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Solar Century East Africa Limited

Environmental and Social Impact Assessment for the Proposed 10MW Lewa Solar Park

17 March 2017

Report Submission Form

Report Title

Environmental and Social Impact Assessment for the Proposed 10MW Lewa Solar Park Project

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Glossary

Abbreviation or Term	Definition
AC	Alternating Current
AIDS	Acquire Immune Deficiency Syndrome
CAT	Content Analysis Technique
CEC	County Executive Committee y
CIDP	County Integrated Development Plan
DC	Direct Current
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMoP	Environmental Monitoring Plan
EMP	Environmental Management Plan
EOI	Expression of Interest
EP	Equator Principles
EPC	Engineering, Procurement, Construction
ERC	Energy Regulatory Commission
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FiT	Feed-in-Tariff
GDP	Gross Domestic Product
GIS	Geographical Information System
GOK	Government of Kenya
Ha	Hectares
HIV	Human Immuno-Deficiency Virus
IFC	International Finance Corporation
KeNHa	Kenya National Highways Authority
KES	Kenya Shilling
KETRACO	Kenya Electricity Transmission Company

Abbreviation or Term	Definition
km	Kilometre
kV	Kilovolts
LCPDP	Least Cost Power Development Plan
mm	Millimetres
MW	Megawatts
NACC	National Aids Control Council
NCCAP	National Climate Change Action Plan
NEMA	National Environment Management Authority
OSHA	Occupational, Health and Safety Act
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PV	Photovoltaic
USD	United States Dollars
UTM	Universal Transverse Mercator
VAT	Value Added Tax
WRMA	Water Resources Management Authority

NON-TECHNICAL SUMMARY

Preface

The proposed Lewa Solar Park (the Project) consists of a 10 MW solar photovoltaic (PV) farm and associated infrastructure (access road, transmission line etc.) to be constructed on land within the ownership of Kisima Farm to the south of Lewa Wildlife Conservancy within Meru County in Kenya. The site is located approximately 20 km north-west of Meru town.

The proposed Project and associated components will lead to both positive and negative environmental and social effects. Therefore, in accordance with the Environmental Management and Coordination Act, 1999 (Amended in 2015); it is important that the EIA is undertaken to ensure that the project impacts are fully assessed and the negative impacts adequately mitigated.

It is on this basis that SgurrEnergy has been appointed to carry out a detailed assessment of potential environmental and social impacts of the Project. This report presents the findings of the assessment, proposed mitigation / recommendations and conclusions.

Approach and Methodology

The assessment has been carried out in accordance with Kenyan national requirements and international lending standards. All necessary mitigation measures are identified to reduce the potential for significant negative changes in environmental, health and safety and socio-economic conditions. In addition, appropriate public consultation and disclosure has been carried out in line within international standards, taking public opinions into adequate consideration.

The assessment covers the direct impacts and any indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary, reversible and irreversible, positive and negative impacts of the Project. Information on the Project site has been gathered through desk-based studies, consultation and field work to determine the nature of the current environment.

Where significant impacts are identified, mitigation measures have been proposed to reduce or eliminate negative impacts and, where possible, enhance those which are considered beneficial.

Air quality impacts have not been considered within the assessment due to negligible emissions during operation. Issues such as dust during construction is considered under the assessment of potential construction impacts caused by traffic to and from the site.

Project Description

The proposed Lewa Solar Park is located in Meru County and lies just to the north of Mt. Kenya, the highest mountain in Kenya. The site is located approximately 20 km north-west of Meru town and 43 km north-east of Nanyuki, near the Nanyuki-Isiolo-Meru B6 road junction. The project is approximately 170 km north-east of Nairobi, the capital city of Kenya. The site is 12 km from the Lewa Wildlife Conservancy to the west of the A2 highway and within the transit corridor utilised by elephants moving between Lewa and Mount Kenya.

The project site is accessible via an all-weather road approximately 1 km off the Nairobi-Meru B6 highway, 24 km north-west of Meru town and 50 km north-east of Nanyuki.

The proposed project will utilise Solar PV technology for power generation. The main components of the Project are: solar PV modules/panels, MPPT solar power inverters, power conditioning units, medium voltage/33kV step-up power transformers and grid connection equipment. The Project will feed directly into the grid with no batteries employed.

Project's activities include four distinct phases, namely: Pre-construction; Construction; Operation; and Decommissioning. Pre-construction activities include land acquisition, expression of interest to Ministry of Energy and Petroleum, surveys (geotechnical, land / cadastral, power line route, site survey amongst others), acquisition of relevant permits / licences, site preparation and grading. Construction activities will include site preparation and construction of the solar PV plant and associated infrastructure. Operation activities will include power generation and plant maintenance. Project decommissioning will include dismantling of the solar PV plant and remediation / reestablishment of the site to its former state.

The Project will require additional infrastructure during construction including effluent and storm water drainage, water supply, sanitation and sewerage disposal, on-site electricity supply (or generator) and road access.

Evaluation of Project Alternatives

The study has evaluated various project alternatives in terms of site selection and a 'without the Project scenario'.

A number of alternative sites were considered in the area with two preferred sites subject to a pre-feasibility study. Following completion of the study, an alternative site was proposed on land owned by Kisima Farm which addressed concerns in relation to potential impacts on the UNESCO World Heritage Site whilst delivering a technically and financially feasibly project. The site was chosen as it is in close proximity to a road network and grid connection, land availability, lack of environmental and cultural heritage designations, appropriate topography, minimal features which may cause shading and the neighbouring communities have shown to be generally supportive.

The alternative 'without the Project scenario' would leave the land as it currently stands. It is currently an elephant corridor and degraded through human activity. This option would leave the local population with fewer employment opportunities and the area would continue to have high poverty and unemployment levels and poor health facilities, access roads and state infrastructure. This alternative is considered least favourable.

Policy, Legal and Institutional Framework

The environmental and social impact study for the Project has been carried out within the framework of local, national and international environmental regulations and guidelines. A review has been carried out of policy and legislative requirements including (amongst others) Kenya Vision 2030, Least Cost Power Development Plan (2013-2033), National Climate Response Strategy 2010, National Climate Change Plan (2013 – 2017), The Constitution of Kenya (2010), Environmental Management and Coordination Act 1999 (amended 2015), The Wildlife (Management and Conservation) Act 2009, National Museum and Heritage Act 2006 (revised 2012), Energy Act (2006), Water Act (2002) and Land Act (2012).

A review has also been carried out of the institutional framework. The National Environmental Management Authority (NEMA) is responsible for the general supervision and coordination over all matters relating to the environment with a number of committees established. The Ministry of Environment and Natural Resources is mandated to protect, conserve and manage the environment and natural resources for socio-economic development. The Project requires approvals from the Ministry of Energy and Petroleum including Expression of Interest (EoI) (obtained) and approval to start Power Purchase Agreement (PPA) negotiations with Kenya Power (yet to commence). The Land Controls Boards are mandated to determine all issues regarding lands in their areas of jurisdiction. The Project has agreed to lease 70 acres from Kisima Farm for power generation.

International lenders who are signatories to the Equator Principles (EPs) require projects that they finance to meet international standards. Beyond Kenyan legal requirements, the following international guidelines, regulations and policies will be followed and applied to the Project development and implementation: IFC Performance Standards; Environmental, Health and Safety (EHS) General Guidelines (2007); EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007); and EU Environmental Impact Assessment Directive 85/337/EEC (as amended).

Description of Baseline Environment

Physical Environment

Climatic Conditions: The two highland masses of Mt. Kenya and the Nyambeni range are the major determining influence on climate in Meru County. They mitigate the high temperature and influence the amount of rainfall. In the highlands, the temperatures are lower and the rainfall heavier than in the lowlands, dividing the county into two climatic regions. There are two rainy seasons (March and September) with rain persisting for five to eight weeks.

Topography and Landscape: Meru County is dominated by Mount Kenya and the Nyambeni range both of which lend diversity to the physical landscape. These land features not only affect the physiography, but also the entire environmental potential of the County. The proposed Project site is situated in the 1,524 – 2,134 m elevation band, placing it in the highland zone.

Geology: The geology of Meru County comprises two natural sub-divisions, the volcanic rocks of Pleistocene to Recent and Tertiary eras and the Pre-Cambrian Basement systems. The proposed Project site is made up of volcanic rock.

Soils: Soils in Meru County are closely related to the landforms and are therefore as diverse as the physiography. The soil in the Project area can be categorized as both soils on hills and minor scraps and soils on volcanic foot ridges.

Hydrology: Meru County has two large water drainage basins. In the north of the Meru forest and the crest of Nyambeni range, water drains towards the Ngare Ndare River that flows through the Lewa Wildlife Conservancy. This river is also called the Ewaso Nyiro. This study did not review the likelihood of flooding affecting the Project area but it is assumed to be moderate if a 100-year flood event is considered. Therefore, appropriate drainage will be considered as part of the detailed design.

Seismic Activity: Kenya is crossed by the East African Rift System (EARS) at the central region. The EARS is a 50-60 km wide zone of volcanoes and faults that extend north to south a distance of more than 3,000 km from Ethiopia in the north to the Zambezi in the south. The Meru region is ranked as VI (Strong) on the Modified Mercali Scale, with a probability that an earthquake of this intensity will be exceeded in 50 years. An intensity VI on the Modified Mercalli Scale corresponds to 4-5 on the Richter scale.

Geotechnical investigations should be undertaken and the Project should be engineered with the appropriate level of seismic activity in mind.

Biological Environment

Protected Areas: The Lewa Wildlife Conservancy is a large private conservation area. In 2013, the Lewa Wildlife Conservancy and Ngare Ndare Forest Reserve achieved UNESCO World Heritage Site (WHS) status as an extension of the existing Mount Kenya National Park/Natural Forest WHS. The Lewa Wildlife Conservancy hosts some of Africa's critically endangered species notably the black rhino and the Grevy's zebra. Lewa is home to more than 400 species of bird, including the Somali Ostrich, the Kori Bustard, and the Lilac Breasted Roller as well as 70 mammal species including lion, leopard, elephant, rhino and buffalo. The Conservancy is completely fenced.

Flora: The flora diversity of the Project site has been altered by human activity. It therefore contains some areas of natural habitats (bushy shrubs) combined with agricultural or tree (eucalyptus) plantation zones. Outside the zones shaped by human activities, field investigations found the natural vegetation in the Project area to be very similar to the rest of the corridor. The only plant of conservation interest, Sandalwood (*Osyris lanceolata*), was found in three places, two of which were far from the area to be cleared for the Project.

Fauna: The elephant corridor connects the protected areas of Mount Kenya and Lewa Wildlife Conservancy that contain huge diversity and an abundance of wildlife, including elephant, rhinoceros, various carnivores, zebra, giraffe, buffalo, a variety of gazelle and primates.

According to Lewa Wildlife Conservancy, some elephants are occasionally observed on the proposed Project site. However, this is not their natural or critical habitat; elephants simply take advantage of vegetation available there. This was confirmed during the site visit when three elephants were recorded travelling along the corridor in the vicinity of the Project site. It should be borne in mind that the habitat and species composition on the proposed project site has been altered by human activity.

A bird survey was carried out by an experienced ornithologist using walked transect method. There were 42 species of birds were identified on the Project site. They are all classified as Least Concern in the IUCN Red List.

Social Environment

The closest residential receptors to the Project site were identified to be located at about 100 m to the east and north of the Project site boundary. Two communities live in proximity of site: to the north, Subuiga has the characteristic of an urban area while on the east, Kamiti is a rural setup.

Project Awareness: A survey was carried out in December 2016 with the aim to introduce the Project to the community, determine their knowledge of the Project and their concerns, views, exceptions and recommendations. Most people were unaware of the Project prior to the survey with just over half having little understanding of renewable energy. Following the interviews, it was determined that over 90% of people supported the Project strongly with less than 2% of no opinion.

Household Composition: The average household size was recorded to be 3.7. The population of the household sample interviewed is characterized by significantly less young people compared to statistics available for the Meru County as a whole.

Literacy and Education: The survey found that the majority of people could read and write (above national levels). Educational levels were determined to be around average for Meru County as a whole. Households with children in primary school and secondary schools indicated their children went to schools 3-5 km and >5 km away.

Livelihood: Agriculture is the main livelihood source in the Project area with main crops including wheat, potatoes, beans, maize and green vegetables. Livestock are also kept such as sheep and dairy cows. Small retail shops are the main types of businesses with one hotel in the vicinity of the Project.

Household Energy Sources: Firewood is the main source of cooking energy followed by LPG and charcoal. Solar energy is used for lighting, electricity for heating / lighting and charcoal for heating.

Access to Services: Over 95% of people interviewed had access to piped water connected through the Kisima water project. Around 2% had to take water from a nearby river. Around 95% of the interviewed households indicated pit latrines as the main sanitation facilities. As far as health services are concerned, 59% of the households mentioned that the health facility they use is located more than 5 km from their households, 31% have to travel about 3-5 km while 10% are to travel less than 3 km to access the health service facility.

Other Infrastructure: The Project site is accessible via the Nairobi-Meru B6 highway, 24 km north-west of Meru town and 50 km north-east of Nanyuki through an access route 1 km off the highway. The highway crosses Subuiga and Kamiti. Both communities therefore benefit from simple access to major road. A power line and a distribution line run in proximity to the site. The area has a good telecommunications network coverage.

Land Use: The site is currently within an area of Kisima farm set aside for wildlife conservation and fenced off for wildlife movement. Most of the Project site's land use however is dedicated to agroforestry (eucalyptus tree plantation) and agricultural / grazing purposes in some other parts. In the rest of Kisima farm, most of land use is dedicated to extensive farming and large scale production of wheat and Irish potatoes with intermittent woodlots.

Archaeology and Cultural Heritage: No archaeological, cultural and/or heritage sites are located within the project site. However, the potential for chance finds remains, especially during construction, which would require considerable care and proper management.

Public Participation and Consultation

Public consultations are an integral component of the environment and social impact assessment. For this study, public participation and consultation have been conducted among the host communities around the proposed Project site.

A number of meetings were held in December 2016 including those with: the land owner representatives at Kisima farm; Meru County Government representatives; Elephant Corridor Management Committee members; Kenya Wildlife Services; Mount Kenya Trust Fund Workers; and the local community.

Issues / ideas raised during these meetings included:

- Potential contamination of seasonal rivers.
- Impacts on the free movement of elephant through the corridor.
- Project benefits to wildlife.
- Environmental changes, loss of vegetation, noise etc.
- Risk of technical faults.
- Security issues.
- Request for a small percentage of profits to be set aside for conservation.
- Potential financial benefits for the community.
- Preference of jobs allocated to local people.
- Possible development of renewable energy programme at the polytechnic school in Meru town.
- Alignment of Project with community development plans.
- Improved access to clean water and electricity.
- Risk of Project delays.

A number of concerns / queries were answered during meetings with others addressed through mitigation measures identified within this report.

Potential Impacts and Mitigation

The study has identified and described the potential environmental and social effects of the proposed project and has provided mitigation measures or strategies for avoiding, reducing or minimising the anticipated negative impacts and enhancement strategies for the beneficial impacts.

The anticipated potential beneficial effects of the Project include: employment creation, improvement in infrastructure, economic growth, capacity development and skills transfer, improved electricity supply, increased government revenue, and climate change mitigation due to reduced greenhouse gas emissions.

Summarised below are the identified potential negative impacts and the recommended mitigation measures at each Project phase. Proper and effective implementation of the suggested measures or strategies would lead to environmental and social sustainability of the Project.

Construction Phase

Potential Negative Impact	Recommended Mitigation Measures
Loss of vegetation cover and biodiversity	▪ Implement proper management measures to prevent damage to biodiversity within the proposed project site ▪ Ensure proper demarcation and delineation of the project construction site ▪ Develop a plan to maintain the indigenous vegetation during construction ▪ Develop a plan to improve the quality of vegetation around the project site ▪ Designate access routes and a parking area within the site to reduce vegetation disturbance ▪ Ensure regular inspection of construction works
Liquid Wastes	▪ Develop a Wastewater Management Plan for use at the site in line with wastewater management regulations and water quality regulations ▪ Ensure proper storage of wastewater at the site before disposal to a designated facility by a contracted waste handler registered by NEMA ▪ Prohibit illegal disposal of wastewater into water resources around the project site ▪ Ensure regular inspection of wastewater management practices within the solar farm to check for compliance ▪ Ensure there is proper and adequate sanitation facilities on during construction
Change in Ambient Air Quality	▪ Control the speed limit for all motor vehicles coming to or leaving the construction site ▪ Train all workers on the management of air pollution from vehicles and machinery ▪ Prohibit engine idling and over revving of construction vehicles and machinery to minimise emissions ▪ Sprinkle water at the construction site and on access roads to minimize fugitive dust during dry weather conditions ▪ Ensure regular inspection and scheduled maintenance for all construction vehicles and machinery ▪ Provide workers with dust masks at all times when working in dusty conditions

Potential Negative Impact	Recommended Mitigation Measures
	▪ Continuously monitor dust emission levels at construction site ▪ Ensure the vehicles transporting loose materials like soil and cement are properly covered
Solid Waste	▪ Develop and implement a Solid Waste Management Plan before commencement of construction activities in line with the governing regulations ▪ Train workers on proper solid waste management practices ▪ Segregate all solid wastes at source ▪ Re-use, re-cycle or reduced solid waste generation onsite to the extent possible ▪ Dispose all construction wastes that cannot be recycled or reused to a NEMA approved licensed solid waste disposal sites in Meru County using a licensed refuse handler ▪ Provide facilities for proper handling and storage of wastes at designated points ▪ Do not leave wastes on site at the end of the work ▪ Provide adequate number of properly contained litter bins and containers properly marked with type of wastes ▪ Strictly prohibit burning or dumping of any wastes at the site ▪ Perform regular inspection of solid waste management practices onsite.
Hazardous Wastes	▪ Develop and implement Hazardous Waste Management Plan, especially for oil, in line with the governing regulations ▪ Train site workers on proper hazardous waste management ▪ Segregate site wastes by separating hazardous waste from non-hazardous waste ▪ Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow ▪ Ensure that hazardous materials are stored in proper areas, where they cannot reach land in case of any spillage.

Potential Negative Impact	Recommended Mitigation Measures
	▪ Incorporate dripping pans at machinery, equipment and area prone to contamination by leakage of hazardous materials such as oil and fuel ▪ Regular maintenance of all equipment and machines used onsite so as to minimise leakage of hazardous materials ▪ Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations ▪ Undertake regular inspection of hazardous waste management practices onsite. ▪ Strictly prohibit illegal disposal of hazardous wastes onsite ▪ Store hazardous materials in designated areas secured with a fence
Security concerns	▪ Develop and implement Site Security Plan ▪ Train workers on the importance of site security ▪ Employ a day and a night time security guards for the solar farm. ▪ Fence the entire solar farm to restrict entrance to the site ▪ Train the onsite guards to adequately handle trespass incidents ▪ Inspect the fence around the facility regularly and seal all loopholes ▪ Ensure adequate lighting within and around the solar farm ▪ Regularly check and maintain security lights at the site
Noise and Vibration	▪ Restrict all construction activities to day time during normal working hours ▪ Conduct construction activities within the maximum permitted noise levels ▪ Provide prior information to the community of any planned noisy activity that is likely to exceed the permitted noise levels ▪ Strictly ensure the use of Protective Personal Equipment at all times while on site such as use of silencers and ear mufflers by employees ▪ Regularly monitor noise levels to comply with permitted maximum levels ▪ Inspection of activities during construction by carrying out regular Noise level test. ▪ Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite. ▪ Undertake regular inspection and scheduled maintenance program for all vehicles and machineries on site. ▪ Adopt and follow best practicable means to ensure that the quietest available plant and construction techniques are used.

Potential Negative Impact	Recommended Mitigation Measures
Archaeology and National Heritage	▪ Develop and implement a Chance Find Plan and Procedure ▪ Train workers on the importance of archaeological and cultural resources and how to deal with them. ▪ Employ an archaeologist during top soil stripping (trenching) to monitor chance find archaeological remains. ▪ In case of chance find, the work should be halted and the area protected and the matter reported immediately to the National Museums of Kenya's for appropriate action.
Visual and Landscape	▪ Develop and implement a Site Rehabilitation and Landscaping plan to restore the site to a better visual state after construction ▪ Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm. ▪ Restore natural vegetation through planting of indigenous ▪ Ensure proper storage, regular collection and disposal of waste streams generated. ▪ Carry out the facility inspection work on regular basis ▪ Minimize the use of project construction signage. Necessary signage should be made of non-glare materials and unobtrusive colours. ▪ Remove in a timely manner all the construction machinery, equipment and vehicles that are not in use and keep them in specific locations within the project site. ▪ Use dust suppressors to minimize impacts of vehicular traffic and wind on roads and exposed soils. ▪ Ensure proper storage, collection and disposal of waste streams generated. ▪ Undertake regular inspection of site construction activities
Occupational Health and Safety	▪ Develop and implement an Occupational Health and Safety Plan for use during construction in line with governing regulations ▪ Train employees on the importance of occupational health and safety requirements and develop work instruction ▪ Provide workers with appropriate Personal Protective Clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls for use during construction ▪ Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning ▪ Regular medical checks ▪ Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing, at all times

Potential Negative Impact	Recommended Mitigation Measures
	▪ Provision and placement of appropriate fire extinguishers and training personnel on their use ▪ Put clear signage to restricted areas in English and local language ▪ Prohibit unauthorised persons from entering the site through installation of a perimeter fence. ▪ Undertake regular inspection to ensure compliance with OSHA, 2007. ▪ Report all incidences of accidents or near misses and keep proper records of the actions taken. ▪ Promote HIV/AIDs Awareness

Operational Phase

Potential Negative Impact	Recommended Mitigation Measures
Liquid Wastes	▪ Develop and implement Liquid Waste Management Plan in line with the governing regulations ▪ Train employees on the importance of proper liquid waste management and water resource management ▪ Reduce, reuse or re-cycle all liquid waste generated onsite to the extent possible ▪ Dispose all liquid wastes that cannot be recycled or reused to NEMA approved liquid waste disposal facilities through a licensed transporter ▪ Prohibit illegal disposal of wastewater into waste resources. ▪ Conduct inspection of wastewater management practices to check for compliance ▪ Emphasize on proper sanitation during operation phase of the project.
Solid Wastes	▪ Develop and implement Solid Waste Management Plan for the operation phase in line with the governing regulations ▪ Train employees on the importance of proper solid waste management ▪ Reduce, reuse or re-cycle all solid waste generated to the extent possible ▪ Dispose all solid wastes that cannot be recycled or reused to NEMA approved solid waste disposal sites within Meru County using a licensed refuse handler

Potential Negative Impact	Recommended Mitigation Measures
	▪ Maintain proper records of solid wastes to monitor the quantity and types of waste generated on site ▪ Provide adequate waste bins and containers at specific places and ensure they are properly marked with type of wastes ▪ Perform regular inspection of waste management practices onsite
Visual Impacts	▪ Develop and implement a Site Rehabilitation and Landscaping plan to restore the site to a better visual state ▪ Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm. ▪ Restore natural vegetation through planting of indigenous ▪ Ensure proper storage, regular collection and disposal of waste streams generated. ▪ Carry out the facility inspection work on regular basis
Hazardous Wastes	▪ Develop and implement Hazardous Waste Management Plan in line with the governing regulations ▪ Train employees on hazardous waste management ▪ Segregate waste by separating hazardous waste from non-hazardous waste ▪ Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations ▪ Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow ▪ Prohibit illegal disposal of hazardous wastes on the solar farm during solar farm maintenance exercise. ▪ Store hazardous materials in designated areas secured with a fence ▪ Undertake regular inspection of hazardous waste management practices onsite.
Occupational Health and Safety	▪ Develop and implement an Occupational Health and Safety Plan ▪ Train employees on the importance of occupational health and safety ▪ Ensure compliance with the governing regulations ▪ Install a fence regularly by netting breakages in order to prevent accidents involving local inhabitants or wildlife ▪ Fence the entire solar farm to prohibit unauthorized persons from accessing the site ▪ Provide workers with appropriate Personal Protective Clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls. ▪ Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning ▪ Regular medical checks

Potential Negative Impact	Recommended Mitigation Measures
	▪ Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing ▪ Put clear signage to restricted areas in English and local language to reduce risk of accidents ▪ Undertake regular inspection of the plant ▪ Promote HIV/AIDs Awareness

Decommissioning Phase

Potential Negative Impact	Recommended Mitigation Measures
Solid Wastes	▪ Develop and implement a Solid Waste Management Plan (SWMP) before decommissioning commencement in line with the governing regulations ▪ The waste streams generated should be re-used, re-cycled and reduced to the extent possible ▪ Dispose all demolition waste that cannot be recycled or reused to a licensed waste disposal site using a licensed waste handler ▪ Rehabilitate the site as appropriate using indigenous vegetation species for landscaping to restore biodiversity
Occupational Health and Safety	▪ Develop and implement an Occupational Health and Safety Plan ▪ Train employees on the importance of occupational health and safety ▪ Provide workers with appropriate Personal Protective Clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls. ▪ Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning ▪ Regular medical checks ▪ Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing ▪ Put clear signage to restricted areas in English and local language ▪ Prohibit unauthorised persons at the site during decommissioning ▪ Promote HIV/AIDs Awareness throughout the decommissioning period
Change in Ambient Air Quality	▪ Train all workers on the management of air pollution from vehicles and machinery ▪ Strictly control the speed limit for all motor vehicles during the demolition exercise. ▪ Sprinkle water on dusty places onsite and on dust to reduce fugitive dust emissions ▪ Provide workers with dust masks

Potential Negative Impact	Recommended Mitigation Measures
Noise Impact	▪ All the decommissioning activities will be done during daytime ▪ The contractor will be kept informed by the community of any noise or vibration complaints. ▪ Conduct demolition activities in line with the maximum permitted noise levels ▪ Inspection of activities during decommissioning by carrying out regular Noise level test. ▪ Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite. ▪ Develop a regular inspection and scheduled maintenance program for vehicles and machineries in order to abate the noise produced

Enhancement Measures

To enhance livelihood benefits the Proponent is recommended to:

- Give priority to the local community in terms of employment and/or contract opportunities.
- Provide equal employment opportunities to both men and women.
- Use locally available materials to the extent possible.
- Identify the number of job opportunities targeted to the local community.
- Develop a transparent recruitment manual specifying the needed skills set.
- Advertise available job opportunities in public places around the project site.
- Train the workers and community members, especially those that might receive direct financial compensation, on sound financial management.

To enhance community development benefits the Proponent is recommended to:

- Conduct a community needs analysis in consultation with the local stakeholders to investigate and assess the current and future development needs of the community. This would allow prioritisation of development requirements for effective programming.
- Develop through a participatory process, a community development plan that identifies areas that the project can support in terms of community development.

Environmental and Social Management Plan

This study has developed an Environmental and Social Management Plan (ESMP) for the Project. The ESMP provides a framework for the management of the identified impacts to improve the efficacy of the mitigation and enhancement measures.

The overall responsibility for the implementation of the project's ESMP rests with the Proponent. Such responsibility shall include reviewing the reporting and auditing requirements to ensure that the implementation of mitigation measures meet the requirements stipulated within project's ESMP.

During construction, the implementation of most parts of the ESMP will be borne by the contractor. The contractors will be required to prepare work plans for environmental management in line with this Project's ESMP and any other condition that may be imposed by the National Environmental Management Authority (NEMA) for the development of the Project. The contractor will also develop action plans and standard procedures for use at the site. The proponent will be required to maintain a monitoring and oversight role to ensure that the contractor's obligations as set out in the Project's ESMP are followed.

Monitoring, Evaluation and Reporting

Monitoring: The overall objective of environmental and social monitoring is to ensure that all construction, operation and decommissioning activities comply with legal and regulatory requirements so that all mitigation measures are implemented effectively.

The items to be monitored for this ESIA will include but not limited to: Air quality, Noise Quality, Socio-economic aspects, Vegetation and Biodiversity, Wastes, Archaeological and Cultural Heritage, Occupational Health and Safety, Visual and Landscape. The key measurement indicators for these aspects are contained in the ESMP. The Proponent will employ various monitoring techniques including supervision and regular site inspections. The key environmental indicators that need to be monitored have been factored into the project's ESMP.

Auditing: Regular audits will enable the Proponent to evaluate the success of ESMP implementation and will provide information for corrective action. In this regard, the Proponent will undertake an Annual Audit of the ESMP and submit the report to NEMA.

Reporting: Regular reporting on the progress of implementation of the ESMP will be critical in adjusting strategic directions and measuring performance. Progress reports will be made on quarterly basis. The reports will outline, in summary, the performance on key measurement indicators. The results of internal and external monitoring will be clearly documented for all the phases of the project.

Conclusions and Recommendations

Based on the study findings, the following conclusions have been reached; and the following recommendations made.

