and labeled clearly the “hazardous waste”.

Part II of the Environment Management & Coordination Act, 1999 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. According to section 58 of the Act an Environmental and Social Impact Assessment study needs to be carried out on projects specified in the Second Schedule of the Act that are likely to have a significant impact on the environment. This project is considered to fall under the part VII of the second schedule of the Act.

Part VII, section 68 of the same Act requires operators of projects or undertakings to carry out environmental audits in order to determine level of conformance with statements made during the ESIA. The audit report should be submitted to NEMA.

Part VIII section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. Section 73 requires that operators of projects which discharges effluent or other pollutants to submit to NEMA accurate information about the quantity and quality of the effluent. Section 74 demands that all effluent generated from point sources are discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities.

Section 87 sub-section 1 states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person, while section 88 provides for acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste, shall apply to the NEMA for a license.

Sections 90 through 100 outline more regulations on management of hazardous and toxic substances including oils, chemicals and pesticides. Section 102 states that subject to provisions of the civil aviation Act, any person who emits noise in excess of the noise emission standards established under this part commit an offence.

5.4.2 Environmental Impact Assessment and Audit Regulations, 2003.

This regulation provides guidelines for conducting Environmental Impact Assessments and Audits. It offers guidance on the fundamental aspects on which emphasis must be laid during field study and outlines the nature and structure of Environmental Impact Assessments and Audit reports. The legislation further explains the legal consequences of partial or non-compliance to the provisions of the Act.

5.4.3 Air Quality Regulations, 2014

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2014". The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources and stationary sources (e.g. power generators) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. Section 78(1) (b) – provides for the establishment of emission standards for various sources such mobile sources and stationery sources. The National Environment management Authority in consultation with relevant lead agencies set permissible levels and review them from time to time.

The act stipulates that these regulations shall apply to all internal combustion engines, all premises, places, processes, operations, or works to which the provisions of the Act and Regulations made there under apply and any other appliance or activity that the Cabinet Secretary may by order in the Gazette, specify. Where, in relation to a Particular air pollutant or air pollutant source, there are no emission standards, targets or guidelines set out in these Regulations, the Authority may apply, subject to such modifications, if any, as the Authority may consider necessary, any internationally recognized emission standards, targets or guidelines in relation to the air pollutant or air pollutant source. In this case, the Authority in consultation with relevant lead agencies shall within six months of the coming into operation of these Regulations, formulate the National Emission Standards for air pollutants such as those stipulated under the Third Schedule.

Under the general prohibition of the act;
1. No person shall act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution or emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the First Schedule.
2. No person shall cause or allow emission of the priority air pollutants prescribed in the Second Schedule to cause the ambient air quality limits prescribed in the First Schedule to be exceeded.
3. No person shall cause the ambient air quality levels specified in the First Schedule of these Regulations to be exceeded.
4. No person shall cause or allow particulate emissions into the atmosphere from any facility listed under the Fourth Schedule in excess of those limits stipulated under the Third Schedule. Where "suspended Particulate matter" means all Particulate material which persists in the atmosphere or in flue gas stream for lengthy periods because the Particles are too small in size to have appreciable falling velocity;
5. A person, being an owner of premises, who causes or allows the generation, from any source, of any odour which unreasonably interferes, or is likely to unreasonably interfere, with any other person's lawful use or enjoyment of his property shall ensure that the odour emission limits comply with the ambient quality limits set out under the First Schedule of the regulations.

The proponent will ensure compliance with this regulation during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.4 Noise and Excessive Vibration Pollution (Control) Regulation, 2009

PART II. General prohibitions: 3.(1) Except as otherwise provided in these regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

(2). In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered-

(a). Time of the day;
(b). Proximity to residential area;
(c). Whether the noise is recurrent, intermittent or constant;
(d). The level and intensity of the noise;
(e). Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
(f). Whether the noise can be controlled without much effort or expense to the person making the noise.

(3). Any person who contravenes the provisions of this Regulation commits an offence.

Generators are often noisy and an effective solution is often required to suppress the noise emitted from them. Generator noise is usually a nuisance because they are sitting on comparatively lightweight structures. Technically, there is no such thing as a totally silent generator because after all there is an engine that is running and producing electrical power. It is almost impossible for any quality generator not to have sound at all. Generator noise can be a big problem, especially in quiet neighborhoods.

5.4.5 Environmental Management and Co-ordination (waste management) Regulations, 2006

Part II of the regulations state that no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. The Act also requires the waste generator to collect, segregate and dispose or cause to be disposed off in the manner provided for under the regulations.

5.4.6 The Electronic Waste Management Regulations-Draft

Kenya has prepared guidelines for E-waste management and in 2013 further completed the development of draft E-waste regulations, which are yet to come into force. Further, the environmental Management and Coordination (Waste Management Regulations) regulations 2006, may apply to electronic waste where they can be classified as hazardous waste. In 2013, Kenya completed the development of E-waste regulations, which are still considered draft pending official gazetted before enactment into law. Key highlights of the regulations include among others:

Registration of Producers

The draft regulations require producers intending to introduce new or used electrical and electronic equipment into Kenya apply for registration from NEMA and further states that already existing producers operating in Kenya must register with the Authority within sixty (60) days of the coming into force of this regulation as per sub-regulation (2);

Producers Register Database

The regulations require that NEMA maintain an Electrical and Electronic Equipment producer'sregisterasspecifiedinschedule3whichshallbeopenedtothepublicforinspection.

Annual compliance certificate of Producers

According to the draft regulations, every producer shall obtain an annual compliance certificate upon;

i. Declaring the previous year's weight of electrical and electronic equipment introduced in the market by product type;

ii. Production of an evidence note with a licensed treatment facility; and

iii. Production of a valid contractual agreement with a licensed treatment facility.

Producer Responsibility

The regulations in regard to producer responsibility require that producer declare to the Authority previous year's electrical and electronic equipment products introduced into the market; and provide to NEMA subsequent year's projected imports of any electrical and electronic equipment products. Further the regulations demand that every producer provide information to recyclers on how to dismantle their product at the end of life and the location of any hazardous substances or items within the product; and that every producer shall, within their relevant product category, support the financing of collection and treatment for problematic fractions by the licensed treatment facility to ensure effective take back and treatment of E-waste. The draft regulations in terms of electrical and electronic equipment

Registry state that a registry shall be established with the aim of keeping a register on the following; tonnage and categories of E-waste collected and processed by licensed treatment facilities; the total tonnage and categories of electrical and electronic equipment placed on the market by all producers; and status of compliance based on percentage of obligations fulfilled.

Prohibitions

The regulations have several prohibitions, which include prohibition against disposal of E-waste through burning; in non-designated waste receptacles or by burial or at a dumpsite. The regulations further prohibit treatment of Cathode Ray Tubes in an unsound environmental manner; cause leaching of precious metals with acids and other hazardous waste from printed wire boards or Printed Circuit Board in an uncontrolled manner; carryout open burning of electrical and electronic equipment/E-waste at the recycling facilities; or abandon E-waste anywhere other than in the collection centres and/or in the licensed recycling facilities.

Penalties

Any person who contravenes this regulation commits an offence and liable on conviction to a fine not exceeding one hundred thousand shillings or to imprisonment for a term not exceeding six months or to both.

The proponent will ensure compliance with this regulation during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.7 The Energy Act, 2019

Following the enactment of the Energy Act 2019, Rural Electrification Authority (REA) has now changed to Rural Electrification and Renewable Energy Corporation (REREC). REREC has an expanded mandate of spearheading Kenya's green energy drive, in addition to implementing rural electrification projects. The Energy Act prescribes the manner with which licenses shall be obtained for generating, transmitting and distributing electricity. The provisions of this Act apply to every person or body of persons importing, exporting, generating, transmitting, distributing, supplying or using electrical energy; importing, exporting, transporting, refining, storing and selling petroleum or petroleum products; producing, transporting, distributing and supplying of any other form of energy, and to all works or apparatus for any or all of these purposes. The Act establishes an energy commission, which is expected to become the main policy maker and enforcer in the energy sector. This commission among other things shall be responsible for issuing all the different licenses in the energy sector.

Electrical Energy

Licensing

Requirements for a license or permit.

27. (1) Subject to the provisions of this Act, a license or licenses as the case may be, shall be required for the:

(a) Generation, importation or exportation, transmission or distribution of electrical energy; and
(b) Supply of electrical energy to consumers: Provided that for undertakings involving a capacity not exceeding 3,000 kW, the provisions of subsections (2), (3) and (4) shall apply.

(2) A Permit shall be required in respect of all undertakings:
(a) Intended for the supply of electrical energy to other persons or consumers; and
(b) With a generating plant of over 1000 kW intended for own use.

(3) Any undertaking operating pursuant to a permit granted under this Act shall:
(a) In any case where conveyance of electrical energy to or from any transmission or distribution network is possible, meet the minimum requirements of the owner or operator of the transmission or distribution network as approved by the Commission, and the owner or operator of any such undertaking shall inform the network owner or operator of all connected load and generation equipment that might have material effect on the network; and

(b) Be subject to such conditions as may be specified by the Commission.

(4) A permit shall not be required in the case of installations with a generating plant of a capacity not exceeding 1000 kW and connected within the premises of any person in such a manner that conveyance of electrical energy to a transmission system or a distribution system cannot occur.

(5) A person who contravenes the provisions of this section commits an offence and shall, on conviction, be liable to:
(a) In the case of contravention of subsection (1) a fine not exceeding two million shillings, or to a maximum term of imprisonment of two years, or to both; and

(b) In the case of contravention of subsections (2), (3) and (4), a fine not exceeding one million shillings, or to a maximum term of imprisonment of one year, or to both.

Application for a licence or permit

28. (1) An application for a license or permit, (including an application for amendment, transfer or renewal), shall be made to the Commission in the form and manner prescribed by regulations made by the Minister under this Act. (2) Before making any application for a license, the intending applicant shall give fifteen days notice, by public advertisement, in at least two national and one regional newspaper of wide circulation and within the time specified for its publication of the intended application.

(3) In addition to the notice required under subsection (2), the intending applicant shall serve a notice in writing with the particulars of the application on every local authority in the area or proposed area of supply and in any other area concerned in the application, but, where the intending applicant is a local authority and the application to be made relates to an area in the jurisdiction of the intending applicant, the provision as to notice to the local authority shall not apply.

(4) Every notice under subsection (2) or (3) shall state that any person or body of persons desirous of making any representation on or objection to the application or to the grant of the licence shall do so by letter addressed to the Commission and marked on the outside of the cover enclosing it "Electric Power Licence Objection", on or before the expiration of thirty days from the date of the application as stated in the notice and that a copy of such representation or objection shall be forwarded to the applicant.

(5) The Commission shall, within fifteen days after receipt of the application, inform the applicant in writing whether the application is complete.

(6) The Commission may hear any objections in public, at a time and place of which not less than fifteen days notice shall be given to the applicant and to every objector and the Commission shall make known its decision regarding any objection within thirty days after the hearing. Commission may invite applications for a license or permit.

29. The Commission may, through a fair, open and competitive process in accordance with procedures prescribed by the Minister by regulations, invite applications for a license or permit under this Act. Factors to be considered in an application.

30.(1) The Commission shall, in granting or rejecting an application for a license or permit, take into consideration–
(a) the impact of the undertaking on the social, cultural or recreational life of the community; No. 8 of 1999.
(b) the need to protect the environment and to conserve the natural resources in accordance with the Environmental Management and Coordination Act of 1999;
(c) land use or the location of the undertaking;
(d) economic and financial benefits to the country or

38.(1) A person shall not carry out any electrical installation work unless the person is licensed by the Commission as an electrician or an electrical contractor.
(2) To be licensed by the Commission as an electrical contractor a person must–
(a) be a licensed electrician registered under the Institute of Engineers of Kenya; or
(b) have in his employment, a licensed electrician.
(3) A person who desires to be licensed as an electrician or an electrical contractor shall make an application in the form and manner prescribed by the Commission.

(4) The Commission shall process all applications contemplated under subsection

(3) Expeditiously and in any case, not later than ninety days from the date of the application, and it may–
(a) grant the license or registration applied for accordingly, either without conditions or subject to such conditions as it may deem fit, or
(b) Refuse to grant the license or registration applied

5.4.8 Fisheries Management and Development Act No. 35 of 2016

An ACT of Parliament to provide for the conservation, management and development of fisheries and other aquatic resources to enhance the livelihood of communities dependent on

fishing and to establish the Kenya Fisheries Services; and for connected purposes. The objective of this Act is to protect, manage, use and develop the aquatic resources in a manner which is consistent with ecologically sustainable development, to uplift the living standards of the fishing communities and to introduce fishing to traditionally non-fishing communities and to enhance food security.

This act provides for:
"Fishing" interpreted as (a) searching for or taking of fish; (b) the attempted searching for or taking of fish; (c) engaging in any other activity which can reasonably be expected to result in the locating or taking of fish; (d) placing, searching for or recovering any fish aggregating device or associated equipment including radio beacons; (e) any operation on Kenya fishery water or on the high seas in support of or in preparation for any activity described in paragraphs (a), (b), (c) or (d); (f) use of an aircraft which is related to any activity described in paragraphs (a), (b), (c) or (d), except for flights in emergencies involving the health or safety of a crew member or the safety of a vessel, but does not include aquaculture or the transportation of fish; and

"Fishing related activity" means any activity in support of, or in preparation for, fishing including the— (a) transshipping of fish to or from any vessel; (b) landing, packaging, processing, handling or transporting of fish that have not been previously landed at port ; (c) provision of personnel, fuel, gear and other supplies at sea or performing other activities in support of fishing operations; (d) exporting fish or fish products from the country; and (e) attempting or preparing to do any of the above;

"Illegal fishing" under this act is interpreted as: (a) activities conducted by national or foreign vessels in waters under the jurisdiction of a state without the permission of that state, or in contravention of its laws and regulations; (b) activities conducted by vessels flying the flag of states that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which those states are bound or relevant provisions of international law; and (c) activities carried out in violation of national laws or international laws or international obligations, including those undertaken by co-operating states to a relevant regional fisheries management organization.

The proponent will ensure compliance with this regulation during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.9 The Wildlife Conservation and Management Act (No. 47 of 2013)

This Act provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes. The law has as one of its guiding principles the devolution of conservation and management of wildlife to landowners and managers in areas where wildlife occurs, through in particular the recognition of wildlife conservation as a form of land-use, better access to benefits from wildlife conservation, and adherence to the principles of sustainable utilization. The implementation of this Act shall be guided by the following principles:

a) Wildlife conservation and management shall be devolved, wherever possible and appropriate to those owners and managers of land where wildlife occurs;
b) Conservation and management of wildlife shall entail effective public participation;
c) Wherever possible, the conservation and management of wildlife shall be encouraged using an ecosystem approach;
d) Wildlife conservation and management shall be encouraged and recognized as a form of land use on public, community and private land;
e) Benefits of wildlife conservation shall be derived by the land user in order to offset costs and to ensure the value and management of wildlife do not decline;
f) Wildlife conservation and management shall be exercised in accordance with the principles of sustainable utilization to meet the benefits of present and future generations; and
g) Benefits accruing from wildlife conservation and management shall be enjoyed and equitably shared by the people of Kenya.

The proponent will ensure compliance with this Act and regulation during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.10 The Water Act, 2016

Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. The control and right to use water are exercised by the Minister administering the Act, and such use can only be acquired under the provisions of the Act. The Minister is also vested with the duty to promote investigations, conserve and properly use water throughout Kenya. Water permits may be acquired for a range of purposes, including the provision and employment of water for the development of power and other uses. The following are the regulations developed under Water Act 2016 relevant to this Project.

The proponent will ensure compliance with this Act during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.11 The Forest Conservation and Management Act, 2016

This is law was enacted by Parliament in 2005 to provide for the establishment, development and sustainable management including conservation and rational utilization of forest resources for the socio-economic development of the country. Parts of the project area consist of indigenous forests. Section 8 of the Act requires all indigenous forests and woodlands to be managed on a sustainable basis for the purposes inter alia of conservation of water, soil and biodiversity, river line and shoreline protection, sustainable production of wood and non-wood productions. Community participation as provided for under Section 46 of the Act should be encouraged. The most appropriate would be initiation of participatory forest management in these forest reserves so that the local community and organization such as REREC can have a significant input with Kenya Forest Services (KFS) office playing a coordination and guidance role.

The proponent will ensure compliance with this Act during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.12 The Occupational Health and Safety Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The Act has the following functions among others:

- Secures safety and health for people legally in all workplaces by minimization of exposure of workers to hazards (gases, fumes and vapours, energies, dangerous machinery/equipment, temperatures, and biological agents) at their workplaces.
- Prevents employment of children in workplaces where their safety and health are at risk.
- Encourages entrepreneurs to set achievable safety targets for their enterprises.
- Promotes reporting of work-place accidents, dangerous occurrences and ill health with a view to finding out their causes and preventing of similar occurrences in future.
- Promotes creation of a safety culture at workplaces through education and training in occupational safety and health.

The Factories and other Places of Work (Fire Risk Reduction) Rules, 2007

These Rules were published in the Kenya Gazette Supplement No. 46, Legislative Supplement No. 28, Legal Notice No. 59 of 4th May, 2007 being a supplementary legislation to the Factories and other places of work act, cap 514 which was repealed. The occupational safety and health Act 2007 (replacement of CAP 514) recommends the implementation of this subsidiary legislation. The rules provide for fire safety measures with specific focus on the following critical requirements:

i. Safe handling and storage of flammable substances,
ii. Provision of fire escape exits,
iii. Formation of firefighting team,
iv. Functions of a firefighting team,
v. Fire safety training,
vi. Conducting fire drills,
vii. Installation, maintenance, inspection and testing of fire equipment,
viii. Documentation of a fire safety policy, and
ix. Annual fire safety audits.

In line with the Fire Risk Reduction, rules 2007, the management is required to:

i. Provide and maintain suitable and adequate number of firefighting equipment,
ii. Establish a firefighting team,
iii. Organize training for firefighting team,
iv. Conduct annual fire drills,
v. Conduct annual fire audit.

The proponent will ensure compliance with this Act and regulation during construction, operation and decommissioning of the proposed mini-grid power project.

5.4.13 The Physical and Land Use Planning Act, 2019

This Act provides for the preparation and implementation of physical development plans for connection purposes. It establishes the responsibility for the physical planning at various levels of Government in order to remove uncertainty regarding the responsibility for regional planning. It gives development control guidelines that means the process of managing or regulating the carrying out of any works on land or making of any material change in the use of any land or structures and ensuring that operations on land conform to spatial development plans as well as policy guidelines, regulations and standards issued by the planning authority from time to time in order to achieve a purposeful utilization of land in the interest of the general welfare of the public. A key provision of the Act is the requirement for Environmental Impact Assessment (ESIA). This legislation is relevant to the implementation and siting of energy projects as identified in the project document.

5.4.14 The Electronic Waste Management Regulations-Draft

Kenya has prepared guidelines for E-waste management and in 2013 further completed the development of draft E-waste regulations, which are yet to come into force. Further, the environmental Management and Coordination (Waste Management Regulations) regulations 2006, may apply to electronic waste where they can be classified as hazardous waste. In 2013, Kenya completed the development of E-waste regulations, which are still considered draft pending official gazetted before enactment into law. Key highlights of the regulations include among others:

Registration of Producers

The draft regulations require producers intending to introduce new or used electrical and electronic equipment into Kenya apply for registration from NEMA and further states that already existing producers operating in Kenya must register with the Authority within sixty (60) days of the coming into force of this regulation as per sub-regulation (2);

Producers Register Database

The regulations require that NEMA maintain an Electrical and Electronic Equipment producer'sregisterasspecifiedinschedule3whichshallbeopenedtothepublicforinspection.