Conclusions: The study concludes as follows:

- A unique aspect of the Project is that the project owners will be international environmental organizations who seek to create sustainable financing for wildlife conservation, biodiversity protection and benefit to rural communities. The owners will therefore reinject all profits from the sale of electricity to Kenya Power to fund environmental conservation in Kenya and development of the project area; Lewa Wildlife Conservancy and Borana Conservancy being two beneficiaries.
- The Project will stabilize the grid power supply, which will cushion the grid against power fluctuations. Increased power supply will help improve access to electricity and thus spur investments. As a result, the project fits well into Kenya's development agenda of increased economic growth and social development in a clean and secure environment.
- The Project is clean energy which will reduce Kenya's vulnerability to climate change, through a reduction in the use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and increase the carbon load. The Project therefore feeds directly into Kenya's low carbon pathway strategies.
- The Project will contribute in a great way to the realisation of the various GoK flagship projects under the Vision 2030, such as the Standard Gauge Railway System, Special Economic Zones, Information and Communication Technology Parks, Growing Manufacturing Sector and the LAPSSET Project, all which would require energy to operate.
- The Project will create employment, improve infrastructure, spur economic growth, reduce incidences of charcoal burning, improve local capacity in renewable energy development technologies and increase GoK revenue base through levies.
- The Project has potential to cause some level of negative environmental and social effects during construction, operation and decommissioning. However, there will be no significant and enduring effects to be associated with the Project.
- The bulk of the potential negative effects will be during construction phase of the Project. During operation, there will be no significant negative effects from the project. As such, most of the project impacts are of low magnitude, localized in extent and short-term in duration related only to specific Project phases.
- The potential negative effects of the Project can be avoided, minimised or reduced through proper implementation of the identified and recommended mitigation measures or strategies contained in the ESMP of this Report.

- The Project alternatives have been selected on the basis of sound environmental and social consideration. The project design has followed a technical and an environmental optimisation process to minimise negative impacts. The project footprint is only 70 acres (0.283 km^2). The project's power evacuation infrastructure involves the construction of only 6.5km 33 kV transmission line, which will follow an existing public (KenHa) road reserve. The 33kV transmission line is classified as low voltage with negligible or insignificant environmental consequences.

Recommendations: The general recommendation from the ESIA study is that the proposed 10MW Lewa Solar Park Project should be allowed to go ahead. In view of this and to ensure the environmental and social sustainability of the Project, it is recommended that the Proponent implements the following:

1. Fully implement the Project's ESMP to mitigate negative impacts and enhance the positive impacts. The ESMP requires that the proposed project follows the recommended mitigation measures; and livelihood and community benefit enhancement strategies.
2. Develop internal capacity in environmental monitoring, audits and reporting to provide an enabling environment to address environmental and social issues competently, timeously, effectively and in a culturally appropriate manner. Internal capacity development may be realised through setting up an Environmental Monitoring Committee (EMC) that would foresee an effective mechanism for monitoring the implementation of ESMP and improving communications amongst the stakeholders. The EMC would also work with the external monitoring expert
3. Comply with all the relevant laws in Kenya, including subjecting the proposed project to statutory annual environmental audits under EMCA 1999 (amended in 2015) and other governing legal frameworks.
4. Develop a Human Resource Policy that would identify and prioritise local community employment opportunities to ensure gender equity in human resource recruitment.
5. Develop a Stakeholder Engagement Plan and commit to a pro-active and continuous stakeholder engagement process to address emerging project issues and to continue the enlightenment of the community on project benefits. Community engagement should be undertaken in close collaboration with the local administration (local chiefs, local sub-chiefs and the county leadership)
6. Develop a Community Development Plan through a participatory process to identify and prioritise areas of development that the proposed project can support to allow the host community share in the project benefits.

7. Establish a local project implementation committee that would bring together the neighbouring communities, county government, ward administrators, chiefs and sub chiefs. The role of such a committee would be to oversee the implementation of the ESMP throughout the project lifecycle following a participatory framework.

1 Introduction

This document forms the Environmental and Social Impact Assessment (ESIA) for the design of the Lewa solar farm (the Project) in Meru County of Kenya. The capacity of the Project will be up to 10 MW available for export to the grid. The location of the Project site is illustrated on Figure 1-1. The ESIA presents information on the identification and assessment of the likely significant environmental and social effects of the Project and its ancillary infrastructure. Additional background information was obtained from the pre-feasibility study report carried out for the initial project proposal by Carbon Africa Limited and dated January 2015.

Figure 1-1: Proposed site location

1.1 Background Information

A 10 MW solar photovoltaic (PV) farm is proposed to be constructed on land within the ownership of Kisima Farm to the south of Lewa Wildlife Conservancy within Meru County in Kenya. The site is located approximately 20 km north-west of Meru town and 43 km north-east of Nanyuki, near the Nanyuki-Isiolo-Meru B6 road junction. A typical view of the project site is shown in Figure 1-2.

Figure 1-2: Typical view of the project site

1.2 Rationale for the Project

Kenya's energy sector relies heavily on hydro-power and thermal generation, both accounting for 70% of the energy supplied to the grid. Though hydropower is renewable, it is vulnerable to the effects of climate change, while thermal plants are costly and increase the carbon load. Addressing the effects of climate change in the energy sector requires proper planning and development of energy solutions that are resilient and that also minimise carbon emissions. Solar energy, alongside geothermal and wind, provide the solution to a low carbon pathway.

The Government of Kenya has initiated several flagship projects under the Vision 2030 Plan. Some of these projects include the Standard Gauge Railway System, Special Economic Zones, Information and Communication Technology Parks, Growing Manufacturing Sector and the LAPSSET Project. Additionally, the counties are also largely viewed as new frontiers for socio-economic growth. All these together with Kenya Power's Last Mile Connectivity project will create demand for additional power. The proposed solar PV project seeks to contribute toward the demand for additional electricity generation infrastructure in a renewable form.

1.3 Objectives of the ESIA

In order to successfully develop this Project, the following requirements must be met:

- The Project would meet Kenyan national requirements and international lending standards.
- The Project would include all necessary mitigation measures to minimize any significant adverse change in environmental, health and safety, and socioeconomic conditions.
- Appropriate public consultation and disclosure are undertaken in line with Equator Principles and IFC Performance Standards, ensuring all reasonable public opinions are adequately considered prior to a commitment for financing.

To ensure compliance with international lending requirements, the overall scope of this assessment includes:

- Definition of baseline conditions of key environmental and social resources.
- Assessment of positive and negative impacts of the Project.
- Consultation with people who may be affected by the Project and other stakeholders.
- Development of design and operating practices that are sufficient to avoid, reduce, or compensate for significant adverse environmental and social impacts.
- Development of such monitoring programs as are necessary to verify mitigation is effective in accomplishing its goals, and to develop and refine the effectiveness of mitigation measures.

1.4 Structure of the Environmental and Social Impact Statement

The remainder of this report is organized as follows:

- Chapter 2 – general assessment methodology applied for this ESIA.
- Chapter 3 – details the Project and proposed layout.
- Chapter 4 – describes the possible alternatives to the Project.
- Chapter 5 – legal and institutional framework and context in which the Project is being proposed and developed.
- Chapter 6 – current baseline environmental and socio-economic conditions of the area.
- Chapter 7 – Public participation and consultation which has taken place and future events.
- Chapter 8 – details the potential impacts resulting from construction, operation and decommissioning of the Project.
- Chapter 9 – mitigation and enhancement measures proposed to reduce adverse effects and improve those which are beneficial.

- Chapter 10 – sets out proposed environmental management measures to be implemented.
- Chapter 11 – describes monitoring, evaluation and reporting requirements.
- Chapter 12 – conclusions and recommendations.
- Chapter 13 – references used in the preparation of the ESIA.

2 Assessment Methodology

2.1 General Approach

A number of criteria were used to determine whether or not a potential impact of the Project could be considered 'significant'. These are outlined with reference to specific environmental and social issues in the subsequent topic chapters of this ESIA. Wherever possible, a quantitative assessment of the impacts was undertaken. Where this was not possible, a qualitative assessment of impacts was carried out, based on existing information available for the site and the surrounding study area, and experience with other solar PV developments.

The ESIA covers the direct impacts and any indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary, reversible and irreversible, beneficial and adverse impacts of the Project.

Where relevant, the anticipated impact was compared against appropriate legal requirements and standards. Where no such standards exist, assessment methods involving interpretation and the application of professional judgement were employed. The assessment of significance in all cases took into account the impact's deviation from the established baseline conditions and the sensitivity of the environment.

2.2 Methodology

2.2.1 Environmental Impacts

A general method for grading of the significance of environmental impacts was adopted to ensure consistency in the terminology of significance, whether for a beneficial or an adverse impact. The two principal criteria determining significance are the sensitivity of the receptor and the magnitude of the change arising from the Project, as shown in Table 2-1.

Table 2-1: Determination of Environmental Impact Significance

Magnitude of Change	**Sensitivity of Receptor**		
	High (e.g. international or national protection)	*Medium* (e.g. regional or local protection)	*Low* (e.g. no protection)
High (e.g. >75% of area or receptor affected)	Major (H, H)	Major (H, M)	Moderate (H, L)
Medium (e.g. 25-75% of area or receptor affected)	Major (M,H)	Moderate (M, M)	Minor (M, M)
Low (e.g. 5 to 25% of area or receptor affected)	Moderate (L, H)	Minor (L, M)	Negligible (L, L)
Very Low (e.g. >0, but <5% of area or receptor affected)	Minor (VL, H)	Negligible (VL, M)	Negligible (VL, L)
No Change	None (NC, H)	None (NC, M)	None (NC, L)

Table 2-1 shows that the significance of impacts was classed as major, moderate, minor, or none; and either positive (beneficial) or negative (adverse). This categorization is widely recognised and accepted in the field of EIA. Where appropriate, topic-specific assessment methods and criteria for determining significance are utilised. Any alternative approaches are described in Chapter 8.

Another consideration was the duration of the impact, whether the impact would be temporary or permanent, and if they were temporary whether they would be short-, medium-, or-long term. Defining the duration of the impact can be subjective, depending on the receptor. For instance, following temporary use of land during construction, it may then take many years for the area of grassland to re-establish, particularly in arid environments. Similarly, although in ecological terms this period may not be a long time, for the people who use the land for pasture, this period could be significant in relation to their lifetime, and could therefore be considered permanent.

Table 2-2 defines the criteria for assessing the duration of impact.

Table 2-2: Duration of Impacts

Nature of Change	Duration	Definition / Description
Temporary	Short-term	Impact continues during construction (1-2 years) and up to 1 year following construction.
	Medium-term	Impact continues 2-5 years following construction.
	Long-term	Impact continues 5-10 years after construction.
Permanent		Due to the length of time period for human beings, impacts over 10 years can subjectively be defined as permanent.

2.2.2 Social Impacts

The objective of the social impact assessment was to identify major risks to social and economic conditions in the area of the proposed action and to assess impacts of the construction and operation on socio-economics following recognised good practise guidance Centre for Good Governance (2006), World Bank (2003), and Mackenzie Valley Environmental Impact Review Board (2007). The impacts can be direct and indirect, intended and unintended, positive and negative. For significant impacts, the developer would implement a variety of mitigation measures, and these are discussed within Chapter 9 (Mitigation) and Chapter 10 (Environmental and Social Management Plan).

Generally, the social impact assessment process involves the following major tasks:

- Identifying types of adverse and beneficial impacts of the proposed action.
- Assessing the level of socioeconomic risks in terms of frequency (how likely is it to happen) and consequences.
- Assessing the acceptability of the risks.
- Introducing mitigation measures to reduce risks to acceptable level.

The social impact assessment typically addresses the following issues:

- **Demographics:** Changes in local population size, emigration/immigration in the area, migration of people in search of work, and other issues.
- **Economic issues:** Supply chain impacts, local sourcing opportunities, potential impacts on local markets for goods and services, employment opportunities for construction, operation and decommissioning phases of the Project.
- **Health issues:** Risks of new diseases to indigenous communities, impacts on health of operations personnel and local communities, impact of local diseases on workers.
- **Social infrastructure**: Adequacy of health care and education facilities, transport and roads, power supply, fresh water supply to support project activities and personnel as well as the local communities.
- **Resources**: Land use changes, increased access to rural or remote areas, use of natural resources.
- **Psychological and community aspects**: Changes from traditional lifestyles, community cohesion, attitudes and behaviour, perception of risk.
- **Cultural**: Issues associated with sites that have archaeological, historical, religious, cultural, or aesthetic values.
- **Social equity**: Local social groups who will gain or lose as a result of the Project or operation.

As with environmental impacts, a general method for grading the significance of socio-economic impacts was adopted to ensure consistency in the terminology of significance, whether for a beneficial or an adverse impact. The two principal criteria used were the nature of the impact and the magnitude of the change arising from the Project, as shown in Table 2-3.

Table 2-3: Determination of Social Impact Significance

Magnitude of Change	Nature of Impact		
	Avoidance	*Disruption / Habituation*	*Permanence*
Negligible	No avoidance needed.	Not noticeable under normal conditions.	Not noticeable.
Minor	Mitigation of design change prevents impact(s).	No effect on daily life or routine of affected party.	Ephemeral: <1 year.
Moderate	Mitigation or design change reduces impact.	Possible initial change on daily life/routine, rapid habituation reduces to below nuisance level.	Temporary: recovery to pre-existing conditions after one or a few years (e.g., after construction).
High	Mitigation or design change cannot significantly reduce impact(s).	Requires change to daily life or routine activities.	Permanent: life of Project, or beyond.

2.2.3 Environmental Mitigation and Monitoring Measures

Where significant impacts are identified, mitigation measures are then developed. These measures are intended to avoid, reduce, compensate, and/or remediate adverse impacts, or to enhance potentially beneficial impacts. Wherever possible, this is undertaken as part of the Project design, so the measures will feed back into impact assessment. An example of this would be to include erosion control measures into the design of roads.

The mitigation and enhancement which should be undertaken as part of the Project are set out within Chapter 9 (Mitigation and Enhancement Measures) and within Chapter 10 (Environmental and Social Management Plan). These measures can then be applied in order to manage different phases of the Project.

2.2.4 Assessment of Residual Impacts

Following the identification of mitigation measures to address significant adverse effects, an assessment of the significance of any residual impacts (i.e. those remaining after mitigation) was completed.

2.2.5 Environmental Monitoring

Where there is uncertainty over the potential significance of an impact, mitigation may include monitoring of that impact to determine whether additional measures are required. It is recommended that Project monitoring be described in a corresponding Environmental and Social Management Plan (ESMP).

2.2.6 Scope Exclusions

It is proposed that air quality impacts can be scoped out of the ESIA due the fact that the Project will have negligible emissions during normal operation.

Air quality issues such as dust emissions during construction will be considered as part of the assessment of construction impacts under transport and access and managed as part of the ESMP.

3 Project Description

3.1 Site Location

The proposed Lewa Solar Park is located in Meru County and lies just to the north of Mt. Kenya, the highest mountain in Kenya (5,199 metres above sea level). The site is located approximately 20 km north-west of Meru town and 43 km north-east of Nanyuki, near the Nanyuki-Isiolo-Meru B6 road junction.

Other towns in the vicinity include Timau, approximately 24 km to the west, and Isiolo, approximately 27 km to the north-north-east. The project is approximately 170 km north-east of Nairobi, the capital city of Kenya.

The site is 12 kilometres from the Lewa Wildlife Conservancy to the west of the A2 highway and within the transit corridor utilised by elephants moving between Lewa and Mount Kenya.

The project site is accessible via an all-weather road approximately 1km off the Nairobi-Meru B6 highway, 24km northwest of Meru town and 50km northeast of Nanyuki. Isiolo International airport has recently opened and which will shortly be taking scheduled flights. The Lewa airstrip could potentially also be used for flights for personnel and material.

3.2 Overview of Photovoltaic (PV) Technology

In general terms, solar PV technology converts the sun's energy into electricity using a series of solar panels, inverters and transformers to connect to the electricity grid.

PV cell technologies are broadly categorised as either crystalline or thin-film. Crystalline silicon (c-Si) cells provide high efficiency modules. They are sub-divided into mono-crystalline silicon (mono-c-Si) or multi-crystalline silicon (multi-c-Si). Mono-c-Si cells are generally the most efficient, but are also more costly than multi-c-Si. Thin-film cells provide a cheaper alternative, but are less efficient. There are three main types of thin-film cells: Cadmium Telluride (CdTe), Copper Indium (Gallium) Di-Selenide (CIGS/CIS), and Amorphous Silicon (a-Si).

The performance of a PV module will decrease over time due to a process known as degradation. The degradation rate depends on the environmental conditions and the technology of the module.

Modules are either mounted on fixed-angle frames or on suntracking frames. Fixed frames are simpler to install, cheaper and require less maintenance. However, tracking systems can increase yield by up to 20 percent. Tracking, particularly for areas with a high direct/diffuse irradiation ratio also enables a smoother power output.

Inverters convert direct current (DC) electricity generated by the PV modules into AC electricity, conforming to the local grid requirements. They are arranged either in string or central configurations. Central configuration inverters are considered to be more suitable for multi-MW plants. String inverters enable individual string Maximum Power Point Tracking (MPPT) and require less specialised maintenance skills. String configurations offer more design flexibility.

PV modules and inverters are all subject to certification, predominantly by the International Electrotechnical Commission (IEC). New standards are currently under development for evaluating PV module components and materials.

The performance ratio (PR) of a well-designed PV power plant will typically be in the region of 77 percent to 86 percent (with an annual average PR of 82 percent), degrading over the lifetime of the plant. In general, good quality PV modules may be expected to have a useful life of 25 to 30 years.

The main components of the solar PV project are:

Solar PV modules: These convert solar radiation directly into electricity through the photovoltaic effect in a silent and clean process that requires no moving parts. The output from a solar PV cell is DC electricity. A PV power plant contains many cells connected together in modules which are then connected in strings to produce the required output.

Inverters: These are required to convert the DC electricity to alternating current (AC) for connection to the utility grid. Many modules in series strings and parallel strings are connected to the inverters.

Module mounting (or tracking) systems: These allow PV modules to be securely attached to the ground at a fixed tilt angle, or on sun-tracking frames.

Step-up transformers: The output from the inverters requires a further step-up in voltage to reach the AC grid voltage level. The step-up transformer takes the output from the inverters to the required grid voltage.

The grid connection interface: This is where the electricity is exported into the grid network. The substation will also have the required grid interface switchgear such as circuit breakers (CBs) and disconnects for protection and isolation of the PV power plant, as well as metering equipment.

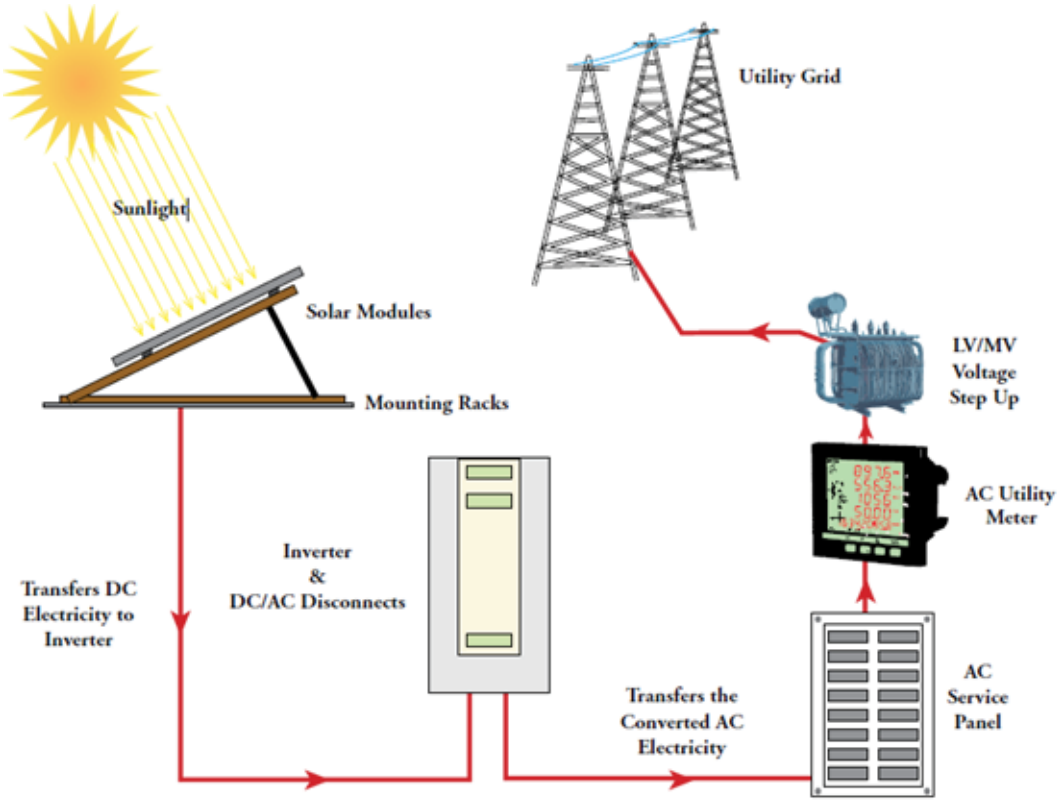


Figure 3-1: Grid Connected Solar PV System

The following sections detail the various technology options that have been considered for use on the Project.

3.3 Description of Key Components

The 10MW power generation plant is designed to use solar photovoltaic (solar-PV) technology, where solar modules/panels made from silicon material are used to convert sun rays (solar energy) into electricity. The proposed plant is a medium size utility grade grid-connected solar-PV power system consisting of Photovoltaic modules/panels, MPPT solar power inverters, power conditioning units, medium voltage/33kV step-up power transformers and grid connection equipment. The plant will feed power directly into the grid with no batteries employed.

The layout will comprise four arrays of solar modules, supported on East-West Single Axis Tracker (+/- 60degrees) mounting structures.

Table 3-1 provides a summary of the key project components. Such information is based on preliminary information and design provided by the Proponent.

Table 3-1: Key Project Components

Component	Parameters
Generating units:	Canadian Solar [CS6X-320P]
Number of units:	38,160
Total DC kWp:	12,020
Total App. Power (kVA):	10,475
Total Export Act. Power (kW):	10,000
Array Slope & Orientation:	Single axis tracker system E-W (+/-60°)
Site boundary area:	41.22 ha

3.3.1 Solar Park Layout

Figure 3-2 overleaf shows the proposed layout for the plant designed by the Proponent.

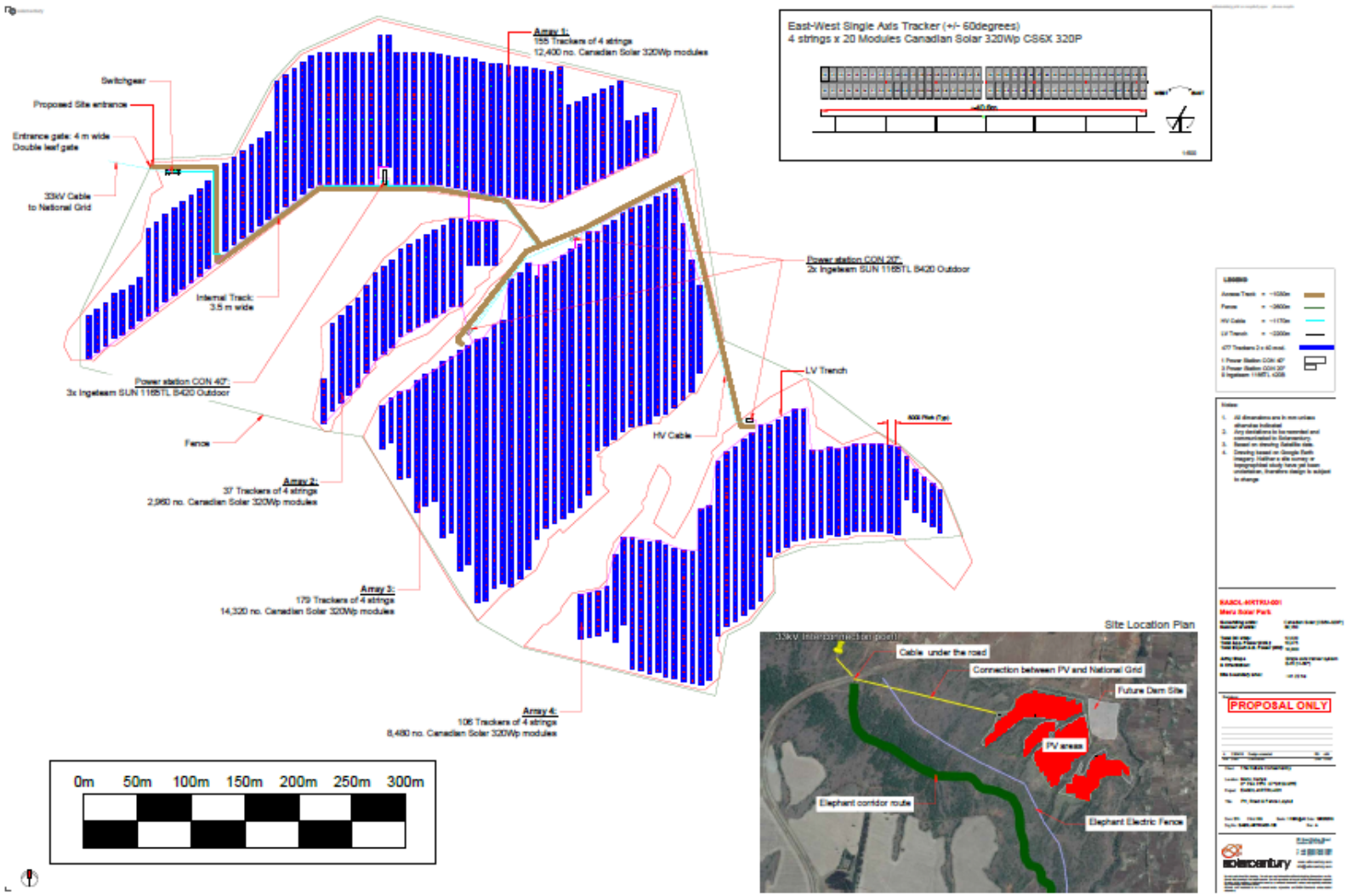


Figure 3-2: Project Layout Plan

3.3.2 PV Modules

Photovoltaic (PV) cell technologies are broadly categorised as either crystalline silicon or thin film:

- **Crystalline Silicon (c-Si):** Crystalline silicon cells provide relatively high efficiency modules. Modules are made from cells of either monocrystalline or multicrystalline silicon. Monocrystalline silicon cells are generally slightly more efficient, but are also more costly than multicrystalline.
- **Thin Film:** Thin film modules are less efficient at peak levels than crystalline modules; however, they can provide performance advantages at varying irradiance and temperature conditions. Modules are made with a thin film deposition of a semiconductor onto a substrate. This class includes semiconductors made from:

In this instance crystalline technology has been chosen for the Project site due to the high irradiance experienced at the site and the fact that such technology is likely to deliver higher efficiency under such conditions.

3.3.3 Inverters

Inverters are solid state electronic devices. They convert DC electricity generated by the PV modules into AC electricity, ideally conforming to the local grid requirements. Inverters can also perform a variety of functions to maximise the output of the plant. These range from optimising the voltage across the strings and monitoring string performance to logging data, and providing protection and isolation in case of irregularities in the grid or with the PV modules.

There are two broad classes of inverters as illustrated in Figure 3-3, central inverters and string inverters. The Proponent will install string invertors on the Project.

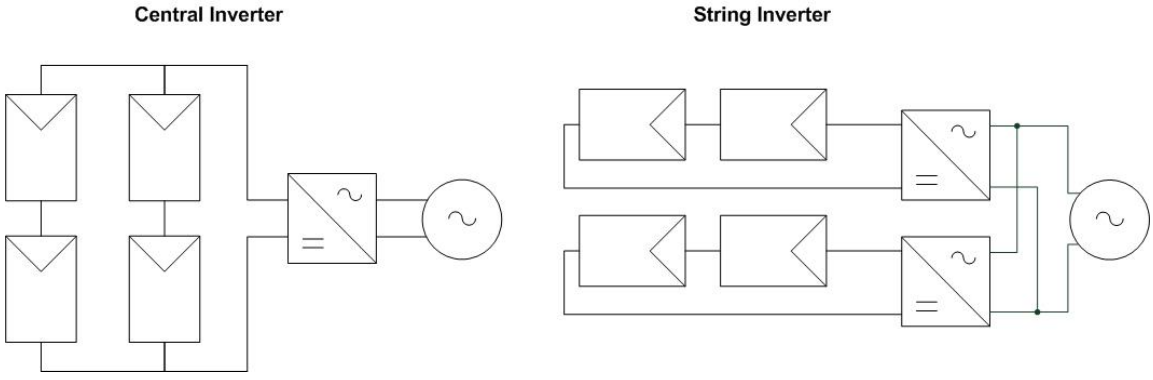


Figure 3-3 : Inverter Configurations

The string inverter concept uses multiple inverters for multiple strings of modules, with inverter capacities in the region of approximately 15 to 30 kVA when used on large-scale PV plants. String inverters provide MPPT on a string or dual-string level with all strings being independent of each other. This is useful in cases where modules cannot be installed with the same orientation, where modules of different specifications are being used, or when there are shading issues.

String inverters, which usually operate in three phases for PV plant installations, also have other advantages. First of all, they can be serviced and replaced by non-specialist personnel. Secondly, it is practical to keep spare string inverters on site. This makes it easy to handle unforeseen circumstances, as in the case of an inverter failure. In comparison, the failure of a large central inverter, with a long lead time for repair, can lead to significant yield loss before it can be replaced.

Up to five small units will be located on the site to house the inverters and transformers. These are used to convert the electricity generated by the panels to grid quality AC power. The final dimensions of these units will be subject to a competitive tendering process for an EPC contractor.

3.3.4 Transformers

Power transformers are electrical devices which convert voltage to different levels. The benefit of their use lies upon the transformation of low voltages, hence high currents, to medium or high voltages, hence much lower currents. This makes it feasible to transfer generated energy to centres of demand through cables of practical dimensions.

Solar PV plants, like any other generator, produce energy that needs to be injected into the grid. As PV inverters typically operate at low voltages, power transformers are required to step the voltage up to the distribution voltage level. Specifically, transformers are required at the output side of the inverters to step the voltage from the low level (e.g. 400 V) up to the medium level (22 kV in case of the Project). It should be noted that in other cases, transformers are also required at the plant substation when the grid connection voltage is higher than the one at the output of the inverter station; this would typically be the case in large scale projects connected to transmission voltage level.

3.3.4.1 Transformer Components

A transformer would typically comprise of the components illustrated on Figure 3-4.

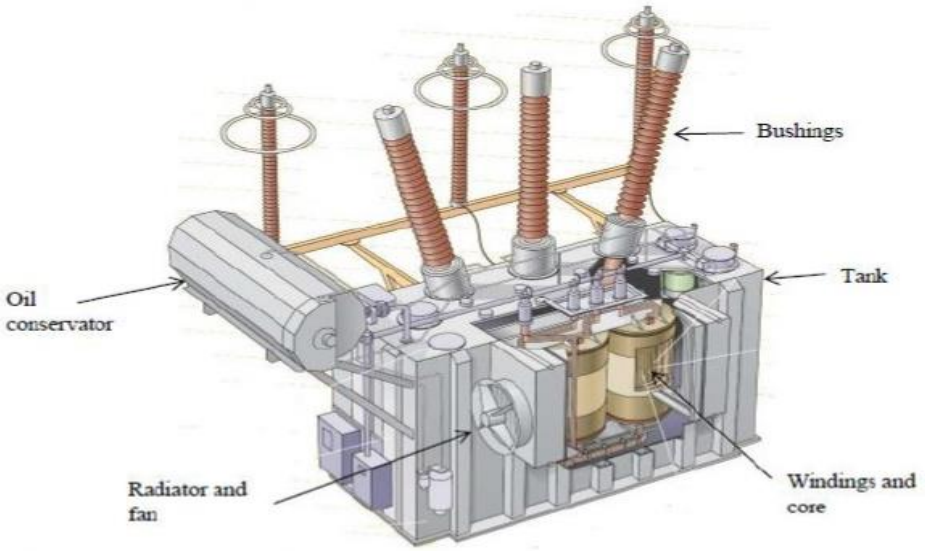


Figure 3-4: Major Components of a Liquid-Immersed Power Transformer

The transformers found in solar applications vary significantly in their characteristics. These are detailed further in Table 3-2.

Table 3-2: Transformers Electrical Characteristics

Category	Electrical Characteristic
Type	Liquid filled or dry type
Nominal Voltage of HV Winding	Depends of the application but typical values include 11 kV, 22 kV, 33 kV, etc.
Nominal Voltage of LV Winding	Depends of the application but typical values include 400 V, 660 V, etc.
Capacity	Depends of the size of the inverter.
Frequency	50 Hz or 60 Hz
Number of Windings	Two or three windings
Short Circuit Impedance	10%
Cooling Method	ONAN, ONAF, OFAF, ODAF
Vector Group	Delta or star connection of windings (Yy, Dy, YNd)

3.3.5 Mounting Structures

Mounting structures will typically be fabricated from galvanised steel or aluminium. Whilst there are also examples of systems which incorporate wooden beams, this is not typically recommended. A good quality mounting system may be expected to:

- Have undergone extensive testing to ensure the designs meet or exceed the load conditions experienced at the site.
- Allow the exact tilt angle to be achieved with a small level of uncertainty.
- Allow field adjustments that may reduce installation time and compensate for inaccuracies in placement of foundations.
- Minimise tools and expertise required for installation.
- Adhere to the conditions described in the module manufacturer's installation manual.
- Allow for thermal expansion, using expansion joints where necessary in long sections, so that modules do not experience thermal stresses.

Purchasing quality structures from reputable manufacturers is generally a low-risk option. Some manufacturers provide soil testing and qualification in order to certify designs for a specific project location.

Figure 3-5 illustrates a typical fixed-tilt mounting structure used for large-scale solar PV plant.

Figure 3-5: Rear View of a Typical Ground Mount Support Structure

Ground mounted structures can sometimes have a single post support, or equally commonly, a twin post support system. Two posts is a more stable solution when strong winds are a feature of the site.

Alternatively, custom-designed structures may be used to solve specific engineering challenges or to reduce costs. This may also be a solution if it is necessary to use local suppliers or fabricators for political reasons. The key is to design a system that is simple and repetitive to install, as labour costs can be a significant element of installation. If this route is chosen, it is important to consider the additional liabilities and cost for validating structural integrity.

3.3.5.1 Mounting Structure Foundations

The topographic conditions of the site and information gathered during the geotechnical survey will influence the choice of foundation type. This will affect the choice of support system design as some are more suited to a particular foundation type.

Foundation options for ground mounted PV systems include:

- **Concrete piers cast in-situ:** These are most suited to small systems and have good tolerance to uneven and sloping terrain. They do not have large economies of scale.
- **Pre-cast concrete ballasts:** This is a common choice for manufacturers having large economies of scale. It is suitable even at places where the ground is difficult to penetrate due to rocky outcrops or subsurface obstacles. This option has low tolerance to uneven or sloping terrain but requires no specialist skills for installation. Consideration must be given to the risk of soil movement or erosion.
- **Driven piles:** If a geotechnical survey proves suitable, a beam or pipe driven into the ground can result in low-cost, large scale installations that can be quickly implemented. Specialist skills and pile driving machinery are required, which may not always be available. However, this technique is most commonly used on PV plants globally.
- **Earth screws:** Helical earth screws typically made of steel have good economics for large scale installations and are tolerant to uneven or sloping terrain. These require specialist skills and machinery to install.

The use of driven piles foundations is considered the most attractive choice due to the speed of installation and cost effectiveness for use on large-scale PV plants. The foundation should be made of hot-dip galvanised steel, with a zinc layer thickness depending on the corrosivity category at the site. It should be designed for a minimum of a 30 years' lifetime.

Based on the topographic conditions of the site, the preferred foundation option for ground mounted PV systems will be driven piles where a beam or pipe driven into the ground can result in low-cost, large scale installations that can be quickly implemented. Specialist skills and pile driving machinery are required, however, this technique is most commonly used on PV plants globally.

An example hydraulic driving machine used for installing pile driven foundations is illustrated in Figure 3-6.

Figure 3-6: Hydraulic Driving Machine for Installing Piles

3.3.5.2 Tracking Systems

The solar park will use the solar tracking system technology which permits orientation of the solar panels from East to West in order to face the position of sun during the day. This technology has the flexibility to optimize the solar resource and is suitable for Kenya, which is next to the equator. The tracking system can increase the power output by between 10-25 percent which would lead to better economic performance of the solar project. The advantages of this technology include; similar installation times and costs to a fix tilt structure system, easy maintenance, optimisation of daily power production, and sensitivity to peak demands (peak demands early in the morning, late in the afternoon). The disadvantages of this include a larger land surface (due to the land availability this is not considered a problem for this project), and higher maintenance costs as compared to the fixed tilt structure system. The use of this technology will require land acquisition effort for about 70 acres (28.3ha) to produce 10MW AC.

Based on the site's irradiation profile, location and energy yield gains, and on SgurrEnergy's experience, it is estimated that using tracking systems at the Project location would obtain a gain of approximately 20% in energy yield.

3.3.6 Grid Connection

Both the existing 33kV Nanyuki-Isiolo-Meru and the planned 132kV Nanyuki-Isiolo-Meru power lines pass in close proximity to the Lewa project site. As the 33kV line is already present within approximately 500m of the project site and due to the cost implications of connecting at 132kV, connecting at this voltage is considered to be the more appropriate and preferred connection option. The following connection options at 33kV were identified for this project:

- Option 1 – Connect to the existing 33 kV line after the branch to Isiolo
- Option 2 – Connect to the existing 33kV line on the main section of the Nanyuki-Meru line nearest the solar PV plant
- Option 3 – Connect to the existing 33/11 kV distribution substation at Marania.

Given that Option 2 represents the shortest and most direct connection to the 33kV line, minimising environmental impact and cost, this has been chosen as the preferred option.

3.4 Overview of Project Activities

The project will entail a series of activities including:

a) The pre-construction phase will include carrying out land survey, power plant design review with reference to EIA recommendations; planning for storm water drainage and containment, undertaking site preparation, manufacturing-procurement of items and transporting the required components and construction equipment to site.
b) The construction phase will include establishment of internal and external access roads; establishment of construction areas; construction of the entire 10MWp solar array, construction of the power substation and other onsite structures) and other ancillary infrastructure (i.e. power-line for evacuation of electricity); and inter-connection of the solar plant substation to the national electricity utility grid.
c) The post-construction phase will include plant operation and maintenance, site remediation, clearance and deposition of debris off the site, restoration of areas where construction activities temporarily disturbed the environment, repairs and replacements of failed parts; and finally decommissioning the entire plant when the useful life of the facilities is over.

3.4.1 Pre-construction Phase

3.4.1.1 Conducting of Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to, a geotechnical survey, survey of land/cadastral survey, power line route survey, a site survey and confirmation of the micro-siting foot print for the solar-PV arrays, substation site and road servitudes.

3.4.2 Site Preparation and Grading

Site preparation activities will include clearance of vegetation for the establishment of internal access roads and at the footprint of each project component. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

It should be noted that, solar-PV sites require the lack of obstruction from surrounding trees and buildings or other infrastructure; otherwise power production is reduced due to shadows on the solar modules. Therefore, all the trees within the vicinity and very close proximity to solar panels will be cut down or trimmed to very low heights to prevent any of these casting a shadow on the solar-PV modules.

3.4.3 Construction Phase

3.4.3.1 Establishment of Access Roads to the Site

The solar array construction site will be accessed via the A2 highway from Nairobi then the B6 road to Meru. Within the site itself, access roads will be constructed from teeing off from this existing B6 road to the individual facility components for construction purposes (and later limited access for maintenance). Some existing dirt tracks will require to be upgraded to allow access. The amount of earthworks and compaction required in the establishment of the access roads will be established through the detailed geotechnical study to be conducted for the site.

3.4.3.2 Construction Base Camp, Stores and Power Control Centre

The construction base camp for all workers, storage facilities and power control centre house, will be constructed on site where all equipment will be stored, accommodation for workers and housing for operation and maintenance personnel. This will help to limit the potential ecological impacts associated with this phase of the project within one designated area.

The storage of fuel for the on-site construction vehicles and equipment will need to be secured in a temporary bundled facility so as to prevent the possibility of leakages and soil contamination. A dedicated area for the concrete batching plant will also need to be established.

3.4.3.3 Power Substation and Interconnection Facilities to the Utility Electricity Grid

A power substation including several power step-up transformers and switch-gear will be constructed at site for stepping up power to 33kV standard, as well as appropriate switching and power control mechanisms.

A gantry system will be constructed to provide the physical interconnection to the existing 33kV Nanyuki-Isiolo-Meru. The line from the Project to the connection point will be buried underground to minimise any impact on the elephant corridor. Where the line crosses the A2 highway two options are being considered:

- Option 1 would employ horizontal directional drilling (HDD) to route the cable under the elephant crossing and highway without impacting on the structural integrity of the road or affecting the free movement of elephants along the corridor.
- Option 2 would involve installing an overhead line over the A2 highway, again avoiding any direct impact on the elephant crossing.

The final preferred option would be confirmed on completion of further grid study and geotechnical study.

3.4.4 Operational Phase

3.4.4.1 General Plant Maintenance

To maintain an appealing environment, plant management will ensure good housekeeping and sanitation around the plant. Proper maintenance and servicing of all plant auxiliaries at all times supported with proper process documentation and data analysis on plant performance.

Solar array maintenance usually involves removing overgrown grasses within the solar-array area, as well as trimming all over grown trees whose branches pose a risk of showing parts of the facilities.

3.4.5 Decommissioning Phase

The solar array facility is expected to have an economic useful lifespan of approximately 30 years and the power plant infrastructure would either be decommissioned or upgrade (if a new license is granted) once it has reached the end of its economic life. Upgrading the PV power plant will consist of replacing old PV modules for new ones, increasing the total peak power of the plant (a process called “Repowering”) or increasing the power of the plant by adding new elements such as trackers, PV modules or transformers.

If the plant is to be decommissioned, then the site should be returned to close to its original state. The components of a PV plant have an intrinsic value either for re-use or recycling. This value will cover the cost of decommissioning the plant and rehabilitating the site.

The following decommissioning activities will form part of the project scope: site preparation and temporary storage; transportation and deposition of waste material.

The decommissioning or upgrading of the infrastructure has not been discussed in this ESIA report, but will be addressed before decommissioning is required. A separate ESIA will be conducted prior to the time of decommissioning.

3.4.5.1 Site Preparation and Temporary Storage

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment, mobilization of decommissioning equipment, planning for temporary and or permanent storage of debris.

3.4.5.2 Disassemble and or Replace Existing Components

The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements. This would be done by sorting all materials, such that they are categorized into re-usable items and debris items.

All re-usable items shall be re-packaged into containers and taken to the market areas where they can be sold; while debris will be packaged into two types, one for hazardous materials and the other for regular debris.

Hazardous wastes will be disposed of in accordance with environmental guidelines required by NEMA; while the non-hazardous, like waste metals or plastics, will be delivered to respective re-cycling plants.

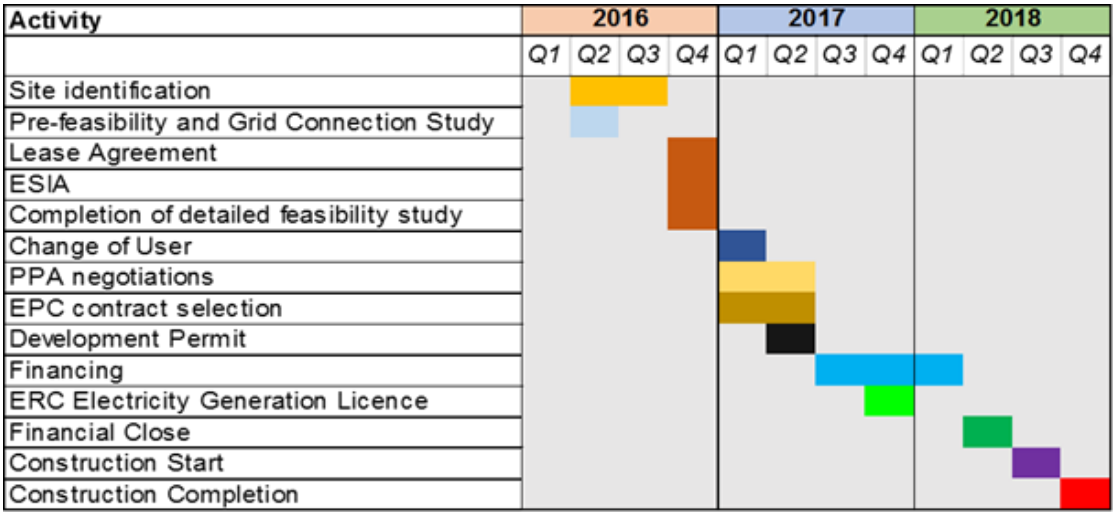
3.4.5.3 Site Remediation

Once construction is completed, all equipment and debris shall be removed from the site and the affected area will be rehabilitated where practical and reasonable, back to the normal state of the environment. Site remediation methodology is included in the project environment management plan proposed for the development. The plan provides measures to mitigate/manage the potential impacts expected during the construction phase.

3.4.6 Project Schedule

The project development timeline is presented as Annexure VI of this Report. It shows that construction of the PV plant would typically be completed between 15-48 months upon identification of suitable solar park site.

In the present case, the following timeline is considered:



3.4.7 Financial Estimate

The estimated investment cost of the project is USD 11,000,000. This is the cost represents the Capital Expenditures (CAPEX) for the project and includes development expenses, procurement of equipment, construction of the solar park and the grid connection and ESMP Monitoring and reporting.

3.4.8 Emergency and Safety Support Systems

Management of the proposed plant will ensure periodic monitoring and upgrading of the safety support systems. These include; the firefighting equipment and well-marked emergency exit routes and assembling points, the necessary signage posts erected in all areas susceptible to dangers, general information and prohibitions. Portable fire extinguishers consisting of dry chemical carbon dioxide and foam type are to be provided at strategic locations in the plant. Adequate numbers of sand buckets are to be provided at various locations and there will also be a water hydrant system at the plant.

First Aid units fully equipped with the necessary materials shall be provided and proper protection gear shall be availed to employees and visitors at the plant. All the above will be supported with comprehensive continuous employee training and awareness on OHS, EMS and QMS matters. An emergency action plan that includes the procedures for handling leaks and spillage will be developed.

A written safety plan will be developed for the facility using established safety procedures for power generation plants as guideline. Employees will be intimately involved with the development of the process hazard analysis and on the development of other elements of process safety management required. Access to this data and all other pertinent information will be made readily available to all employees and onsite contractors.

Clear written operating procedures for safely conducting activities within the plant will be developed. This includes steps for each operating phase, operating limits, safety and health considerations and safety systems and their functions. This document will be readily accessible to employees who work on or maintain a covered process, and will be reviewed as often as necessary to assure they reflect current operating practice. Safe work practice will be implemented and will provide for special circumstances such as lockout/tag out and confined space entry and training limits.

3.4.9 Infrastructure Requirements during Construction of Power Plant

The project will require additional infrastructure during construction works. It is anticipated that the following infrastructure and services will be required:

- Effluent and storm-water drainage.
- Water supply from Kisima Farm.
- Sanitation and sewerage disposal.
- On-site electricity supply (by means of diesel generator).
- Road access.

4 Evaluation of Project Alternatives

The section below sets out the main alternatives considered during the site selection process and demonstrates the reasoning for the decision to take this Project site forward as the preferred development option.

4.1 Without the Project

This alternative is to maintain the status of the land as it currently stands. The land has been set aside for the elephant corridor but has been degraded as a result of human activity. The flora is relatively species poor and dominated by eucalyptus plantation. From an environmental standpoint, this option would mean that the country continues to have an over-reliance on thermal power plants thereby increasing the carbon footprint, contribution to global warming and climate change. A 'without project alternative' would also deny the local population potential employment opportunities associated with the Project. In this respect, the area would therefore continue along a marginalization path, with high poverty and unemployment levels, poor health facilities, poor access roads and poor state infrastructure. With Kenya's desire to reach middle income economic status by 2030, this alternative is the least favourable. A 'With Project Alternative' is therefore recommended.

4.2 Site Selection

In identifying a suitable site for solar energy developments, various elements need to be considered. These include factors such as:

- Solar resource.
- Environmental designations.
- Residential properties.
- Potential access.
- Grid connection.

A number of potential sites were considered in the area of the current Project site with two preferred sites being subject to pre-feasibility study. The two sites initially considered as part of the pre-feasibility study were on land within Lewa Wildlife Conservancy and on Kisima Farm.

The results of the prefeasibility study indicate that the proposed Lewa and Kisima project sites to the north of Mt Kenya near the Nanyuki-Isiolo-Meru road junction have suitable characteristics for a grid-connected 10 MWp solar PV power plant.

A desk review of available information did not identify any "no go" terrain, access, grid integration and environmental barriers to implementation although there were a number of issues to consider and further assess.

The Lewa site was assessed as having a high likelihood of being able to evacuate all power generated via the existing 33 kV Nanyuki-Isiolo-Meru Distribution network near the project site. Both the Lewa and Kisima alternatives have a number of interconnection points in close proximity and no competing projects were identified. While the Nanyuki-Meru section of the line is known to have a capacity of 20 MW, the 33 kV spur to Isiolo (which passes closest to both sites) may only be able to carry up to 4.5 MW as currently configured, which would present constraints to power export or necessitate an investment in network upgrades.

As a small-scale, embedded generator located at the edge of the distribution network the project may present benefits for KPLC in terms of local generation, voltage support and other ancillary grid services to increase system stability and a reduction in transmission and distribution losses from distant hydropower.

The original Lewa site alternative is located on the grounds of a private conservancy that has UNESCO World Heritage Site status. Although revenue from electricity sales may be used to support conservation efforts the project will need to make sure that it is not in conflict with the conservancy management plans. This was less of a consideration at the Kisima site, which is situated on private farmland.

However, as the Lewa site is being proposed with not only commercial but also environmental and social benefits in mind, project financial attractiveness may be less of a consideration than is usually the case.

The conclusion of the prefeasibility study is that the Lewa site was likely to be technically feasible but only marginally attractive on commercial terms. As an innovative model for sustainable conservation funding, however, the project was considered to make sense.

Following the completion of the pre-feasibility study an alternative site was proposed on land owned by Kisima Farm and outside of the Lewa World Heritage Site which would address concerns in relation to impacts on a UNESCO World Heritage Site whilst still delivering a project that is technically and financially feasible.

Following those initial studies the Project site was chosen due to the following aspects:

- Close proximity to road network.
- Close proximity to grid connection.
- Land availability.
- Lack of environmental and cultural heritage designations on the site area.
- Appropriate topography for solar PV development.
- Minimal features (i.e. tall trees / buildings) that may result in shading of PV panels.
- The neighbouring communities are generally supportive of the development of renewable energy development and this is essential for ensuring the success of the project.

5 Policy, Legal and Institutional Framework

The ESIA study for the Project has been carried out within the framework of local, national and international environmental regulations and guidelines. This chapter therefore outlines different policy and legislation requirements pertinent to the project including the East African regulations/Institutions as well as international conventions that may be triggered by the Project.

5.1 Policy Framework

5.1.1 Kenya Vision 2030

The Kenya Vision 2030 establishes a national development blue-print to create a globally competitive and prosperous nation with a high quality of life by 2030. It aims to transform Kenya into a newly industrialised, middle-income country providing a high quality of life to all its citizens by 2030, in a clean and secure environment. The vision is anchored on three key pillars: economic, social and political governance.

It sets the goal of achieving 23,000 MW of power generation capacity by 2030 and recognizes the boosting of Kenya's electrification as a prerequisite in attaining the different projects for the national development.

5.1.2 Least Cost Power Development Plan (2013-2033)

The Least Cost Power Development Plan (2013 – 2033) aims at enhancing national power generation and supply by identifying new least-cost generation and supply sources to meet the energy needs of the nation for sustainable domestic use. It sets the target of 3,000 MW of additional generation capacity by 2018. The plan recognises the need to diversify the country's energy sources in order to reduce dependence on unsustainable energy. It also recognises such initiatives as development, rehabilitation and expansion of generating power plants, expansion and extension of national grid and energy efficiency and conservation. As a solar park connected to the national grid, the proposed project will add 10 MW of sustainable power generation capacity.

5.1.3 National Climate Response Strategy 2010

In response to the challenges posed by climate change, Kenya developed the Climate Change Response Strategy that was launched in 2010. Its purpose is to put in place robust measures to address socio-economic challenges posed by climate change through thorough impact(s) assessment and monitoring. The strategy interventions include all sectors which are vulnerable to climate change including water and irrigation, agriculture, wildlife, rangelands, energy and more broadly, infrastructure. In the energy sector, priority areas include energy efficient innovations and technologies, low-carbon appliances and tools, the development of eco-friendly energy resources such as wind, solar, biogas, small hydro. The proposed project is based on solar technology and therefore fits the purpose of the National Climate Response Strategy.

5.1.4 National Climate Change Action Plan 2013 – 2017

The National Climate Change Action Plan 2013 – 2017 was developed to implement the National Climate Change Strategy that was launched in 2010. It advocates low carbon and climate resilient development pathway. It recommends an enabling policy and regulatory framework and details adaptation analysis, priority actions, mitigation options, considerations for technology requirements, national performance and benefit measurement system, recommendation for knowledge management and capacity development. The Action Plan recognises the promotion and use of alternative energy, such as wind, solar and mini hydro power generation and improved cook stoves, for adaptation and mitigation against the effects of climate change. It both seeks to expand renewable energy generation through centralised and decentralised systems. As such, the proposed solar energy project is consistent with the National Climate Change Action Plan.

5.1.5 Sessional Paper No. 10 of 2014 on National Environment Policy

Sessional Paper No. 10 of 2014 on National Environment Policy is a policy document which outlines a broad range of measures and actions responding to key environmental issues and challenges facing the country. It provides a framework for integrated approach to planning and sustainable management of natural resources in Kenya and policy direction on various vulnerable ecosystems in the country. It also considers cross-cutting and emerging issues such as poverty reduction, gender, disability, HIV / AIDS and other diseases in the management of the environment and natural resources. Public participation is a guiding principle of the policy. The Proponent is committed to continuous stakeholder involvement throughout the lifetime of the Project, from development, throughout pre-construction, construction and operations phases, and until de-commissioning.

5.1.6 Sessional Paper No. 4 of 2004 on National Energy Policy

Kenya's current energy policy is provided in the 2004 National Energy Policy, Sessional Paper on Energy, known as Sessional Paper no. 4 of 2004. The policy covers the period 2004 – 2023 and strategies for renewable energy are found in paragraphs 6.1 and 6.3 - 6.5, while Chapter 7 includes implementation plans for 2007 – 2012 and 2012 - 2024. In January 2011, the preparation of a new and significantly revamped National Energy and Petroleum Policy began. At the time of writing the October 2014 final draft policy was awaiting adoption by the government.

5.1.7 Energy Act No. 12 of 2006

The Energy Act No. 12 of 2006 is the current legislative instrument governing the sector with associated subsidiary regulations, including for generation licensing. The 2006 Act consolidated the Electric Power Act No. 11 of 1997 and the Petroleum Act Cap. 116. The Act, among others, provides for the establishment, powers and functions of the Energy Regulatory Commission. As of January 2015, the October 2014 draft of the new Energy Bill is under review by various stakeholders before it is presented to Parliament. Examples of significant changes therein include (a) confirmation the legal status of the Feed-in-Tariff (FIT) policy, (b) provisions for net metering, (c) the creation of a new Renewable Energy Resources Advisory Committee to advise on site allocation and licensing and (d) and the transformation of the Rural Electrification Authority (REA) into the Rural Electrification and Renewable Energy Authority as the lead agency for renewables development. The Ministry of Energy & Petroleum is also currently considering the possible auctioning of renewable energy project sites and the Energy Regulatory Commission the 2014 draft Energy (Local Content) Regulations.

5.1.8 Kenya Electricity Grid Code, 2008

The 2008 Kenya Electricity Grid Code sets out detailed arrangements for the regulation of the Kenya electricity supply industry. It is the primary technical document of the electricity sector, with provisions covering the generation, transmission, distribution and supply of electrical energy. The Electricity Grid Code has never been officially approved but is commonly used as a guidance document. An exercise to update the Grid Code is currently underway.

5.1.9 Feed in-Tariffs (FiTs) Policy, 2012

Feed in-Tariffs (FiTs) Policy of 2008 (revised 2012) is an instrument for promoting investment in electricity generation from renewable energy sources. It allows power producers to sell electricity generated from renewable energy sources to an off-taker at a predetermined tariff for a given period of time. The policy recognises such renewable energy sources as solar, wind, biomass, biogas and geothermal.

The objective of the policy is to facilitate resource mobilisation by providing investment security and market stability for investors in electricity generation from renewable energy sources, encourage private investors to operate their power plants prudently and efficiently so as to maximise returns and to reduce transaction and administrative costs and delays associated with conventional procurement processes.

A Power Purchase Agreement will be negotiated between Kenya Power and the Proponent. The current FiTs Policy provides for a tariff of US$0.12, with 12% escalation portion, for solar projects. This tariff is guaranteed 20 years from the date of the first commissioning of the plant.

5.2 Legislative Framework

5.2.1 The Constitution of Kenya, 2010

The Constitution of Kenya includes several provisions for natural resources, environment and energy relevant to the Project. Article 42 of the constitution under the Bill of Rights, provides for the right of every Kenyan to a clean and healthy environment.

5.2.2 Environmental Management and Coordination Act 1999 (Amended 2015)

The Environmental Management and Coordination Act (EMCA), 1999 (as amended (2015)), is the principal legislation providing the legal and institutional framework for environmental management. The act provides for environmental protection through integrated environmental impact assessments (EIA), environmental auditing and monitoring, environmental restoration orders, conservation orders and easements. It provides framework legislation for over 77 sectoral statutes. It addresses cross-sectoral issues including environmental impact assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.

The Act establishes such institutions as:

- National Environment Management Authority (NEMA) which is charged with administration of all environmental matters;
- Public Complaints Committee;
- National Environmental Tribunal; and
- County Environmental Committees, among others.

Section 3 of the Act, provides for the entitlement to a clean and healthy environment in accordance with the Constitution and relevant laws. Every person is required under the Act to cooperate with state organs to protect and conserve the environment for ecological sustainability of development and the use of natural resources.