Annual compliance certificate of Producers

According to the draft regulations, every producer shall obtain an annual compliance certificate upon;

iv. Declaring the previous year's weight of electrical and electronic equipment introduced in the market by product type;

v. Production of an evidence note with a licensed treatment facility; and

vi. Production of a valid contractual agreement with a licensed treatment facility.

Producer Responsibility

The regulations in regard to producer responsibility require that producer declare to the Authority previous year's electrical and electronic equipment products introduced into the market; and provide to NEMA subsequent year's projected imports of any electrical and electronic equipment products. Further the regulations demand that every producer provide

information to recyclers on how to dismantle their product at the end of life and the location of any hazardous substances or items within the product; and that every producer shall, within their relevant product category, support the financing of collection and treatment for problematic fractions by the licensed treatment facility to ensure effective take back and treatment of E-waste. The draft regulations in terms of electrical and electronic equipment Registry state that a registry shall be established with the aim of keeping a register on the following; tonnage and categories of E-waste collected and processed by licensed treatment facilities; the total tonnage and categories of electrical and electronic equipment placed on the market by all producers; and status of compliance based on percentage of obligations fulfilled.

Prohibitions

The regulations have several prohibitions, which include prohibition against disposal of E-waste through burning; in non-designated waste receptacles or by burial or at a dumpsite. The regulations further prohibit treatment of Cathode Ray Tubes in an unsound environmental manner; cause leaching of precious metals with acids and other hazardous waste from printed wire boards or Printed Circuit Board in an uncontrolled manner; carryout open burning of electrical and electronic equipment/E-waste at the recycling facilities; or abandon E-waste anywhere other than in the collection centres and/or in the licensed recycling facilities.

Penalties

Any person who contravenes this regulation commits an offence and liable on conviction to a fine not exceeding one hundred thousand shillings or to imprisonment for a term not exceeding six months or to both.

5.5 Institutional Framework

5.5.1 The Ministry of Energy and Petroleum

The Ministry of Energy and Petroleum was first established in 1979 to oversee the development and implementation of policies to ensure energy from various sources was made available to meet demand. The Ministry plays a largely facilitative role in energy supply, which includes taking leadership in the development of policy as well as legal and regulatory framework for the sector. In addition it has an oversight responsibility over the provision of reliable and adequate energy generation and distribution.

5.5.2 Ministry of Environment and Natural Resources

The Ministry of Environment and Natural Resources (MEWNR) is responsible for the environment at policy level. One of its key functions is the full implementation of The Environmental Management and Coordination Act 1999 (Amendment - 2015) which defines hazardous waste**,** pollutants and pollution. To achieve this objective, the Ministry's role is to create an enabling environment through policy, legal and regulatory reforms for environmental and natural resources management. The mandate of the ministry is to monitor, protect, conserve and manage the environment and natural resources through sustainable exploitation for socio-economic development aimed at eradication of poverty, improving living standards and ensuring that a clean environment is sustained now and in the future. The ministry comprises of various divisions at the headquarters and the following parastatals and departments including the National Environment Management Authority.

Roles and Functions in relation to E-waste

The ministry has a core function and role of policy formulation, analysis and review in matters related to environment and natural resources. In E-waste, this is the principal responsibility responsible for formulating E-waste policies and was involved in the drafting of the existing draft E-waste regulations and guideline**s** for Kenya. The ministry has the mandate to ensure sustainable management and conservation of environment and this implies that the ministry has a critical role in ensuring that E-waste is addressed sustainable to ensure conservation of the environment. The ministry has the mandate to promote, monitor and coordinate environmental activities and enforce compliance of environmental regulations and guidelines. In respect to E-waste thus, this ministry has the significant role ensuring the same in relation to E-waste related activities as well as enforcing compliance to the E-waste regulations and guidelines.

5.5.3 National Environment Management Authority-NEMA

The National Environment Management Authority (NEMA) is the principal instrument of Government in the implementation of all policies relating to the environment. In the NEMA strategic plan 2010-12, key objectives include universal compliance and enforcement of environmental regulations, developing guidelines and standards and the prosecution of offenders failing to meet the provisions of The Environmental Management and Coordination Act 1999 (Amendment - 2015). The lead agencies that are also pertinent to E-waste management include the Ministry of Information and Communication, Communications Commission of Kenya (CCK), Kenya Bureau of Standards (KEBS), Kenya Revenue Authority (KRA), Ministry of Education. NEMA is established under The Environmental Management and Coordination Act 1999 (Amendment - 2015), as the principal instrument of government in the implementation of all policies relating to the environment.

Roles and Functions in relation to E-waste

i. Coordinating the various environmental management activities being undertaken by the lead agencies including those related to E-waste management;

ii. Promote the integration of environmental considerations into development policies, plans, programmes and projects, with a view to ensuring the proper management and rational utilization of environmental resources, on sustainable yield basis, for the improvement of the quality of human life in Kenya. In the context of E-waste, NEMA has the role of ensuring that policies, plans and programs that entail increased uptake of electronics e.g. ICT policies, consider the environmental implication of electronics specifically as a waste after end of life;

iii. Carry out surveys, which will assist in the proper management and conservation of the environment. In the context of E-waste, NEMA plays a role of conducting surveys on E-waste including quantities, impacts, challenges, management efforts etc. with a view of assisting in proper management and conservation of the environment;

iv. Advise Government on legislative and other measures for the management of the environment or the implementation of relevant international conventions, treaties and agreements. NEMA's role in regard to E-waste and this function is related to the international conventions touching on E-waste namely: Basel and Bamako;

v. Advise the Government on regional and international conventions, treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements;

vi. Undertake and coordinate research, investigation and surveys, collect, collate and disseminate information on the findings of such research, investigations or surveys. In the context of E-waste, NEMA has the responsibility of spearheading and coordinating all research, investigations and surveys related to E-waste including dissemination of the findings;

vii. Identify projects and programmes for which environmental audit or environmental monitoring must be conducted under this Act;

viii. Undertake, in cooperation with relevant lead agencies, programmes intended to enhance environmental education and public awareness, about the need for sound environmental management, as well as for enlisting public support and encouraging the effort made by other entities in that regard;

ix. Publish and disseminate manual codes or guidelines relating to environmental management and prevention or abatement of environmental degradation. In the context of E-waste, NEMA has the role of publishing and disseminating the existing E-waste guidelines;

x. Render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection, so as to enable them to carry out their responsibilities satisfactorily; and

xi. Prepare and issue an annual report on the State of Environment in Kenya and in this regard, may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency.

5.6 World Bank's Safeguards

The table 7 below summarizes the World Bank's Safeguards Policies.

Table 7: World Bank's Safeguards Policies

Policy	Objective
OP/BP 4.01 Environmental Assessment	The objective of this policy is to ensure that World 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. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and transboundary and global environment concerns.
OP/BP 4.04 Natural Habitats	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 World 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 terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities, but retaining their ecological functions and most native species. This bank policy prohibits financing for developments that would significantly convert or degrade critical natural habitats, and preference is on siting projects on already converted land.
OP/BP 4.36 Forests	The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development and protect the vital local and global environmental services and values of forests. Where forest restoration and plantation development are necessary to meet these objectives, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank assists borrowers with the establishment of environmentally appropriate, socially beneficial and economically viable forest plantations to help meet growing demands for forest goods and services.
OP 4.09 Pest Management	The objective of this policy is to: (i) promote the use of biological or environmental control and reduce reliance on synthetic chemical pesticides; and (ii) strengthen the capacity of the country's regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. More specifically, the policy aims to: (a). Ascertain that pest management activities in Bank-financed operations are based on integrated approaches and seek to reduce reliance on synthetic chemical

	pesticides (Integrated Pest Management (IPM) in agricultural projects and Integrated Vector Management (IVM) in public health projects. (b) Ensure that health and environmental hazards associated with pest management, especially the use of pesticides are minimized and can be properly managed by the user. (c) As necessary, support policy reform and institutional capacity development to: (i) Enhance implementation of IPM-based pest management, and (ii) Regulate and monitor the distribution and use of pesticides. Pesticides in WHO Classes IA and IB may not be procured for Bank supported projects.
OP/BP 4.11 Physical Cultural Resources	The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community.
OP/BP 4.10 Indigenous Peoples	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 and gender and inter-generationally inclusive social and economic benefits. The policy requires free, prior and informed consultation with indigenous peoples.
OP/BP 4.12 Involuntary Resettlement	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.
OP/BP 4.37 Safety of Dams	The objectives of this policy are as follows: For new dams, to ensure that experienced and competent professionals design and supervise construction; the borrower adopts and implements dam safety measures for the dam and associated works. For existing dams, to ensure that any dam that can influence the performance of the project is identified, a dam safety assessment is carried out, and necessary additional dam safety measures and remedial work are implemented.

OP 7.50 Projects in International Waters	The objective of this policy is to ensure that Bank financed projects affecting international waterways would not affect: (i) relations between the Bank and its borrowers and between states (whether members of the Bank or not); and (ii) The efficient utilization and protection of international waterways. The policy applies to the following types of projects: (a) Hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial and similar projects that involve the use or potential pollution of international waterways; and (b) Detailed design and engineering studies of projects under (a) above, include those carried out by the Bank as executing agency or in any other capacity.
OP 7.60 Projects in Disputed Areas	The objective of this policy is to ensure that projects in disputed areas are dealt with at the earliest possible stage: (a) so as not to affect relations between the Bank and its member countries; (b) so as not to affect relations between the borrower and neighboring countries; and (c) so as not to prejudice the position of either the Bank or the countries concerned.
The WB Group Environment, Health and Safety Guidelines.	The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. The guidelines include;- • ***Environment*** - Air Emissions and Ambient Air Quality - Energy Conservation - Wastewater and Ambient Water Quality - Water Conservation - Hazardous Materials Management - Waste Management - Noise - Contaminated Land • ***Occupational Health and Safety Guidelines*** • ***Community Health and Safety*** • ***Construction and Decommissioning***

5.7 World Bank's Safeguards Policies Triggered by proposed mini-grid power project

The proposed mini-grid power project triggers OPs 4.01 (Environmental Assessment) and 4.12 (Involuntary Resettlement) 4.04 (Natural Habitats), 4.11 (Physical Cultural Resources), and 4.12 (Indigenous Peoples). The safeguards instruments prepared for any mini-grid project will address the requirements of any applicable policies.

Table 8: Safeguard polices to be triggered under proposed mini-grid power project

Safeguard Policies Triggered by the Project	**Reasons for Triggers**

Environmental Assessment (OP/BP 4.01)	The proposed mini-grid project is likely to have potential environmental impacts. The objective of OP 4.01 is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate environmental screening, analysis of actions and mitigation of their likely environmental impacts and monitoring. Therefore, OP 4.01 has been triggered, and in line with this operational policy, the environmental and social screening process for the mini-grid project. This policy requires Environmental Assessment (EA) of projects proposed to ensure that they are environmentally sound and sustainable, and thus to improve decision-making. The proposed mini-grid project is likely to have minimal or no adverse environmental impacts.
Natural Habitats (OP/BP 4.04)	The proposed mini-grid project may be located in or close to areas with natural unique flora and fauna though the component is unlikely to have significant negative impacts on natural habitat. Works will nevertheless be implemented in areas of the island that may not negatively affect diverse flora, fauna, and avifauna. The island is dependent on fishing activities. The island is close to a Kisite Mpunguti which is a marine reserve. The reserve is a habitat and protects a variety of flora and fauna species. Aquatic fauna species in in the area are holothurians (sea cucumber), fish species such as the King fish, scavengers, Rabbit fish and Jack, octopus, molluscs and crustaceans such as crabs and prawns. The aquatic fauna are crabs, lobsters, prawns, marine animals and sea cucumbers. Other fish species include such as Tuna, red snapper, white snapper, Ornatus, lobsters, octopus, dugongs, star fish, dolphins, blue merlins, sharks, oysters, crabs, prawns, squids among others. Endangered species in the area include green turtle and hawksbill turtle, and the dugong. Marine vegetation in the county include mangroves and sea grass beds.
Involuntary Resettlement (OP/BP 4.12)	The proposed mini-grid project involves land take for construction purposes including, solar panels; generator rooms and distribution lines. There is available two (2) acres of community land, therefore, affected residents by land uptake will be compensated. Mkwiro village proposed project site is registered as “Reserved for Worship”. However, this may not affect development of the proposed mini-grid project..
Indigenous Peoples (OP/BP 4.10)	The proposed mini-grid project may be located in areas with vulnerable and marginalized groups/people. In Mkwiro, the village is inhabited by the Wakifundi community which is a community included among people who meet the OP 4.10 criteria and to whom the policy requirements would apply.
Physical Cultural Resources (OP/BP 4.11)	Given that the works will take place in areas of archaeological and cultural importance, OP 4.11 has been triggered as a precaution. Therefore, the precautionary measures will be taken to minimize environmental impacts.

Environmental Assessment (OP 4.01)

Table 9: World Bank EA Screening Categories

Category "A"	An EIA is always required for projects that are in this category. Impacts are expected to be 'adverse, sensitive, irreversible and diverse with attributes such as pollutant discharges large enough to cause degradation of air, water, or soil; large-scale physical disturbance of the site or surroundings; extraction, consumption or conversion of substantial amounts of forests and other natural resources; measurable modification of hydrological cycles; use of hazardous materials in more than incidental quantities; and involuntary displacement of people and other significant social disturbances.
Category B	When the subproject's adverse environmental impacts on human populations or environmentally important areas (including wetlands, forests, grasslands, and other natural habitats) are less adverse than those of Category A subprojects. Impacts are site – specific; few, if any, of the impacts are irreversible; and in most cases, mitigation measures can be designed more readily than for Category A subprojects. The scope of environmental assessment for a Category B subproject may vary from subproject to sub-project, but it is narrower than that of a Category A sub-project. It examines the subproject's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.
Category C	If the subproject is likely to have minimal or no adverse environmental impacts. Beyond screening, no further environmental assessment action is required for a Category C sub-project. This proposed mini-grid project falls under this category.

5.8 Alignment of WB and GOK Polices relevant to this ESIA

Both the World Bank safeguards policies and GoK laws are generally aligned in principle and objective:

- Both require screening of sub project investments in order to determine if further
- Environmental analysis (ESIAs) is needed.
- Both require ESIA before project design and implementation (which also includes an assessment of social impacts).
- Both require public disclosure of ESIA reports.
- EMCA recognizes other sectoral laws while WB has safeguards for specific interests.
- The Bank requires that stakeholder consultations be undertaken during planning, implementation and operation phases of the project, which is equivalent to the EMCA requirements.
- Additionally, statutory annual environmental audits are required by EMCA.
- The national provisions for the management of resettlement related issues are not as fully developed and therefore not at par with the World Bank safeguard policy requirements.
- Thus, it is expected that the WB OP 4.12 will be mostly applied under the KEMP and a separate document to guide the process, i.e. a Resettlement Policy Framework (RPF)

and Vulnerable and Marginalized Groups Framework (VMGF) document will be prepared as a standalone report to support the social management and acceptability of the projects.

In Kenya, it is a mandatory requirement under EMCA 1999 for all proposed development projects to be preceded by an ESIA study. However, prior to developing an ESIA, a project proponent is required to prepare a project report to aid NEMA in making a determination whether a full scale ESIA is necessary or not. Thus, under the laws of Kenya, environmental assessment is fully mainstreamed in all development process and starts with a screening process, which is consistent with World Bank safeguard policies on EA that calls for mandatory screening as well to determine the rating category. Project reports will be prepared for all the sub project investments under the KEMP to determine if they require a full scale ESIA. Further, in order to fully insure against triggers to WB safeguard policies, individual investments will be screened against each policy as part of the EA process.

5.9 International Finance Corporation (IFC) Performance Standards relevant to this ESIA

Performance Standards reviewed and relevance in the proposed Mkwiro mini-grid project.
PS 1: Assessment and Management of Environmental and Social Risks and Impacts Performance Standard.
PS 2: Labor and Working Conditions Performance Standard.
PS 3: Resource Efficiency and Pollution Prevention Performance Standard.
PS 4: Community Health, Safety, and Security Performance Standard.
PS 5: Land Acquisition and Involuntary Resettlement Performance Standard.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources Performance Standard.
PS 7: Indigenous Peoples Performance Standard.
PS 8: Cultural Heritage.

5.11 Requirements for Public Disclosure

This ESIA report will be disclosed in line with the World Bank requirements through posting on the REREC's website www.rea.co.ke. The final version will be publicly disclosed through the Bank's Info shop. In addition, this will be disclosed in country through posting on the websites of Ministry of Energy and Petroleum and the Rural Electrification and Renewable Energy Corporation. Further, the ESIA/ESMP will be disclosed to local communities/beneficiaries in culturally appropriate languages and in accessible locations, as well as the RPF and VMGF as appropriate.

CHAPTER 6: CONSULTATIONS AND PUBLIC PARTICIPATION

6.1 Introduction

Focus Group Discussion guide, and a structured questionnaire guide was used to collect responses from various categories of stakeholders such as the community members, national and county government officers, state agencies such as the Kenya Wildlife service, Kenya Forest Service and National Environment Management Authority (NEMA), local non-governmental organizations and CBOs during the proposed mini-grid project site visit. Copies of completed questionnaires are attached as appendix. The contents of the structured tool used in this baseline data collection has been described under methodology.

6.2 Public/community member's participation and views regarding environmental concerns

A structured guide was used to elicit responses from the men, women, youth and the opinion leaders in the community during the project site visit. Furthermore, the immediate neighbours of the project site gave their comments (Attached stakeholders and neighbours comments). A consultative meeting with the neighbours and land owners was held at various farms and the following concerns were raised:

i. Relocate residents -from land on which the power line passes;
ii. Compensate residents for any property that will be affected by the power line construction including their crops/vegetation;
iii. Proper maintenance of generators to avoid oil spillages, and
iv. Avoid or minimize cutting down of trees and clearance of vegetation.

Table 10: Summary of impacts of the proposed mini-grid power project based on community consultative meetings

Potential environmental impacts	
Positive Impacts	***Negative Impacts***
i. Improved clean energy supply ii. Increased formal and informal sectors opportunities iii. Creation of job opportunities improving livelihoods.	i. Deforestation especially along the power line, ii. Soil pollution, iii. Air, water, noise pollution, iv. Encroachment of farmland during power line construction especially within Wasini/Mkwiro Sub-Location, v. Loss of vegetation cover.

The consolidated highlights of the mitigation measures of the potential negative environmental impacts as captured by the community members (Men, Women, Youth, Opinion leaders) have been addressed.

6.3 Highlights of discussion with the stakeholders Management

The outcome of the discussions with the Relevant Management and the relevant Kwale County Government Officers enabled development of appropriate tools for acquisition of relevant information/data for this Study report. The major concerns that crystallized out of the discussions included the expectations of the community members from the proposed mini-grid power project, environmental, social, health, and economic concerns in the location and the anticipated impacts of the proposed mini-grid power project and mitigation measures.

6.4 Responses from some County Heads of various departments and other government institutions

Below summarizes concerns expressed by some Lunga Lunga County heads of departments and state corporations (Agriculture, Physical Planning Officer, Public Health, WRMA, Kenya Forest Service, Social Development Services and the County Environment Officer).

6.4.1 The Department of Physical Planning

i. Whether the project site is ideal for the project
ii. To check compatibility of land use with the topography and the environment
iii. To check whether land is enough for the intended purpose; and
iv. To check how the various mitigation measures will be addressed

6.4.2 Public Health Office

The public health department indicated issues that must be taken into consideration during implementation to be:

i. Efficient water use;
ii. Provision of protective clothing to workers;
iii. Machineries should be well guarded to protect workers from injuries;
iv. Employment of medically fit individuals who should produce valid medical certificates from government hospitals before being recruited; and
v. The proponent to ensure the proposed design/plan passes through Public Health Officer for approval.