Sections 44 to 48 provides for the protection of hilltops, hillsides, mountain areas and forests through the development and implementation of regulations, procedures, guidelines and measures for their sustainable use. It aims to protect water catchment areas, prevent soil erosion and regulate of human settlement in such areas. It also identifies environmental degradation risk requiring assessment, monitoring and/or protection measures; such risks include soil erosion, landslide, vegetation cover removal or depletion and any other land use activity likely to lead to environmental degradation.

Section 49 provides for conservation of energy through the promotion of research in appropriate renewable sources of energy and the creation of incentives for the promotion of renewable sources of energy.

Section 50 of the Act provides for the conservation of biological diversity. It intends to integrate the conservation and sustainable utilisation ethic in relation to biological diversity in existing government activities and activities by private persons.

Environmental Impact Assessments (EIA) are important tools for environmental conservation. Section 58 sets out the requirements and process for an application for an EIA license. As the initial step, it stipulates that the proponent of any project specified in the second schedule shall submit an EIA project report to NEMA before the commencement of a project. The second schedule identifies, in section 10, electrical infrastructure and specifically generating station as projects that typically require the submission of an environmental impact assessment study report. Furthermore, under Section 13, projects that affect any areas designated as environmentally sensitive areas are also required to carry out an EIA study. In certain cases, NEMA may direct that the proponent foregoes the submission of an environmental impact assessment study report.

This Report has been prepared in compliance with Section 58 of the Act. The Proponent is committed to ensuring that all project activities are carried out in an environmentally friendly manner.

The EMCA provides the framework for various ESIA regulations and guidelines including:

- Environmental Impact Assessment and Audit Regulations, 2003.
- Water Quality Regulations, 2006.
- Waste Management Regulations, 2006.
- Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefits Sharing Regulation, 2006
- Fossil Fuel Emission Control Regulations, 2006.
- Noise and Excessive Vibrations Regulations, 2009.
- Air Quality Regulations, 2014.

5.2.2.1 Environmental Impact Assessment and Audit Regulations, 2003

The Environmental Impact Assessment and Audit Regulations, gazetted in 2003, set out the guidelines to implement environmental impact assessment and audit in Kenya. They inform on the process for EIA implementation and approval, public participation requirements, content and nature of report and legal consequences of partial or complete non-compliance to the provisions of the Act.

Section 4 establishes that no proponent shall implement a project likely to have a negative environmental impact; or for which an environmental impact assessment is required under the EMCA or these Regulations, unless an environmental impact assessment has been concluded and approved in accordance with these Regulations.

The Proponent has undertaken this EIA study in compliance with the requirements of the above regulations.

5.2.2.2 Water Quality Regulations, 2006

The Water Quality Regulations, gazetted in 2006, set out guidelines and standards for the sustainable management of water used for agricultural, domestic, industrial and recreational purposes. The Regulations provide for the protection of lakes, rivers, streams, springs, wells and other natural water sources or water bodies. They prohibit the discharge of any effluent from sewage treatment works, industry or other point sources into the environment without a valid effluent discharge license issued by NEMA. More generally, the Regulations establish that every person shall refrain from any actions, which directly or indirectly cause water pollution.

The characteristics of the proposed Project are as such that the Project is unlikely to have major impacts on water resources. Nonetheless the Proponent will implement the Project in accordance with the provisions of the Regulations: no liquid waste will be directed to either permanent or seasonal water bodies. Furthermore, the ESMP laid out in this Report provides measures for the sustainable management of water required for the Project and proper disposal of liquid waste.

5.2.2.3 Waste Management Regulations, 2006

The Waste Management Regulations, gazetted in 2006, set out standards for the handling, transporting and disposal of various types of waste. The Regulations place emphasis on waste minimisation or reduction at source through clean production mechanisms, re-use and re-cycling of wastes. They provide for licensing of waste transporters and prohibit engaging into activities that are likely to generate hazardous waste without a valid EIA license from NEMA. The Third Schedule provides for standards for treatment and disposal of wastes. The Fourth Schedule defines wastes considered hazardous and the Fifth Schedule defines hazardous characteristics.

The ESMP laid out in this Report provides measures for the management and disposal of all types of wastes that will be generated by the Project.

5.2.2.4 Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefits Sharing Regulations, 2006

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection.

Developed to protect biological diversity and resources, the Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefits Sharing Regulations, gazetted in 2006, set out standards and guidelines for the conservation and sustainable management of biological diversity and resources and access to genetic resources in Kenya.

Section 4 prohibits engaging into activities that may have an adverse impact on any ecosystem, lead to the introduction of any exotic (alien) species, or lead to unsustainable use of natural resources, without a valid EIA license issued by NEMA. Section 5 relates to the conservation of threatened species and measures such as bans and restrictions on the access and use of any threatened species in order to ensure its regeneration and maximum sustainable yield. Section 7 provides for monitoring of status and measures to prevent and control their depletion. Section 8 provides for the protection of environmentally significant areas (which have been declared by the Minister by notice in the Gazette).

The proposed Project is located within the elephant corridor linking Lewa Conservancy to Mount Kenya. This EIA has extensively studied the impact of the Project on biodiversity (fauna and flora), notably on elephant movement, and concluded that the Project shall not have any significant impact on biodiversity. While located within the corridor, the proposed site has been dedicated to a different used shaped by human activities (tree plantation) and is therefore not the natural habitat of wildlife. Furthermore, Elephant tracking data analysed confirm that the proposed site is not on the preferred path of the elephants that commute between Mount Kenya and Lewa Wildlife Conservancy. The Project is therefore expected not to impact their free movement. Consulted stakeholders, Lewa Wildlife Conservancy, Borana Conservancy, Kenya Wildlife Services, and Mount Kenya Trust, are of the same opinion. Two flora species listed on the Least Concern category of the IUCN Red List have been identified on the site: one tree (African Cedar) and one plant (Sandalwood); the ESMP proposes measures to assure their protection.]

The Proponent is committed to implement the Project in accordance with the provisions of the Regulations to protect biodiversity, especially the species of flora and fauna that are conservation importance. The ESMP laid out in this Report provides measures for the monitoring of impact on fauna and flora; an activity for which Lewa Wildlife Conservancy has already indicated to manage.

5.2.2.5 Fossil Fuel Emission Control Regulations, 2006

The Fossil Fuel Emission Control Regulations, gazetted in 2006, specify emission standards for internal combustion engines, provide for licensing of persons who treat fuel and for the appointment of environmental inspectors for purposes of emission inspection, cost of clearing pollution and partnerships to control fossil fuel emissions. The fossil fuels considered are petrol, diesel, fuel oils and kerosene.

Section 4 states that any internal combustion engine for motor vehicles and generators must comply with the emission standards established in the First Schedule.

The Proponent is committed to implement the Project in accordance with the provisions of the Regulations. The characteristics of the Project are such as the process of generating power from a solar power plant does not require any fossil fuel. Nonetheless, minimal, localised and limited fossil fuel emissions will be experienced during construction, operations and decommissioning as a result of traffic movements and occasional maintenance visits to the site. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Regulations to reduce the impacts of fossil fuel emissions.

5.2.2.6 Noise and Excessive Vibration Pollution Control Regulations, 2009

The Noise and Excessive Vibration Pollution Control Regulations, gazetted in 2009, prohibits any person to make or cause any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. The Regulations provide factors that may be considered to determine whether noise is loud, unreasonable, unnecessary or unusual: the time of the day when noise is emitted; proximity of the person making the noise to residential areas; whether the noise is recurrent, intermittent or constant; the level and intensity of the noise; whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and, whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise. The First Schedule informs on the generally acceptable maximum permissible noise levels while the Second Schedule provides the maximum permissible noise levels for construction sites. Fourth Schedule provides the application form for a license to emit noise or vibrations in excess of the permissible levels.

These Regulations also relate to vibrational effects and seek to ensure no harmful vibrations are caused.

Any person (s) intending to undertake activities in which noise is suspected to be injurious or compromises the comfort, repose, health or safety of others and / or the environment must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions.

The Proponent is committed to implement the Project in accordance with the provisions of the Regulations. A solar power plant does not emit any noise during operations; maintenance activities may generate very limited and localised noise pollution. As for construction and decommissioning, limited and localised noise pollution will be generated as a result of machines and workers. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Regulations to ensure that the Project operates within permissible levels during the different phases of the Project.

5.2.2.7 Air Quality Regulations, 2014

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. Emission limits for various pollutants, areas and facilities have been set.

The First Schedule defines ambient air quality tolerance limits; the Second Schedule informs on priority air pollutants. On suspended particulate matter, Section 8 prohibit any person to 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.

The Proponent is committed to implement the Project in accordance with the provisions of the Regulations. The process of generating power from a solar power plant does not result in any air pollution; nonetheless minimal and highly limited air quality influences may be experienced during operations as a result of occasional maintenance visit to the site. As for construction and decommissioning, limited and localised air quality influences may be experienced as a result of site clearance, excavation, construction or demolition work, and traffic movements. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Regulations to ensure that the Project operates within permissible air quality levels during construction, operations and decommissioning phases.

5.2.3 The Wildlife (Management and Conservation) Act 2009

The Wildlife (Management and Conservation) Act, gazetted in 2009, provides for protection, conservation and management of wildlife in Kenya and related matters.

Section 15 grants power to the Minister to prohibit, restrict or regulate any acts in any area adjacent to the Park, National Reserve or local sanctuary and declare, by notice in the Gazette, that the area to be a protection area.

5.2.4 The National Museum and Heritage Act 2006 (Revised Edition 2012)

The National Museum and Heritage Act of 2006 (revised in 2012) was enacted to ensure proper standards in management of Kenyan cultural heritage. The Act specifies the functions and powers of National Museums of Kenya. Part V deals with searches and discovery and more specifically, Section 30 details the procedure for notification of discovery and Section 31 restricts the moving of monument or object of archaeological or palaeontological interest. Part VII and VIII of the Act specify the procedure for compensating private landowner in case a historical monument is identified.

The Proponent is committed to implement the Project in accordance with the provisions of the Act. The EIA studied the characteristics of the project site and its environs and it was found that the site has not been set aside for cultural purposes or declared a protected area. Hence, neither archaeological, cultural and/or heritage sites are located within the project site. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Act in relation to the potential for chance finds, especially during construction.

5.2.5 Public Health Act 1986 (Revised Edition 2012)

The Public Health Act concerns the protection of public health in Kenya and lays down rules relative to, among other things, food hygiene and protection of foodstuffs, the keeping of animals, protection of public water supplies, the prevention and destruction of mosquitos and the abatement of nuisances including nuisances arising from sewerage.

It defines nuisances on land and premises and empowers public health authorities to deal with such conditions. The Act prohibits activities (nuisances) that may be injurious to health.

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that local authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitized to prevent occurrence of nuisance or condition liable to be injuries or dangerous to human health, as defined in Section 118.

The Proponent is committed to implement the Project in accordance with the provisions of this Act. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Act to safeguard public health.

5.2.6 The Energy Act, 2006

The Energy Act, 2006 is under review via the Energy Bill 2016. The Act replaced the Electric Power Act of 1997 and the Petroleum Act, Cap 116 and is the primary legislation for the management of the energy sector. It deals with, amongst other issues, all matters related to all forms of energy including the generation, transmission, distribution and supply and use of electrical energy as well as the legal basis for the establishment of the energy systems associated with these purposes.

The Act prescribes the manner of obtaining licenses for generation, transmission and distribution of electricity. Section 30 provides for the considerations to be taken into account on approval or rejection of the permit application including the need to protect the environment and to conserve the natural resources in accordance to EMCA, 1999 (revised in 2015) and the impact of the undertaking on the social, cultural or recreational life of the community. Section 103 of the Act relates to the promotion, development and use of renewable energy technologies, including solar.

5.2.7 The Water Act, 2002

The Water Act, gazetted in 2002, provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services.

The Act establishes the Water Resources Management Authority (WRMA) whose functions include the regulation and protection of water resources quality from adverse impacts.

Section 11 assigns to the Minister the responsibility of review the national water resources management strategy, which shall provide, as defined in Section 18, for national monitoring and information systems on water resources. Section 18 also assigns WRMA the responsibility of record collection. Under these provisions, the Proponent may be required to keep records and provide them to WRMA.

Section 14 provides for the definition of catchment areas and section 15 provides for public participation in managing the water resources within each catchment area.

Section 25 deals with permit requirement for use of water from a water resource, while Section 29 details permit application procedure, which shall be subject of public consultation and, where applicable, of an environmental impact assessment.

Section 76 states that no person shall discharge any trade effluent from any trade premises into the sewers of a licensee without the consent of the licensee, which requires an application for consent to be made to the licensee.

Section 94 prohibits any person, without authority under this Act, to wilfully obstruct, interfere with, divert or obstruct water from any watercourse, or take actions to cause, or be likely to cause, pollution of the water resource. A person who contravenes these provisions shall be guilty of an offence.

The Proponent is committed to implement the Project in accordance with the provisions of the Act. The characteristics of the Project are such as the process of generating power from a solar power plant does not require any water and the risk of pollution of surface and ground water are very low. Nonetheless, water usage will be required to clean the solar panels during the operations phase of the Project. This water will be provided by Kisima Farm and as a result no new wells or boreholes are required. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Act to sustainably manage water usage and wastage and prevent pollution of surface and ground water throughout the project lifetime.

5.2.8 Occupational Safety and Health Act, 2007

The OSHA Act, 2007 replaced the Factories and Other Places of Work, Cap, 514. OSHA provides for the safety, health and welfare of workers and all persons lawfully present at work place, as well as the establishment of the National Council for Occupational Safety and Health and for connected purposes. Under this Act, based on provisions of section 3(1) and (2) of this Act, the safety, health and welfare of persons at work will be prioritised by the Proponent throughout the project life cycle.

Regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earning for the employees and if possible within normal working hours. The OSHA provides for development and maintenance of an effective programme of collection, compilation and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illness including disabling during working hours, are adhered.

The ESMP of this ESIA report sets out measures to be put in put in place to ensure safety and health of workers, including providing suitable and appropriate PPE to workers on site throughout the construction phase of the project. Adequate measures will also be taken by the Proponent to ensure that the premises are kept clean all the time.

5.2.9 Work Injury and Benefits Act, 2007

The Work Injury and Benefits Act, gazetted in 2007, provides for compensation to employees for work related injuries and disease contracted during their employment and for connected purposes. The Act sets employer's obligations and deals with reporting of accidents and medical aid.

The Proponent is committed to implement the Project in accordance with the provisions of this Act. The ESMP laid out in this Report provides measures to assure compliance with the requirements of the Act to make sure employees of the Project are adequately taken care of in case of injury or disease.

5.2.10 Penal Code (Cap.63)

This Penal Code establishes a code of criminal law, including but not limited to: offences against the person and relating to property. Of relevance to the Project, Section 191 of the penal code states that any person or institution voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence.

The Penal Code consolidates the law relating to traffic on all public roads. Key sections include registration and licensing of vehicles; driving licenses; driving and other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other than motor vehicles and other road users. Many types of equipment and fuel shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the stipulated road regulations. The Code also prohibits encroachment on and damage to roads including land reserved for roads. The Proponent will observe the provisions of the Code.

The Proponent will observe the provisions of the Penal Code diligently.

5.2.11 Employment Act 2007

The Employment Act, gazetted in 2007, deals with employment relationships, protection of wages, rights and duties in employment, termination and dismissal and protection of children. Its objectives are to declare and define the rights of the employees, to provide basic conditions of employment of employees, to regulate employment of children, and to provide for matters connected thereto.

The socio-economic welfare of the Employees that will be hired on temporal basis needs to be addressed appropriately by the Project contractor or a developer. Therefore, the employment act provisions will be adopted. All workers, including those employed during the construction phase, will be employed under this Act, which includes provision with respect to minimum wage, working conditions and time, and also in the resolution of disputes. This makes it mandatory for the Project to consider the social and financial welfare of its workers.

5.2.12 County Government Act, 2012

The adoption of the new Constitution for the Republic of Kenya in 2010 resulted in a process of power devolution and the creation of 47 counties. The County Governments Act, gazetted in 2012, is the primary law governing the development and operations of counties.

The Act puts a special importance to citizen participation (Part VIII) and access to public information (Part IX). Section (87) (b) specifies the areas for citizen participation which include the approval of development proposals and the granting of permits.

As part of this EIA, public participation included the organisation of consultative meetings as per the provision of this Act on Citizen Participation (Section 87 (b), Part VIII) with different stakeholders related to the Project.

5.2.13 Public Roads and Roads of Access Act (Cap. 399)

Any required road upgrade works will need to accord with the Public Roads and Roads of Access (Act No. 3 of 1951, s. 12, Act No. 19 of 1954, s. 3) which outline steps to be followed when upgrading roads of access. Relevant approvals will be required should upgraded be necessary.

The project site has feeder roads appropriate for the construction of the project. Where feeder roads shall be required, the proponent shall follow the guidelines outlined in this Act.

5.2.14 Physical Planning Act 2006

The Physical Planning Act, gazetted in 2006, provides for the preparation and implementation of physical development plans and for associated purposes enacted by the Parliament of Kenya. Under this Act, no person shall carry out development within the area of a local authority without a development permission granted by the local authority as defined in Section 30. Such application may require the submission of an EIA report. The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. Section 41 deals with the subdivision of provide land that must comply with the requirements of a local physical development plan.

The Proponent is committed to implement the Project in accordance with the provisions of this Act and has already liaised with the county government of Meru. The Proponent will continue to engage with the local authority to secure the development permit.

5.2.15 Physical Planning Bill, 2015

The Bill provides for the empowerment of the Local Authorities under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore allows for the prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area. Section 24 of the Physical Planning Act gives provision for the development of local physical development plan for guiding and coordinating development of infrastructure facilities and services within the area of authority of County, municipal and town council and for specific control of the use and development of land. The plan shows the manner in which the land in the area may be used.

Section 36 states that, if in connection with development application, a local authority is of the opinion that, the proposed activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an EIA Report. The EIA Report must be approved by the National Environmental Management Authority (NEMA) and followed by annual environmental audits as spelled out by EMCA (Amendment) 2015. Section 38 states that if the local authority finds out that the development activity is not complying to all laid down regulations, the local authority may serve an enforcement notice specifying the conditions of the development permissions alleged to have been contravened and compel the developer to restore the land to original conditions.

Therefore, this act gives the Regional Physical Planner the authority to approve any development within a given Region in order to achieve the set objectives. The project will have to liaise with the physical planning offices of Meru County in order to obtain these approvals.

5.2.16 Land Act, 2012

The Land Act, gazetted in 2012, deals with the administration and management of public and private land. It defines the form of land tenure as freehold, leasehold and customary land rights. Part VI of the Act gives general provisions on leases including transfers, assignments and remedies.

Such provisions will apply to the Project as the Proponent has agreed to lease 70 acres for the project from Kisima Farm Limited.

5.2.17 The Land and Environment Court Act, 2011

This is an Act of Parliament to give effect to Article 162(2)(b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes. The principal objective of this Act is to enable the Court to facilitate the just, expeditious, proportionate and accessible resolution of disputes governed by this Act. Section 13 (2) (b) of the Act outlines that in exercise of its jurisdiction under Article 162 (2) (b) of the Constitution, the Court shall have power to hear and determine disputes relating to environment and land, including disputes:

- Relating to environmental planning and protection, trade, climate issues, land use planning, title, tenure, boundaries, rates, rents, valuations, mining, minerals and other natural resources;
- Relating to compulsory acquisition of land;
- Relating to land administration and management;
- Relating to public, private and community land and contracts, chooses in action or other instruments granting any enforceable interests in land; and

- Any other dispute relating to environment and land.

5.2.18 The Standards Act 2012

The Standards Act of 1974 (amended in 2012) provides for the promotion of the standardisation of the specification of commodities and codes of practice. It establishes the Kenya Bureau of Standards and defines its functions, management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.

The Act contains various specifications touching on electrical products. The Proponent shall ensure that commodities and codes of practice utilized in the Project adhere to the provisions of this Act.

5.3 Institutional Framework

5.3.1 National Environmental Management Authority (NEMA)

Established under EMCA of 1999, NEMA is the institution charged with the general supervision and coordination over all matters relating to the environment. It is also the principal instrument of government in the implementation of all policies relating to the environment. Mandate is designated to the following committees:

5.3.1.1 County Environmental Committees

These are established by the governors as provided in section 29 of Environmental Management and Coordination Amendment Act 2015. The Committee's roles include;

- Development of County Environmental Action Plan;
- Ensuring proper management of the Environment in the County among other functions.

5.3.1.2 Public Complaints Committee

This is established by section 31 of EMCA, 1999. Its functions are to investigate any allegations or complaints against any person or against the Authority in relation to condition of the Environment in Kenya. It also investigates any suspected cases of environmental degradation and recommends on further action.

5.3.1.3 National Environmental Council

This council is established by section 4 of EMCA 1999. The council provides policy formulation and direction with reference to EMCA. It sets National goals and objectives and determines policies and priorities for the protection of the environment. It also promotes cooperation among public, private and non-governmental bodies on the protection of the Environment

5.3.1.4 National Environment Action Plan Committee

Established by section 37 of EMCA to prepare National Environmental Action Plan every five years for consideration and adoption by the National Assembly.

5.3.1.5 Standards and Enforcement Review Committee

Established by section 70 (1) of EMCA to advise NEMA on how to establish criteria and procedure for the measurement of water quality and to recommend to the authority minimum water quality standards for all the waters of Kenya and for different uses including for drinking, industrial use, agriculture among others. It also analyses discharge of effluents into the Environment among other important functions.

5.3.1.6 National Environment Tribunal

The tribunal is established by section 125 of EMCA, 1999. It investigates and decides on appeals by persons aggrieved by:

- Imposition of any condition, limitation or restriction of the license;
- Revocation, suspension or variation of his/her license;
- Amount of money required to pay as fee under EMCA; and
- Imposition of environmental restoration order or environmental improvement order by NEMA.

5.3.2 Ministry of Environment and Natural Resources

The government of Kenya recognizes the importance of environmental conservation and sustainable development and has instituted the Ministry of Environment and Natural Resources headed by the Cabinet Secretary. The vision of the Ministry is to ensure a clean, healthy and sustainably managed environment and natural resources steered by the cabinet secretary. The Ministry is mandated to protect, conserve and manage the environment and natural resources for socio-economic development.

5.3.3 Ministry of Energy and Petroleum

The Ministry is headed by the Cabinet Secretary who is in charge of policy development to create an enabling environment for the operation of the energy and petroleum sector. According to executive order number 2/2013 of 2013, the Ministry is mandated to ensure, among other functions: energy and policy development; hydropower development; geothermal exploration and development; thermal power development; Oil and Gas exploration; renewable energy promotion and development; energy regulation, security and conservation, and rural electrification programme.

The proposed Project will have to obtain approvals from the Ministry of Energy and Petroleum. These include Expression of Interest (EoI) that has already been obtained by the Proponent and approval to start Power Purchase Agreement (PPA) negotiations with Kenya Power, which is yet to commence.

5.3.4 Land Control Boards

Created by Land Control Act cap. 302 (Revised Edition 2012), the Land Control Boards are mandated to determine all issues regarding land in their areas of jurisdiction.

The Project has agreed to lease 70 acres from Kisima farm for power generation. In line with Land Control Act, such an arrangement is void for all purposes unless the land control board for the land control area or division in which the land is situated has given its consent in accordance with this Act.

5.3.5 Water Resource Management Authority (WARMA)

The Water Resource Management Authority was established by gazette notice Number 8140 of 14th November 2003 pursuant to the Water Act (2002) and was operationalized in July 2005. It is the lead agency tasked with the management of all water resources in Kenya. It ensures rational, effective management of water resources and equitable access for various competing needs.

5.3.6 Energy Regulatory Commission

Established under the Energy Ac 2006, the ERC's functions include to: regulation of electrical energy, petroleum and related products as well as renewable energy and other forms of energy; protection of the interests of the consumers, investors and other stakeholders; maintenance of a list of accredited energy auditors; monitor and ensure implementation of and the observance of principles of fair competition in the energy sector; in coordination with other statutory authorities, collection and maintenance of energy data and preparation of indicative energy plan(s) among other functions.

5.3.7 Kenya Power

Kenya Power owns and operates most of the electricity transmission and distribution system in the country and sells electricity to over 4.8 million customers (as of June, 2016).

The Company's key mandate is to plan for sufficient electricity generation and transmission capacity to meet demand; building and maintaining the power distribution and transmission network and retailing of electricity to its customers.

The Government has a controlling stake at 50.1% of shareholding with private investors at 49.9%. Kenya Power is listed on the Nairobi Securities Exchange.

Kenya Power is the national off-taker. It procures power from power producers with whom it negotiates PPA(s). The Project will be will established as an Independent Power Producer and the Proponent is yet to start PPA negotiations with Kenya Power.

5.4 International Best Practice Guidelines

International lenders who are signatories to the Equator Principles (EPs) require projects that they finance to meet international standards. Beyond Kenyan legal requirements, the following international guidelines, regulations and policies will be followed and applied to the Project development and implementation:

- IFC Performance Standards (IFC, 2012).
- Environmental, Health & Safety (EHS) General Guidelines, including wastewater and ambient water quality, waste management and hazardous materials management, noise management, occupational health and safety, and construction and decommissioning guidelines (IFC, 2007a).
- EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007b).
- European Union Environmental Impact Assessment Directive 85/337/EEC (as amended).

These are all specific policies, procedures, strategies and regulations designed for promoting sustainable development. These procedures include a detailed environmental review process prior to final approval of financing for the Project, detailed environmental guidelines, detailed health and safety requirements, procedures for social impact assessment and public consultation and information disclosure and many other issues, associated with project construction, operation and decommissioning. Many of the mitigation measures described in later sections of this ESIA are based on these requirements.

Of particular relevance is Principle 1 of the Rio Declaration of Environment and Development (United Nations, 1992c) states that "*Human beings are entitled to a healthy and productive life in harmony with nature*". Principle 18 requires that an impact assessment be undertaken.

Further detail relating to the IFC Performance Standards is provided below.

5.4.1 IFC Performance Standards

The EPs apply to all new project financings with total capital costs of USD10 million or more across all industry sectors globally. The EPs represent a framework for project financing, which is underpinned by the revised IFC Performance Standards (PS).

The extent to which the EPs apply to a project depends on whether the country in which the project is located is "Designated" or "Non-Designated". Projects within Non-Designated countries such as Kenya are required to follow the standards and guidelines as set out in the IFC PSs and Environmental Health and Safety Guidelines.

The IFC PS are detailed below:

- IFC PS1 – Assessment and Management of Environmental and Social Risks and Impacts.
- IFC PS2 – Labor and working conditions.

- IFC PS3 – Resource Efficiency and Pollution Prevention.
- IFC PS4 – Community Health, Safety, and Security.
- IFC PS5 – Land acquisition and involuntary resettlement.
- IFC PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- IFC PS7 – Indigenous peoples.
- IFC PS8 – Cultural heritage.

PS 1 establishes the importance of assessment to identify the environmental and social impacts associated with development, effective community engagement and project information disclosure and consultation with local Project affected communities and environmental and social management measures. This ESIA has therefore been carried out to meet the requirements of IFC PS1.

The remaining IFC PS set out objectives and requirements to avoid and minimize potential environmental and social adverse effects on the environment and to offset/compensate any residual effects. PS 2 to 8 have therefore been considered as part of the assessment process and discussed where relevant within the topic specific sections below.

6 Description of Baseline Environment

6.1 Physical Environment

6.1.1 Climate Conditions

The two highland masses of Mt. Kenya and the Nyambeni range are the major determining influence on climate in Meru County. They mitigate the high temperature and influence the amount of rainfall. In the highlands, the temperatures are lower and the rainfall heavier than in the lowlands, dividing the county into two climatic regions. Despite the county being on the equator, the climate is not equatorial; rather it is highland savannah and warm steppe characterized by warm, rather hot, temperatures with no marked seasonal variation and an uneven distribution of rainfall. This climate is predominant on the areas above 914 masl. The steppe areas are hotter and drier and mainly because of their lower elevation. The climate conditions of Meru are determined by seasonal variation of rainfall rather than by temperature differences[1].

A distinct bimodal rainfall distribution divides the year into two rainy seasons. In March and September, the Sun position directly over the equator influences a low-pressure system responsible for the bimodal distribution. Winds mostly from the Indian Ocean converge into this trough from the northeast and southeast, producing upward motion of the moist air and precipitation commences soon after the equinox.

Usually, rains persist five to eight weeks[2]. Above the 2,200masl contour,rainfall is in fact so heavy that the soil becomes leached and flat land is seasonally inundated. Areas on the northern slopes of Mount Kenya where the project is located receive much less rain compared to areas on the eastern side of the mountain regardless of them being above the 2200 masl contour. For instance, Timau town near the project area receives an average of 884mm annually despite being situated at 2,499 masl. It is also worthwhile to note that in Meru County, rainfall at lower elevations is more predictable than in higher areas.

Figure 6-1 below shows the mean annual rainfall of Meru County, indicating that the Lewa site receives between 1000 and 1500mm.