6.4.3 Kenya Forest Service Office

The Kenya Forest Service personnel indicate that:

i. The farmers around the site should be encouraged to plant trees (engage in agroforestry);

ii. The Ministry of Roads needs to ensure that the roads serving the mini-grid power project are passable and in good state;

iii. Effluent from the mini-grid power project must be properly disposed; and

6.4.4 Social Development Services

i. Community members should be given priority for employment;
ii. Potential increase in school-dropout rate as the result of the available employment opportunities (power line construction); and

iii. Potential increase in diseases, especially HIV/AIDS due to influx of employment seekers from outside and also indirectly due to improved income.
iv. 6.4.5 County Environment Office
i. Depletion of the forest cover along the transmission lines, and
ii. Environmental pollution due to inappropriate disposal of solid and liquid wastes and air pollution, and
iii. Noise pollution during the construction phase.

6.4.6 County Agricultural Office

i. Encroachment of farmland during power line construction, and
ii. Compensation for loss of plants by farmers.

6.5 Consultation and Public Participation (CPP)

Public participation was conducted to inform the stakeholders and surrounding community on the proposed mini-grid power project, and ask them about the environmental impacts they anticipate with the project and how the problems could be overcome. The study involved some of the neighboring individuals who gave their views on the proposed mini-grid power project. Stakeholders such as county and national government officers were consulted. Local administration such as the area Assistant Chief, community elders and heads of 45 households were interviewed. Kenya has developed ESIA regulations, which must be adhered to by proponents of all development projects. These regulations have been clearly spelt out in the Environmental Management and Coordination (Amended) Act, 2015 and the Environmental and Social Impact Assessment (ESIA) Regulations. These documents provide guidance on environmental and social issues/factors, which must be considered during an ESIA study and preparation of the study report.

Plate 10: Area Assistant Chief with some members of the local community during stakeholders consultations

Discussion with the REREC officers and Kwale County Government relevant Departments

Discussions were held with REREC officers at the headquarters in Nairobi, Kwale County headquarters and field officers at the proposed mini-grid project site. Discussions were also held with relevant County Government Departments. These included Environment and Natural Resources, Education, Social Services, Agriculture, Water, Statistics, Labour, Employment, Survey, Physical Planning, Public Health, Public Works, and Roads. The Interior Ministry administrators, such as the area Assistant Chief as well as residents of the proposed mini-grid power project were consulted. Other stakeholder interviewed were the landowners of the land within the proposed mini-grid project. Detailed discussions centered mainly on environmental issues, energy situation and socio-economic concerns in the location and the anticipated impacts of the proposed mini-grid power project and mitigation measures. The Lead expert and his Associate Experts were involved in the discussions and took notes of the proceedings. At the end of the discussions, the consultants consolidated and analyzed the data.

Plate 11: Lead Expert (on the right) consulting key stakeholders (County Fisheries Officer (left) and area Assistant Chief) before crossing over to the Island by boat

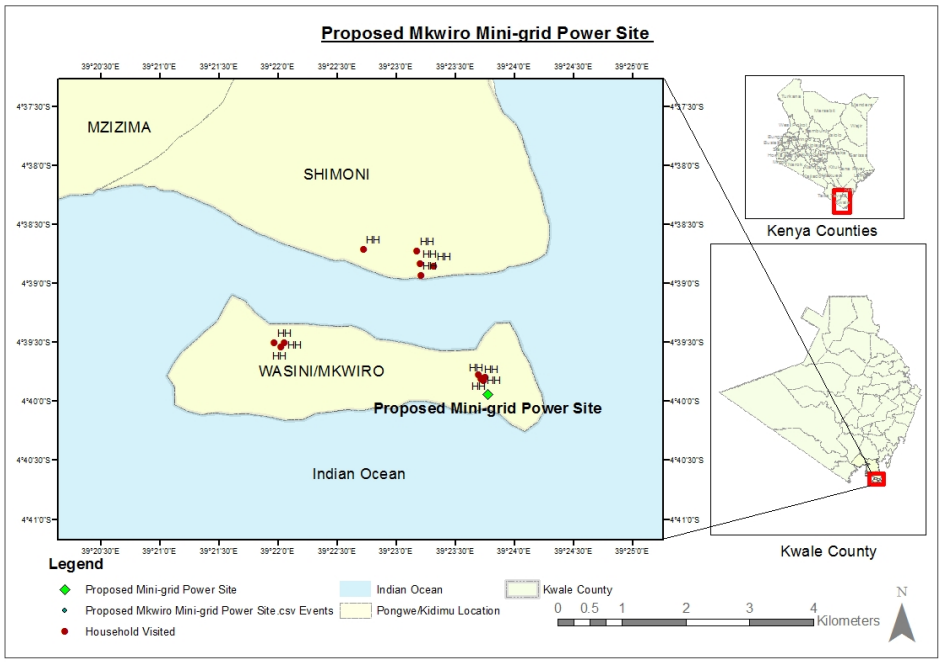

Figure 21: GIS map showing the proposed project mini-grid power site

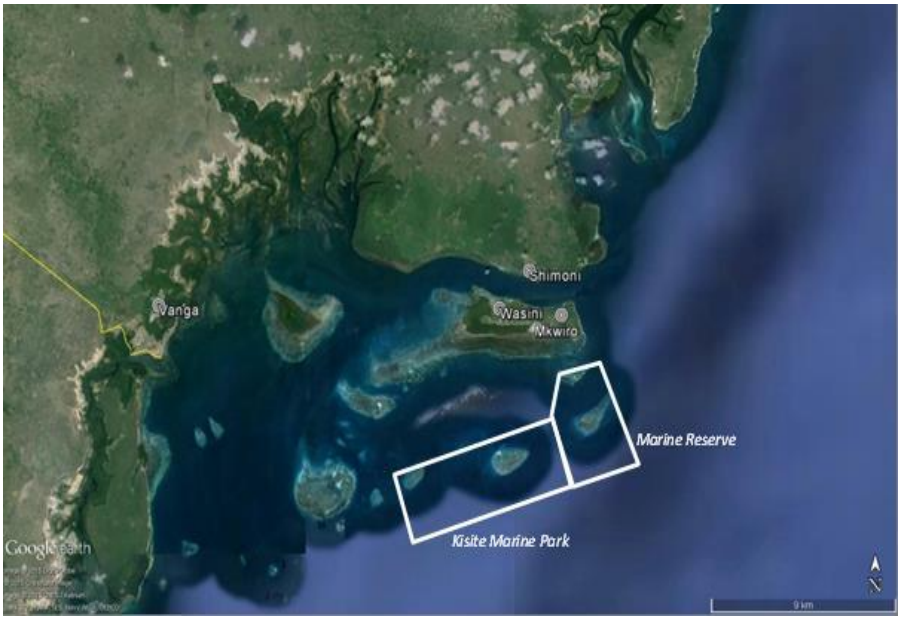

Figure 22: Satellite image showing the project area

Field Study Visit to the proposed mini-grid power project site

Walk-through Inspection of the proposed mini-grid power project site

The consultants made and recorded observations during field study visit to the location of the proposed mini-grid power project. The observations focused on physical environment (topography, geology and hydrology), the vegetation cover, land availability and suitability for the project, land use pattern (especially the proportion of individual farm lands allocated for coconut and millet farming), agricultural practices, accessibility of the site, proximity to other infrastructure amenities, centrality with respect to the economic benefits as a result of the proposed mini-grid power project and environmental concerns, potential sources of energy, socio-cultural environment, employment and labour market. On the site of the proposed mini-grid power project, further detailed observations centered on the *biological environment* (flora and fauna types and diversity, endangered species, sensitive habitats etc.).

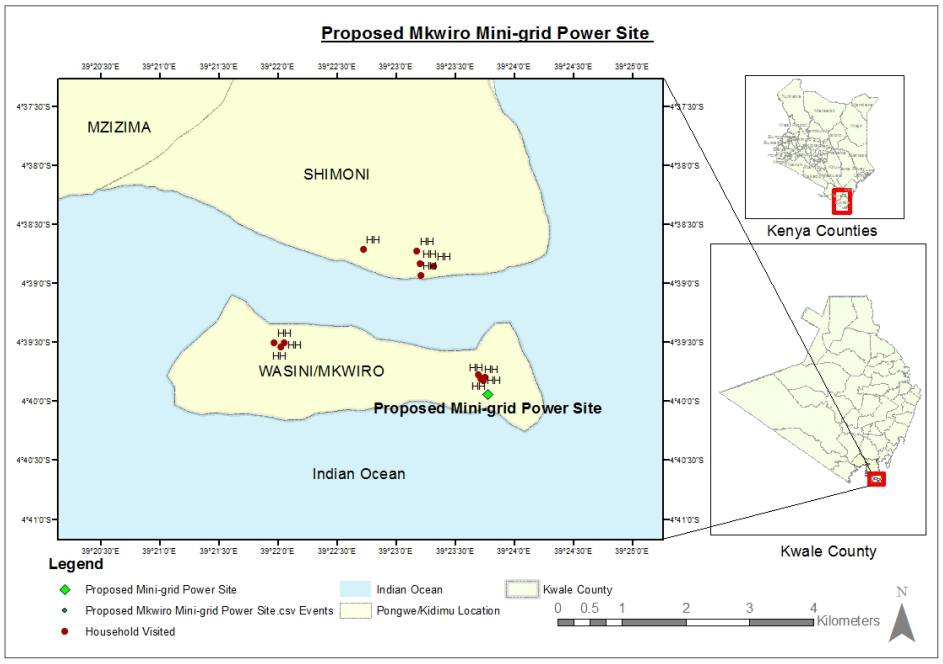

Figure 23: GIS map showing the proposed project mini-grid power site

Plate 12: Boats used in ferrying people can be seen in the ocean while others are docked at Shimoni harbor.

6.6 Stakeholders and Neighbours Comments

These are the major impacts (positive and negative) as indicated by the stakeholders and neighbours on the forms administered to them;

Anticipated Positive Impacts:

i. Jobs will be created both (short-term and long-term);
ii. Livelihood standards in this area will be improved as electricity will affect people's lives in this area in many ways (more business opportunities will be opened in the area and cost of living will go down);
iii. The proposed mini-grid project will have economic impact at this area; and
iv. Will improve security in the area.

Anticipated Negative impacts:

i. Displacement of people, demolition of houses, degradation of land value;
ii. Open power line will be dangerous to the people as this is a densely populated area;
iii. Communication systems in the area will change;
iv. Plants will be destroyed;
v. Soil erosion during construction phase.
vi. Noise pollution during the construction phase and from the generators.

Proposed Mitigation measures:

i. The project does not anticipate any displacement, however, in-case of any physical or economic displacement, affected parties will be compensated in line with the RPF.
ii. The power line should be covered and awareness created to local communities on safety.
iii. The project does not have a provision for bonusses. However, any project related risks and impacts will be managed in accordance to the ESMF, RPF and VMGF as appropriate, including managing grievances through the GRM to be established for the project.
iv. If a farmer's land is affected and it is too small, the project proponent should buy the whole of it instead of leaving behind a piece of land that is not economically viable to the affected farmer. This is in line with the World Bank OP 4.12 policy. The ESMP has outlined mitigation measures and monitoring plans to ensure that environmental and social risks and impacts are avoided, minimized or mitigated. However, should there be involuntary physical or economic resettlement or relocation, then the affected people should be paid disturbance allowance and offered other resettlement assistance;
v. Provide more health facilities; and
vi. Practice soil erosion measures during construction phase.

Plate 13: ESIA Expert (right) with key informants at the proposed business place

6.7 Socio-Economic Survey during feasibility study

A brief socio-economic survey was conducted in November 2016 mainly by use of a written questionnaire as well as on the ground visits by the project personnel for random interviews. The primary beneficiary, Mkwiro, Pongwe/Kidimu location, Shimoni Division, Lunga Lunga District of Lunga Lunga sub-county in Kwale County. Household and population information available is based on a recently proposed government initiative called "Nyumba Kumi" where it is proposed that households should come together in groups of 10 and share information about each other. This is aimed at improving security by having these households sharing information with each other regarding members' movement, occupation and associations. Information on number of households above or below poverty line is however, not available. The information is provided by the administrative village elder. Mkwiro is accessible through motor boats docked at Shimoni harbor. The area is not connected to the national grid.

The available primary school, Mosques and other amenities use solar energy for lighting. The nearest hospital is the county hospital 50 kilometers from the village. There is no defined community centre but space is available for community activities such as meetings and football matches. The main economic activity of the beneficiary community is fishing. The community engages in fisheries related activities such as fish drying, fish trading and sport fishing. Being a labour intensive kind of active, fish engages a majority of the workforce in the area. A minority is involved in other businesses such as retail shops, hotel services, sand/rock

quarrying, tourism and salaried jobs. Others carry out crop farming for crops such as coconut, cashew nuts, millet, cow peas, maize and vegetables mainly for subsistence with the surplus taken to market. Dairy farming and poultry farming are also at a subsistence level.

Their main means of transport if on foot to transport goods is through boats across the Island and carts within the Island. The community's main sources of information are word of mouth and electronic media, specifically the radio. Their saving culture is diverse, a majority indicating that they either save at home or through MPESA/MSHWARI, a service offered by Safaricom, the main mobile network in the area. A minority save either in the bank or through cooperatives and SACCOS. Home lighting is mainly through paraffin lamps while cooking is through firewood. For the few who use DC batteries, charging is either through solar panels or travelling to a battery charging station approximately 1.5 Km to 2Km away. A majority have shown interest in engaging in night time productive electricity use with suggestions ranging from fish preservation to gaming cafes.

Some of the activities analyzed during the survey include:

Fishing
Currently, fishing is mostly conducted by individuals through netting, use of fishing rods, basket traps and hand fishing during the day. In other cases they set out to sea at night in pursuit of larger catches. This means they have to use PV's lamps or kerosene lamps for vision and/or to attract fish. After fishing they take the different kinds of fish to Shimoni mainland for sale as well largescale preservation using electricity. There is only one fisheries office in the area catering to all the fishermen in the area indicating that construction of the mini-grid project will help improve service to the fishermen.

Battery Charging
Currently, for a majority of villagers, battery charging is conducted at Shimoni, the hub centre of Wasini /Mkwiro sub-location. This is about 4 km from the village. Some of the villagers interviewed cite electricity connection costs and lack of confidence in demand for the service as deterring factors to conducting the business.

Poultry Farming
Currently, a majority of households rear their chicken and ducks on a free-range model whereby the chickens are let loose to forage for food. Very few households practice a zero-grazing model of poultry keeping. However, when queried on productive activities one would like to engage in if electricity connection is provided, poultry farming (egg incubation) came up highly citing that the market for poultry and poultry products is good in the area.

Dairy Farming
Few households keep cattle for dairy purposes. Another group of people rear bulls that are used in farming activities. Cows are mainly kept for reproduction purposes. Furthermore, investment in meaningful dairy farming had been hampered by lack of extensive grazing lands. It is hoped that commercial dairy farming will increase in the region after connection to electricity since they can engage in zero-grazing after a surplus in demand for milk in the market.

Productive Uses

During interactions with the community within the setting of an Opinion Leaders' Workshop, the opinion leaders were able to generate a list of possible productive/commercial uses of the electricity to be generated by the generator. They were encouraged to think along the line of uses that can be implemented as a group, with the overall benefit of the community in mind. Some of the commercial uses presented include: Fish processing, Salon & Barbershop, Welding, Tailoring, Carpentry and Battery Charging, Bakery, Video Show, Poultry Farming, Posho Mill, Refrigeration (cold storage) and Water Pumping.

These uses were analyzed in a matrix of socioeconomic positive impact against ease of implementation so as to arrive with the best productive use mix. Socioeconomic impact factored in land use, employment, local economy, national economy, food security, infrastructure, public health, cultural resources and population. Ease of implementation analyzed the factors affecting setting up the business including overall cost, land acquisition, construction requirement and ease of licensing. The matrix arrived at is as summarized below. The uses highlighted in yellow represent the proposed best uses mix.

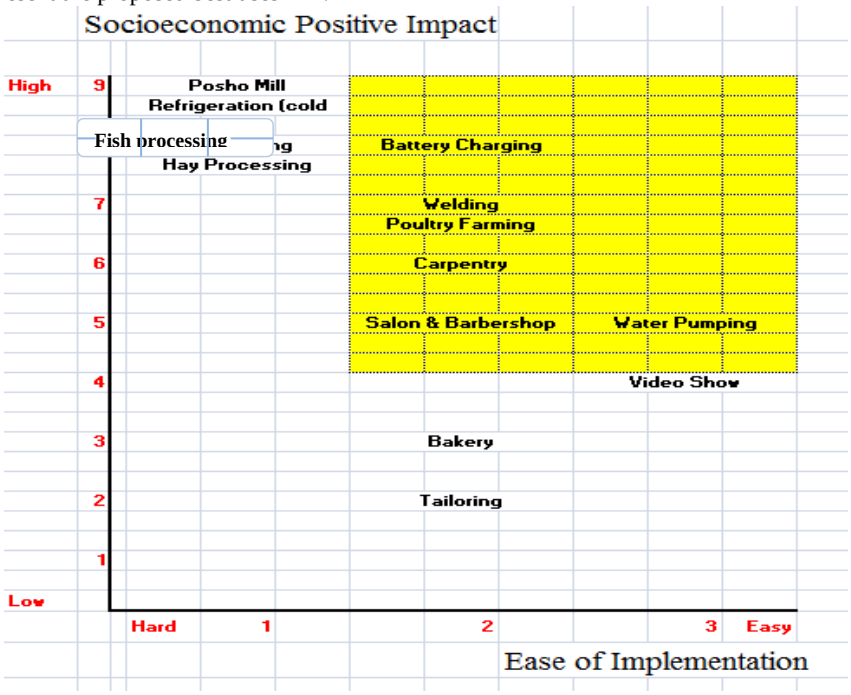

Figure 24: Productive Uses Matrix

These uses are however further classified in terms of priority of implementation. Prioritization was arrived at after consultation with a number of opinion leaders from fisheries office and Mkwiro namely:

i. The Fisheries Office Shimoni,
ii. Mkwiro elder, and

Through their input, a prioritization of the shortlisted productive uses was arrived at with:

i. Fish preservation and processing- High priority
ii. Salon and Barbershop - High priority;
iii. Welding - High priority;
iv. Poultry - Medium priority;
v. Carpentry - Medium priority;
vi. Battery charging - Low priority; and
vii. Water pumping - Low priority.

The site of the proposed mini-grid project will be mainly owned and maintained by the community thus eliminating rental costs of the project area. Setting up the mini-grid system has no demographic impact to the community. Location of the control panel however is to be discussed with relevant authorities as minimal space might be required from a community member's piece of land. A legal document of commitment not to interfere with the system is proposed to be negotiated with the land owner so as to avoid future inconveniences. If monthly tariff or per unit rate will be cheap in comparison to existing system, villagers say that they can take electricity from the proposed mini-grid project.

6.8 Community Involvement

The end beneficiaries of the project is the community thus their involvement in this is important to the overall success of the project. Awareness of the program will be initiated first through a workshop focusing on the community opinion leaders. They have been identified as administrative leaders (chief, assistant chief and village in-charge), religious leaders (Islam religious leaders since the area is predominantly Muslims), business leaders and youth and women leaders (representatives from youth and women self-help groups active in the village). From the opinion leaders' workshop, the leaders are tasked with informing the local community about the project based on information received from the workshop. This workshop will be followed by a community awareness program whereby REREC project personnel will interact with the community on the ground through a series of "baraza" (public meetings) thus providing a forum where the locals will receive firsthand information as well as have all their queries on the project answered to satisfaction.

The community through the village elders has already expressed interest and commitment on the project. Sustainability of the project is important and the community will be sensitized on the emphasis of productive (commercial) use of the electricity as opposed to domestic emphasis. This is to ensure that, other than improving the economic wellbeing of the community through economic activities powered by affordable electricity, the productive uses will generate income necessary for the maintenance of the turbine-generator system thus improve long-term sustainability of the system. It is proposed that ownership of the power generation will be in a public basis through a community group equally owned by members of the village. It is proposed that ownership in the group will be through equal shares allocated when members each contribute a reasonable, minimal and affordable set amount that will be agreed upon by the villagers, opinion leaders and the fisheries office. This community group will be in-charge of maintenance of the system as well as metering and billing of the power produced and supplied to the load centre.

6.9 Community Awareness Forum

As part of promoting community involvement and ownership of the project, a community awareness forum was held with the goal of "Inclusiveness, transparency and sustainability to ensure social acceptance of the Mkwiro mini-grid power project". The forum involved visiting both the direct and indirect beneficiary village and having REREC project staff interacting with the community at local level so as to ensure that the community has an understanding of the project i.e. domestic and commercial impact of the project on the community; the role they have to play in the project; ownership of project; obtain community buy-in for productive use of electricity. The forum was successful with good community turn-out and very inquisitive community members. Community reception to the project was positive and all in attendance called for its swift implementation. Furthermore, interest in engaging in productive of the electricity was also observed with a number of self-help groups bringing up the topic on the sidelines of the forum.

6.10 Conclusions and recommendations

Respondents interviewed regarding major reasons given for not using electricity indicated that lack of access due to distance from the electricity lines, the approximate average distance from the nearest electricity line being 3Km over a stretch of the Indian Ocean. Because the main reasons for not switching to energy of choice is lack of electricity and lack of electricity connection fees. Any electrification program should identify innovative funding mechanisms that will enable residents to pay for connections. Support would be required to link residents up with financing institutions they have already identified such as cooperatives and local micro-finances. Mobilisation would also be required to encourage communities to utilise existing social networks such as *merry-go rounds* to finance connections as well as to demystify the general conception that electricity is expensive.

Regarding household expenditure on energy for lighting, households using firewood spend more than those using electricity and rechargeable batteries among other available energy options. Monthly expenditure on charcoal is also higher. This indicates that the combined household expenditure on different forms of energy is high and access to electricity for most residents would result in savings. Although decisions on the type of energy to use for lighting are mainly made by both men and women in most households, men alone make more decisions as compared to women alone. Decisions on how income from food crops and cash crops is spent are mainly made by both husband and wife. Any electrification project should therefore involve both women and men during the implementation of the project as both will be involved in deciding if to get connected.

The average time spent collecting firewood is 2 hours with a minimum of ten minutes and a maximum of 7 hours. Access to electricity would reduce the amount of firewood used for lighting and cooking and result in time savings for women to engage in productive enterprises and for girls to study, since both are involved in collecting firewood for household use. Majority of residents rely on rain water and constructed water reservoirs for water. Electricity could be used to pump water to homes and free time for women and girls who are responsible for fetching water. The saved time could be put to more productive use. Use of treated water would also curb the incidence of diseases such as typhoid and cholera.

With regard to overall annual household income, the majority of the sampled households earn over Kshs. 55,000/=. Furthermore, a good number of residents have access to a range of financial sources, and they could be encouraged seek finances from these to finance connections to their homes. The most commonly owned electrical appliance is the radio. Residents also own other appliances such as torches, radio cassette players and TVs that are mainly used by all family members. Dry-cell batteries are mainly used in the powering of radios and torches while rechargeable batteries are used to power TVs. Access to electricity will improve access to these facilities to benefit the whole family. A number of the residents have invested in rechargeable batteries. Most of them are purchased new. Switching from dry cell batteries and rechargeable batteries to electricity will result in savings. Access to electricity will also result in an increase in the number of households investing in these appliances for entertainment as well as information.

Majority of residents have noticed changes in energy quality and availability with energy becoming more scarce and expensive. Firewood and charcoal are very expensive while households are using much more energy. For those who have switched from kerosene to solar, expenses have reduced. With firewood getting more scarce and commercialized, residents are aware of the laws prohibiting cutting down of trees. This clearly gives the incentive to connect to electricity in order to reduce the energy budget. There is clear indication that once electricity is installed in households, expenditure on energy will reduce as it will replace kerosene for lighting.

Ninety per cent (90%) of the respondents said they would like to change to a different form of energy. This clearly demonstrates that there is a large percentage of households who would be ready for connection to electricity if it was available close to their homes. With residents travelling long distances to hospitals and maternity facilities, access to electricity would result in improvement of the facilities in the Health Centres and would bring health facilities closer to people. This would reduce time spent travelling long distances in search of health care facilities. Saved time could be used in productive activities hence reduce poverty levels.

The Health Centre is not well equipped to handle cases of complicated conditions and maternal deliveries. They lack proper structures, equipment and facilities as well as trained personnel to handle the cases. Providing electricity to the Health Centre would improve staffing facilities and attract qualified medical personnel. Residents also have to travel long distances to the grain mills and access to electricity would bring this facility closer to homes and free time for other productive activities.

The local Primary School and Mosques without access to any energy as well as those using generators would greatly benefit from an electrification project in terms of reduced fuel bills as well as improved studying conditions and performance. Both women and men operate a range of businesses at the market centres including general shops, groceries, water vending, hotels, etc would offer better services with access to electricity. Access to electricity would also lead to increased volume of business as well as trigger establishment of new businesses and create employment opportunities to the local community.

Residents are very aware of the benefits that access to electricity would bring to them. The main benefits includes; school improvement; Improving peoples overall economic base leading to

better livelihoods; increasing business opportunities; environmental conservation/sanitation; Creating employment opportunities; reduces cost, time and energy spent on such services; improving lighting in homes; improving security in homes and market centres; making work easier since most will be done by machines; Improvement on Communication and Industrialization; Hospital and dispensary improvement; Improvement of agriculture; Factory improvement; Markets improvement and Improvement of livestock rearing.

CHAPTER 7: PREDICTED ENVIRONMENTAL, HEALTH AND SOCIAL-ECONOMIC IMPACTS

7.1 Introduction

The proposed Mkwiro mini-grid project is classified as category B due to limited adverse environmental and social impacts which are site specific, largely reversible and can be readily addressed through mitigation measures. The KEMP Off-Grid sites are likely to be located in a sensitive ecosystems, since most off-grid areas are generally sensitive with historical and cultural significance. The land to be used for the Solar, mini-grid development will be acquired from either communities (communal land), individuals (private land) or county government (public land) by REREC. Mkwiro has donated 2 acres, Kerio and Kaeris 5 acres each. Typically the generator is housed in a shipping type container along with spare parts.

The location of the project site coupled with the clean nature of solar generation ensures that the Off-Grid component will not cause major significant adverse environmental and social impacts during construction and operation. The main project impacts are associated with the solar panels, batteries and, clearing of shrub vegetation, and construction waste management and influx of people. Moreover, most of the associated impacts are limited to the construction phase and are temporary in nature. Except for the visual quality operational phase impact has a limited environmental footprint. Solar power facilities reduce the environmental impacts of combustion used in fossil fuel power generation, such as impacts from greenhouse gases and other air pollution emissions. Unlike fossil fuel power generating facilities, solar facilities have very low air emissions of air pollutants such as sulfur dioxide, nitrogen oxides, carbon monoxide, volatile organic compounds, and the greenhouse gas carbon dioxide during operations.

In addition to these benefits of solar development, construction and operation of solar facilities creates both direct and indirect employment and additional income in the regions where the development occurs. However, there are also some adverse impacts associated with solar and wind power facilities that must be considered in the process of granting authorizations and the process of developing environmental guidance for such facilities. Potential adverse impacts to various resources associated with the construction, operation, and decommissioning of solar power plants are briefly outlined below. These solar energy environmental considerations include land disturbance/land use impacts; potential impacts to ecologically important areas; impacts to vegetation, wildlife, wildlife habitat, and sensitive species; visual intrusion, cultural, paleontological, and socioeconomic, impacts, ; and need to adequately dispose of obsolete batteries from photovoltaic installations.

The proposed Mkwiro Village mini-grid project is expected to create direct and indirect employment and business opportunities; there will be job opportunities especially engagement of the local residents as casual workers. In addition skilled/unskilled labour available in the village will be used in livelihoods improvement. Socially, the youth in the village will be engaged in productive employment hence improve economic situation of their families. Engagement of youth in proactive activities will minimize incidences of them getting involved in drug abuse, prostitution and other criminal activities. The proposed project will be benefit local and national economy. Many people will gain income through supply of available materials including: steel materials, power cables, hardware materials such as nuts, bolts, and

cement. Environmentally the proposed project will significantly reduce greenhouse emissions through installation of the PV electricity (PVe) production. The PVs do not pollute the environment either through noise or chemical pollutants during their operational phases.

7.2 Environmental Impacts of the proposed mini-grid power project

The impacts assessed during pre-construction, construction and operational phase are categorized into 3 basic resources as per details given in figures 98 and 99) below:

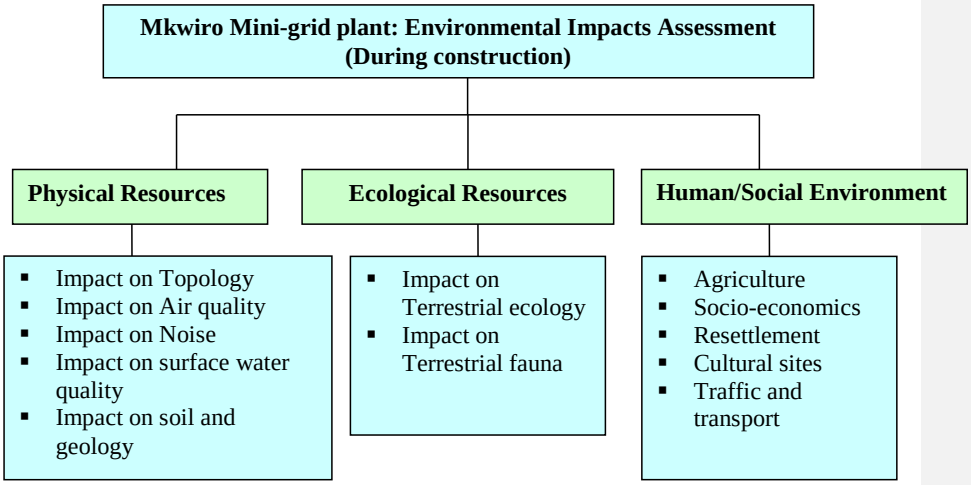

Figure 25: The impacts assessed during construction phase

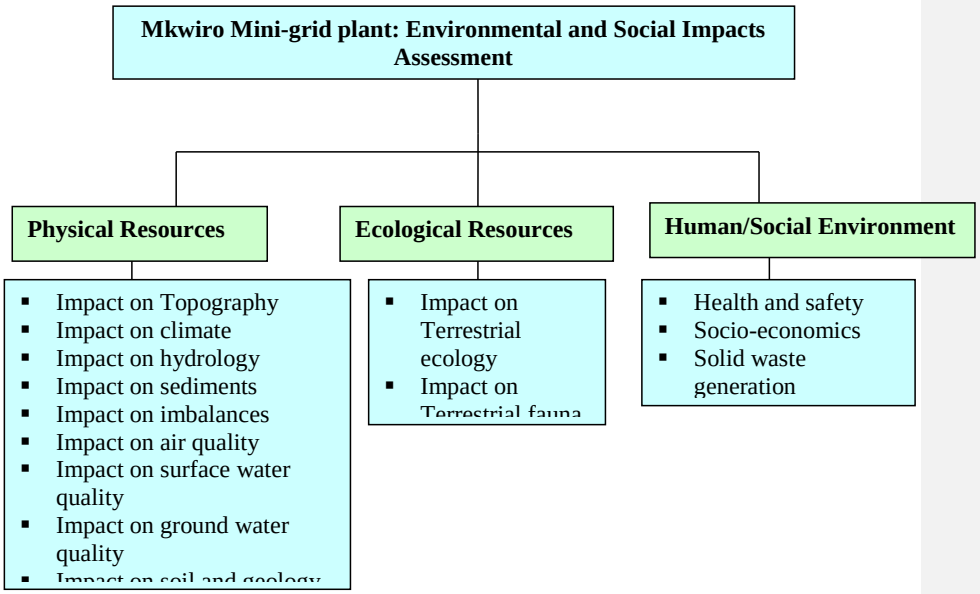

Figure 26: Impacts assessed during operational phase

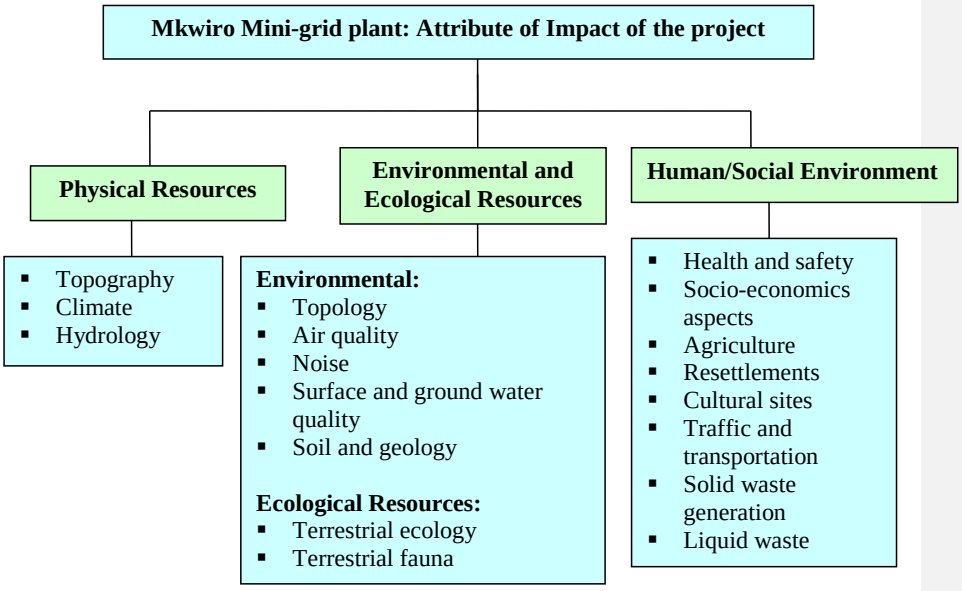

Figure 27: Attribute of Impact of the project during pre-construction, construction and operational phase

7.3 Potential Social, Environmental, Health and Safety Impacts

Potential negative environmental and social impacts for the solar rooftop and ground mounted PV investments are not expected to be significant. The proposed mini-grid is small in intensity. However, the investments will not encroach or degrade sensitive habitats, nor be located in sensitive areas of biological diversity or protected area for physical cultural resources. The environmental concerns or issues likely to arise from the installation and operation of the roof top and ground mounted solar PV system are limited and can be effectively mitigated, except for the disposal of damaged or discarded panels, if these are not covered under the take-back policy with the supplier or manufacturer during replacement.

In case a take-back policy is not available or cannot be ensured throughout the life cycle, the discarded or damaged panels should be disposed of as per the guidelines outlined in EMCA Waste Management Regulation of 2006 on the disposal of hazardous wastes. Safety of personnel during construction, installation and operation can be ensured through measures in each standard working protocol regarding safety equipment by the developer. The proposed Wasini village mini-grid project will bring general social benefit for the locality through air quality improvement, and employment opportunities to the local communities. Based upon the predictions of impact detailed above, impact assessed without and with the proposed mini-grid project has been conducted and the results are reported in the Table 11 below:

Table 11: Predictions of impact detailed above, impact assessed without and with the proposed mini-grid project

No.	Parameter	Environmental Impact units			
		Without project	***With project***	***Net change***	***Magnitude***
1	Crops	Nil	Negative	Small	Low
2	Natural vegetation	Nil	Negative	Small	Low
3	Forests	Nil	Negative	Small	Low
4	Land use	Nil	Negative	Small	Low
5	Natural Reserves	Nil	Negative	Small	Low
6	Fisheries	Nil	Negative	Small	Low
7	Wildlife	Nil	Negative	Small	Low
8	Rare species	Nil	Negative	Small	Low
9	Endangered species	Nil	Negative	Small	Low
10	Species diversity	Nil	Negative	Small	Low
11	Water pollution	Nil	Negative	Small	Low
12	Air pollution	Nil	Negative	Small	Low
13	Noise pollution	Nil	Negative	Small	Low
14	Solid waste	Nil	Negative	Small	Low

15	Land pollution	Nil	Negative	Small	Low
16	Soil erosion	Nil	Negative	Medium	Medium
17	Eutrophication	Nil	Negative	Small	Low
18	Health	Nil	Positive	Big	High
19	Education	Nil	Positive	Big	High
20	Benefit to Economy	Nil	Positive	Big	High
21	Displacement/ encroachment of private land	Nil	Negative	Small	Low

Table 12: Ranking matrix to provide an Environmental Significance

Environmental Significance Negative	
Low	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent development. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment
Moderate	Social environment and result in severe negative or beneficial effects. An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which, in conjunction with other impacts may prevent its implementation. These impacts will usually result in either positive or negative medium to long term effect on the social and/or natural environment.
High	These impacts would be considered by society as constituting a major and usually longterm change to the natural and/or social environment and result in severe negative or beneficial effects.
Very High	A very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects or very beneficial effects.

Table 13: Risk categorization of Mkwiro Village mini-gid power project impacts

Impact	Ranking		
	Likelihood	***Significance***	***Severity***
	Very unlikely, unlikely to occur, May occur, definitely occurs, very High	High, Moderate Low, No significance, Don't know	Very Severe, Severe, Moderately Severe Slight, No effect
Soil disturbance	Very unlikely	No significance	No effect
Solid waste	May occur	Moderate	Slight
Biodiversity loss	Very unlikely	No significance	No effect
Deforestation	Unlikely	No significance	No effect
Hydrology	Very unlikely	No significance	No effect
Pollution of waters	Unlikely	Low	No effect
Insecurity	Unlikely	Low	Slight
EMF	May occur	Moderate	Moderate
Occupational injuries	Likely	Moderate	Moderate
Resource use conflicts	Unlikely	No significance	No effect
Human wildlife conflicts	Unlikely	No significance	No effect
Fire hazard	Likely	High	Moderate
Water use and depletion	Unlikely	No significance	No effect

7.4 Physical Environment

7.4.1 Geology and Soils

The potential impacts of the proposed mini-grid project on the soil and geology of the project site are mainly associated with water impoundment and construction activities. However, the impacts are expected to be minimal because the geology of the proposed mini-grid project site is stable. Seismic activities have not been recorded in the area and therefore such activities are not anticipated from the proposed development. There will be no blasting during construction of the mini-grid power project and other works that may cause loosening of some rocks and soils of the area is anticipated will be minimal.

7.4.2 Climate

The development of the proposed mini-grid project shall not cause any significant changes to the climate of the project area. The availability of cleaner mini-grid energy, where the industries are electrified, will reduce pressure on fossil fuel and forestry products for energy. This will consequently contribute positively to climate change aspects as more trees will be preserved which provide important carbon sink. The proposed Mkwiro mini-grid project is important in reducing the greenhouse gases that are significantly emitted when using fossil fuel generators.