[1] Mugo, C (2007) Land use and land usage impacts within protected areas and adjacent regions of the NE Mt Kenya, available at http://publikationen.ub.uni-frankfurt.de/frontdoor/index/index/docId/1369 [Accessed 6 Dec 2016]

[2] Ministry of Environment and Natural Resources (1985) Meru; District Environmental Assessment Report .p 22 Available at http://pdf.usaid.gov/pdf_docs/PNAAU557.pdf [Accessed 6 December 2016]

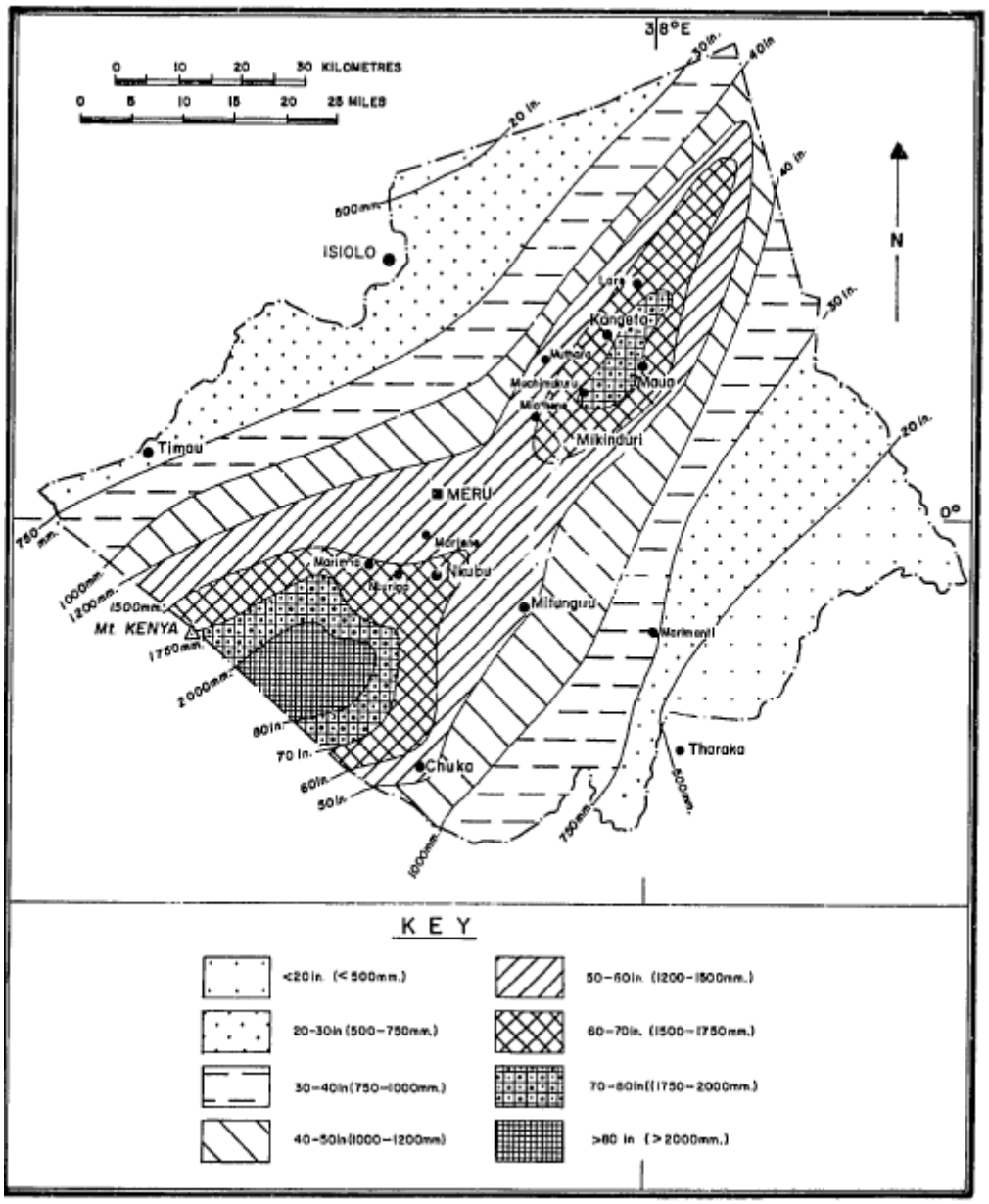


Figure 6-1: Mean Annual Rainfall in Meru District (Source: Survey of Kenya, 1970, in MENR, 1985)

34-year records at the District Agriculture Office in Isiolo, which is representative of the Lewa site, show 702mm annual average precipitation.[3]

[3] Franz, Trenton E. (2007) Ecohydrology of Upper Ewaso Ngiro River Basin, Kenya, MSc Thesis, Appendix A, Table A.1 Summary of precipitation gauge data, p. 84

6.1.2 Topography

Meru County is dominated by the two great massifs of Mount Kenya and the Nyambeni range both of which lend diversity to the physical landscape. These land features not only affect the physiography, but also the entire environmental potential of the County. Mount Kenya, which is the highest point in the county and also the country, rises to 5,199 masl and slopes gently from west to east finally reaching an altitude of 335 masl near Tana River. This tremendous range of altitude gives the county a more diverse climate as well as a wide range of agro-ecological zones. Figure 6-2 below shows the topography of the county.

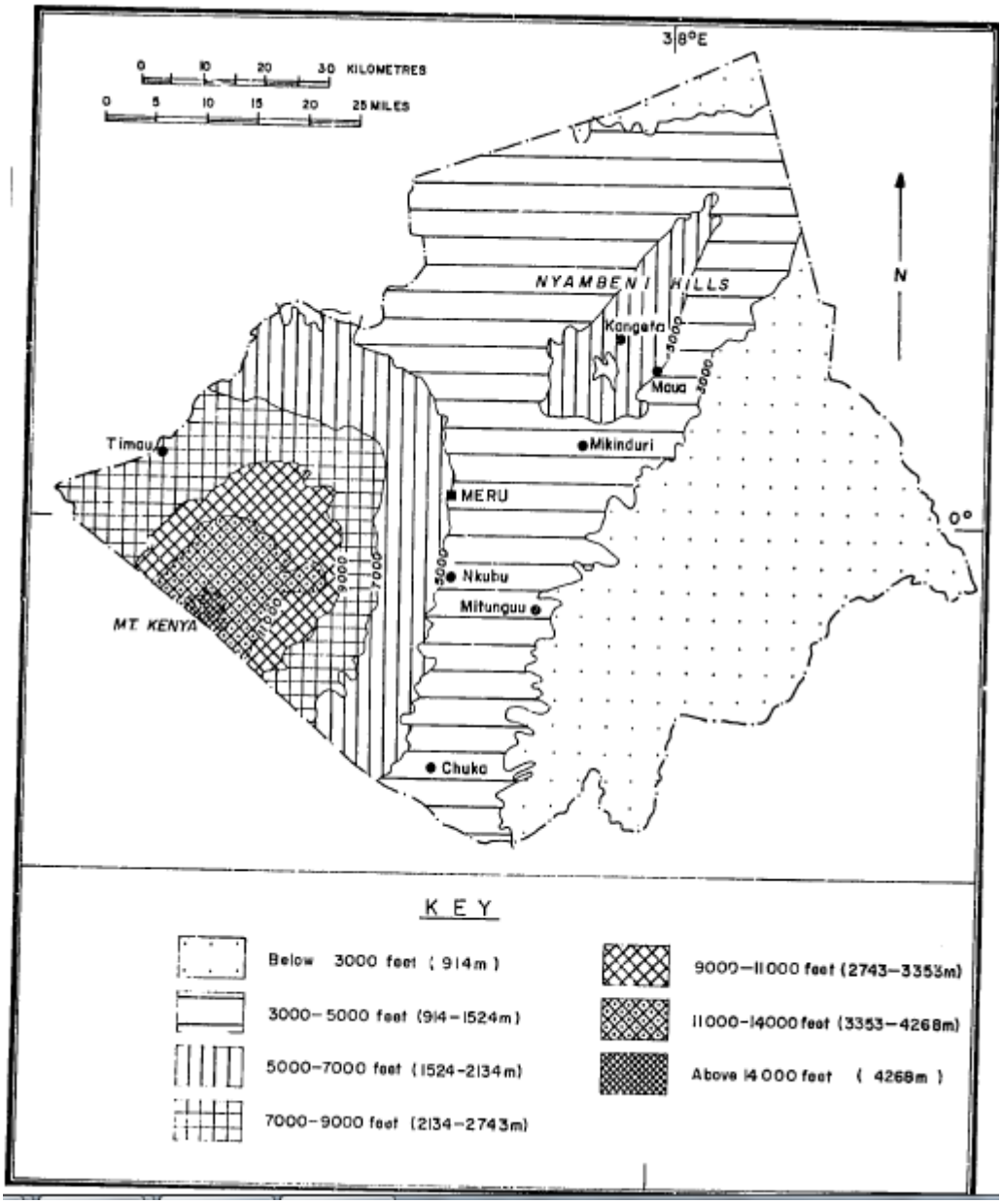


Figure 6-2: Meru County Topography (Source: MENR, 1985)

The county can be divided into three altitudinal zones – the highlands, 1524 masl and above, the plateau, 914 – 1524 masl and the lowlands, which are areas below 914 masl.

The proposed project site is situated in the 1,524 – 2,134m elevation band, placing it in the highland zone.

6.1.3 Geology

The geology of Meru County comprises two natural sub-divisions, the volcanic rocks of Pleistocene to Recent and Tertiary eras and the Pre-Cambrian Basement systems. The basement system, which is in a state of maturity, forms the floor on which all the remaining rocks of the area lie. Other basement systems found in the county are due to post-volcanic erosion. The basement system rocks are mainly sediment-grits, sandstones, shales and limestones that have been metamorphosed by heat and pressure or by impregnation of pervading fluids. Other types include heterogeneous gneisses, granulite and schist of varied and complex.

The proposed Project site is made up of volcanic rock more specifically quaternary volcanics, as observed in Figure 6-3 below.

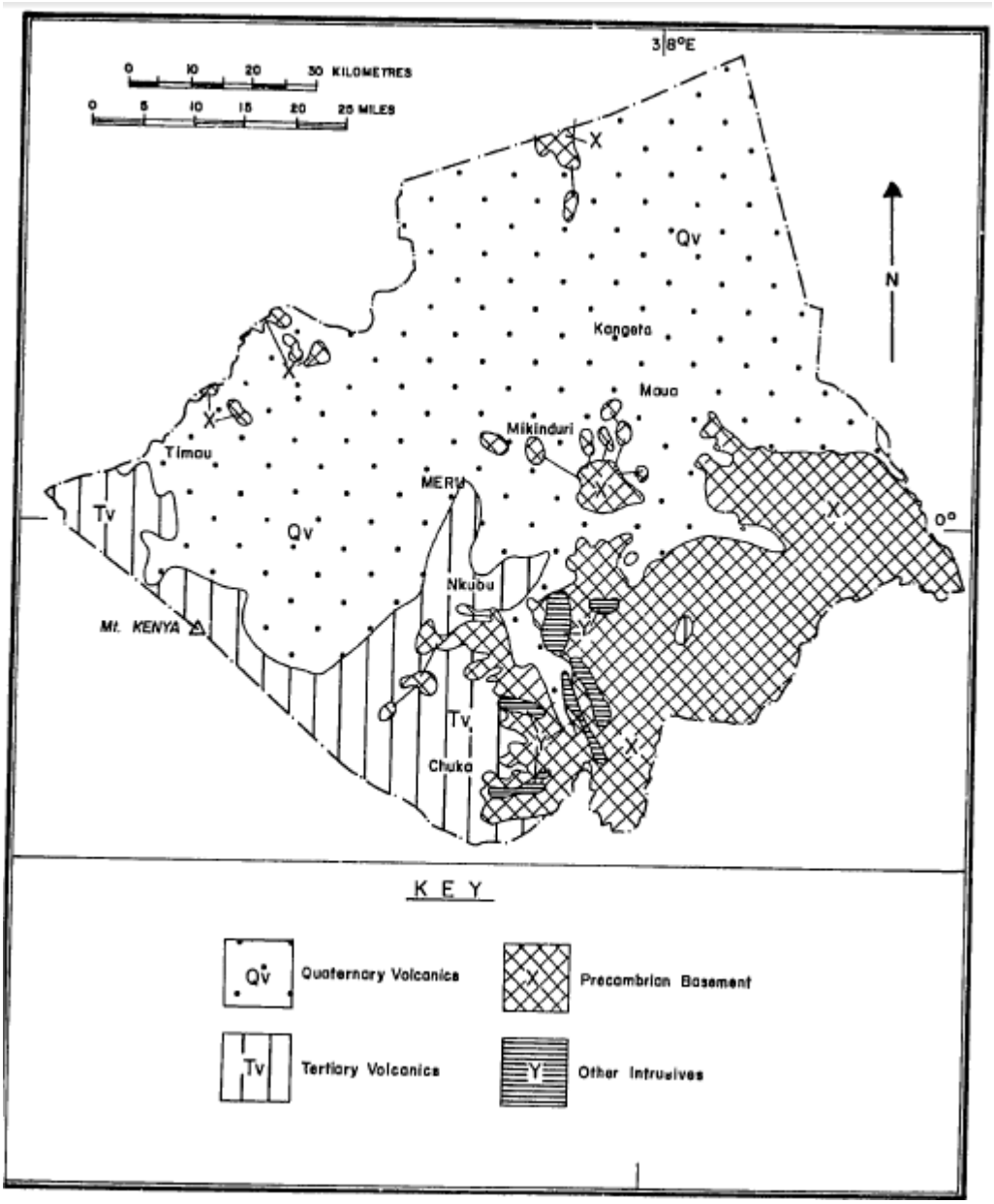


Figure 6-3: Meru County Geology (Source: MENR, 1985)

6.1.4 Soils

Soils in Meru County are closely related to the landforms and are therefore as diverse as the physiography. Out of the 21 categories of soil identified in Kenya, 17 of them are found in Meru County. A clear contrast exists between soils that have evolved in the highlands from recent volcanic activity and those that are derivative of ancient basement rocks. Mount Kenya and Nyambeni lavas and basalts give rise to clay soils while the basement system granites and gneisses, usually of high quartz content yield sandy soils. The soil in the project area can be categorized as both soils on hills and minor scraps and soils on volcanic foot ridges as observed in Figure 6-4.

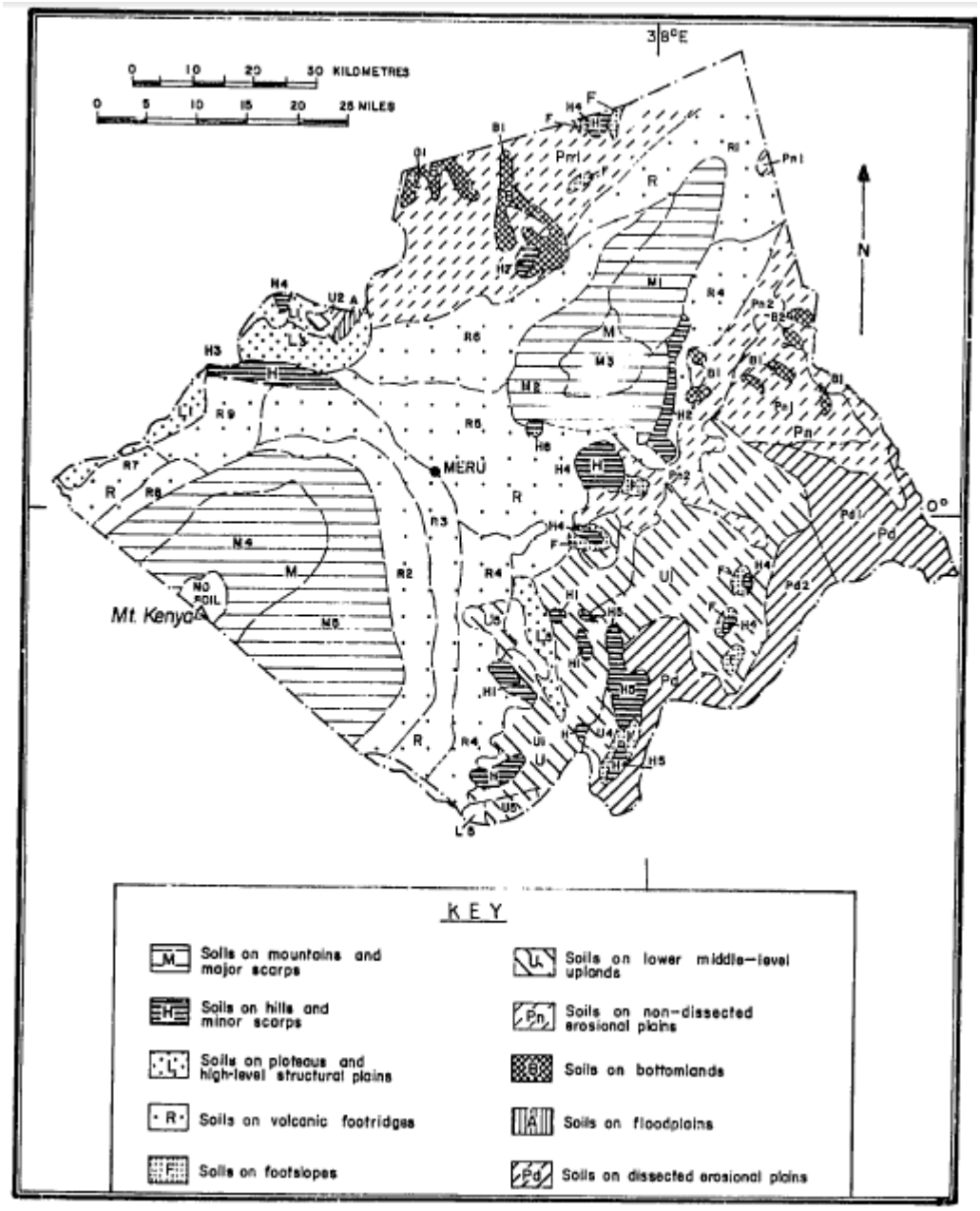


Figure 6-4: Meru County Soils (Source: MENR, 1985)

Soils on hills and minor scraps classified as H, are either developed from basic igneous rocks, which are well drained, very shallow to moderate deep and are brown or undifferentiated basement system rocks predominantly gneisses which are excessively drained and are shallow reddish brown to dark red. Soils on volcanic foot ridges classified as R , are developed on olivine basalts, ashes and other pyroclastic rocks. The soils are well drained shallow to extremely deep and dark brown. According to an adaptation of the 1980 UNESCO Kenya Soil Map the soil types in the wider project area are clay, clay loam, loamy sand and sandy clay loam (Franz, 2007).

6.1.5 Hydrology

Meru County has two large water drainage basins. In the north of the Meru forest and the crest of Nyambeni range, water drains towards the Ngare Ndare River that flows through the Lewa Wildlife Conservancy. This river is also called the Ewaso Nyiro.

Surface water on Mount Kenya and the eastern and southeastern Nyambeni ranges is abundant. The orographic precipitation is high and volcanic rocks in the region retain most of it. To the north of Mt Kenya a number of small streams run down the foot-slopes. In addition to the Ngare Ndare/Ewaso Nyiro, the Lewa and Sirikoi rivers also flow through Lewa Wildlife Conservancy.

This study did not review the likelihood of flooding affecting the project area but it is assumed to be moderate if a 100-year flood event is considered. Therefore appropriate drainage will be considered as part of the detailed design. A river discharge analysis for the three ephemeral watercourses could be used to carry out a flood risk assessment.

6.1.6 Seismic Activity

Kenya is crossed by the East African Rift System (EARS) at the central region. The EARS is a 50-60 km wide zone of volcanoes and faults that extend north to south a distance of more than 3,000 km from Ethiopia in the north to the Zambezi in the south. The East African Rift is seismically and volcanically active and this has resulted I ground deformation within the system[4]. In terms of overall risk, the EARS means that Kenya is vulnerable to seismic activity and related natural disasters: earthquakes, volcanic eruptions and tsunamis. The project location is on the low seismic hazard, with a Peak Ground Acceleration (PGA) of 0.2 – 0.8 m/s^2.

The Meru region is ranked as VI (Strong) on the Modified Mercali Scale, with a probability that an earthquake of this intensity will be exceeded in 50 years. An intensity VI on the Modified Mercalli Scale corresponds to 4-5 on the Richter scale.

Geotechnical investigations should be undertaken and the project should be engineered with the appropriate level of seismic activity in mind.

6.2 Biological Environment

6.2.1 Protected Areas

The assessment of the biological environment was performed thanks to a walk across the project site on four 800 m transects, laid out to observe bird species, other fauna species and the dominant plant species and the species of conservation importance.

[4] Odhiambo, J., A. (2010) East Africa Rift System seismic activity, ground deformation and tsunami hazard assessment in Kenya.

Keen observations were made to list the plants found in the transect and find out any plant species either endangered or threatened according to literature and IUCN species red data book.

The Lewa Wildlife Conservancy is a large private conservation area. In 2013 the Lewa Wildlife Conservancy and Ngare Ndare Forest Reserve achieved UNESCO World Heritage Site (WHS) status as an extension of the existing Mount Kenya National Park/Natural Forest WHS. This globally recognized designation was made possible by the completion of a 9.8km elephant corridor between the lower lying conservancy and the Mt Kenya protected area.

The Lewa Wildlife Conservancy hosts some of Africa's critically endangered species notably the black rhino and the Grevy's zebra. Lewa is home to more than 400 species of bird, including the Somali Ostrich, the Kori Bustard, and the Lilac Breasted Roller as well as 70 mammal species including lion, leopard, elephant, rhino and buffalo. The Conservancy is completely fenced.

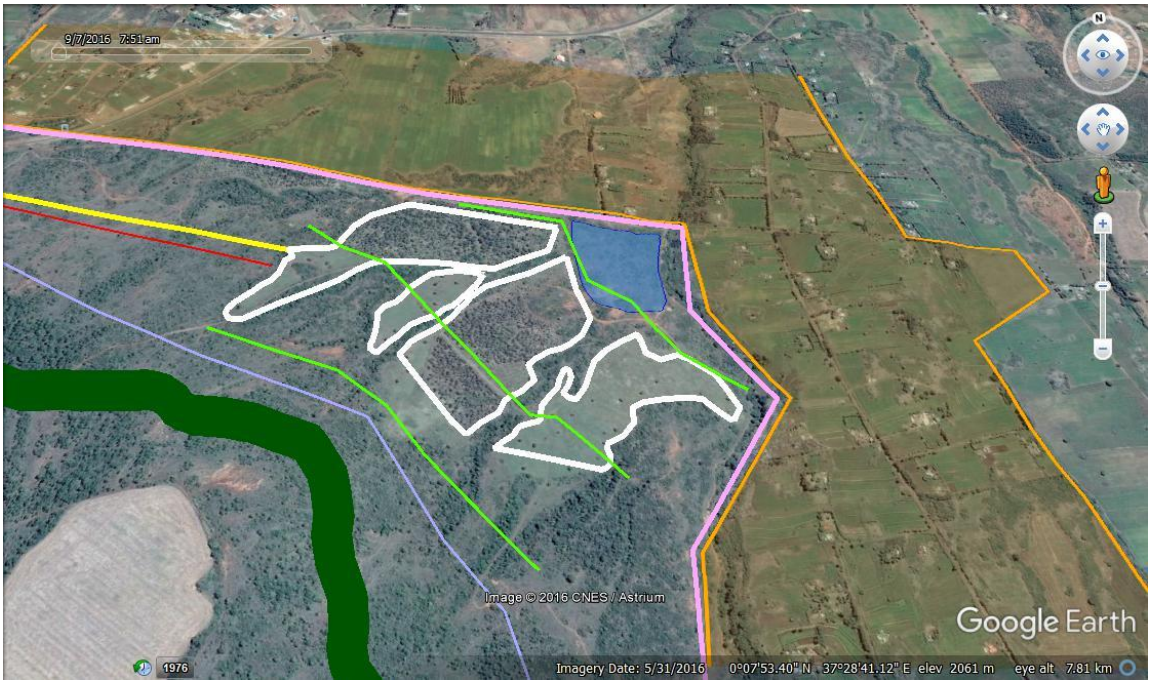


Figure 6-5: Map showing site and 3 transects (green lines) used for the survey of biodiversity

6.2.2 Flora

Though located within the elephant corridor, the flora diversity of the project site has been altered by human activity. It therefore contains some areas of natural habitats (bushy shrubs) combined with agricultural or tree (eucalyptus) plantation zones.

Figure 6-6: Typical flora of the project site

Outside the zones shaped by human activities, field investigations found the natural vegetation in the proposed solar farm area to be very similar to the rest of the corridor.

The only plant of conservation interest – Sandalwood (*Osyris lanceolata*) which was found in three places, two of which were far from the area to be cleared for the solar plant.

Due to a high rate of commercial harvesting, *Osyris lanceolata* was placed under protection in Kenya by Legal Notice No. 3176 under the Forest act 2005. This gave protection of the species for a period of 5 years intended to allow time for development of sustainable harvesting mechanisms. This was later re-enforced by a presidential decree issued on 14th February 2007 which offered further protection for the species for a period of 5 years even though the time covered by the two legislations overlaps. Following the decree the Wildlife Act of 2013 listed the species to be nationally protected and for which game farming was allowed even though this is said not to have been accepted up to now.

Internationally, the IUCN, at the 16th CITES COP meeting in 2013 considered listing *Osyris lanceolata* as an endangered species using the criteria for inclusion in Appendix II of Annex 2 of the list of endangered species (IUCN/TRAFFIC, 2013). However, lack of evidence for wide scale exploitation of the species in other parts of the world, and the lack of distinctive trade name of its products from products of other species of Sandalwood currently listed (e.g. Red Sandalwood *Pterocarpus santalinus*) meant that the species did not meet the criteria for inclusion in the red list of endangered species.

African Cedar tree (*Juniperus procera*) is classified to be of "Least Concern" in the IUCN Red List which specifies that "this widespread conifer is still common or abundant in many areas of its extensive range and is therefore assessed to have least conservation concern at the global level" (IUCN, 2017).

This species has been logged in many areas, but it is still too common to be threatened with extinction. Depletion of old growth forest groves of this species threatens to occur in Kenya and Ethiopia and from an ecological point of view at a regional perspective there is certainly a conservation issue regarding the only juniper in sub-Saharan Africa (IUCN, 2017).

The presence of certain species like *Lantana camara* among others are clear evidence of human disturbance.

The construction of the project will require the removal of these bushes and trees. It is recommended that measures are put in place to minimize the impacts on these trees. Such measures would include:

- Minimizing vegetation clearance for areas not necessary for the solar park (such as the remaining portion of the zone to fence where the grid connection line will pass)
- Avoid uprooting indigenous trees / plants whenever possible, and if possible re-planting them elsewhere within the fenced zone;
- Use indigenous plants in greening the project area.

The table below provides some of the observed floral diversity within the project site. Note that woodlots of *Eucalyptus spp*. were present in the study area but since they were planted by Kisima farm and were at the time being uprooted to give way for an alternative land use, *Eucalyptus spp*. is not included in the list.

Table 6-1: Plant species observed on site

Ref	Common Name	Scientific Name	Uses	Comments based on field observations and expert opinion
1	Sandalwood	*Osyris lanceolata*	Medicine, Fragrance	Not Evaluated category of IUCN Red List Plant highly harvested for commercial uses

Ref	Common Name	Scientific Name	Uses	Comments based on field observations and expert opinion
				Distribution believed to be abundant but harvesting is banned in Kenya
2	Whistling Thorn	*Acacia drepanolobium*	Woodfuel Fencing	Not Evaluated category of IUCN Red List
3	Wild Olive	*Olea africana*	Posts	Not Evaluated category of IUCN Red List
4	Cedar tree	*Juniperus procera*	Timber	Least Concern category of IUCN Red List due to loss of its habitat, slow growth and heavy harvesting
5	None	*Euphorbia candelabrum*	Medicine	Common along seasonal rivers in drylands Not Evaluated category of IUCN Red List
6	Arabian num-num	*Carissa edulis*	Food Fodder Medicine	Common in bushland Not Evaluated category of IUCN Red List
7	Magic gwarra	*Euclea divinorum*	Food Medicinal	Common in bushlands Not Evaluated category of IUCN Red List
8	None	*Rhamnus prinoides*	Wood fuel Flavouring	Common in bushlands Not Evaluated category of IUCN Red List
9	None	*Maytenus heterophylla*	Medicine	Common in bushlands Not Evaluated category of IUCN Red List
10	Lemon Bush / Fever Tea	*Lippia javanica*	Medicinal Pesticide Cosmetic	Occurs frequently in bush lands of wetter areas Not Evaluated category of IUCN Red List
11	Swahili (mvunja kodo)	*Rhus natalensis*	Fodder Fuel Tannin Poison Timber	Common in bush lands Not Evaluated category of IUCN Red List
12	None	*Grewia similis*	Timber Fuel Fodder	Common in bushlands Not Evaluated category of IUCN Red List

6.2.3 Fauna

The elephant corridor connects the protected areas of Mount Kenya and Lewa Wildlife Conservancy that contain huge diversity and an abundance of wildlife, including elephant, rhinoceros, various carnivores, zebra, giraffe, buffalo, a variety of gazelle and primates. Mount Kenya and Lewa are amongst Kenya's prime wildlife conservation areas, attracting large numbers of tourists every year. The elephant corridor is essential to Lewa Wildlife Conservancy as it assures the movement of elephants from Mount Kenya to Lewa Wildlife Conservancy. The project site is located within the elephant corridor and as such, assessing the potential impacts of the project on wildlife is essential.