7.4.3 Hydrology

With there being no river near the proposed site, there will be no diversion of water or possible pollution to the water. The Ocean which is about 1 Km from the site will not be affected either. There being no swamps nearby indicates there will be no drainage of swamps too. However, the island is basically coral rag, which means it is very porous and transmissivity rates of oil in water would be high. Therefore, it is important to implement environmental management plan in all phases of the project implementation.

7.4.4 Water Quality

The project area is endowed with no surface water. The proposed mini-grid project design shall be of a low water demand and the water used during the construction phase should be handled to avoid altering it's natural state. The residents have their own source of fresh water and it is anticipated the project will not interfere with the source of water even after completion.

7.4.5 Air Quality

The quality of air of the project area shall not be greatly impacted by the proposed mini-grid project. However, it is anticipated that air quality may be impacted upon during the construction phase. Activities such as blasting, earth moving, and construction machinery movements, shall result in dust, gases and particulate emissions at the civil work sites.

7.4.6 Noise Quality

The potential impact on the ambient noise quality of the project site shall be experienced during the construction. Heavy drilling as well as machinery and generators shall contribute to the noise pollution in the project area. The proponent will comply with the NEMA regulations and noise emission standards.

Sources of generator noise:

- Engine noise – This is mainly caused by mechanical and combustion forces and typically ranges from 100 dB(A) to 121 dB(A), measured at one meter, depending on the size of the engine.
- Cooling fan noise - This results from the sound of air being moved at high speed across the engine and through the radiator. Its level ranges from 100 dB(A) to 105 (A) dB at one meter.
- Alternator noise - This is caused by cooling air and brush friction and ranges from approximately 80 dB(A) to 90 dB(A) at one meter.
- Induction noise - This is caused by fluctuations in current in the alternator windings that give rise to mechanical noise that ranges from 80 dB(A) to 90 dB(A) at one meter.
- Engine exhaust - Without an exhaust silencer, this ranges from 120 dB(A) to 130 dB(A) or more and is usually reduced by a minimum of 15 dB(A) with a standard silencer.
- Structural/mechanical noise - This is caused by mechanical vibration of various structural parts and components that is radiated as sound.

Depending on the current sound levels of the generators and your noise reduction goals, an abatement solution can be determined. In most applications a soundproofing blanket enclosure will meet your sound reduction needs. This is a two to four-sided enclosure with or without a roof. Typically a frame and track is constructed to suspend the sound curtain panels. The

soundproofing blankets material is a composite material bonding mass loaded vinyl with an acoustical absorber and faced with a vinyl diamond stitched facing. The best way to soundproof and to reduce any noise from a generator regardless of size is to enclose it within a Floor Mounted 4-Sided Soundproofing blanket Enclosure. For best results the enclosure should be as large as possible to allow less heat buildup and also to be more effective at reducing the noise output from reaching other areas and acoustically isolating the pump to contain structure borne sound being transmitted from where it is mounted.

Strategies for managing generator set noise:

i). Noise Control barriers
Rigid materials with significant mass and stiffness reduce the transmission of sound. Examples include sheet steel typical of enclosures and concrete or sand filled block walls or solid concrete walls typical of indoor generator room installations. It is also important to eliminate sound paths through cracks in doors or walls, or through access points for exhaust, fuel or electrical wiring. Noise control blankets come standard with grommets across top, mating Velcro along the vertical edges and corner seals.

ii). Acoustic insulation
Use sound-absorbing materials for lining air ducts and covering walls and ceilings. Directing noise at a wall covered in sound-absorbing material can be very effective. Select materials that are resistant to oil and other engine contaminants. Fiberglass or foam is suitable based on factors such as cost, availability, density, resistance to abrasion, aesthetics and ability to clean.

iii). Isolation mounts
Vibrating equipment creates sound pressure waves (noise) in the surrounding air. Anything that is physically connected to a generator set can cause vibrations to be transmitted to the building structure. These connection points include skid anchors, radiator discharge air ducts, exhaust piping, coolant piping, fuel lines and wiring conduit. Fitting these connections with flexible joints effectively reduces noise transmission. Mounting a generator set on spring-type vibration isolators effectively reduces the vibration and noise that are transmitted through the floor.

iv) Noise control enclosures
Steel and aluminum noise control enclosures of all kinds provide at least 10 dB(A) of attenuation for generator sets that must be located outdoors. In many cases, when combined with an effective exhaust silencer, this amount of attenuation. Sound Attenuation is needed to meet local noise ordinances or reduce impact on employees or neighbors, special sound-attenuating enclosures must be employed.

Special sound-attenuating noise control enclosures combine both barrier and absorption noise control strategies to contain generator Noise. Stell enclosure provide 2-3 dB(A) better attenuation. Reducing noise by 20 to 40 decibels with this cost-effective, durable material is one of the best ways to solve noise control issues in commercial, facility & industrial markets. ***The proponent will ensure compliance with this regulation during construction, operation and decommissioning of the proposed mini-grid power project.***

7.4.7 Waste Disposal

Most of solid waste will be generated during construction phase. These wastes will include rubble from the blasted rocks, concrete, steel bars, bolts, nuts, cables, cable drums, waste oils, paper, plastics, metal and woody vegetation. The project is also expected to generate domestic waste such as leftover foodstuffs and human waste, especially during working hours. Most workers will be housed in the nearby Shimoni urban centre.

7.5 Biological

7.5.1 Flora

The impact of the proposed mini-grid project on the flora of the project site is mainly related to preparatory activities such as clearance of vegetation, excavation and stripping; and during clearing of the way leave for the transmission lines. During these processes, the plants and animal life will be disturbed.

7.5.2 Fauna

The impact of the proposed mini-grid project on the fauna of the project site is mainly related to preparatory activities such as clearance of vegetation, excavation and stripping; and during clearing of the way leave for the transmission lines. During these processes, the plants and animal life will be disturbed.

7.6 Socio-economic Environment

7.6.1 Population

There will be a temporal increase in population during the construction of the mini-grid power project, as some of the skilled and semi-skilled workers will be recruited from outside the project area. During operational phase, only a few operational staff will be retained, therefor e in the long term, the impact on population will be minimal. Influx of job seekers, in-migration and improved income levels will potentially lead to spread of STDs, Gender Based Violence, i.e. Sexual Exploitation and Abuse and Sexual Harassment; as well as increased insecurity cases.

7.6.2 Local Economy

The introduction of electricity in the area will give the local communities an opportunity to improve production capacities in various sectors of the local economy carpentry, farming and trade. Employment of local people shall be encouraged for this will lead to an improvement in the income levels and in turn in the standard of living.

7.6.3 Health

The impact on health is viewed from two perspectives namely; the occupation health impacts related to the construction and operation activities, and the non-occupational health impacts occasioned by the execution of the proposed mini-grid project. The occupational health impacts occur to the workers during their respective duties. During construction phase, the workers will be exposed to hazards such as machine cuts, and repetitive injuries from use of tools and equipment among others. The anticipated non occupational health impacts will be associated

with the use of labour from outside into Mkwiro. The use labour from outside the project site may cause or increase the spread of communicable diseases such as dysentery, HIV/AIDS and other sexually transmitted diseases.

7.7 Summary of Possible Environmental Impacts and Suggested Mitigation Measures

7.7.1 Positive Impacts

7.7.1.1 Socio-economic Impact

i. Enhance income generation: By encouraging productive use of the electricity generated through activities such as agro-processing and small service businesses like hair salons, it will enable villagers to engage in activities that generate income thus improving their economic wellbeing.
ii. Education improved: Lighting provided in the households at night provides children with a chance to study. Furthermore, uneducated adults can be encouraged to organize adult education classes in the evenings.
iii. Savings on fuel: When electricity is used as an alternative to kerosene, charcoal and firewood, savings are made on purchase of these. The additional income can be put to other uses or as savings.
iv. Workload on women and children is reduced due to them spending less time on energy related household tasks such as collecting firewood. Time for productive uses is available. The women can engage in sewing/tailoring while the children have more study time. This also reduces physical impairments resulting from heavy load work.
v. Night time security is improved in the village: If security lighting is provided at night, security improves in general including more night mobility due to flood light availability.
vi. Technical training will be provided to the villagers responsible for maintenance of the generating system. Thus technical skills will be provided to a number of the villagers. They will in time train others and possibly develop an interest in acquiring more and diverse technical skills.
vii. Telecommunication will be enhanced: With increased use of electrical devices such as TVs and radios, villagers will have more access to information thus giving them more knowledge.
viii. The village social life will improve since community social gatherings at night will now be possible.
ix. Electricity provided will have a positive impact on the household's health situation. It will decrease indoor air pollution from kerosene and firewood as well as reduce the risk of fire. If cold storage is adopted as a productive use, the refrigerator might also be used to store some essential medicines. Use of groundwater pumps will also reduce water borne diseases due to contaminated surface water.

7.7.1.2 Environmental impacts

i. Reduced greenhouse gas emission and deforestation: When electricity is used as an alternative to kerosene lamps, charcoal and firewood, there is reduced carbon emission as well as reduced deforestation.
ii. The project raises awareness of proper watershed management and reforestation to secure the sustainable use of water resources.

7.7.2 Negative Impacts

i. It has environmental impact on the overall ecology and ecosystem function of the area. The mini- grid system is hybrid built to source energy from sunshine backed up by generators. There will clearance of vegetation cover to create space where the solar panels and generators will sit.
ii. Being situated close to the ocean, there is the risk of pollution especially during the construction phase waste such as rubble from the blasted rocks, concrete, steel bars, bolts, nuts, cables, cable drums, waste oils, paper, plastics, metal and woody vegetation will be carried to the ocean.
iii. There are possible oil spillages from generators creating a hazard to the ecosystem and altering the aesthetic view of the village.
iv. The project will cause soil erosion especially during the construction phase which in turn will cause sedimentation during the rainy seasons after surface water run-offs; and
v. The design of the system involving generators will cause noise pollution.

7.7.3 Life-Cycle Global Warming Emissions

The proposed Mkwiro mini-grid energy project is a hybrid plant and it will emit GHGs from the generator and transportation of equipment, and concrete and other materials for construction and fuel requirements during operation. However, solar mini-grids have no emissions associated with other stages of a mini-grid's life-cycle, including materials production, materials transportation, on-site construction and assembly, operation and maintenance, and decommissioning phase.

7.7.3 Waste management problem of non-biodegradable equipment

Most of the components of electronic devices are not biodegradable and hence provides a challenge in terms of disposal. Non-biodegradable equipment often remain in the environment for years and end up becoming a menace, eye sore as well as a landscape and visual intrusion problem. ***Toxicity and radioactive nature of E-waste to the human, water, soil and animals***
Electrical and electronic equipment contain different hazardous materials, which are harmful to human health and the environment if not disposed of carefully. While some naturally occurring substances are harmless in nature, their use in the manufacture of electronic equipment often results in compounds, which are hazardous (e.g. chromium becomes chromium VI).

Table 14: Toxic Substances in E-waste

Substance	**Occurrence in E-waste**
Halogenated compounds	
PCB (polychlorinated biphenyls)	Condensers, Transformers
TBBA (tetrabromo-bisphenol-A) PBB (polybrominated biphenyls) PBDE (polybrominateddiphenyl ethers)	Fire retardants for plastics (thermoplastic components, cable insulation) TBBA is presently the most widely used flame retardant.
Chlorofluorocarbon (CFC)	Cooling unit, Insulation foam
PVC (polyvinyl chloride)	Cable insulation
Heavy metals and other metals:	
Arsenic	Small quantities in the form of gallium arsenide within light emitting diodes

Barium	Getters in CRT
Beryllium	Power supply boxes which contain silicon controlled rectifiers and x-ray lenses
Cadmium	Rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines (printer drums)
Chromium VI	Data tapes, floppy-disks
Lead	CRT screens, batteries, printed wiring boards
Lithium	Li-batteries
Mercury	Fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches
Nickel	Rechargeable NiCd-batteries or NiMH-batteries, electron gun in CRT
Rare Earth elements (Yttrium, Europium)	Fluorescent layer (CRT-screen)
Selenium	Older photocopying machines.
Zinc sulphide	Interior of CRT screens, mixed with rare earth metals

7.7.4 Land Disturbance/Land Use Impacts

Solar energy facilities may require relatively large areas for solar radiation collection when used to generate electricity and this may interfere with existing land uses, such as grazing, community uses, and minerals production if present in such area. Solar facilities could impact the use of nearby specially designated areas such as wilderness areas, areas of critical environmental concern, or special recreation management areas. Proper siting decisions can help to avoid land disturbance and land use impacts.

7.7.5 Way-leave Acquisition and Compensation for Low Voltage lines

As already noted the project will involve connection of power to end users i.e. to low-income households Off-Grid areas. The low voltage lines to connect the households will be mainly constructed along the public land and they will not involve any resettlement. The low voltage lines will require way leaves acquisition to facilitate line construction and protection of power line. Way leaves by definition is an easement or rights of way (ROW) which gives the right of use or restricts the use of land of another in a way that benefits other people other than the owner of the land.

While the project does not expect any resettlement, there may be need, nevertheless, to compensate people whose assets, namely trees and crops may be damaged during project implementation. Way leaves is necessary for protection of power lines and it is not just a matter of facilitating line construction. The Energy Act 2007 provides that when a public electricity supplier intends to lay a power line on land owned by another person, the supplier must obtain consent (way leaves) beforehand. The Way leave acquisition process entails the following main steps especially for the connection to customers.

Survey, design and payment by the customer File is forwarded to way leaves officer who checks to see where the line will pass in order to identify the people to consult Way Leave officer talks to land owners or public utility representatives e.g., roads authority on the need for a way leave consent The land owners sign the way leave consent allowing REREC to lay line on their land Once consent is given the construction engineer/contractor proceeds with construction. Clearing of bushes and cutting of trees if any exists, will be undertaken with, minimal**,** disturbance wherever possible to pave way for the line. The wayleaves officer will pay the tree owners as stipulated by the law and RPF prepared for the project as per OP 4.12 and records will be kept. Once construction is done, the construction engineer does a memo to the way leave officer to visit the site and assess the impact, if any damage to property has taken place.

In such a case, damage assessment and recording is done by way leave officer in the presence of the owner and construction engineer or contractor who also sign the property damage report. Costing for damages is done by the way leave officer using property damages standard rates for the companies which are developed by the chief way leaves officer in liaison with government agencies such as ministry of agriculture and Kenya Forest service. The cost of damages are forwarded to finance for processing the funds Once the funds are ready the way leave officer talks to the local administration i.e. chief/assistant chief and arrange for a date when payments will be made. The officer then notifies all the concerned persons on the day and time of payment for damages which is done at the chiefs/assistant chiefs office. Once payment is done the owner, wayleave officer, a representative from finance (accountant) and the chief signs the payment record sheet. It is important to note that when granted, wayleave does not mean ownership of land but only limited use to the land. This project may occasion damage to properties of third parties accidentally or necessitated by line construction, survey and maintenance. The same procedure shall be followed in this project. The main emphasis is that the contractor/supervisor shall record all damages occasioned in the presence of the owner or his/her representative and forward to the way leave officer who shall arrange for payments.

7.8 Monitoring Roles and Responsibilities

The goal of monitoring is to measure the success rate of the project, determine whether interventions have resulted in dealing with negative impacts, whether further interventions are needed or monitoring is to be extended in some areas.

7.8.1 REREC/PIU -Environmental and Social Specialists

The REREC/PIU will have an environmental specialist and a social safeguard specialist who will provide oversight, screening of sub projects, and preparation of ToRs for ESIAs, facilitation, coordination, review of ESIAs, monitoring and evaluation of all the sub projects. The PIU will prepare quarterly monitoring reports of all active investments under implementation and these will be submitted to the World Bank.

7.8.2 Bank's Monitoring Support

The Bank will provide second line of monitoring compliance and commitments made in the Management Plans through supervision. The Bank will further undertake monitoring during its scheduled project supervision missions. Specifically, for each year that the agreement is in effect, MoEP will be required to submit all the monitoring reports to the Bank as part of its reporting and the Bank supervision missions will review these reports and provide feedback.

7.8.3 National Environment Management Authority (NEMA)

The EMCA places the responsibility of environmental protection on NEMA as the coordinating agency. NEMA is charged with the overall role of providing oversight in regards to monitoring for all project activities that have potential impacts on the environment in Kenya. NEMA will undertake periodic monitoring of the investment projects by making regular site inspection visits to determine compliance with the investment projects ESIAs approved and will further rely on the submitted annual audit reports submitted for each investment project annually as required by EMCA as a way of monitoring. NEMA will provide approvals and ESIA license to all the investments based on the ESIA reports submitted, without NEMA's approval implementation of the investment project will not move forward. All monitoring reports as well as annual environmental audit repost will be submitted to NEMA as specified by the environmental assessment and audit regulations.

CHAPTER 8: ENVIRONMENTAL AND SOCIAL MANAGEMENT

8.1 Introduction

A number of activities have to be carried out during the various phases of the project to ensure adequate environmental and social impact management. These include, but are not limited, to the following:

8.2 Project Preparation

i. Collection of baseline data for monitoring purposes (for example, Mkwiro mini-grid project area level of sunshine, ambient noise, socio-economic conditions);
ii. Training of mini-grid power project staff in environmental and social management;
iii. Verification of design details;
iv. Inclusion of environmental and social specifications in Tender Documents, and development of Code of Conduct for the Contractor; and
v. Preparation of an occupational health and safety manual for use during project operation.

8.3 Construction

i. Implementation and monitoring-of mitigation measures;
ii. Enforcement of occupational health and safety requirements (conditions at the Contractor's Yard, materials storage, condition of equipment, protective clothing, etc) that will be placed at the identified public land identified by the community members;
iii. Collection of data on sunshine levels, and noise and vibration levels and topography of the area;
iv. Disposal of construction, solid and sanitary wastes in an acceptable manner and in conformance with regulations;
v. Ensuring that the Contractor is following the Code of Conduct and environmental specifications in the Tender Documents;
vi. Training the Contractor's workforce in environmental and social awareness and responsibility (including STD/HIV/AIDS awareness); and
vii. Liaison with local administration and community leaders in matters of disturbance to the public, security issues, and siting of the Contractor's Yard.

8.4 Operation

i. Maintenance, calibration and checking of all equipment as specified in respective manuals or regulations;
ii. Monitoring leakage and spills;
iii. Collection of data on physiography, geology and soils, sunshine levels and noise levels to be used for analysis and remediation where necessary;
iv. Disposal of solid and sanitary wastes in an acceptable manner and in conformance with regulations;
v. Compliance with occupational health and safety manual to be prepared during by scheme management during the project preparation phase; and

vi. Environmental performance reporting (based on evaluation of data collected, investigations, etc).

Table 9 below presents the environmental and social management plan. It describes how each of the main mitigation measures proposed should be implemented, how frequently, and who should be responsible during and after construction. Monitoring indicators and means of monitoring have also been included the table. It is imperative that this Environmental Study report is made available to the contractors bidding for the project during the tendering process so that they can appreciate what is involved in implementing proposed mitigation measures and will be able to include mitigation measures in the bills of quantities. Prior to mobilization, the Contractor should also prepare his own environmental management plan for review by the Supervising Engineer. In his schedule of works, the Contractor must include all proposed mitigation measures, and the Supervising Engineer should ensure that the schedule and environmental management/monitoring plan are complied with. This will also lend a sense of ownership to the Contractor, in addition to instilling in him a thorough understanding of the pertinent issues.

The responsibility for supervision of the implementation of all the proposed mitigation measures during construction and the defects liability period will lie with the Supervising Engineer, while the Contractor will be responsible for day to day operational matters of construction, which will include implementation of mitigation measures that he is responsible for. After the defects liability period, responsibility for the operation and maintenance of the scheme will rest with the mini-grid power project manager to be operated through IPP arrangements. Table 13 also presents an estimate of the costs of environmental management and mitigation.

8.5 Grievance Redress Mechanism (GRM)

The proposed mini-grid project may lead to some grievances. A Grievance Redress Mechanism (GRM) provides access to remedy and identifies procedures to effectively address grievances arising from project implementation. Persons affected by the project must have an avenue where they can formally lodge their complaints and grievances and have them properly considered and addressed. Potential sources of grievances and conflicts as a result of administration of the mini-grid project include:

- ✓ Inadequate or lack of consultation;
- ✓ Concern over exclusion in decision-making;
- ✓ Poor communication and facilitation;
- ✓ Dissatisfaction with levels of representation in the various project committees.
- ✓ Discontentment regarding performance of mitigation measures (e.g. support from alternative livelihoods); and
- ✓ Lack of transparency and accountability through the citizen engagement.

Table 15: GRM Principles

Equity	**No complaint is too big or small. All complaints received shall be treated with the urgency and the attention they deserve. All Aggrieved Parties regardless of their social standing, gender, political affiliation, religious affiliation shall be given opportunity to be heard by the responsible mini-grid project officers without prejudice.**
Accountability	The project outcomes should benefit the people in the targeted communities and as such the mini-grid project management is accountable to the people in the communities, they operate in. The mini-grid project should be responsive to the needs of the community including their complaints and grievances.
Transparency	Members of the community or aggrieved parties have the right to information on the grievance mechanism, how to access it, who is responsible for handling their complaints and the potential outcome of the processes.
Accessibility	All people in the target communities must have unrestricted and free access to the GRM. The project shall publicize the GRM to all those who may wish to access it and provide adequate assistance for aggrieved parties who may face barriers of access, including language, literacy, awareness, finance, distance, or fear of reprisal. The Aggrieved Party shall be kept informed at each stage of the process.
Anonymity	The GRM will not disclose the identity(s) of the AP by name or otherwise to maintain confidentiality.
Timely Response	This GRM should function promptly and speedily. Prompt action is not only desirable from the complaint's point of view, but also from the management's point of view. Since delay causes frustration and tempers may rise, it is necessary that grievances should be dealt with speedily. It is a common saying that justice delayed is justice denied. However, any 'unnecessary delay constitutes another grievance. Settlement of grievances "in the shortest possible time and at the lowest level possible," is the ideal one. Some of these cases and incidences might require reporting to the WB Task Team immediately.
Confidentiality	Grievances will be treated confidentially. Complainant's names and personally identifiable information will be kept in the strictest confidence.
Participatory and socially inclusive:	All project-affected persons – fishers, community members, members of vulnerable groups, project implementers, civil society, and the media - are encouraged to bring grievances and comments to the attention of project authorities. Special attention will be given to ensure that poor and marginalized groups, including those with special needs, are able to access the GRM.
Building on existing informal and formal dispute resolution flows	The GRM will build on existing structures of informal and formal dispute resolution to enhance cost effectiveness. The GRM will rely on two existing systems: informal dispute resolution practices (through the existing traditional conflict resolution flows) and formal resolution practices (through existing administrative and judicial flows by arbitration and courts of law). By doing this, the mechanism can easily become acceptable as the majority of stakeholders are already familiar with it.

Grievance Redress Mechanism (GRM) both for mini-grid project workers and for dealing with grievances between the community and the contractor. We proposed that both community and the contractor should be accessible to the intended audiences.

8.6 Grievance Procedures

i. ***Registration*** - Community members can inform the mini-grid project management office about concerns directly and if necessary, through third parties. Once a complaint has been received, it will be recorded in a complaints log or data system. The log will be kept in hardcopy or electronic form. All reported grievances will be categorized, assigned priority, and routed as appropriate.

ii. ***Sorting and Processing*** - This step determines whether a complaint is eligible for the grievance mechanism and its seriousness and complexity. The complaint will be screened however this will not involve judging the substantive merit of the complaint. The following guide will be used to determine whether a complaint is eligible or not:

Eligible complaints may include those where:

- ✓ The complaint pertains to the mini-grid project.
- ✓ The issues raised in the complaint fall within the scope of issues the grievance mechanism is authorized to address.
- ✓ The complainant has standing to file.

Ineligible complaints may include those where:

- ✓ The complaint is clearly not mini-grid project -related.
- ✓ The nature of the issue is outside the mandate of the grievance mechanism.
- ✓ The complainant has no standing to file.
- ✓ Other project or organizational procedures are more appropriate to address the issue.

iii. Closing Out and Escalation: Project-related grievances will be addressed and closed out as appropriate. The GRM will provide a channel for escalation e.g. through legal redress.

Table 16: Environmental and Social Management Plan and Mitigation measures

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
ENVIRONMENTAL MANAGEMENT PLAN							
Soil Erosion	Earth works	- Controlled clearing of vegetation and re-vegetation of disturbed areas as required. - Management of excavation activities, and reuse/ storage / disposal of spoil. - Undertaking of earthworks during dry season. - There is minimal earthmoving involved as the project site is an existing concrete canal. However, if any earthmoving involved, the overburden earth can be used in-filling the burrows - Create contour drains during construction.	Supervising Engineer / Contractor	n/a	(c) Inspection	(c) Continuous	(c) Construction cost.
	Scheme design	- Re-vegetation of all barren areas to be coordinated with completion of different elements of the works. - Power line and embankment stabilization measures to be incorporated and maintained.	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(c) (o) Inspection	(c) (o) continuous	(c) Construction cost. (o) Routine O&M costs.

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
	Access routes and transmission lines	- Incorporation of properly designed drainage structures along access routes. - Re-vegetation of road embankments. - Trash lines to be constructed and maintained where the transmission lines traverse steep terrain.	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) verification of design of drainage structures (c) (o) Inspection	(d) on completion of design (c) (o) continuous	(c) Construction cost. (o) routine O&M costs.
Air Quality	Air and dust emissions	- Control speed vehicles delivering construction and solar modules. - Equipment/machinery operators and drivers of construction vehicles to be sensitised. - Maintenance of construction plant and equipment. - Watering to keep dust levels down. - Prohibit idling of vehicles. - Regular maintenance of the solar modules and related equipment. - Servicing of the machinery and generators to reduce emissions. - Stockpiles to be enclosed / covered. - Engage sensitive construction workers.	Supervising Engineer / Contractor	n/a	(c) inspection / observation	(c) Daily/random	(c) Construction cost.

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Noise Quality	Noise pollution	- Noise buffering measures such as the generator room to be incorporated into project design. - Installation activities to be restricted to daytime. - Sensitize drivers of construction machinery on effects of noise and control measures - Maintenance of installation equipment - Noise levels to comply with national standards - Construction workers and drivers sensitised. No movement of heavy vehicles after dark. - Maintenance of plant and equipment. - Workers in the vicinity of or involved in high level noise to wear respective safety and protective gear such PPE (ear plugs/muffs) to be provided and use enforced.	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) equipment specifications (c) Inspection / observation; noise measurement records (o) Inspection/ observation; maintenance records; noise measurement records.	(c) Daily/random (o) fortnightly monitoring of noise; maintenance as required by manufacturers specifications	(c) Construction cost. (o) Noise meter Kshs 30,000/-; PPE costs – see below. Maintenance - part of operation costs

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Water Quality	Sediment loading	- Management of earthworks and spoil. - Incorporation and maintenance of erosion control measures - Installation and maintenance of silt trap. - Interference with the marshland is not foreseen.	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) verification of design of erosion control measures (c) inspection (o) Inspection	(d) on completion of design (c) continuous (o) monthly or as needed; annual maintenance.	(c) construction cost (o) routine O&M costs

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
	Foul water contamination	- Provision of proper sanitation facilities. - Design and construction of sanitation facilities ensures compliance with national standards.	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) verification of design of sanitation facilities (c) inspection (o) inspection	(d) once when designed (c) sanitation facilities: completion of works certificate; other aspects monitored daily (o) daily	(c) construction cost (o) routine O&M costs

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Contamination by Oil	Oil pollution	- Specified area near the proposed mini-grid project has been allocated for maintenance of construction equipment. - Provision of proper contained facility constructed for storage of oil and oil products. - Oil interceptor to be installed at storm water drain outlet, and maintained - Procedures for proper storage, handling and disposal of oil products, and spill response - Provision of spill kit - Maintenance of power plant equipment	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) verification of design of oil storage facilities and interceptor (c) Inspection (o) inspection	(d) once when designed (c) oil storage facility / interceptor: completion of works certificate; other aspects monitored continuously (o) continuously; maintenance as required.	(c) Construction cost. (o) Spill kit KShs 15,000/-; other costs are routine O&M costs.

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Solid waste and Construction Debris	Solid waste management	- Contractor's practices to minimise amount of debris and waste generated. - All waste to be properly disposed of. Kwale County government waste collection point then disposed in a sanitary landfill or dumpsite. - During plant operation, waste to be segregated, inventoried and disposal methods recommended, as required by Waste Regulations. - Debris should be disposed off at approved sites. - None required, if there are take-back arrangements with manufacturer or supplier(s). If not, damaged/discarded panels can be disposed as per the EMCA Regulations for disposal of hazardous wastes.	Supervising Engineer / Contractor	Mini-grid power project Manager	(c) Inspection (o) inspection	(c) Daily. (o) Daily	(c) Construction cost. (o) routine O&M costs

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Materials Sources	New gravel sites opened by Contractor	- Properly planned excavation activities, including proper drainage, fencing, access and egress to the site, and rehabilitation of gravel site as agreed with gravel site owner. - Prohibition of dumping of oil, garbage and spoil in the gravel site area. - Dust reduction through water sprinkling.	Supervising Engineer / Contractor	n/a	(c) ESIA report, inspection.	(c) ESIA study done when sites are identified and before excavation begins. Other aspects to be monitored continuously.	(c) ESIA Study: KShs 550,000/-; other costs are included in Construction costs
	Other construction materials	- Specified standards such quality specification to be applied to all materials and appliances. - Specified materials not to be used for construction. - Verification of sources of all construction materials.	Supervising Engineer / Contractor	n/a	(c) certificates, Inspection.	(c) continuously	(c) Construction cost.

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Vegetation / flora	Clearing activities	- Controlled clearing of vegetation and trees. - All disturbed areas to be rehabilitated and re-vegetated. - Minimize extent of disturbance - Construction is limited to a small project site so habitat damage is minimal. - Furthermore, there is no requirement of construction of access roads to facilitate the project thus no fragmentation of the shrubs and indigenous trees.	Supervising Engineer / Contractor	Mini-grid power project Manager	(c) Inspection	(c) Daily	(c) Construction cost.
	Changes in aquatic floral composition	- Baseline survey of aquatic flora, and follow up study 5 years later. - Plan the installation of a MV line crossing the forest between fishermen Mkwiro there would be a major impact by cutting trees. There is need to re-open the old telephone line path by cutting trees on 3 km by 10 m width. This would also probably have impacts on mobility between Mkwiro and Mkwiro.	Design Engineer	Mini-grid power project Manager – weir condition Fisheries Office and REREC – baseline and follow up	(d) verification of project design	(d) on completion of project design (o) baseline immediately, follow up study in 5 yrs	(d) included in design fee (o) Baseline study to cover flora and fauna and follow up study: KShs 100,000/- each

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
Forests	Catchment management	- Provision of support to KFS, KWS, local CBO and the local communities in the management of the forest to establish current status.	n/a WRMA	KFS – forest management, supported by with assistance local communities. WSB/WRMA	(o) survey of forest cover and recovery; consistent records of daily hydrological flow	(o) forest status study immediately; follow up study in 5 years.	(o) to be determined.
Wildlife / fauna	Terrestrial habitat destruction	- Controlled clearing of vegetation and trees. - Re-vegetation and re-afforestation and of the site and any areas that are cleared.	Supervising Engineer / Contractor	Mini-grid power project Manager	(c)	(c) continuous	(c) Construction cost

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
	Changes in aquatic fauna composition	- Project design to minimise pollution effects. - Baseline survey of aquatic fauna, and follow up study 5 years later.	Design Engineer	Mini-grid power project Manager – weir condition REREC – baseline and follow up	(d) verification of weir design.	(d) on completion of project design (o) baseline immediately, follow up study in 5 yrs.	(d) included in design fee (o) Baseline study covering flora and fauna – see above.
	Fish	- Construction will not significantly interfere with the natural aquatic life. However, there will be disturbance during transportation of equipment across the channel.	Design Engineer	n/a	(d) verification of design	(d) on completion of project design	(c) construction cost
De-mobilization		- Site to be left in a clean, aesthetic and restored condition on completion of works.	Supervising Engineer / Contractor	n/a	(c) certificate of completion	(c) once when construction is complete	(c) construction cost

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
SOCIAL MANAGEMENT PLAN							
Settlement and Immigration	Risk of STD/ HIV/ AIDS	Contractor to develop and implement an STD/HIV/AIDS awareness plan on prevention mitigation	Supervising Engineer / Contractor	Local administration, County Medical Officer of Health	(c) minutes of awareness raising meetings	(c) every month (o) every 6 months	(c) HIV/AIDS awareness KShs 100,000/- (o) none
	Gender Based Violence (GBV)	-Contractor to develop and implement GBV, SEA (Sexual Exploitation and Abuse) and workplace Sexual Harassment (WSH) Management plans (including plans for prevention, response and GRM) -Contractor to ensure that a code of conduct is developed and signed by all with physical presence on site -Contractor to train and create awareness to local communities and workers on GBV -Contractor to ensure that the project GRM provides confidential reporting, safe and ethical documenting of GBV cases	Supervising Engineer/contractor	Local administration, County Medical Officer of Health	GRM Log (c) minutes of awareness raising and training meetings	(c) every month (o) every 6 months	

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
	Stakeholder engagement and information disclosure	Contractor to develop and implement the Stakeholder Engagement Plan to guide consultations and information disclosure to stakeholders Contractor to ensure that community engagement and disclosure is done prior to project mobilization Contractor to ensure full disclosure to communities on positive and negative impacts as well as opportunities	Supervising Engineer/contractor		Minutes of all engagements held	(c) every month (o) every 6 months	
	GRM	Contractor to develop an effective project GRM to ensure every grievance is registered, documented, fully addressed and closed out. GRM to ascertain anonymity and confidentiality.	Supervising Engineer/contractor		GRM log	(c) every month (o) every 6 months	
	Institutional capacity	Contractor to engage a qualified social specialist to implement and monitor the ESMP	Supervising Engineer/contractor		Progress reports	(c) every month (o) every 6 months	

Environmental/ Social Aspects / Impacts		Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation monitoring and/or maintenance after defects liability period	Monitoring means (d) = design/ preconstruction (c) = construction (o) = operation	Recommended frequency of monitoring	Estimated Cost (KShs)
	Contractors Yard and Workers camp	- Contractor to consult with community and if required pay compensation for temporal use of site - Contractor to ensure restoration of contractor's yard and workers site at the end of the construction period - Contractor and community to have a written agreement on the above	Supervising Engineer / Contractor	n/a			
© minutes of consultation meetings, Letter of approval from authorities							
Written agreement with communities©(c) upon mobilization before Yard is set©		(c) construction cost					
	Security	- Security arrangements to pre-empt influx of workers. - Contractor will be expected to recruit security staff local staff. Outside workers are recommended in case the skills needed are not available locally.		Local administration	(o) number of criminal incidents reported involving outsiders	(o) biannually	none

Loss of Land, Property and crops	Compensation of the affected persons -	- REREC to disclose to communities their rights and entitlements to compensation, to enable them choose their most preferred compensation options. - REREC, community and local administration to identify appropriate and accessible land for compensation. - REREC to compensate affected persons for loss of land, property and crops/trees in accordance to the RPF. - . - REREC, community and local administration to ensure legal documentation of land.	REREC – Compensation and Resettlement plan	REREC – REREC to ensure timely resettlement and compensation of the affected persons before the project is implemented.	(c) Compensation Plan for the affected families; power line route map (o) Minutes of public meetings, implementation and progress reports	(c) Plan to be prepared Pre construction; power line construction to be monitored continuously (o) continuous, with quarter reporting	(c) Compensation costs KShs. One million, plus admin and monitoring costs
Employment opportunities and benefit sharing	Local employment	Contractor to develop and implement a labour management plan, including a recruitment plan to address: - Priority given to local communities - Ensure an inclusive recruitment i.e. gender, tribal balance, VMGs, - Contractor to develop and implement a Child Protection Plan-to mitigate the risk of child labour and employment of school children	Supervising Engineer /contractor	n/a	(c) Certificate of employment. Employment statistics/data base i.e. number of locals, tribes, gender, type of employment	(c) monthly.	(c) Construction cost.
Agricultural Activities		-					

Fisheries	Impact on fish stocks	- Detailed investigations of the aquatic ecology to determine actual species near the proposed mini-grid project.	Design Engineer	Mini-grid power project Manager	(d) study report	(d) once on completion of study (o) daily	see above
		-					
	Waste and Waste water disposal	- Proper treatment and disposal of sewage generated on site to comply with national regulations such as use of septic tanks. - Proper arrangements for disposal of solid waste to comply with national regulations	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) verificatio©f design of sanitation facilities (c) inspectio©o) inspection	(d) once when designed (c) sanitation facilities: completion of works certificate; other as©ts monitored daily (o) daily	As above (c) construction cost (o) routine O&M costs

	Site Safety	- Fencing or clearing of mini-grid power transmission line and site area. - The plots along the site area at the intake to be fenced off.	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(d) verification ©design of structures, and fencing details (c) ©pection (o) inspection	(d) once when designed (c) completion of works certificate; ©her aspects monitored daily (o) daily	As above (c) construction cost (o) routine O&M costs
		- Contractor to raise awareness among local communities on site safety	Supervising ©gineer / Contractor	Mini-grid power project Manager	(c) minutes of meetings with local c©unities (o) minutes of meetings with local commun©es	(c) monthly (o) initially monthly, then after 6 months	(c) constr con127orkerro utine O&M costs
Occupational Health and Safety	Site / worker s safety	- Obtaining insurance to cover all accidents including Workmen's Compensation. - All workmen / visitors to be provided with suitable protective gear (such as nose masks, ear muffs, helmets, overalls, industrial boots, etc) - A fully equipped first aid kit on site, - Workmen's compensation cover required as per regulations.	Su©vising Engineer / Co–tractor	Mini-grid power project Manager	(c)) PPE & first aid kit - inspection / observ–tion; workmen's insurance – cover details (o) PPE & first aid k©- inspection / observati© workmen's insurance – cover details	(c) continuous (o) continuous	(c) PPE – incl in Construction cost (o) PPE: KShs 100,000/-; First aid kit – KShs 5,000/-

	Potable water	- Workers to be provided with potable water for drinking and domestic©e.	Supervising Engineer / Contractor	Mini-grid power ©ject Manager	(c) inspection (o) inspection	(c) continuous (o) continuous	(c) Construction cost (o) routine O&M costs
	HSE Officer	- Health, Safety and Environment Officer to be©ployed	Supervising Engineer / Cont©tor	Mini-grid power project Manager	(c) (o) contract / letter o©mployment	(c) upon mobilization and thereafter every 6 months (o) every 6 months	(c) salary – to include in Contractors cost (o) salary – estimated at KShs 40,000/- per month
	OHS Handbook	- OHS Handbook to be prepared.	n/a	Mini-grid power project Manager	(o) handbook available	(o) once after 3 months	(o) operation cost
	Waste and Waste water disposal	- Proper treatment and disposal of sewage generated on site to comply with national regulations such as use of septic tanks. - Proper arrangements for disposal of solid waste to comply with national regulations. - Ensure proper solid waste disposal and collection system. - Consider basic safety precautionary measures such as providing safety gears like har©ats, boots,©d safety belts ©le working at heights.	Supervising Engineer / Contractor	n/a	(c) inspection	(c) daily	As above (c) construction cost
		-					