It is worth noting the opinion of the elephant corridor committee that includes Lewa Wildlife Conservancy, Borana Conservancy, Mount Kenya Trust and Kisima Farm. These institutions support the Project as they consider that it will not impact the free movement of elephant through the corridor.

Nonetheless, fauna diversity assessment has been a priority of this EIA that has been conducted through observations, community consultations and expert information. The team of experts who visited the site included wildlife specialist from Lewa Wildlife Conservancy. A bird transect survey was also carried out during the site visit.

The primary purpose of the corridor is to facilitate and protect elephant movement from Mount Kenya to Lewa Wildlife Conservancy. As such, understanding the project impact on elephants is paramount. According to Lewa Wildlife Conservancy, some elephants are occasionally observed on the proposed solar park site. However, this is not their natural or critical habitat; elephants simply take advantage of vegetation available there. This was confirmed during the site visit when three elephants were recorded travelling along the corridor in the vicinity of the project site. It should be borne in mind that the habitat and species composition on the proposed project site has been altered by human activity.

Figure 6-7: Elephant observed within the corridor, in the vicinity of the project site

Figure 6-8: Elephants using the road underpass

Other fauna observed at the project site during the field work are listed in the table below outlining some of the fauna diversity at the site.

Bird survey methodology

A bird survey was carried out by an experienced ornithologist using walked transect method. This involved walking along three pre-determined GIS marked transects observing birds on a span of 100m on either side of the transect recording all birds either flying over the transect or found flying off from the observation area within a span of 25m or 100m from the transect line. Birds heard singing either from the transect or from areas further than the 100 m were also identified and recorded as from either inside or from outside the transect area. Birds were recorded by their species. Transect way points were taken every 200m.

42 species of birds were identified on the project site. They are all classified as Least Concern in the IUCN Red List, and four mammals were recorded, including two elephants. Elephants are classified as Vulnerable within the IUCN Red List. Other mammals encountered were Reedbuck, Dikdik and Warthog, all Least Concern species.

Summary of Baseline Fauna

As stated above and in the impact assessment section, the impact of the Project on wildlife movement is expected to be negligible. As for the loss of habitat, the assessment of diversity of flora has demonstrated that human activities have taken place at the project site over a long time and have influenced the habitat and species composition (its initial use was not meant to be dedicated to biodiversity conservation). The project site is therefore not the natural habitat of the species recorded. It is worth noting that the project site will be sited on the edge of the widest part of the corridor and will therefore not create a barrier to the free movement of elephants between Lewa and Mount Kenya.

Table 3-2: Fauna observed on the project site during the study

Ref	Class of the animal	Common Name	Scientific Name	Conservation Status and Comments
1	Large Mammal	Elephant	*Loxodonta Africana*	Vulnerable Category of IUCN Red List
2	Antelope	Reedbuck	*Redunca redunca*	Least Concern Category of IUCN Red List
3	Small Antelope	Dikdik	*Madoqua kirkii*	Least Concern Category of IUCN Red List
4	Wild Hog	Warthog	*Phacochoerus africanus*	Least Concern Category of IUCN Red List
5	Bird	Grey backed Camaroptera	*Camaroptera brachyura*	Least Concern Category of IUCN Red List

Ref	Class of the animal	Common Name	Scientific Name	Conservation Status and Comments
6	Bird	Cinnamon breasted bunting	*Emberiza tahapisi*	Least Concern Category of IUCN Red List
7	Bird	Yellow vented bulbul	*Pycnonotus barbatus*	Least Concern Category of IUCN Red List
8	Bird	Yellow breasted Apalis	*Apalis flavida*	Least Concern Category of IUCN Red List
9	Bird	Augur buzzard	*Buteo Augur*	Least Concern Category of IUCN Red List
10	Bird	Barred warbler	*Sylvia nisoria*	Least Concern Category of IUCN Red List
11	Bird	Little green sunbird	*Anthreptes seimundi*	Least Concern Category of IUCN Red List
12	Bird	Little rock thrush	*Monticola rufocinereus*	Least Concern Category of IUCN Red List
13	Bird	Olive thrush	*Turdus olivaceus*	Least Concern Category of IUCN Red List
14	Bird	Brown eagle	*Aquila chrysaetos*	Least Concern Category of IUCN Red List
15	Bird	Brown snake eagle	*Circaetus cinerus*	Not Evaluated category of IUCN Red List
16	Bird	Rattling cisticola	*Cisticola chiniana*	Least Concern Category of IUCN Red List
17	Bird	Tropical boubou	*Laniarius ferrugineus*	Least Concern Category of IUCN
18	Bird	Violet-breasted sunbird	*Anthreptes orientalis*	Least Concern Category of IUCN Red List
19	Bird	Speckled mousebird	*Colius striatus*	Least Concern Category of IUCN Red List
20	Bird	Crested francolin	*Francolinus sephaena*	Least Concern Category of IUCN Red List
21	Bird	Rofous chatterer	*Turdoides rubiginosus*	Least Concern Category of IUCN Red List

Ref	Class of the animal	Common Name	Scientific Name	Conservation Status and Comments
22	Bird	Fiscal shrike	*Lanius collaris*	Least Concern Category of IUCN Red List
23	Bird	Northern puffback	*Dryoscopus gambensis*	Least Concern Category of IUCN Red List
24	Bird	Yellow necked spurfowl	*Pternistis leucoscepus*	Least Concern Category of IUCN Red List
25	Bird	Red & yellow barbet	*Trachyphonus erythrocephalus*	Least Concern Category of IUCN Red List
26	Bird	Variable sunbird	*Nectarinia venusta*	Least Concern Category of IUCN Red List
27	Bird	Black crowned Tchagra	*Tchagra senegala*	Least Concern Category of IUCN Red List
28	Bird	Orange breasted bush shrike	*Telophorus sulfureopectus*	Least Concern Category of IUCN Red List
29	Bird	Marico sunbird	*Cinnyris mariquensis*	Least Concern Category of IUCN Red List
30	Bird	Banded martin swallow	*Riparia cincta*	Least Concern Category of IUCN Red List
31	Bird	Abyssinian Scimitar bill	*Rhinopomastus mino*	Not Evaluated category of IUCN Red List
32	Bird	Rufous sparrow	*Aimophila ruficeps*	Least Concern Category of IUCN Red List
33	Bird	Common bulbul	*Pycnonotus barbatus*	Least Concern Category of IUCN Red List
34	Bird	Tucazze sunbird	*Nectarinia tacazze*	Least Concern Category of IUCN Red List

Ref	Class of the animal	Common Name	Scientific Name	Conservation Status and Comments
35	Bird	Little bee eater	*Merops pusillus*	Least Concern Category of IUCN Red List
36	Bird	Grey fly catcher	*Empidonax wrightii*	Least Concern Category of IUCN Red List
37	Bird	Malachite sunbird	*Nectarinia famosa*	Least Concern Category of IUCN Red List
38	Bird	Paradise flycatcher	*Terpsiphone*	Least Concern Category of IUCN Red List
39	Bird	Chin-spot bantis	*Batis molitor*	Least Concern Category of IUCN Red List
40	Bird	Blue napped mousebird	*Urocolius macrourus*	Least Concern Category of IUCN Red List
41	Bird	Baglafecht weaver	*Ploceus baglafecht*	Least Concern Category of IUCN Red List
42	Bird	Red throated tinker bird	*Pogoniulus pusillus*	Least Concern Category of IUCN Red List
43	Bird	African Hawk eagle	*Nisaetus cirrhatus*	Least Concern Category of IUCN Red List
44	Bird	Common wood shrike	*Tephrodornis pondicerianus*	Least Concern Category of IUCN Red List
45	Bird	Red tailed shrike	*Lanius phoenicuroides*	Least Concern Category of IUCN Red List
46	Bird	Ringed necked dove	*Streptopelia capicola*	Least Concern Category of IUCN Red List
47	Bird	Red cheaked cordon blue	*Uraeginthus bengalus*	Least Concern Category of IUCN Red List

The following table shows other mammals found in the corridor but not seen during the survey. It includes some endangered species (African Wild dogs) and vulnerable (leopards) but none are present at the site.

Table 5-3: Other mammals reported in the corridor but not recorded during the survey

No	Class of the animal	Common Name	Scientific Name	Present at the solar park site (YES / NO)	Comment on conservation status
1	Large carnivore	Leopard	*Panthera pardus*	No	Vulnerable Category of IUCN Red List
2	Large carnivore	Spotted Hyena	*Crocuta crocuta*	No	Least Concern Category of IUCN Red List
3	Bovids	Cape Buffalo	*Syncerus caffer*	Not likely	Least Concern Category of IUCN Red List
4	Equids	Plains Zebra / Burchell's zebra	*Equus quagga*	No	Near Threatened Category of IUCN Red List
5	Large carnivores	African Wild dogs	*Lycaon pictus*	No	Endangered Category of IUCN Red List
6	Antelopes	Defassa Waterbuck	*Kobus ellipsiprymnus*	No	Least Concern Category of IUCN Red List
7	Primate	Velvet monkeys	*Chlorocebus pygerythrus*	No	Least Concern Category of IUCN Red List
8	Primate	Sykes/Blue monkeys	*Cercopithecus mitis*	No	Least Concern Category of IUCN
9	Primate	Olive Baboons	*Papio anubis*	No	Least Concern Category of IUCN Red List
10	Small carnivore	Serval cat	*Leptailurus serval*	No	Least Concern Category of IUCN Red List

6.3 Social Environment

The proposed project will not lead to the displacement or relocation of persons and does not therefore require any resettlement. The closest residential receptors to the project site were identified to be located at about 100 m to the east and north of the project site boundary.

Two communities live in proximity of the project site: on the north, Subuiga location has the characteristic of an urban area while on the east, Kamiti is a rural setup.

In this section, the social profile of the community members neighbouring the project site is presented focusing on: household demography, access to water and sanitation, access to health, access to education, livelihood sources and sources of household energy and land use, based on interviews of a total of 61 households interviewed between 15 December 2016 and 16 December 2016. The survey also sought to introduce the project to the community, determine their knowledge on the project, and their concerns, views, exceptions and recommendations from the proposed project. The EIA team also probed on the likely negative and positive impacts of the project. All the responses provided were analyzed and considered while elaborating the mitigation and monitoring measures for the Project.

6.3.1 Project awareness and support

The study has shown that, for the household sample interviewed, 97% were not aware of the Project before the survey (see Figure 6-9). Furthermore, 59% of the interviewed households reported to have little understanding of renewable energy; 30% indicating they do not understand it at all while only 11% understood it fully.

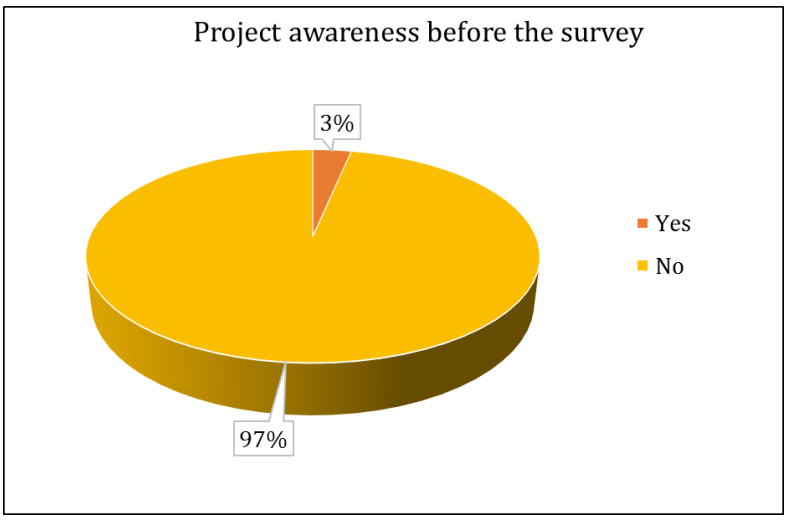


Figure 6-9: Project awareness before the survey

This therefore prompted the EIA team to explain the project details; technology, location, timeline and likely impacts in details to the households interviewed before any survey was conducted.

At the end of the interviews, the EIA team investigated support to the Project. Households interviewed expressed clear support with 92% strongly supporting the project, 7% being reasonably supportive of the project and less than 2% neither supportive nor supportive of the Project (see Figure 6-10). The same level of support was observed during the community meeting that took place on 17 December 2016.

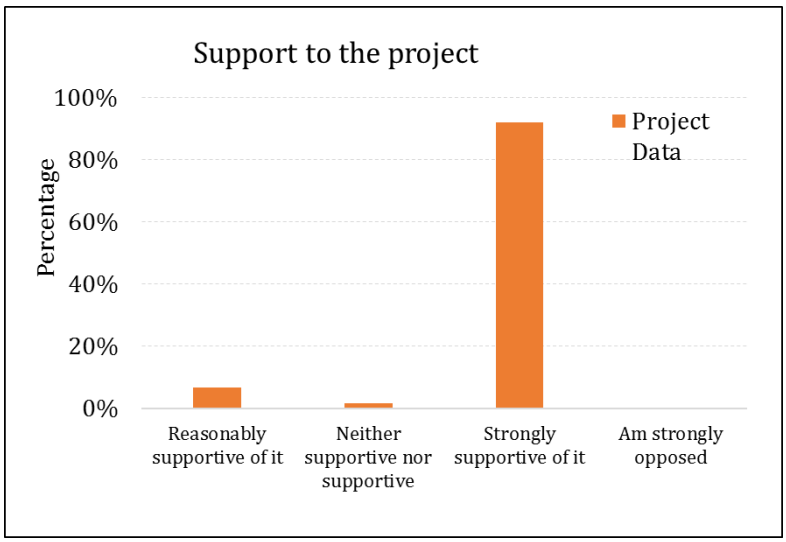


Figure 6-10: Community support of the project

6.3.2 Household composition

The survey was completed for 61 households neighboring the project site, with a recorded population of 228 persons at an average household size of 3.7.

Of the 61 interviewees, both genders, male and female were well represented. 52% of the interviewees were men while 48% were female.

The table below (Table 6-4) presents the age and sex distribution of the enumerated persons neighboring the project site.

The survey indicated that 10-19 and 20-29 years as the dominant age groups with each representing 23% of household composition, followed by 30-39 year age group with 20%. The population of the household sample interviewed is characterized by significantly less young people compared to statistics available for the Meru County as a whole: while the 2009 census established that 28% of Meru County population was less than 10 year old, the same age group only represents 9% of the composition of the household sample enumerated. Household members aged below 30 years and 30-59 years represented respectively 68% and 26% of Meru County according to the 2009 census and 55% and 39% of the composition of the household sample of communities neighboring the project site. This indicates a much more homogeneous distribution of age groups at the site. Global consideration and support from all age groups will therefore be key for the successful implementation and sustainability of the proposed project.

Table 6-4: Age and sex distribution of enumerated population neighbouring the project site

Age group	0~9	10~19	20~29	30~39	40~49	50~59	Over 60	TOTAL
Males								
Project data counts	13	30	23	22	12	12	6	118
Project data stat	11%	25%	19%	19%	10%	10%	5%	100%
Census 2009	28%	22%	17%	13%	8%	5%	6%	100%
Females								
Project data counts	8	22	30	23	10	9	8	110
Project data stat	7%	20%	27%	21%	9%	8%	7%	100%
Census 2009	27%	22%	19%	12%	8%	5%	7%	100%
Total								
Project data counts	21	52	53	45	22	21	14	228
Project data stat	9%	23%	23%	20%	10%	9%	6%	100%
Census 2009	28%	22%	18%	13%	8%	5%	6%	100%

As shown in Figure 6-11, 64% of the interviewees reported being married, 21% never married, 6% separated, divorced 2% and 7% widowed. One male interviewee reported to have two wives.

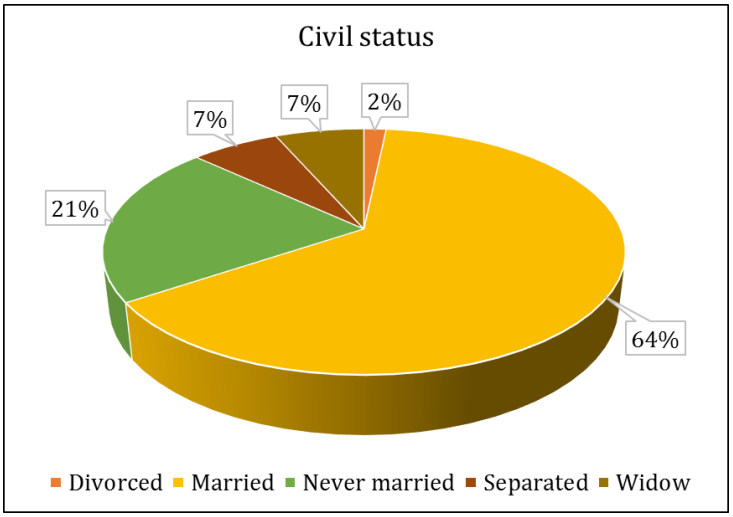


Figure 6-11: Household head civil status

6.3.3 Literacy and education levels

Literacy status of the population around the project site was investigated in terms of the ability of household members to read and write (this question was asked to the respondent who further gave analysis of the household members who could read and write). The results indicate that 95% (males, 97%; females, 91%) could read and write, which was above the national average literacy level, which stood at 87% for the adults and 93% for the youth in 2010 according to UNESCO, 2012[5].

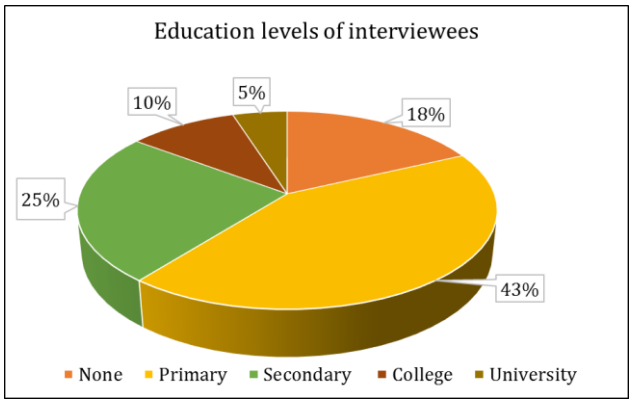


Figure 6-12: Education levels of interviewed heads of household

As far as education is concerned, and compared to statistics for Meru County as a whole, data collected for the interviewees sample indicated similar percentage of population with no education, lower level of population with primary education but higher level of population with secondary education.

[5] UNESCO, Education in Kenya Factsheet, 2012

Table 6-4 showed that the interviewed household's age distribution had a larger proportion of adults than the level observed at Meru County level. This may be a factor contributing to education level gap observed between the interviewed sample and Meru county population as a whole. Nonetheless, it is also important to realize that education level statistics presented on Figure 6-12 represent heads of families only, therefore adults, and may not be exactly representative of the entire population - this is also to be taken into account when considering the observed differences.

According to the analyzed data, primary level is the most common education level with 43% of the interviewees having only reached this level. Interviewees with secondary education or above represented 40% while the ones with no formal education represented 18% of the interviewees sample.

For comparison, the Kenya National Bureau of Statistics, 2013[6] informed that 21% of Meru County population had no formal education, 62% had primary level education only and 18% had secondary level of education and above.

Of the 61 households interviewed, 42 of the households had school going children. The respondents mentioned the common primary schools as Kamiti Primary, Lewa Academy, Madrid Primary, Nkubu boarding, Subuiga, among others. Secondary schools commonly mentioned included Guithi Secondary, Kibirichia, Kikuyu girls, Ndumbali Secondary, Ntugi mixed day and Mawari.

69% of the households had children in primary school only, 17% had children in secondary school, 7% had children in primary and secondary schools while 7% had their children in universities and colleges. 43% of the households indicated their children accessed schools less than 3 km away from their households. 33% indicated their children accessed schools more than 5 km away and 17% 3-5 km away. Households with children in primary school and secondary schools indicated their children went to schools 3-5 km and >5 km and they composed 7% of the population sample.

6.3.4 Livelihood

As shown in Figure 6-13, agriculture is the main livelihood source in the project area with over 41% of the interviewed household sample relying solitary on it. Main crops grown in the project area include wheat, potatoes, beans, maize and green vegetable like kales. Many homesteads also keep various types of livestock like sheep and some dairy cows.

[6] KNBS 2013, Exploring Kenyas inequality; Pooling Apart or Pooling together Meru County, Available at http://inequalities.sidint.net/kenya/wp-content/uploads/sites/2/2013/09/Meru.pdf, Accessed 17/1/2017

This was then followed by business with 34% (these are mainly households located in Subuiga location). Small retails shops are the main types of businesses; others include saloons, barber shops, tailors and bars. There also exists a privately-owned hotel a few hundred meters away from the project site named Elephant Corridor Resort.

16% of the sampled population relied on employment only as a source of livelihood while 5% reported to practice agriculture in addition to employment. In addition, 2% reported to practice business and agriculture while we had only 2% of the population sample have retired.

As far as employment is concerned, 92% of the employed were on full time employment while 8% were on seasonal employment.

Only 39 households out of the sampled 61 households were willing to disclose their income levels to the ESIA team. As shown in Figure 6-14, 49% of the 39 households indicated to earn less than KES 5,000 per month, followed by those who earned 5,001-10,000 with 26%, 10,001-20,000 with 8%, 40,001-50,000 with 5%, 20,001-30,000 with 3%, 30,001-40,000 with 3% , 50,001-60,000 with 3%, 60,001-70,000 with 3% and 70,001-80,000 with 3%.

This therefore indicated high poverty levels as the population indicated an average of 4 persons per household which survived on the income levels shown in the paragraph above.

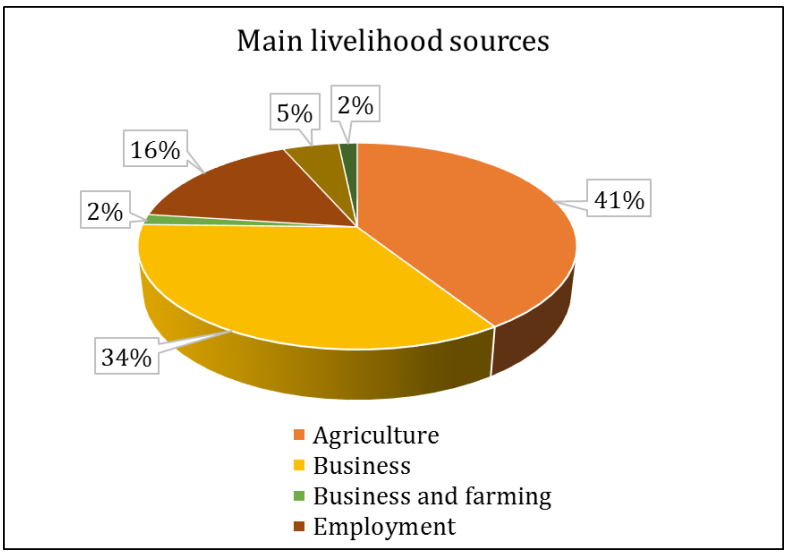


Figure 6-13: Livelihood sources in the project area

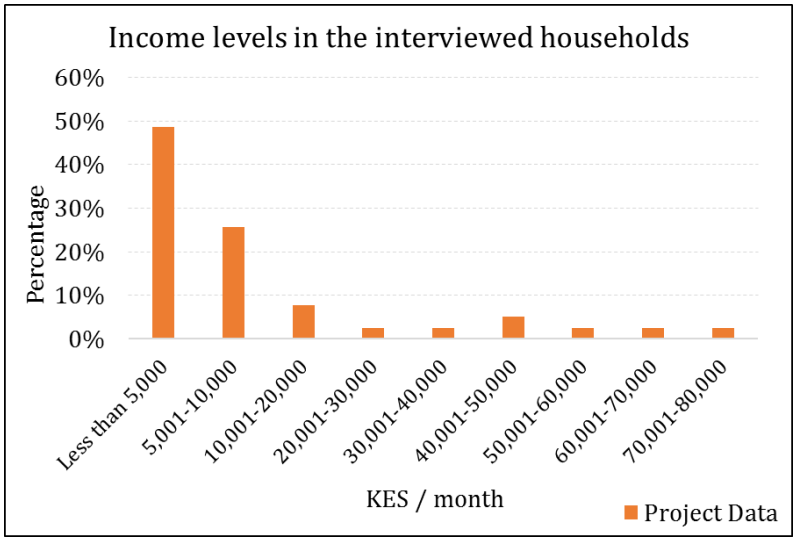


Figure 6-14: Income levels in the project area

As far as housing is concerned, the characteristics of Subuiga and Kamiti communities are different. Subuiga housing type is characteristic of a town center and therefore most structures are permanent; built with concrete and roofed with mabati. In Kamiti area, that has the characteristics of a village set up, there are different kinds of housing types including permanent houses; built with concrete and roofed with mabati and also semi-permanent houses; built with wood and roofed with mabati.

6.3.5 Household energy sources

As shown in Figure 6-15, firewood accounts for 69% of use within the interviewed household sample and is therefore the main source of cooking energy. This is then followed by a tie between LPG and Charcoal accounting for 15% of the interviewed population while 1% reported kerosene as the main source of cooking fuel.

This project data agrees with data at the Meru County level. Indeed, according to the Kenya National Bureau of Statistics, 2013[6], wood fuel is the main source of energy for cooking with 81.9% of households using it in the whole county, followed by charcoal with 12.7%. However, LPG is a more common fuel within the households interviewed compared to Meru County as a whole, where it is only used by 1.6% of the population.

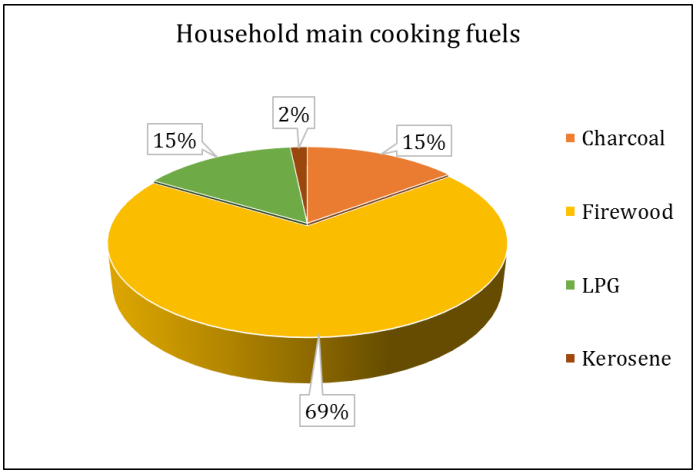


Figure 6-15: Household main cooking fuels

As far as energy is concerned for other uses, interviewed households reported solar energy being used for lightning, electricity for heating or lightning, charcoal used for heating. County Government of Meru Resource Map, 2015 also outlines electricity, paraffin, gas, biogas and solar as the main alternative sources of energy in the county.

6.3.6 Access to services

As far as water access is concerned, 97% of the households interviewed reported access to piped water (either from their own connection or their neighbour's connection), connected through the Kisima water project. 2% of the sampled population reported having to fetch water from the nearby river while 1% bought from retailers. Improving access to water connection to those who have no connection was one of the recommendations expressed during the household consultation process.

As far as sanitation is concerned, 95% of the interviewed households indicated pit latrines as the main sanitation facilities. This is higher than the average value for the Meru County as indicated in the County Government of Meru Resource Map, 2015 which gives 80%. 1% of the household sample indicated using their own sewer system; while 2% use a combination of pit latrine and own sewer system. 2% are connected the county sewer system.

Gundua, Kandui, Kiboroini, Kiirua, Kisima, Lewa, Mboroga, Meru General Hospital, Mutunyi dispensary, Nkubu green and Ntugi are the health facilities used by the interviewed households.

As far as health services are concerned, 59% of the households mentioned that the health facility they use is located more than 5 km from their households, 31% have to travel about 3-5 km while 10% are to travel less than 3 km to access the health service facility.

6.3.7 Other infrastructures

The proposed project site is accessible via the Nairobi-Meru B6 highway, 24 km northwest of Meru town and 50 km northeast of Nanyuki through an access route 1 km off the highway. The highway crosses Subuiga location and is neighboring Kamiti. Both communities therefore benefit from simple access to major road.

The Nanyuki-Isiolo-Meru 33 kV power line (shown in Figure 6-16), runs parallel to the B6 and A2 roads and crosses Subuiga location. This line would be the first power evacuation option. There is also a distribution line in Kamiti location. A proposed 132kV Nanyuki-Isiolo-Meru line will also pass along the Nanyuki-Isiolo A2 road and could be a power evacuation alternative.

Figure 6-16 - Nanyuki-isiolo-Meru 33 kV power line

The area has good telecommunication network coverage.