Dist©ance to th©ublic	Pollution	- Minimise pollution as above	Supervising Engineer / Contractor	n/a	(c) inspection	(c) continuous	(c) Construction cost.
	Sensitization of community	- Contractor to sensitize communities on project impacts (disturbances) during construction ©©	Supervising Engineer / Contractor	n/a	(c) minutes of meetings	(c) Community sensitization – before mobil©tion . Dail	(c) Construc©n cost (mobilization)
		- Erect warning/informative signs.	Supervising Engineer / Contractor	n/a	(c) Inspection.	(c)©en erected.	(c) Construction cost.
	Nuisance	- Prohibition of construction activities at night.	Supervising Engineer / Contractor	n/a	(c) Observation/ inspection.	(c) Continuous .	(c) Construction cost.
Access and to site	Safety issues	- Controlled movement of all construction vehicles, and specified routes. - Adherence to speed limits by construction vehicles. - Warning / informative signs to be erected wherever construction works are in progress, - Alternative ac©s routes to be specifies necessar©and - All roads used by construction traffic to be rehabilitated.	Supervising Engineer / Contractor	n/a	(c) Observation/ inspection.	(c) Continuous .	(c) Construction cost.
	Sensitization of community	- Contrac© to sensitize communitiess on the risk of road safety. ©	Supervising Engineer / Contractor	n/a	(c) minutes of meetings	(c) Community sensitization – before mobilization. Daily.	(c) Construction cost (mobilization)

Visual intrusion		- Mini-grid buildings to be designed to blend into the surrounding environment. - Clearing of construction debris, and reducing dust levels, - Restoration of the worked ©a upon com–letion of works, and - Planting and afforestation of the si–e.	Design Engineer Supervising Engineer / Contractor	n/a	(d) v©fication of design (c) debris/dust - inspection and observati©; restoration / afforestation - completion of works certificate /	(d) when design completed (c) continuous; restoration at end of constructio n	(d) design cost (c) construction cost
Other risks and hazards	Blastin g	- Blasting during construction phase to be carried out by a licenced blaster, - Regulatory safety precautions to be followed, - The area to be blasted to be cord©d off, - Local administration and neighbouring communities informed well beforehand where and when blasting will take plac©	Supervisin g Engineer / Contracto ©/a	(c) blasting license; visual inspection of cordoned area; minutes of meetings with local administratio n and community leaders	(c) once when blasting is to take place	(c) construction cost	

	Fire Precautions	- Site to be properly equipped to prevent and fight fire, in accordance national regulations. - Maintain fire fighting equipment regularly. - Provide emergency numbers at strategic points. - Adapt effective emergency response plan. - Install fire fighting equipment - Ensure adherence to basic safety measures like providing gloves, first-aid box, rubber mats, fire extinguishers to handle all type of fires and ©l-lit exit routes while installers and O&M person© at work, in c© of fire or any type of emergencies.	Supervising Engineer / Contractor	Mini-grid power project Manager	(c) inspection (o) inspection, fire drills and reports	(c) daily (d) daily	(c) construction cost (o) routine O&M cost
	Emergency Response Plan	- Emergency response plans for earth movements, flood©fire and spills to be prepared. - ©s to include details for containment, clean up and ©toration/rehabilitation.	Supervising Engineer / Contractor	Mini-grid power project Manager	(c) ERP available (o) ERP available	(c) once at beginning of construction phase (o) annually	(c) construction cost (o) routine O&M cost
	- Safety / sabota©Stress analysis tests to be ©e on all pipes and structures. - All project infrastructure to ©fenced off and/or protected.		Supervising Engineer / Contractor	Mini-grid power project Manager	(c) test reports (o) test reports	(c) when pipes / structures installed (o) during major maintenance	(c) construction cost (o) routine O&M cost

		- Regular inspection and maintenance of the entire power plant and associated infrastructure. - Regular Check-up - About twice a month, perform inspection on system operation, and confirm if any abnormality found noting following items. - Generators: sound, rotation, overheating, smell, greasing condition. - Control panel: dust, dirt, damage, overheating, looseness, connection status.	n/a	Mini-grid power project Manager	(o) inspection reports	(o) as stipulated in equipment specs and procedures	(o) routine O&M cost

CHAPTER 9: ENVIRONMENTAL MONITORING AND FOLLOW-UP PROGRAMS

9.1 Environmental Monitoring

The project may have minimal adverse environmental effects, provided that recommendations and mitigation measures identified in this report are incorporated into all the contracts and followed by both the developer and the contractor. During operation of the proposed mini-grid project there will be need for monitoring of air quality, water quality, and ambient noise quality. The purpose of environmental monitoring is to ensure that the state of environment of the project area is maintained at a level equal to or better than pre-construction conditions. The designed power plant incorporates a built in-system of monitoring and surveillance of key system components for safety, integrity and protection against loss of working fluid and power and safety to humans and equipment.

9.2 Environmental Auditing

In compliance with Legal Notice No. 101 of 2003, the proponent will undertake environmental auditing of the proposed mini-grid project. The proponent will develop a comprehensive environmental monitoring program that will be used to:

i. Ensure protection of the environment,
ii. Ensure that personnel exercise due diligence in carrying out activities,
iii. Evaluate the effectiveness of the measures used to prevent or minimize environmental impacts.

Table 17: Environmental and Social Monitoring Plan (ESMP)

Environmental/ Social Aspects / Impacts	**Proposed Aspects for Monitoring**	**Performance Indicator**	**Baseline data**	**Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period**	**Responsibility for mitigation, monitoring and/or maintenance after defects liability period**	**Monitoring means (c) = construction (o) = operation**	**Recommended frequency of monitoring**
ENVIRONMENTA©ONITORING							
Soi©rosion	- Efficiency of soil erosion measures	- Erosion observed at	- Zero erosion	Design EnGIneer	Mini-grid power project Manager	(c) (o) Inspection	(c) (o) continuous

Environmental/ Social Aspects / Impacts	Proposed Aspects for Monitoring	Performance Indicator	Baseline data	Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Monitoring means (c) = construction (o) = operation	Recommended frequency of monitoring
		specified locations		Supervising Engineer / CONtractor			
Noise pollution	- Noise levels at site boundary. - Noise levels inside powerhouse.	- Noise levels in dB©	- Ambient noise levels (55 dB(A)). - Permissible limits as pe©ational regulations (Noise Rules and NEMA Noise Regulations).	Design Engineer; Supervising Engineer / Contractor	Mini-grid power project Manager	(c) (o) noise measurement records (o) noise measurement rrds	(c) Dai©random (o) fortnightly monitoring of noise;
New gravel sites opened by Contractor	- Rehabilitation of gravel site(s)	- Site rehabilitated	- Zero r©bilitation	ervising Engineer / Contractor	n/a	(c) inspection.	(c) continuously.
Clearing activities	- Rehabilitation of cleared areas	- Established vegetation	- Zero vegetation	Supervising Engineer / Contractor	n/a	(c) Inspection	(c) Daily
Changes in aquatic flora and fauna	- Baseline survey of aquatic flora and fauna, and follow up study 5 years later.	- Changes in aquatic flora and fauna composition	- To be identified during baseline study	n/a	REREC to hire consultant to carry out baseline and follow up after 5 years	(o) study reports	(o) baseline immediately, follow up study in 5 yrs

Environmental/ Social Aspects / Impacts	Proposed Aspects for Monitoring	Performance Indicator	Baseline data	Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Monitoring means (c) = construction (o) = operation	Recommended frequency of monitoring
Catchment management	- Provision of support to KFS, KWS, and the local communities in the management of the local forest to establish current status	- Changes in forest cover	- To be identified during baseline study	n/a	KFS – forest management, supported by REREC with assistance from the local communities.	(o) survey of forest cover and recovery	(o) forest status study immediately; follow up study in 5 years.
Fish	- No or minimized pollution to the ocean	- Fish population and types.	- To be identified during baseline study	Design Engineer	Mini-grid power project Manager	(o) observation	(o) daily
SOCIAL MONITORING							
Risk of STD/ HIV/ AIDS	- STD/HIV/AIDS incidence rates documented	- No. of reported incidence rates	- Data from local health institutions on incidence and prevalence rates	Contractor	Local administration, local Health institutions at county level and Mini-grid operator	(o) medical records- incidence rates	(c) every month (o) every six months
GBV/SEA/ WSH	GBV cases reported, Code of conduct	No. of GBV cases reported and processed, closed out	Data from relevant institutions at national and local levels on	Contractor	Local administration, and other relevant institutions and Mini-grid Operator	GRM log- GBV cases,	(c) every month (o) every six months

Environmental/ Social Aspects / Impacts	Proposed Aspects for Monitoring	Performance Indicator	Baseline data	Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Monitoring means (c) = construction (o) = operation	Recommended frequency of monitoring
			GBV prevalence				
GRM	Cases reported, Effectiveness of GRM Level of anonymity and confidentiality	No. of cases reported, closed-out, pending, escalated	No. and type of existing project related concerns No. and type of local redress mechanisms present	Contractor	Local administration and Mini-grid Operator	GRM log-concerns/grievances	(c) every month (o) every six months
Stakeholder engagement and information disclosure	- Stakeholder engagement process - Level of information disclosure - Types of stakeholders engaged	No. and type of stakeholders engaged No. of engagements undertaken Information disclosed to stakeholders	No. and type of stakeholders, Type of information disclosed or to be disclosed Level of project awareness	Contractor	Local administration and Mini-grid Operator	GRM log-issues raised Minutes of all engagements held	(c) every month (o) every six months
- Compensation of affected parties for loss of land,	- Success of compensation plan. People compensated Type of compensation received	- No. of people compensated and type of Compensation received in full	No. of affected parties to be compensated Type of compensation	REREC – Compensation Plan REREC	Affected parties/beneficiaries	GRM log-resettlement complaints	(c) continuous, with quarterly reporting (o) continuous, with quarterly reporting

Environmental/ Social Aspects / Impacts	Proposed Aspects for Monitoring	Performance Indicator	Baseline data	Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Monitoring means (c) = construction (o) = operation	Recommended frequency of monitoring
property, crops, trees	Status of affected parties after receiving compensation	- Status of affected parties restored or enhanced -					
Contractors Yard and Workers camp	- Contractor and community agreement	- Agreement enforced 100%		Contractor	n/a	GRM-log-complaints Minutes of consultation meetings	(c) every month (o) every six months
Local Employment	Employment statistics/database (number of locals, tribes, gender, type of labour	- % of workforce from local communities, women and men, VMGs, skilled and unskilled, -	- No. of locals available and capable of taking up employment, , men, women, VMGs, skilled and unskilled	Supervising Engineer / Contractor	Local administration and Mini-grid Operator	©GRM log-employment complaints	(c) every month (o) every six months
Institutional Capacity	-All social aspects identified in the ESMP i.e. GBV, local employment, stakeholder engagement,	No. of progress reports submitted (frequency on reporting) Quality of progress reports-aligned to ESMP	- Availability of qualified social specialist	Contractor	Mini-grid operator	Progress reports submitted	(c) every month (o) every six months

Environmental/ Social Aspects / Impacts	Proposed Aspects for Monitoring	Performance Indicator	Baseline data	Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Monitoring means (c) = construction (o) = operation	Recommended frequency of monitoring
	information disclosure etc.						
Child Protection	-Code of conduct-child labour/employment of school going children -Children reportedly dropping out of school	- No. of cases reported on children dropping out of school, and utilization of child labour -	- No. of children enrolled and attending local schools within project area	Contractor	Local administration and Mini-grid Operator	GRM-log-complaints about children dropping out of school	(c) every month (o) every six months
Site Safety	- Security and safety level of site infrastructure	- No. of accidents and incidents	- Zero accidents and incidents	Design Engineer Supervising Engineer / Contractor	Mini-grid power project Manager	(c) (o) records of accidents and incidents	(c) (o) continuous

Environmental/ Social Aspects / Impacts	Proposed Aspects for Monitoring	Performance Indicator	Baseline data	Responsibility fo©ntervention and/or monitoring during design, construction and defects liability period	Responsibility for mitigation, monitoring and/or maintenance after defects liability period	Monitoring means (c) = construction (o) = operation	Recommended frequency of monitoring
Site / workers safety	- Use of PPE	- No. of workers using PPE	- All workers using PPE	Supervising Engineer / Contractor	Mini-grid power project Manager	(c)) PPE & first aid kit - inspection / observation; workmen's insurance – cover details (o) PPE & first aid kit - inspection / observation; workmen's insurance – cover details	(c) continuous (o) continuous

CHAPTER 10: DECOMMISSIONING PHASE

10.1 Introduction

This is an important phase in a project cycle which comes when the lifespan of a project has come to an end. The project life is 30 years; however, batteries will be replaced after five (5) years. If by any unforeseen circumstances the operation of the proposed mini-grid power project ceases, the removal of facilities and structures will entail demolition of buildings, slabs, foundations and other structures within the built area of the mini-grid power project, and proper disposal and/or re-use of demolition materials followed by backfilling, grading, and re-vegetation of the site. All underground storage tanks and any facility containing hazardous liquid shall be located and removed. Disposal of such materials shall be governed by the national standards. The following should be undertaken to restore the aesthetic value of the environment.

10.2 Mini-grid power project machinery, structure and waste

i. The proponent to employ integrated solid and liquid waste management system;
ii. The proponent together with the local council will select disposal locations based on properties of particular wastes generated;
iii. Removal, recycling, re-use or selling of scrap materials; and
iv. All disposals should be done according to legal requirements.

10.3 Rehabilitation of project site

i. Landscaping;
ii. Re-vegetation of the site to restore the aesthetic value of the environment;
iii. Proper erosion control measures during re-vegetation;
iv. Proper monitoring and inspection of the site for indications of erosion; and
v. Fencing and signs restricting access to minimize disturbance and assure safety.

10.4 Socio-economic impacts

i. Ensure safety of workers;
ii. Offer advice and counseling to employees on other livelihood opportunities;
iii. Assist with re-employment and job-seeking of the involved workforce; and
iv. Compensation and suitably recommend the project workers in seeking employment opportunities elsewhere.

CHAPTER 11: CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusion

In accordance with the Environmental Management and Coordination Act 1999 and The Environmental (Impact and Audit) Regulations, 2002, the findings of the Environmental and Social Impact Assessment carried out for this project indicate that possible environmental impacts generated during operations and decommissioning phases will be addresses effectively by the proponent through the mitigation measures indicated in the matrix above.

As per the above analysis of the aspects of both positive and negative environmental impacts of the project's development, we, the **experts found no significant negative impacts that could pose adverse effects to the extent of barring the proposed mini-grid project from being implemented.** However, the minor potential negative impacts of the proposed mini-grid project could be managed with the suggested environmental and social mitigation management plans. Having considered the data collected, analyzed and collated information that is available, it is the experts' considered opinion that:

i. The project **Does Not** pose any serious environmental concern, other than those of a minor scale that accompany most development activities;
ii. The positive impacts of the project far outweigh the negative ones, which will be adequately contained by following the prescribed environmental management and social impact management plans; and
iii. As such, the project should be allowed to commence, and activities be managed within the provided Environmental Management Plan and sound environmental management practices that are internationally recognized.

11.2 Statutory Compliance

The proponent and the contractor shall ensure that they implement statutory provision of the statutes mentioned in Chapter Five (5).

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13. APPENDICES

Appendix 13.1: Terms of Reference for the Assignment

1. Scope of ESIA Study report

The ESIA experts conducted the Environmental and Social Impact Assessment (ESIA) Study report and prepared an ESIA Study report as per the general ESIA guidelines and administrative procedures issued by the Authority as provided for by the Environmental (Impact Assessment and Audit) Regulations 2003. The scope of the ESIA study as established under these regulations included the following:-

2. Contents of the study report:

A Study report should include the following details:

- Name of the proponent, PIN number, address and contact person
- Title of the project
- Objectives and scope of the project
- Nature of the project;
- Location of the proposed project, including the physical area that may be affected by the project's activities;
- Types of activities that will be undertaken during the project construction, operation and decommissioning phases;
- Design(s) of the project;
- Materials to be used, products and by-products, including waste to be generated by the project and the method(s) of their disposal;
- Potential environmental impacts of the project;
- Mitigation measures to be taken during and after implementation of the project;
- An action plan for the prevention and management of foreseeable accidents during the project cycle;
- A plan to ensure the health and safety of the workers, and neighbouring communities;
- Economic and social benefits to the local community and the nation in general;
- Project budget;
- Views of the public about the project, indicating representativeness of the potentially affected people; and
- An environmental management plan (EMP) for the entire project cycle.

3. ESIA Study Guiding Issues (Ref: Second schedule EIA/Audit Regulations, 2003):

1. Ecological considerations including the effect of project on the number, diversity, breeding habits of wild animals and vegetation,
2. Effect of project on:-
    - Soil fertility,
    - Breeding populations of fish, game or wild animals,
    - Natural regeneration of woodland and sustainable yield, and
    - Wetland resource degrading or wise use of wetlands.
3. Ecosystem maintenance including –
    - Effect of proposal on food chains,

- Nutrient cycles,
- Aquifer recharge, water runoff rate,
- Real extent of habitats, and
- Fragile ecosystems.

4. Social considerations including –
   - Economic impacts,
   - Social cohesion or disruption,
   - Effect on human health,
   - Immigration or emigration,
   - Communication – roads opened up, closed, rerouted, and
   - Effects on culture and objects of cultural value.
5. Effect on landscape including –
   - Views opened up or closed,
   - Visual impacts (features, removal of vegetation e.t.c.),
   - Compatibility with surrounding area, and
   - Amenity opened up or closed.
6. Land uses –
   - Effects of project on current land uses and land use potentials to the project area,
   - Possibility of multiple use, and
   - Effects of project on surrounding land uses and land use potentials.
7. Effects of project on water resources including –
   - Rivers,
   - Springs,
   - Lakes (natural and man-made),
   - Underground water, and
   - Drainage patterns/drainage systems.
8. Expected Outputs

The expected outputs from the ESIA study were as follows:-

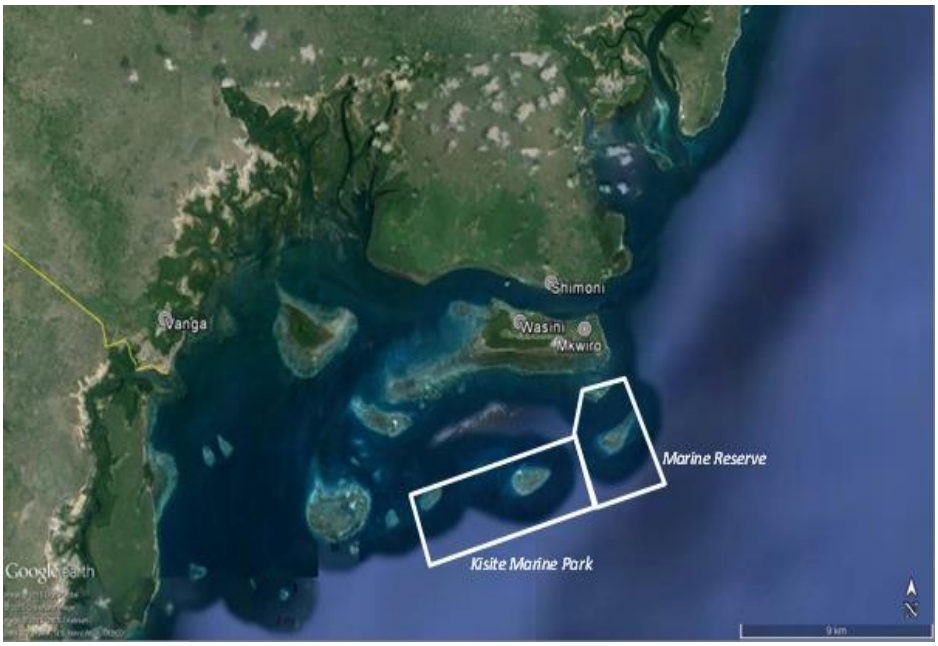
- A description of the proposed site and the immediate surroundings with respect to
- The proposed project,
- Stakeholders' opinions and suggestions on the proposed development,
- Clear impact projections that would be associated with the proposed project,
- Appropriate mitigation measures and a monitoring plan on the significant impacts,
- An environmental management plan, and
- Ten (10) copies of and an electronic copy of the ESIA study report for submission to NEMA.