6.3.8 Land use

The project site is currently within an area of Kisima farm set aside for wildlife conservation and fenced off for wildlife movement between Mount Kenya and Lewa Wildlife Conservancy. However, at the location where the solar plant is to be established, the corridor is very wide, measuring about 1 km across, while in other section it is only 100 m wide. This section of the corridor was in fact initially meant to be dedicated to other purposes than wildlife conservation and this has happened in practice: though being within the elephant corridor, most of the project site land use is currently dedicated to agroforestry (eucalyptus tree plantation) and agricultural / grazing purposes in some other parts (see Figure 6-17). Field observations by the EIA team found that the land now lies fallow awaiting the implementation of this project. The removal of eucalyptus trees is planned to commence in the near future.

Figure 6-17 - Current land uses in the vicinity of the site

In the rest of Kisima farm, most of land use is dedicated to extensive farming and large scale production of wheat and Irish potatoes with intermittent woodlots of variable sizes growing cedar and eucalyptus trees for commercial purposes.

In the neighbourhood of the site, outside the Kisima plot, farming was the main source of livelihoods in Kamiti and therefore most of the land parcels in this location were under crops such as wheat, potatoes, maize, beans, sugarcane and green vegetables such as kales. There also exists open fields used for grazing livestock such as sheep and cattle.

In Subuiga, land use is characterized by a growing urban center surrounded by small farming.

6.3.9 Archaeological and Cultural Heritage

The EIA study investigated the project site and its environs for cultural and archaeological significance. It was found that the site has not been set aside for cultural purposes or declared a protected area. The project site does not have forests or trees of cultural significance. It was further noted that no archaeological, cultural and/or heritage sites are located within the project site. However, the potential for chance finds remains, especially during construction, which would require considerable care and proper management.

7 Public Participation and Consultations

7.1 Introduction

Transparency, accountability and public involvement are essential to fulfilling any project development mandate and to obtain a social license. According to the national and international guidelines, public consultations are an integral component of the environment and social impact assessment. It is also a regulatory requirement by NEMA. The Environmental (Impact Assessment and Audit) regulations of 2003 state that the proponent shall in consultation with NEMA, "seek the views of persons who may be affected by the project"[7].

For this study, public participation and consultation have been conducted among the host communities around the proposed project site. The goal of the consultations was to provide adequate project information to the stakeholders and to present sufficient opportunity for them to present their concerns and opinions about the project in order to inform the ESIA process. This chapter presents a synopsis of views, concerns, expectations, and recommendations from the community as well as the county government administration for Meru County, and some other key institutional stakeholders such as Kisima farm, Kenyan Wildlife Service and the Elephant Corridor Management Committee. A full list of those consulted during the ESIA process, together with the minutes of meetings, are presented in an Annexure to this Report.

7.1.1 Objectives of the public and stakeholder's consultations and disclosure process

Public and stakeholder consultations and disclosure is designed to guide discussion by interested parties in an organized way. It provides stakeholders with a chance to contribute to project design and implementation, which enhances harmony between the project and host communities. The essence of such hearings and/or consultation is to ensure as much public acceptance as possible and to eliminate conflict of interest that could cause bottlenecks in the implementation and operation of projects. The overall objectives of the public and stakeholder's consultations and disclosure process are to:

- Explain to the public about the project, activities to be implemented and benefits.
- Communicate the potential impacts of the project and encourage open, transparency and rational discussion.
- Gather social and cultural viewpoints of all stakeholders and to involve the public in decision-making.

[7] NEMA, Environmental (Impact Assessment and Audit) regulations of 2003, section 17 (1)

7.2 Stakeholder Engagement Process Implemented during ESIA

7.2.1 Meeting with Kisima Farm

The EIA team met with the land owner (Kisima farm) representatives Dr. Jonathan Moss, Kisima Farm Managing Director and, Mr. Charles Dyer, Kisima Farm Foundation Manager, on 15 and 16 December 2016.

7.2.2 Meeting with Meru County Government

Interview of with Meru County executives Mrs. Mary Mwiti, County Executive Community (CEC) Member for Water, Environment and Sanitation and Mr. Martin Bikuri, CEC Member for Land, Physical/Economic Planning, ICT, and Housing was conducted by the ESIA team on 15 December 2016.

7.2.3 Meeting with Elephant Corridor Management Committee

The Elephant Corridor is a project involving Mount Kenya Trust in partnership with LWC, KWS, Borana Conservancy, the Kenya Forest Service, and Kisima as well as Marania Farms. The EIA team was invited on 16th December 2016 to a meeting to the Elephant Corridor Management Committee composed of Dr. Jonathan Moss, Kisima Farm Managing Director/ Borana Conservancy Director, Mr. Charles Dyer, Kisima Farm Foundation Manager and Borana Conservancy Director, Mr. Mickael Watson, Lewa Wildlife Conservation Chief Executive Officer, Mrs. Suzie Weeks, Mount Kenya Trust Fund Executive Officer and KWS Honorary Warden.

7.2.4 Interview with Kenya Wildlife Services

The EIA team interviewed Mr Francis Mbaka, a KWS Warden, took place on 17 December 2016 in Meru town.

7.2.5 Focus group discussion with Mount Kenya Trust Fund Workers

On 16 December 2016, a focus group discussion was held with the workers from Mount Kenya Trust Fund who ensure security in and around the elephant corridor. The discussion was chaired by Maurice Theuri, MKTF manager, with support from the EIA team.

7.2.6 Community meeting in Kamiti

The community meeting was held on 17 December 2016 at the Kamiti Catholic Church grounds. A total of 64 community members attended the meeting.

7.3 Issues Raised from the Consultations

The following table lists the issues raised by stakeholders during the consultation process that took place during the ESIA process.

Table 7-1: Summary of Consultation Responses

Ref	Stakeholder	Issue Raised / Discussed	Response / Mitigation Measures
Project Risks and Negative Impacts			
1	County Meru Government	County government requested information on liquid waste contaminating nearby seasonal rivers	Solar park generates very little waste (quasi inexistent during operations). Nonetheless, the project will develop and implement Liquid, Solid and Hazardous Waste Management Plans.
2	Elephant Corridor Management Committee	Project impact on the free movement of elephant through the corridor. The Elephant Corridor Management Committee is of the opinion that the Project will not impact free movement of elephants.	The project has put in place several appropriate measures to ensure the movement of elephants are not impacted in the corridor: - the project site is located where the corridor is wide, and placed in a corner of the corridor to avoid interference with main path followed by elephants; - a monitoring programme will be developed and implemented with support of Lewa Wildlife Conservancy experts and 24/7 security team.
3	Neighbouring communities	The community members enquired about project impacts on benefits from wildlife	The project is not expected to have any impact on wildlife. A monitoring plan will be developed and implemented to assure there is, effectively, no impact.
4	Neighbouring communities	The community members enquired about environmental changes, risk loss of vegetation, noise and pollution	There will be clearing of the vegetation on the project site to enable the construction of the project. Construction will generate noise. Operations of the solar park will not generate noise. Solar park projects generate very little pollution. Plans such as pollution management plans will be developed and implemented to mitigate impacts.
5	Elephant Corridor Management Committee	Risk of elephants penetrating or attempting to penetrate in the solar park site	According to Borana Conservancy, the solar park site will have nothing of interest for elephants: therefore elephants shall have no reason to be interested in the solar park site. The solar park site will be surrounded by an elephant-proof fence designed to be approximately a straight line and avoid corners which are prone to elephant intrusion risk (when elephants feel trapped).
6	Kenya Wildlife Services	Risk of elephant electrocution	No risk as there will be an elephant proof fence and then the Proponent's own site security fence. Proponent will also have security teams on site 24 hours who will not allow access and will deter elephants that get close.
7	Kenya Wildlife Services	Risk of human electrocution	There is a proper security fence as per all of the Proponent's large scale ground mount sites. Proponent will also have security guards 24 hours a day who will be on site and will deter intruders, plus CCTV etc. Even if someone access the site, all cables are buried, the inverters are closed and the distribution boards securely locked.

8	Neighbouring communities	The community members enquired about risk of technical faults that might cause damage	Solar technology is safe. Furthermore, the project site will be fenced to avoid intrusion of people and wild animals.
9	Neighbouring communities	The community members enquired about security risk and vandalism	The Proponent shall develop and implement a security plan including a 24/7 security team will guard the project site.
10	Neighbouring communities	The community members enquired whether the project help with curbing the issue with small monkeys	This issue with monkeys occurs on land farmed by community - therefore outside the project site. This point will be considered for inclusion in the project impact monitoring programme in co-operation with Lewa Wildlife Conservancy.
11	Neighbouring communities	The community members expressed the concern that the Project would result in limitation of grass harvesting at the proposed project site.	Kisima farm representative reminded the community that it is illegal to harvest grass within the elephant corridor and puts people in direct conflict with wild animals. Kisima farm is willing to work together with the community to stop illegal grass harvesting within the corridor while finding alternative locations where community members could source grass (neighbouring flower greenhouses that allow for grass harvesting was mentioned).
12	Mount Kenya Trust Fund Workers	The workers expressed concerns on the secutity of the solar park. They also suggested that an electric fence should be put at the boundary of the project site to make sure the elephants are not hurt by solar park equipment as well as them not damaging the solar panels	The Proponent has already planned for the fencing of the project site. The proponent shall develop and implement a security plan including a 24/7 security team will guard the project site.
Project Benefits and Positive Impacts			
12	County Meru government	County government enhanced the need to articulate biodiversity conservation and socio-economic development projects that will benefit directly the community neighbouring the project site.	The Proponent is very keen to address this issue. Indeed, a unique specificity of the Project is that the project owners will be international environmental organisations who seek to create sustainable financing for wildlife conservation, biodiversity protection and benefit to rural communities. The owners will therefore reinject all profits from the sale of electricity to Kenya Power to fund environmental conservation in Kenya and development of the project area; Lewa Wildlife Conservancy and Borana Conservancy being two beneficiaries.

13 (a)	County Meru government	County government requested for a small percentage of the profits to be accrued from the Project to be set aside for environmental conservation activities managed by the county.	In relation to (1), the design and implementation of biodiversity conservation and socio-economic development activities shall include the County government, and other key stakeholders such as KWS, Lewa and Borana Conservancies, relevant Civil society and Non-Governmental Associations, to assure coordination with other initiatives implemented in the general project area and at the county level and maximise efficiencies. This will be done through ongoing stakeholder consultation and participation, and the design of a specific Community Development Plan, once the Project has further progressed.
13 (b)	Neighbouring communities	Community members wanted to know any financial benefit for the community from sale of electricity to KPLC	Same as above
13 (c)	Neighbouring communities	Community members wanted to know any individual financial benefit they will receive	Same as above
14 (a)	Neighbouring communities	County government expressed importance of job creation and preference given to locals	The Proponent will develop a structured Human Resource Policy that would set out the skills set needed and the criteria for selection of applicants to ensure a transparent recruitment process. Such policy would provide equal opportunity for all.
14 (b)	Neighbouring communities	Community members wanted to know employment criteria to be used and whether a percentage of employment would be guaranteed to local	Same as above
15	County Meru government	County government expressed the idea of the development of solar / renewable energy programme at the existing polytechnic school in Meru town	This suggestion has been noted by the Proponent and it is proposed to be the source of follow up discussion with Meru county government as socio-economic development activities to benefit the local area are developed.
16 (a)	Neighbouring communities	The community members highlighted the importance of aligning the implementation of the project with the community development plans.	The purpose of the community development plan (to be developed at a later stage when the Project is more advanced) is precisely to assure consistency of funded development activities with community's strategic vision and existing plans.

16 (b)	Neighbouring communities	The community members mentioned better water access in the area through power generated from the project and socioeconomic development in the community through technology, as important aspects for local development.	Same as above
16 (c)	Neighbouring communities	The community members enquired about improved access to electricity	There shall be no direct connections for the community. However, if access to electricity is what is much needed, such issue shall be assessed during the development of the community development plan.
Support to the Project			
17	County Meru government	The County Meru government expressed positive views about the Project as it is a green energy project with a strong vision for local benefit programme.	No mitigation measure required
18	Elephant Corridor Management Committee	The Elephant Corridor Management Committee supports the Project that will bring new financial resources to Lewa Wildlife Conservancy and Borana Conservancy. These additional resources are essential to continue their mandate of sustainable wildlife conservation, biodiversity protection and support to local community development.	No mitigation measure required
19	Kenya Wildlife Services	KWS representative expressed the view that the project looks like a good idea.	No mitigation measure required
20	Neighbouring communities	As evidenced by both the household interviews and baraza, the community members in their great majority are supportive of the Project and interested in being informed and participating	No mitigation measure required

Project Information			
21	County Meru government	Site visit organisation before the submission of the EIA report to NEMA, with the presence of a county government team	The project proponent planned a follow up meeting on 27th January 2017. Unfortunately, the county government didn't attend or send their representative. The proponent shall however continue with stakeholder engagement during the development of the project. Any concern on the stakeholders shall be addressed.
22	Kenya Wildlife Services	Site visit organisation before the submission of the EIA report to NEMA, with the presence of KWS	The project proponent planned a follow up meeting on 27th January 2017. Unfortunately, KWS didn't attend or send their representative. The proponent shall however continue with stakeholder engagement during the development of the project. Any concern on the stakeholders shall be addressed.
23	Neighbouring communities	The community members requested about the risk of project implementation delay (comparison with much delayed dam project)	The project developer shall keep the community updated on the current status of development of the project and any delays shall be communicated.

8 Potential Impacts of the Project

8.1 Construction Phase

8.1.1 Hydrology and Hydrogeology

There are no permanent surface water bodies within the project site. During construction, earthworks, road construction and use of heavy vehicles could alter surface drainage patterns. The removal of vegetation and compaction of soils will reduce infiltration and surface run-off will increase. The risk is greatest during severe precipitation events. The increased volume of water flowing down drainage channels and creeks is likely to cause additional soil erosion and increase the size of the channels. Surface run-off will also contain larger amounts of suspended sediments during construction than would otherwise be the case. Other potential sources of pollution during construction comprise leaks and spills of oils from machinery and discharge of sanitary waste and wastewater.

The sensitivity of surface water is assessed as medium. The magnitude of the effect is predicted to be low given the limited area of the project site in relation to the overall catchment area but recognising the fact that local populations may depend on the season surface water for growing crops. As a result the significance of the impact is assessed as moderate and significant. The effects on soils are discussed separately in Section 8.1.4. A number of mitigation measure have been proposed to protect surface water resources.

At this stage it is not proposed that a local groundwater well be installed to provide water for construction activities. All water would be sourced from the nearby Kisima Farm. If groundwater is to be used then a full assessment of the resource will be undertaken prior to construction. However this may not be suitable for drinking water purposes. Given the high season rainfall levels, the magnitude of the impact on groundwater is low and the impact is assessed as low and not significant (see also Section 8.4(Summary of Impacts)).

Potential sources of pollution to groundwater during construction also comprise leaks and spills of oils from machinery and discharge of sanitary waste and wastewater. During construction sanitary waste will be collected in containers below portable toilets and transported to a registered waste disposal facility for disposal. Storage and handling procedures for oils and other chemicals will be required to minimize risk of pollution. These measures should be incorporated into a Project ESMP. With the implementation of these mitigation measures the magnitude of the impact on groundwater is low and is assessed as minor adverse.

8.1.2 Ornithology

Construction impacts are likely to include habitat loss and possible nest destruction for passerine and ground nesting bird species as well as disturbance impacts in the Project and adjacent areas. None of the species recorded during the site surveys were of conservation concern and are common species in the region and nationally therefore this breeding assemblage is valued at negligible to low sensitivity and the magnitude of impact associated with habitat loss and construction disturbance is considered to be negligible.

Habitat loss associated with construction is unlikely to result in a significant impact to migrating birds as no major attractant features (e.g. lakes / wetlands) will be lost.

8.1.3 Terrestrial Ecology

The Project site has been chosen to avoid the areas of highest ecological sensitivity and therefore the proposed Project will not result in direct negative impacts on more sensitive areas such as wetlands or Protected Sites.

Therefore potential impacts on flora and fauna arising during construction comprise:

- Direct loss of vegetation and habitat (including food sources).
- Direct loss of fauna during construction activities.
- Indirect impacts associated with pollution.
- Disturbance of fauna from presence of people, machinery, traffic, and noise, both within and outside of the project area.

As described above, areas of habitat and flora will be lost due to construction activities and in particular due to earthworks for the substation and invertor buildings, solar PV foundations and electrical transmission connections; on-site construction roads and construction of off-site access road and power transmission line.

The project site is located in an arable and partially forested section of Kisima Farm. The Lewa-Borana-Mt Kenya elephant corridor passes just to the south of the site. To avoid any potential impact related to the proximity of the elephant corridor, the project site will be robustly fenced to prevent incursion by any wayward elephant, thereby preventing damage to the solar plant and to the elephant populations travelling past the project site.

The natural vegetation at the project site has been substantially altered by human activities, especially farming. The project area includes 11 species of indigenous and exotic trees including *Pinus Radiata, Pinus Patula, Cup. Lusitanica, Acacia spp*., *Eucalyptus Globulus, Eucalyptus Grandis, Eucalyptus Saligna* and *Grevilla Robusta*.

The particular species present in the immediate project site will be assessed during the EIA. However, due to limited diversity of vegetation on the site, it is likely not a highly sensitive area.

Much of the existing vegetation, including small forest patches, will be removed during construction due to shading concerns.

8.1.4 Geology and Soils

The main impact on soils during construction will be the increase in vulnerability to erosion. The following types of construction activity could lead to potential soil erosion:

- Vehicle traffic along dirt tracks used during construction of on- and off-site roads, power lines, control centre and solar panels will cause soil compaction.
- Off-road vehicle traffic will damage vegetation and cause soil compaction.
- Any vegetation and some soil will be removed for the construction camp, the control centre, solar panel foundations, transmission towers, and both on- and off-site roads.
- The use of heavy equipment will cause soil compaction if used outside designated roads.

Soil compaction and loss of limited vegetation present increases in the soils' vulnerability to erosion. Soils will be particularly vulnerable during the rainy seasons, when vehicle traffic is likely to cause the greatest damage.

Where roads are un-surfaced, rutting and gully erosion eventually makes the roads impassable so that vehicles drive off the track and the area affected by erosion continually widens.

Damage to soils has further effects on land use. When soil is compacted, it cannot support the native grasses, and this in turn reduces the pasturage that can be used by the livestock of local farmers. In addition, the loss of grass affects biodiversity, since grassland is a food source for small mammals, which in turn provide food for predators.

The sensitivity of soils is medium however the magnitude of the impact is low, since the area affected is limited, in addition to off-site impacts of roads and power transmission. The significance of the impact is therefore assessed as medium. The medium impact should be of relatively short duration, lasting only through construction of the hardstandings, transmission line foundations and roads. Once foundations have been buried and roads have been narrowed, a much smaller area will be affected, and previously disturbed areas will have been reclaimed.

There is potential for soils to be contaminated by waste. Liquid wastes such as oils and sanitary waste are discussed under Hydrology and Hydrogeology. Inert waste will be taken off-site and disposed of in a suitable landfill site. Because residual waste is very low, the significance of the impact is assessed as minor adverse.

8.1.5 Archaeology

The Project is not deemed to have a direct adverse impact on any international or nationally recognised cultural heritage feature and consultation confirmed that there are no significant cultural resources within the Project area.

As a result of the absence of known archaeological, religious and aesthetic sites, the site sensitivity is assessed to be Low. Similarly the magnitude of direct impact is assessed as Low therefore the impact significance is Low and not significant.

There is the potential for the discovery of unrecorded buried archaeological remains during the construction phase as the Project will involve ground clearance activities such as levelling, grading and excavation works. These works therefore have the potential to directly impact on unrecorded buried archaeological remains which may be present within the site boundary and may be of archaeological importance. As a result of the absence of known archaeological, religious and aesthetic sites, and the past agricultural activity, the site sensitivity is assessed to be Low. Similarly the magnitude of direct impact is assessed as Low therefore the impact significance is Negligible and not significant.

8.1.6 Noise and Air Pollution

Noise pollution may result from the large workforce and construction activities, particularly the movement of trucks used to carry material to the site and removal of debris. Some heavy earth moving and compacting machinery may be required for brief periods during construction but it is expected that much of the civil work will involve manual labour.

Air pollution may also arise as a result of dust emanating from vehicle movements and other construction activity. However, this will be a temporary effect which can be mitigated by restricting vehicles to sealed access tracks and the use of dust suppression measures.

8.1.7 Social Impacts

The construction of the Lewa Solar project has the potential to have a number of social impacts on residents living in the surrounding area, both positive and negative. The solar park will require both skilled and unskilled labour during the construction and operational phase. Labour may be sought from the local community and training provided for selected individuals, thereby creating direct and indirect employment opportunities.

Local residents should be engaged and informed regarding the development process and provided with open channels for communication in order to raise any concerns or grievances. A plan should be developed with regard to a suitable community benefit scheme.

8.2 Operation Phase

8.2.1 Solid Wastes

The proposed solar PV plant is expected to generate limited types of solid wastes during operation. The wastes will consist primarily of domestic and sanitary wastes from on-site compounds. If solid waste is not properly managed during operation, there are potential impacts on the land, soil and the environment and the general health and safety of the workers on site. However, it is expected that the amount of solid wastes generated would minimal in quantity and will be accumulated on-site for a short period before disposal to a NEMA licensed disposal facilities by a licensed waste transporter. As such, negative impacts from solid wastes are considered to be of low and of minor significance.

8.2.2 Liquid Wastes

The proposed projects will generate limited types of liquid wastes during operation in terms of wastewater (black water) such sewage from toilets and sanitation facilities; and grey water from sinks and showers and from cleaning of solar panels. The volume of such waste is expected to be minimal. Nevertheless, all generated liquid wastes will be collected into septic tanks which will be serviced by a licensed transporter for disposal to an appropriate Wastewater Treatment Plant.

8.2.3 Hazardous Wastes

The proposed project will require the use of oil and fuel for the various equipment and machinery during operation. Improper management of such material entails a risk of leakage into the surrounding environment either from storage areas or throughout the use of equipment and machinery. All hazardous waste generated during operation will be collected and stored onsite in a suitably bunded area which will contain 110% of the total volume to be stored. This will then be disposed of at NEMA approved disposal sites. However, in case of accidental spillage or leakage, this ESIA has identified adequate mitigation measures to prevent environmental contamination from hazardous wastes.

8.2.4 Landscape and Visual Impact

The potential landscape and visual impact of a solar PV farm is likely to be one of the most significant impacts of such development. The Project will cover approximately 70 acres of land and will change the largely rural and natural setting in the area. However, with the project location at the edge of the conservancy, it will likely not be visible from the main lodging and conservation areas. In addition, the presence of a solar PV plant with electricity sales funding conservation activities may be a novel and supplementary attraction and awareness raising point for tourists.

Nevertheless, ways to minimize the visual impact should be considered. For example, vegetation around the project that may not directly affect its performance should be left in place or rehabilitated. The visual impact of solar photovoltaic project is typically relatively low, particularly in comparison with other technologies such as wind or large thermal power plants.

8.2.5 Hydrology and Hydrogeology

Potential impacts to surface waters by operating activities would be confined to increased runoff and erosion, primarily in existing or new erosion channels that receive run-off from roads.

The sensitivity of the seasonal watercourse is low and the magnitude of the impact is very low. Therefore the significance of the impact is low and not significant.

At this stage it is proposed that a local groundwater well be installed to provide water for operational activities (e.g. cleaning of panels). If groundwater is to be used then a full assessment of the resource will be undertaken prior to commencement of operations, alongside a full assessment of alternative cleaning methods (including non-water use). Given the high seasonal rainfall levels, the magnitude of the impact on groundwater is low and the impact is assessed as low and not significant.

Potential sources of pollution to groundwater during operation include sanitary waste and leaks and spills from maintenance activities. The sanitary waste from employees will be treated using wastewater recycling equipment installed at the control centre. Recycled water will be used to water restored areas of any grassland and landscaping.

Despite the low risk of contamination involved, the soils are highly porous and measures are specified in the Environmental and Social Management Plan to prevent leakage or spillage to groundwater. Groundwater is assessed as medium sensitivity and the magnitude of pollution risk is very low, therefore the significance of the impact is low.

8.2.6 Ornithology

Potential impacts during operation of the Project are as follows:

- Habitat loss and displacement.
- Disturbance of birds from people and traffic.
- Loss of birds from electrocution from perching on transmission lines.

The habitat and species composition on the site are not deemed to be particularly sensitive or of conservation concern. Although an area of habitat will be removed and displacement effect will occur it is considered that the area impacted is low and there are significant alternative habitats of equal or better quality available along the elephant corridor, at Mount Kenya NP to the south and Lewa Conservancy to the north to compensate. The transmission line between the solar park and the point of grid connection is proposed to be underground cable therefore no new impacts are predicted. As a result ornithology is assessed as low sensitivity with a low magnitude of impact. Therefore the significance of impact is low.

8.2.7 Terrestrial Ecology

Potential impacts during operation of the Project are likely to be limited to loss of habitat due to shading effects of solar panels.

It is possible, without control measures, that staff working on the operational solar PV panels could cause disturbance to these ecological receptors. Control measures, including no access outside of the Project area, no hunting and control of lighting and night-time vehicle movements, will be incorporated in to the Project scheme. This will ensure no operational disturbance outside of the Project area.

Taking in to consideration the distance from areas of highest ecological sensitivity and the suggested mitigation the operational impact to terrestrial animals is assessed as being not significant.

8.2.8 Geology and Soils

During this phase of the Project, the main impacts on soils would be from continued vehicle traffic. Vehicle movements will comprise:

- Movement of staff and materials to and from the site along the access roads
- Movements between the control centre and across the site for operation and maintenance. Workers are expected to visit the site at least once per week for routine maintenance.

There should be no need for vehicles to travel off the improved roads, and this should be activity discouraged. As described with regard to the construction phase impacts, the main risk to soils would be where vehicles leave prepared roads and drive cross-country. If designated roads are not used, vehicle movements can cause damage over a wide area. The soils are a medium sensitive receptor given its agricultural use, but the magnitude of the effect during operation is very low, since there will be much less frequent traffic than during construction, and only occasional use of heavy equipment. In addition, vehicles will keep to improved roads. The significance of the impact is assessed as minor adverse.

8.2.9 Archaeology

There is the potential of indirect impacts on the setting of cultural heritage features as a result of new development. The Project is located a considerable distance from any international or nationally recognised cultural heritage feature. Following site visit observations it was confirmed that the Project will not be visible from any international or nationally recognised cultural heritage feature. The Project is therefore not deemed to have an indirect impact on setting of designated cultural heritage sites.

8.2.10 Noise

Solar PV panels themselves do not provide a noise source during operation, however equipment within the site (typically inverter stations and transformers) will emit noise during operation. While the solar PV farm will only be operational during daylight hours, as the transformers are permanently energised they may emit some noise by way of magnetostriction hum during night time. However the distance between the transformers and the nearest residential properties is sufficient to reduce any noise to an acceptable level. As such, the potential impacts are assessed to be low and not significant.

8.2.11 Occupational Health and Safety

During the operation phase, there may be occupational health and safety risks to workers from the various operation and maintenance activities expected to take place for the proposed project. Key risks could include but not limited to: Collision with vehicles and plant, exposure to a variety of hazards such as electric shock from exposed cables and thermal burn hazards and exposure to chemicals, hazardous or flammable materials. Occupational health and safety impacts are considered of long-term duration throughout the operation phase and are expected to be of medium magnitude and medium sensitivity as in extreme cases they could entail permanent impacts (e.g. permanent disability). As such, the impacts are considered to be of major significance and appropriate mitigation has been proposed.

8.2.12 Glare and Glint

The potential for glare and glint from the proposed project during operation is low. It is important to note that the PV panels work on the concept of absorbing sunlight rather than reflecting it as compared to other technologies that concentrate solar energy. The PV panels that will be used for the proposed project have very limited levels of either glint or glare and are substantially less reflective than most surfaces such as still water, glass or steel. Glint will be substantially reduced by the anti-reflective coating of the modules that is incorporated to maximise the light capture of the solar cells.

Previous studies have been undertaken to compare the reflectivity of solar panels with other materials. The most commonly referenced source is a Federal Aviation study focusing on solar panels located at airports. This study states that modern solar panels reflect as little as 2% of the incoming sunlight. Solar PV panels have a lower level of reflectivity than many commonly occurring features such as bare soil and vegetation. In addition, there are no nearby residential receptors located in close proximity to the site and the airfield locating to the south of the Project sees very limited use. The intensity of any glare and glint effects are therefore expected to be minor and not significant. Nevertheless, the proponent will work with nearby aviation interests to implement any necessary measures to minimise the potential safety issues associated with proximity to the airfield should this be requested.

8.3 Decommissioning Phase

8.3.1 Solid Waste Generation

Decommissioning activities are expected to generate solid wastes. These will consist primarily of wastes such as PV modules, cables, trackers, inverters, concrete, metal, wood, adhesives, sealants and fasteners. Demolition waste is generally considered as less harmful to the environment since they are composed of inert materials. Additionally, much of the solid wastes will have recycling options.

8.3.2 Occupational Health and Safety Hazards

Decommissioning activities will inevitably expose workers and the public to occupational health and safety risks. These risks will be similar to those at construction. Such impacts are considered to be of short-term duration as they are limited to the decommissioning phase only.