9. Responsibility of the Client
   - Pay for any testing that may be demanded by NEMA
   - Pay consultancy fees for the ESIA study report
10. Appendices
    - All relevant documents)

Appendix 13.2: List of some Stakeholders and Neighbours Interviewed

S/No	*Name*	*Position*	*Livelihood source*	*Telephone number*
1.	Fatuma Masoud	Neighbour	Retail business	0729402440
2.	Tima Mataka	Neighbour	Crop farming	0702508786
3.	Immamu Dossa	Neighbour	Casual employment	0716085537
4.	Mariam Hamsa	Neighbour	Retail business	0723218479
5.	Fadhil Mohammed	Neighbour	Tourism	0718937083
6.	Mwalola Hemedi	Neighbour	Fisheries	0712815879
7.	Mwalim Adhman	Neighbour	Fisheries	0718862336
8.	Abdalla Masoud	Neighbour	Fisheries	0721869845
9.	Janet Charo	Neighbour	Salaried employment	0728532883
10.	Mwanakombo Hassan	Neighbour	Fisheries	0708846780
11.	Burhan Khamis	Neighbour	Fisheries	0724730641
12.	Mwenye Haji Abdala	Neighbour	Fisheries	0720496421
13.	Rashid Omar	Neighbour	Fisheries	0722281954
14.	Mepandu Hmisi	Neighbour	Salaried employment	0707886721
15.	Hamisi Salim	Neighbour	Casual employment	0705544339
16.	Rashid Juma	Neighbour	Fisheries	0728888633
17.	Ali Swalehe	Neighbour	Fisheries	0714314577
18.	Salama Yasmin	Neighbour	Crop farming	0723230073
19.	Lali Hemed	Neighbour	Fisheries	0727807373
20.	Mabibo Kadzo	Neighbour	Tourism	0729202443
21.	Haji Omar	Neighbour	Tourism	0714180304
22.	Abdul Aziz Hemed	Neighbour	Fisheries	0791028896
23.	Mwanaate Masai	Neighbour	Trading	0720389907

Appendix 13.3: Map showing location of mini-grid power project



Appendix 13.4: Principles of Corporate Social Responsibility (CSR) Guiding Principles

i. Focus on stakeholders and NOT shareholders
ii. Focus on the three spheres of sustainability: economic, social and environmental
iii. Operating beyond legal compliance as an accountability approach.
iv. Focus on long term and NOT short term impacts
v. A holistic approach that includes both internal and external issues
vi. Responsibility proportional to firms influence in society
vii. Global and NOT just local responsibility
viii. Supply chain approach to responsibility as opposed to compartmentalized approach
ix. Embeddedness: i.e. continuity of CSR, continuous learning and change management
x. Measurement: i.e. having in place systems to assess impacts and monitor change.
xi. Reporting: i.e. Companies to disclose their environmental and social performance
xii. Verification: Willingness for firms to prove good things they purport to be doing

Source: (www.Ufadhilitrust.org/ufadhili_publications)

Appendix 13.5: Bill of Quantities (BQ)

Appendix 13.6: NEMA Registered Lead Expert Registration Certificates

FORM 5 (r. 14(4))

Application Reference No: 272
Registration No: 0673
FOR OFFICIAL USE

THE ENVIRONMENTAL MANAGEMENT AND COORDINATION ACT

CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT EXPERT

This is to certify Ms. **MR. JOSEPH KATHIAI KURAUKA**
of **P. O. BOX 17586 - 00100, NAIROBI** (Address)
has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environment Management and Coordination Act and is authorized to practice in the capacity of a Lead Expert/Associate Expert/Firm of Experts (Type) **LEAD EXPERT**

Dated this **4TH** day **APRIL** of 20**07**

Signature

(Seal)

Director General
The National Environmental Management Authority

GPK (L)

Appendix 13.7: NEMA Registered Lead Expert Practicing License, Year 2019

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/9775
Application Reference No: NEMA/EIA/EL/13392

M/S **Dr Joseph Kathiai Kurauka**
(individual or firm) of address

P.O. Box 17286-00100, Nairobi.

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **0673**

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

Issued Date: **2/28/2019** Expiry Date: **12/31/2019**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2008 Certified

Appendix 13.8: Assistant Chief and community members during consultations

Appendix 13.9: Some of the responses from the stakeholders consultations

004

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN MUKUIRU ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Mukuiru Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
FATUMA MASOUD ABDALLAH 2626 8982	STAKEHOLDER Spouse	- Should accelerate the process & initiate the project - It's good project long awaited.	0729402440

Signature of the Respondent Fatuma Masoud Date 20-04-2017

Interviewed by LALI HEMED Signature

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

- Increased business activities
- improvement in educational performace,
- promote equality in the country.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

- noise pollution
- destruction of vegetation cover
- Oil spillages (possible)

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

- Controlled noise pollution
- proper plant/equipment installation /
- prope management.
- proper study of the site and controlled vegetation clearance.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

① Emergence of new businesses
② Security improvement.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

① Water polliton ~~of~~ from spillage.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

① Ensure no leaks on the generators.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

① Emergence of electricity dependant businesses.
② Improvement of security in the village

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

① Noise pollution.
② Oil spillage from the generators.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

① Controlled noise.
② Ensure no leaks from generators.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

N/A.

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN MUKUIRU ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Mukuiru Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
IMAMU DOSSA 10956568	STAKE HOLDER	- I support the project and ready to install it. - I have no issue with the project.	0716085537

Signature of the Respondent ..... Date 20/4/2017

Interviewed by HAMISI SALIM ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

① Learning and studding for pupils and students.

② Emergence of power dependant businesses.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

① Noise pollution from generators.

② Oil spillage from generators. (water pollution)

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

① Controlled noise from generators.

② Ensuring no leaks from generators.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

010

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN SHIMONI ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Shimoni Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
BURHAN KHAMIS	Stakeholder.	I support the project since I will be in a position to start a barber shop.	0724730641

Signature of the Respondent ..... Date 20/4/2017

Interviewed by ROSEMARY GACHILENGU Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

Increased businesses. for instance ~~refrig~~ refrigeration of fish.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

Cutting off trees. causing pollution.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

Planting of more trees to replace the cut trees.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

011

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN SHIMONI ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Shimoni Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
MWENTEMAJI ABDALA MTUDO 4617495	Stakeholder/ Assistant Chairman	I support the project as it positively impact on our lives.	0720496421 Plot # *45.

Signature of the Respondent ..... Date 20/4/2017.....

Interviewed by ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

1- He will engage in modern activities.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

- Deforestation.
- Spillages.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

- Use Proper maintence of generators.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

012.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN MUKUIRU ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Mukuiru Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
MARIAM HAMISA 8373183	Stakeholder.	I support the project; I will be in a position to refrigerate soft drinks.	0723321479.

Signature of the Respondent ..... Date 25/4/2017.

Interviewed by ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

- Improved livelihoods from more enterprises.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

- Deforestation.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

- [redacted]
- Controlled deforestation.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed small-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

014

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN SHIMONI ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Shimoni Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
~~FAIMA~~ RASHID JUMA 27388943	STAKEHOLDER	-I support the project and I have no issue on the project. -I will be ready to pay the monthly dues and co-operate accordingly.	0728888623

Signature of the Respondent ..... Date 21/4/2017

Interviewed by HAMISI SALIM ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

1. Improve health facilities (services)
2. Improve ~~Education~~.
3. Improve Security.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

1. Noise pollution.
2. Risks (danger) children.
3. Explosion from the generator breakage.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

1. Controlled noise.
2. Creat awereness to children living near the project.
3. Keeping away all ~~so~~ sorts of flames and regular maintenance.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed ~~small hydro~~ Mini-grid power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

015

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN MUKUIRU ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Mukuiru Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
ABDALLAH MASOUD ABDALLAH ID 14436962	STAKEHOLDER ASSISTANT MANAGER WASINI MPUNGUTI LODGE AND RESTAURANT	-We support the project. - It will be a great Boost to our Business and will greatly enhance development in the area. - It will also attract investments in education and other potential sectors.	0721869845

Signature of the Respondent ..... Date 21/4/2017

Interviewed by LALI HEMED ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

- Improving the Living standards of the people.
- Exploration of potential Business Ideas.
- possible solution in health facilities and improved Academic levels within the area.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

- Noise pollution
- Land pollution in case of oil spillage.
- Emission of harmful gases.
- Risk of electrocution (esp children).
- Deforestration

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

- Creation of public awareness
- Proper managment of the plant.
- Controlling and proper disposal of PV wastes.
- proper installation and regular maintenance.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed ~~small hydro~~ Mini-grid power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

N/A.

2

6/6

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN SHIMONI ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Shimoni Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
ALI SWALEHE	STAKE HOLDER	- I support this project. - It will improve the livelihood of myself and the whole community at large.	07

Signature of the Respondent ..... Date 21/4/2017

Interviewed by Hamisi Salim ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

① Provision of employment to the locals.
② Emergance of new bussinesses

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

① Deffforestration.
② Noise pollution.
③

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

① Controll the distance at which the project takes place.
② Controlled noise from the generators.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed ~~small-hydro~~ Mini-grid power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

N/A

020

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN MUKUIRU ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Mukuiru Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
MWANAATE MASAI	STAKEHOLDER Sister to the Head.	-I support the Project. -I have no issue with the project at all.	0720389907

Signature of the Respondent ..... Date 21/04/2017

Interviewed by LALI HEMED ..... Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

- Creation of employment
- Encouraging investment
- Improvement of social amenities and health facilities.
-

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

- Exposure to danger of electricity due to curiosity esp children.
- Deforestration
- ~~and~~ pollution air/land/noise.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

- Participation of the native of the area in the project.
- Control deforestration process.
- Creation of public awareness on risks associated with electricity

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed ~~small hydro~~ Mini-Grid power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

021

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN MUKUIRU ISLAND, KWALE COUNTY

(VILLAGE) ~~(WARD)~~ MKWIRO

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Mukuiru Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
Abdulaziz Hamad Muhamad 32297015	Stakeholder	- I fully support the project. - If implamented the project may lead to prosperity of various activities with in the locality - I as an individual with to start my own video player game.	0791028896

Signature of the Respondent ..... Date ~~22~~ 21/4/2017

Interviewed by HAMISI SALIM F. Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

(i) Development of fishing in mkwiro island.
(ii) Emergency of new preservation facilities and storage area.
(iii) Empowerment of jobless people.

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

(i) Fluctuating or decline of other old and cultural means of preservation.
(ii) Risk, eg. explosions.
(iii) Other members may fail to afford the electricity service.

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

(i) Making sure the charges to cater for the service is affordable by every resident.
(ii) Avoiding smoking near the power house.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed ~~small hydro~~ Mini-Grid power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

N/A

2

~~18~~ 23

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROJECT FOR THE PROPOSED MINI GRID POWER PROJECT WITHIN SHIMONI ISLAND, KWALE COUNTY

PROPONENT: RURAL ELECTRICITY AUTHORITY (REA)

STAKEHOLDERS AND PROJECT NEIGHBOURS COMMENTS

Environmental Management and Coordination Act (EMCA) of 1999 and Environmental Assessment and Audit Regulations 2003 require that Environmental Impact Assessment (EIA) and Environmental Audits (EA) be done on projects as a matter of law. Neighbours comments are significant components of this process.

Rural Electrification Authority (REA) is proposing to construct a mini grid power project within Shimoni Island, Kwale County. As a neighbour/stakeholder, you are invited to give your comments on whether you have any issues with the proposed activity.

NAME & ID. NO.	STAKEHOLDER/ NEIGHBOUR	COMMENTS	TELEPHONE & PLOT NO.
RUKIA NZAI RUWA 9773881	STAKEHOLDER	I support the project because it will make development to the communities.	0702673710

Signature of the Respondent ..... Date 21/4/2017

Interviewed by JUSTUS BAYA Signature .....

Question 1: In your own opinion, what are the **main positive impacts** of the proposed mini grid power project?

Question 2: What are the **possible negative environmental impacts** of the proposed small- mini grid power project?

Noise pollutions to the area due to generators
cutting down of trees (deforestations).

Question 3: What are the possible **mitigation measures** to be put in place to address the negative impacts?

They should keep highly maintance of the machine to
avoid noise pollutions.
Controlling of cutting down of trees.

Question 4: Do you think the problems the project intends to address will be alleviated?

1= Yes [✓]
2= No [ ]

Question 5: Do you support the proposed ~~small~~ mini-hydro power project in this area?

1 = Yes [✓]
2 = No [ ]
If **NO**, give reasons/comments regarding your objection:

Appendix 14.10: Proposed Mkwiro mini-grid power project preliminary designs

Community Land Donation Resolution and Consent Form for KEMP Mini-Grids

Item	Brief Description
Sub-Project name	MKWIRO SOLAR MINI-GRID
Expected Output:	A SOLAR PLANT & MINI-GRID
Sub-Project Location:	WASINI ISLAND
GPS coordinates	1. 0548756, 9484665 2. 0543675, 9484655 3. 0543736, 9484567 4. 0543657, 9484557
Estimated cost of the investment	
Source of Funding	WORLD BANK
Financial Year	2019-2020

TERMS OF THE AGREEMENT

1. As discussed in our community baraaza on ..2..9..2019.. (date, location, venue) to which all residents and regular users of the land in ...MKWIRO.....village, in .....sublocation, ...location, ...subcounty, ...county) were invited, and chaired by ... (name of the person who chaired the meeting) and attended by REREC representatives GRACE OMA AND ALICE MUTHENGI. (name them).
2. We the nominated representatives at that meeting confirm that the following issues were discussed
   ..... 1. Allocation of Land for Project .....
   ..... 2. Grievance Redress Mechanism .....
   ..... 3. Rights of Community including right to .....
   ..... Compensation and Informed Choice .....
   ..... 3. Potential impacts of project ..... (specify the agenda of the meeting) and the residents and regular users of this land are in unanimous agreement that:
   a. The land measuring ...2 acres... (specify the amount of land required) which is located in... (specify the location of the site) shall be site of the proposed **mini grid subproject**; MKWIRO
   b. We all are aware that the land we have set aside for the investment is community land and no one is claiming individual ownership because it belongs to all of us collectively through: KWALE/WASINI ISLAND/292
      i. registration no..... (indicate registration number if applicable);
      ii. customary/ancestry land rights
      iii. other..... (specify)

1

c. The land to be donated was identified in consultation with all residents and users of the land, witnessed by ……B.E.Y……HEMED……JUMA…… (specify who witnessed the choice and agreement e.g. Chief, Assistant Chief, Ward Administrator…)
d. The land being donated will not reduce the remaining land area to a level below that required to maintain the livelihoods of occupiers and users of land at current levels and will not require the relocation of any household
e. We were all informed about our right to compensation for the parcel of land and the compensation options which include land for land, in-kind or cash compensation.
f. We all understand that the community could have refused this investment.
g. We have however unanimously agreed to DONATE the land
h. We all agreed to this subproject and donation of the land without coercion, manipulation, or any form of pressure on us by REREC/County Government or traditional authorities.
i. We all agreed that (delete whichever is not applicable):
    i. we will not require any monetary or non-monetary benefits or incentives as a condition for the donation; or;
    ii. we are donating the land on condition that (specify the conditions for the donation if any):
        1. ……..
        2. …….
        3. ……..
j. The land is free of encumbrances or encroachment and is not claimed by any individual and its ownership is not contested.

3. We have discussed with REREC and understand the negative impacts of the project and:
    a. As a community we have agreed that:
        i. If any structure (residential, business or any other structure) will be moved or any access to land be limited as a result of the sub-project, we, the ……N/A…….. (specify the name of the community) community will compensate the affected individual/household in a manner that is acceptable to them to enable them restore their livelihood.
        ii. If any negative impacts should fall disproportionately on any individual/household(s) who may currently be using the land for income or other livelihood activities (specify the current use of land – if any - that will be impacted by the project). Such negative impacts that these will be addressed by the community, through ……(specify the mitigation measure agreed to) which has been accepted by the affected individuals
    b. No compensation claims for the land will be made from the project by the affected individuals.
4. We have all agreed unanimously that the project implementation should continue.

5. Together with REREC we have established a GRM and we shall strive to peacefully resolve any conflicts that may arise among, between us and REREC Contractor or between us and other communities concerning the mini grid through this mechanism.
6. Any conflicts related to the subproject that we will not be able to solve through the agreed mechanism will be resolved through due process provided by the laws of Kenya.

We, the undersigned, have been designated by the community of ……MKWIRO…… (specify the name of the community) to sign this form on their behalf and we confirm the above information to be true and that we have resolved to abide by ALL terms of this agreement.

(Please attach: minutes of the community meeting that resolved to donate land, including the issues discussed, names of individuals who asked questions, answers provided by REREC/KPLC, signed attendance sheet and photos of the meeting).

S/No.	Name	Village/Location	ID/No.	Signature	Photo
1.	MSHALI HAMISI MSHALI	MKWIRO	11647[illegible]		
2.	NDALU MGALLA IKIRUA	MKWIRO	29390043		
3.	MWANAMKUU BAKARI	MKWIRO	28285655		
4.	MWANJAKOMBO KOPA	MKWIRO	27101110		
5.	Mwalola Hamed	MKWIRO	4616372		

Witnessed on this 2nd **Day of** SEPTEMBER **in the Year** 2019**: by:**

1. **~~AREREC~~ AREA Chief**

Name	ID/No.	Signature & R/Stamp
BEI HEMED JUMA	4593672	ASST CHIEF ASINI/MKWIRO SUB-LOCATION

2. **Ward Administrator**

Name	ID/No.	Signature & R/Stamp
JUMA MWAZIRO	23489892	WARD ADMINISTRATOR KONGOWEA/KADZANDANI LUNGALUNGA SUB COUNTY 02 SEP 2019 COUNTY GOVERNMENT OF KWALE P.O. Box 4 - 80403, KWALE.

4

3. **County Land Registrar**

Name	ID/No.	Signature & R/Stamp
DICK .T. SAFARI	21105471	

4. **County Government (Physical Planning Department)**

Name	ID/No.	Signature & R/Stamp
SAMU B. MAHAJA	27459228	COUNTY EXECUTIVE COMMITTEE 05 SEP 2019 P O Box 4 - 80... KWALE DEPT OF ENVIRONMENT & NATURAL RESOURCES

5. **County Ministry Relevant to the project e.g. Energy and Lands etc.**

Name	P/No.	Designation	Signature & R/Stamp
KENNEDY N-G. NGUGI	19910738 68	COUNTY LAND MANAGEMENT CO-ORDINATOR	LAND ADJ & SETTLEMENT OFFICER TEL: 040 4020

6. **REREC Project Team Leader**

Name	ID/No.	Signature & R/Stamp
~~EDWARD~~ ~~GAKUNJU~~ NICHOLAS MUIGAI KARIU.	14421675	RURAL ELECTRIFICATION AUTHORITY P.O. Box 34585 – 00100 NAIROBI, KENYA. TEL: +254 - 20 - 2710955 / 2341400