8.3.3 Loss of Employment

There will be a small number of job losses associated with decommissioning of the project. It is expected that both skilled and unskilled labour associated with the project will lose their sources of livelihood. However, it is anticipated that the skills gained through working on this project will be transferred to other newer solar PV projects meaning that the wider employment opportunities for the project workers will be significantly increased.

8.3.4 Change in Ambient Air Quality

The change in ambient air quality may arise at decommissioning as a result of fugitive dust and particulate matter emissions. However, such impacts are expected to be temporary and of short-term nature as they are limited to the decommissioning phase only. The impacts will be of minor significance.

8.3.5 Social Structure and Amenities

In planning the closure of a site, the disruption of the overall existing social structure may have an effect on the neighbouring community. This may include loss of support from the project companies for social projects such as community projects, fire and emergency services, training centres, and child care facilities.

8.3.6 Noise Impact

Local noise levels will be affected temporarily by decommissioning activities such as equipment movement during building demolition and use of heavy machinery. The impacts will be similar to those experience during the construction phase.

8.3.7 Hydrology and Hydrogeology

Effects on water resources during decommissioning are likely to be similar to those during construction, so sensitive features such as ephemeral drainage channels would need to be avoided. Contaminated materials such as oil storage tanks would need to be removed from the site and taken to a suitable disposal site to prevent future contamination of surface and groundwater.

8.3.8 Ornithology

Similar to construction, the main impacts during decommissioning are likely to comprise disturbance to birds. Following decommissioning, reinstatement will be important to re-establishing the ecosystem in areas previously occupied by solar panels, site roads and other structures. At the time of decommissioning, the sensitivity of some species, particularly those which are regionally rare, may have increased.

8.3.9 Terrestrial Ecology

Similar to construction, the main impacts during decommissioning are likely to comprise habitat loss, loss of small numbers of mammals, and disturbance to animals. Following decommissioning, reinstatement will be important to re-establishing the ecosystem in areas previously occupied by solar panels, site roads and other structures. At the time of decommissioning, the sensitivity of some species, particularly those animals which are regionally rare, may have increased.

8.3.10 Geology and Soils

Similar to construction, soils will be highly vulnerable to traffic and erosion during decommissioning. The movement of materials off-site may involve the construction of temporary roads and use of large vehicles. Similar measures to those outlined for the construction phase will need to be taken to minimize impacts on soils. Reinstatement of land and after-care will be critical to mitigating the damage to soils.

The panels and supports will be dismantled and steel and other useful materials will be recycled. Inert materials which cannot be recycled will be taken to a suitable disposal site. However, foundations and other inert belowground materials will be buried. This is not likely to have a significant impact on soils as it will not prevent re-vegetation or restoration of land.

8.3.11 Forgone Project Benefits

As noted in Section 8.3.3 above, the benefits resulting from the project activities would cease at decommissioning. This includes power to the grid and employment opportunities. Provision of jobs for skilled and non-skilled workers would cease and therefore lost income (source of livelihood). Nevertheless, it is expected that developed capacity of the locals in terms of solar technology skills would be utilised elsewhere for potential employment opportunities.

8.4 Summary of Potential Project Impacts

Table 8-1 below presents a summary of project impacts during construction, operation and decommissioning phases of the project. The Table contains information on: Phase, impact, impact categorisation (nature), magnitude, extent and duration. Impact magnitude has been defined as: Low (minor), Medium (moderate) and High (major), depending on the scale or severity of change. Impact extent is defined based on geography as: site-specific, if it occurs on site; local if it occurs outside the site by within the project locality, or regional, if it occurs far away from the project site and locality. Duration of impacts is defined as short term if it is less than 2 years; medium term if it is between 2-5 years and long term if it is more than 5 years.

Table 8-1: Summary of Anticipated Impacts

Phase	Impact	Nature	Magnitude	Extent	Duration
Construction Phase	Employment creation	Positive	Low	Local	Short Term
	Improved local infrastructure	Positive	Low	Local	Medium Term
	Improvement of local economy	Positive	Medium	Regional	Long Term
	Community Empowerment	Positive	High	Local	Long Term
	Capacity building and skills transfer	Positive	High	Local	Long Term
	Loss of vegetation/biodiversity	Negative	Low	Site Specific	Short Term
	Solid and Liquid wastes	Negative	Low	Site Specific	Short Term
	Change in ambient air quality	Negative	Low	Site Specific	Short Term
	Change in land use	Negative	Low	Local	Short Term
	Visual and landscape impacts	Negative	Low	Local	Short Term
	Impact on archaeology/cultural heritage	Negative	Low	Local	Medium Term
	Impact from solid and liquid waste	Negative	Low	Site Specific	Short Term
	Noise and vibration	Negative	Low	Site Specific	Short Term
	Occupational health and safety concerns	Negative	Low	Site Specific	Short Term
Operation Phase	Improved electrical capacity and reliability into national grid	Positive	High	Regional	Long Term
	Increased government revenue in terms of levies	Positive	High	Regional	Long Term

Phase	Impact	Nature	Magnitude	Extent	Duration
	Employment opportunities	Positive	Medium	Regional	Long Term
	Capacity building skills transfer	Positive	Low	Local	Long Term
	Solid and Liquid Wastes	Negative	Low	Site Specific	Long Term
	Visual and landscape impacts	Negative	Low	Local	Long Term
	Hazardous Wastes	Negative	Low	Site Specific	Long Term
	Occupational health and safety hazards	Negative	Low	Site Specific	Long Term
Decommissioning Phase	Rehabilitation	Positive	Medium	Site Specific	Long Term
	Employment creation	Positive	Low	Local	Short Term
	Solid waste generation	Negative	Low	Local	Short Term
	Occupational health hazards	Negative	Low	Local	Short Term
	Loss of employment	Negative	Medium	Regional	Medium Term
	Disruption of social structure and amenities	Negative	Medium	Local	Medium Term
	Noise impacts	Negative	Low	Local	Short Term
	Forgone project benefits	Negative	Medium	Region	Long Term
	Change in ambient air quality	Negative	Short Term	Local	Short Term

9 Mitigation and Enhancement Measures

The study has identified and described the potential environmental and social effects of the proposed project in Chapter 8 of this Report. This Chapter provides the mitigation measures or strategies for avoiding, reducing or minimising the anticipated negative impacts and enhancement strategies for the beneficial impacts. Proper and effective implementation of the suggested measures or strategies would lead to environmental and social sustainability of the proposed project development. The mitigation measures have been discussed for each project phase.

9.1 Construction Phase Mitigation Measures

Table 9-1 below provides the recommended mitigation measures to be implemented throughout the construction phase of the proposed project to avoid, reduce or minimise the identified potential negative impacts. Proper and effective implementation of these measures will make the identified potential negative impacts during construction insignificant.

Table 9-1: Recommended Mitigation Measures during Construction

Potential Negative Impact	Recommended Mitigation Measures
Loss of vegetation cover and biodiversity	▪ Implement proper management measures to prevent damage to biodiversity within the proposed project site ▪ Ensure proper demarcation and delineation of the project construction site ▪ Develop a plan to maintain the indigenous vegetation during construction ▪ Develop a plan to improve the quality of vegetation around the project site ▪ Designate access routes and a parking area within the site to reduce vegetation disturbance ▪ Ensure regular inspection of construction works
Liquid Wastes	▪ Develop a Wastewater Management Plan for use at the site in line with wastewater management regulations and water quality regulations ▪ Ensure proper storage of wastewater at the site before disposal to a designated facility by a contracted waste handler registered by NEMA ▪ Prohibit illegal disposal of wastewater into water resources around the project site ▪ Ensure regular inspection of wastewater management practices within the solar farm to check for compliance ▪ Ensure there is proper and adequate sanitation facilities on during construction

Potential Negative Impact	Recommended Mitigation Measures
Change in Ambient Air Quality	▪ Control the speed limit for all motor vehicles coming to or leaving the construction site ▪ Train all workers on the management of air pollution from vehicles and machinery ▪ Prohibit engine idling and over revving of construction vehicles and machinery to minimise emissions ▪ Sprinkle water at the construction site and on access roads to minimize fugitive dust during dry weather conditions ▪ Ensure regular inspection and scheduled maintenance for all construction vehicles and machinery ▪ Provide workers with dust masks at all times when working in dusty conditions ▪ Continuously monitor dust emission levels at construction site ▪ Ensure the vehicles transporting loose materials like soil and cement are properly covered
Solid Waste	▪ Develop and implement a Solid Waste Management Plan before commencement of construction activities in line with the governing regulations ▪ Train workers on proper solid waste management practices ▪ Segregate all solid wastes at source ▪ Re-use, re-cycle or reduced solid waste generation onsite to the extent possible ▪ Dispose all construction wastes that cannot be recycled or reused to a NEMA approved licensed solid waste disposal sites in Meru County using a licensed refuse handler ▪ Provide facilities for proper handling and storage of wastes at designated points ▪ Do not leave wastes on site at the end of the work ▪ Provide adequate number of properly contained litter bins and containers properly marked with type of wastes ▪ Strictly prohibit burning or dumping of any wastes at the site ▪ Perform regular inspection of solid waste management practices onsite.
Hazardous Wastes	▪ Develop and implement Hazardous Waste Management Plan, especially for oil, in line with the governing regulations ▪ Train site workers on proper hazardous waste management ▪ Segregate site wastes by separating hazardous waste from non-hazardous waste ▪ Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow

Potential Negative Impact	Recommended Mitigation Measures
	▪ Ensure that hazardous materials are stored in proper areas, where they cannot reach land in case of any spillage. ▪ Incorporate dripping pans at machinery, equipment and area prone to contamination by leakage of hazardous materials such as oil and fuel ▪ Regular maintenance of all equipment and machines used onsite so as to minimise leakage of hazardous materials ▪ Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations ▪ Undertake regular inspection of hazardous waste management practices onsite. ▪ Strictly prohibit illegal disposal of hazardous wastes onsite ▪ Store hazardous materials in designated areas secured with a fence
Security concerns	▪ Develop and implement Site Security Plan ▪ Train workers on the importance of site security ▪ Employ a day and a night time security guards for the solar farm. ▪ Fence the entire solar farm to restrict entrance to the site ▪ Train the onsite guards to adequately handle trespass incidents ▪ Inspect the fence around the facility regularly and seal all loopholes ▪ Ensure adequate lighting within and around the solar farm ▪ Regularly check and maintain security lights at the site
Noise and Vibration	▪ Restrict all construction activities to day time during normal working hours ▪ Conduct construction activities within the maximum permitted noise levels ▪ Provide prior information to the community of any planned noisy activity that is likely to exceed the permitted noise levels ▪ Strictly ensure the use of Protective Personal Equipment at all times while on site such as use of silencers and ear mufflers by employees ▪ Regularly monitor noise levels to comply with permitted maximum levels ▪ Inspection of activities during construction by carrying out regular Noise level test. ▪ Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite. ▪ Undertake regular inspection and scheduled maintenance program for all vehicles and machineries on site.

Potential Negative Impact	Recommended Mitigation Measures
	▪ Adopt and follow best practicable means to ensure that the quietest available plant and construction techniques are used.
Archaeology and National Heritage	▪ Develop and implement a Chance Find Plan and Procedure ▪ Train workers on the importance of archaeological and cultural resources and how to deal with them. ▪ Employ an archaeologist during top soil stripping (trenching) to monitor chance find archaeological remains. ▪ In case of chance find, the work should be halted and the area protected and the matter reported immediately to the National Museums of Kenya's for appropriate action.
Visual and Landscape	▪ Develop and implement a Site Rehabilitation and Landscaping plan to restore the site to a better visual state after construction ▪ Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm. ▪ Restore natural vegetation through planting of indigenous ▪ Ensure proper storage, regular collection and disposal of waste streams generated. ▪ Carry out the facility inspection work on regular basis ▪ Minimize the use of project construction signage. Necessary signage should be made of non-glare materials and unobtrusive colours. ▪ Remove in a timely manner all the construction machinery, equipment and vehicles that are not in use and keep them in specific locations within the project site. ▪ Use dust suppressors to minimize impacts of vehicular traffic and wind on roads and exposed soils. ▪ Ensure proper storage, collection and disposal of waste streams generated. ▪ Undertake regular inspection of site construction activities
Occupational Health and Safety	▪ Develop and implement an Occupational Health and Safety Plan for use during construction in line with governing regulations ▪ Train employees on the importance of occupational health and safety requirements and develop work instruction ▪ Provide workers with appropriate Personal Protective Clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls for use during construction ▪ Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning ▪ Regular medical checks

Potential Negative Impact	Recommended Mitigation Measures
	▪ Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing, at all times ▪ Provision and placement of appropriate fire extinguishers and training personnel on their use ▪ Put clear signage to restricted areas in English and local language ▪ Prohibit unauthorised persons from entering the site through installation of a perimeter fence. ▪ Undertake regular inspection to ensure compliance with OSHA, 2007. ▪ Report all incidences of accidents or near misses and keep proper records of the actions taken. ▪ Promote HIV/AIDs Awareness

9.2 Operation Phase Mitigation Measures

Mitigation measures to be implemented throughout the operation phase of the proposed project to avoid, reduce or minimise the identified potential negative impacts are summarised in Table 9-2 below. Proper and effective implementation of these measures will make the identified potential negative impacts during operation insignificant.

Table 9-2: Recommended Mitigation Measures during Operation

Potential Negative Impact	Recommended Mitigation Measures
Liquid Wastes	▪ Develop and implement Liquid Waste Management Plan in line with the governing regulations ▪ Train employees on the importance of proper liquid waste management and water resource management ▪ Reduce, reuse or re-cycle all liquid waste generated onsite to the extent possible ▪ Dispose all liquid wastes that cannot be recycled or reused to NEMA approved liquid waste disposal facilities through a licensed transporter ▪ Prohibit illegal disposal of wastewater into waste resources. ▪ Conduct inspection of wastewater management practices to check for compliance ▪ Emphasize on proper sanitation during operation phase of the project.
Solid Wastes	▪ Develop and implement Solid Waste Management Plan for the operation phase in line with the governing regulations ▪ Train employees on the importance of proper solid waste management

Potential Negative Impact	Recommended Mitigation Measures
	▪ Reduce, reuse or re-cycle all solid waste generated to the extent possible ▪ Dispose all solid wastes that cannot be recycled or reused to NEMA approved solid waste disposal sites within Meru County using a licensed refuse handler ▪ Maintain proper records of solid wastes to monitor the quantity and types of waste generated on site ▪ Provide adequate waste bins and containers at specific places and ensure they are properly marked with type of wastes ▪ Perform regular inspection of waste management practices onsite
Visual Impacts	▪ Develop and implement a Site Rehabilitation and Landscaping plan to restore the site to a better visual state ▪ Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm. ▪ Restore natural vegetation through planting of indigenous ▪ Ensure proper storage, regular collection and disposal of waste streams generated. ▪ Carry out the facility inspection work on regular basis
Hazardous Wastes	▪ Develop and implement Hazardous Waste Management Plan in line with the governing regulations ▪ Train employees on hazardous waste management ▪ Segregate waste by separating hazardous waste from non-hazardous waste ▪ Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations ▪ Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow ▪ Prohibit illegal disposal of hazardous wastes on the solar farm during solar farm maintenance exercise. ▪ Store hazardous materials in designated areas secured with a fence ▪ Undertake regular inspection of hazardous waste management practices onsite.
Occupational Health and Safety	▪ Develop and implement an Occupational Health and Safety Plan ▪ Train employees on the importance of occupational health and safety ▪ Ensure compliance with the governing regulations ▪ Install a fence regularly by netting breakages in order to prevent accidents involving local inhabitants or wildlife ▪ Fence the entire solar farm to prohibit unauthorized persons from accessing the site ▪ Provide workers with appropriate Personal Protective Clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls.

Potential Negative Impact	Recommended Mitigation Measures
	▪ Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning ▪ Regular medical checks ▪ Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing ▪ Put clear signage to restricted areas in English and local language to reduce risk of accidents ▪ Undertake regular inspection of the plant ▪ Promote HIV/AIDs Awareness

9.3 Decommissioning Phase Mitigation Measures

Provided in Table 9-3 below are mitigation measures to be implementation throughout the operation phase of the proposed project to avoid, reduce or minimise the identified potential negative impacts. Proper and effective implementation of these measures will make the identified potential negative impacts during decommissioning insignificant.

Table 9-3: Recommended Mitigation Measures at Decommissioning

Potential Negative Impact	Recommended Mitigation Measures
Solid Wastes	▪ Develop and implement a Solid Waste Management Plan (SWMP) before decommissioning commencement in line with the governing regulations ▪ The waste streams generated should be re-used, re-cycled and reduced to the extent possible ▪ Dispose all demolition waste that cannot be recycled or reused to a licensed waste disposal site using a licensed waste handler ▪ Rehabilitate the site as appropriate using indigenous vegetation species for landscaping to restore biodiversity
Occupational Health and Safety	▪ Develop and implement an Occupational Health and Safety Plan ▪ Train employees on the importance of occupational health and safety ▪ Provide workers with appropriate Personal Protective Clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls. ▪ Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning ▪ Regular medical checks ▪ Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing ▪ Put clear signage to restricted areas in English and local language

Potential Negative Impact	Recommended Mitigation Measures
	▪ Prohibit unauthorised persons at the site during decommissioning ▪ Promote HIV/AIDs Awareness throughout the decommissioning period
Change in Ambient Air Quality	▪ Train all workers on the management of air pollution from vehicles and machinery ▪ Strictly control the speed limit for all motor vehicles during the demolition exercise. ▪ Sprinkle water on dusty places onsite and on dust to reduce fugitive dust emissions ▪ Provide workers with dust masks
Noise Impact	▪ All the decommissioning activities will be done during daytime ▪ The contractor will be kept informed by the community of any noise or vibration complaints. ▪ Conduct demolition activities in line with the maximum permitted noise levels ▪ Inspection of activities during decommissioning by carrying out regular Noise level test. ▪ Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite. ▪ Develop a regular inspection and scheduled maintenance program for vehicles and machineries in order to abate the noise produced

9.4 Enhancement Measures

9.4.1 Livelihood Benefits

To enhance livelihood benefits the Proponent is recommended to:

i. Give priority to the local community in terms of employment and/or contract opportunities
ii. Provide equal employment opportunities to both men and women
iii. Use locally available materials to the extent possible
iv. Identify the number of job opportunities targeted to the local community
v. Develop a transparent recruitment manual specifying the needed skills set
vi. Advertise available job opportunities in public places around the project site
vii. Train the workers and community members, especially those that might receive direct financial compensation, on sound financial management

9.4.2 Community Development Benefits

To enhance community development benefits the Proponent is recommended to:

i. Conduct a community needs analysis in consultation with the local stakeholders to investigate and assess the current and future development needs of the community. This would allow prioritisation of development requirements for effective programming.
ii. Develop through a participatory process, a community development plan that identifies areas that the project can support in terms of community development.

10 Environmental and Social Management Plan

10.1 Introduction

This ESIA Report has summarised the EIA process undertaken to identify the impacts that will arise from the Project construction and operation and the mitigation measures required to prevent or reduce these. During the detailed design stage, further consultations and surveys will be undertaken to refine the design and construction techniques. One of the key mechanisms for environmental management during the design and construction stages is the Environmental and Social Management Plan (ESMP) and associated subject plans which will be developed by the Proponent. The ESMP provides a framework for the management of the identified impacts to improve the efficacy of the mitigation and enhancement measures.

10.2 Roles and Responsibilities

The overall responsibility for the implementation of the project's ESMP rests with the Proponent. The Proponent is responsible for reviewing the reporting and auditing requirements to ensure that the implementation of mitigation measures meet the requirements stipulated within project's ESMP.

During construction, the implementation of most parts of the ESMP will be borne by the contractor. The contractor will be required to prepare work plans for environmental management in line with this Project's ESMP and any other condition that may be imposed by NEMA for the development of the proposed project. The contractor will also develop action plans and standard procedures for use at the site. The Proponent will maintain a monitoring and oversight role to ensure that the contractor's obligations as set out in the ESMP are followed.

10.3 Solarcentury East Africa Environmental and Social Management Plan (ESMP)

The ESMP has been developed for each of the proposed project phases. Tables 10-1, 10-2 and 10-3 present the ESMP for the proposed project during construction, operation and decommissioning phases respectively. The ESMP details the identified project impact, mitigation measures, monitoring indicator, responsible party, monitoring means and monitoring frequency.

These standards form the basis against which the site will be measured during environmental audits. The primary purpose of this document is to act as the mechanism by which the project developer and sub-contractors will incorporate the requirements of the ESIA together with Equator Principles and IFC Performance Standards into the construction and operation of the solar farm.

This ESMP for the Project enables factors that affect solar farm construction, operation and decommissioning to be addressed.

The document sets a number of objectives to ensure that the site is operated in an environmentally acceptable manner through managing the site's significant environmental aspects. The scope of this ESMP for the Project includes all activities, whether conducted by the Proponent and sub-contractors that are part of the construction, operation and decommissioning of the Project. It will be detailed in all contractor's contracts that they will have to demonstrate compliance with the sections of this ESMP relevant to their activities.

Each significant aspect has one or more objectives, which are followed by mitigation measures to ensure that the objectives are met through operational controls. The ESMP will be set out key action items to ensure appropriate mitigation is implemented.

An Environmental Manager will be established to communicate progress of site operations and report the internal environmental performance audit results during the construction phase.

10.3.1 Implementation of the ESMP

In order to successfully implement the ESMP, the following key tasks will be undertaken:

- Preparation of audit checklist based on the targets and objectives.
- Undertake inspection/audit of site and project operations, including records of training and waste management practises.
- Prepare a report detailing areas of compliance/non-compliance.
- Prepare a list of actions (action plan) to address non-compliances with associated timescales for completion.
- Audit the actions to ensure issues have been addressed.

It will be the responsibility of the Proponent to monitor the effectiveness of the Project ESMP and identify improvement actions as necessary.

Table 10-1: ESMP for the Construction Phase

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
Loss of vegetation cover and biodiversity	• Implement proper management measures to prevent damage to biodiversity within the proposed project site • Ensure proper demarcation and delineation of the project construction site • Develop a plan to maintain the indigenous vegetation during construction • Develop an appropriate landscaping plan and use indigenous vegetation for landscaping to preserve floral diversity • Designate access routes and a parking area within the site to reduce vegetation disturbance • Ensure regular inspection of construction works	• Rehabilitation and landscaping plan • Acres of land rehabilitated • Designated parking areas on site • Number of inspection reports	• Contractor • Proponent	• Survey Report • Site Inspection Reports	Once, at Construction
Liquid Wastes	• Develop a wastewater management plan for use at the site in line with wastewater management regulations and water quality regulations • Ensure proper storage of wastewater at the site before disposal to a designated facility by a contracted waste handler registered by NEMA • Prohibit illegal disposal of wastewater into water resources around the project site • Ensure regular inspection of wastewater management practices within the solar farm to check for compliance • Ensure there is proper and adequate sanitation facilities at the site during construction	• Wastewater Management Plan • Quantity of liquid waste generated • Quantity of liquid waste correctly disposed to NEMA Approved disposal sites • Number of Waste storage facilities at the site • Number of Sanitation facilities on site • Number of completed inspection missions	• Contractor • Proponent • NEMA • Licensed liquid waste transporter	• Waste Management Plan and Inventory • Inspection	Continuous
Change in Air Quality	• Control the speed limit for all motor vehicles coming to or leaving the construction site • Train all workers on the management of air pollution from vehicles and machinery • Prohibit engine idling and over revving of construction vehicles and machinery to minimise emissions • No dust visible at distances over 50m	• Number of Vehicles on site • Quantity of dust emitted • Quantity of emissions emitted • Workers trained on air quality management	• Contractor • Proponent • NEMA	• Air Quality Monitoring Reports • Vehicle speed limit reports • Inspection	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
	• Sprinkle water at the construction site and on access roads to minimize fugitive dust during dry weather conditions • Ensure regular inspection and scheduled maintenance for all construction vehicles and machinery • Provide workers dust masks at all times when working in dusty conditions • Continuously monitor dust emission levels at construction site • Ensure the vehicles transporting loose materials like soil and cement are properly covered	• Number of completed inspection missions			
Solid Wastes	• Develop and implement a Solid Waste Management Plan before commencement of construction activities in line with the governing regulations • Train workers on proper solid waste management practices • Segregate all solid wastes at source • Re-use, re-cycle or reduce solid waste generation onsite to the extent possible • Dispose all construction wastes that cannot be recycled or reused to a NEMA approved licensed solid waste disposal site within Meru County using a licensed refuse handler • Provide facilities for proper handling and storage of wastes at designated points • Do not leave wastes on site at the end of the work • Provide adequate number of properly contained litter bins and containers properly marked with type of wastes • Strictly prohibit burning or dumping of any wastes at the site • Perform regular inspection of solid waste management practices onsite.	• Solid Waste Management Plan • Quantity of solid waste generated • Number of solid waste storage facilities on site • Quantity of solid waste correctly disposed to NEMA Approved disposal sites • Number of completed inspection missions	• Contractor • Proponent • Licensed solid waste transporter	• Solid Waste Management Plan • Regular inspection • Solid Waste Manifest	Continuous
Hazardous Wastes	• Develop and implement Hazardous Waste Manage Plan in line with the governing regulations • Train site workers on proper hazardous waste management • Segregate site wastes by separating hazardous waste from non-hazardous waste • Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow	• Hazardous Waste Management Plan developed and implemented • Number of Trained Workers on Hazardous Waste Management	• Contractor • Proponent • Licensed hazardous waste transporter	• Inspection Reports • Hazardous Waste Management Plan and Inventory	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
	• Ensure that hazardous materials are stored in proper areas, where they cannot reach land in case of any spillage. • Incorporate dripping pans at machinery, equipment and area prone to contamination by leakage of hazardous materials such as oil and fuel • Regular maintenance of all equipment and machines used onsite so as to minimise leakage of hazardous materials • If applicable, containers for storing chemicals or fuels should be securely bundled, labelled and disposed in line with the governing regulations • Undertake regular inspection of hazardous waste management practices onsite. • Strictly prohibit illegal disposal of hazardous wastes onsite • Store hazardous materials in designated areas secured with a fence	• Amount of Hazardous Waste Segregated • Quantity of accidental hazard spillage • Quantity of hazardous correctly disposed • Number of completed inspection missions			
Security concerns	• Develop and implement Site Security Plan • Train workers on the importance of site security • Employ a day and a night time security guards for the solar farm. • Fence the entire solar farm to restrict entrance to the site • Train the onsite guards to adequately handle trespass incidents • Inspect the fence around the facility regularly and seal all loopholes • Ensure adequate lighting within and around the solar farm • Regularly check and maintain security lights at the site	• Site Security Plan developed and implemented • Number of Security personnel employed • Site Fence • Trained workers on site security • Number of inspection missions	• Contractor • Proponent • Security Personnel	• Inspection • Security reports and intelligence	Construction Phase
Noise and Vibration	• Restrict all construction activities to day time during normal working hours • Conduct construction activities within the maximum permitted noise levels • Provide prior information to the community of any planned noisy activity that is likely to exceed the permitted noise levels • Strictly ensure the use of protective personal equipment at all times while on site and noise reduction techniques such as silencers and ear mufflers to employees • Regularly monitor noise levels to comply with permitted maximum levels	• Noise monitoring devices procured and installed on site • Levels of noise and vibration produced at the site • Number of PPE procured and being used by workers • Number of Noise complaints received	• Contractor • Proponent • NEMA	• Noise Monitoring Reports • Inspections	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
	• Inspection of activities during decommissioning by carrying out regular Noise level test. • Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite. • Undertake regular inspection and scheduled maintenance program for all vehicles and machineries on site • Adopt and follow best practicable means to ensure that the quietest available plant and construction techniques are used	• Maintenance procedure for vehicles and machinery • Number of inspection missions completed			
Archaeology and National Heritage	• Develop and implement a Chance Find Plan and Procedure • Train workers on the importance of archaeological and cultural resources and how to deal with them. • Employ an archaeologist during top soil tripping (trenching) to monitor for chance find archaeological remains. • In case of chance find, the work should be halted and the area protected and the matter reported immediately to the National Museums of Kenya's for appropriate action.	• Chance Find Plan and Procedure • Number of recorded chance finds • Number of inspections mission on site	• Contractor • Proponent • National Museum of Kenya	• Chance find procedure and reports • Inspections	Continuous
Visual and Landscape	• Develop and implement a site rehabilitation and landscaping plan to restore the site to a better visual state after construction • Restore natural vegetation through planting of indigenous • Ensure proper storage, regular collection and disposal of waste streams generated. • Carry out the facility inspection work on regular basis • Minimize the use project construction signage. Necessary signage should be made of non-glare materials and unobtrusive colours. • Remove in a timely manner all the construction machinery, equipment and vehicles that are not in use and keep them in specific locations within the project site. • Ensure proper storage, collection and disposal of waste streams generated. • Undertake regular inspection of site construction activities	• Site rehabilitation and landscaping plan developed and implemented • Availability of waste management plan developed and implemented • Site inspection missions completed	• Contractor • Proponent	• Inspection reports • Waste Management Plan	Continuous
Occupational Health and Safety	• Develop and implement an Occupational Health and Safety Plan for use during construction in line with governing regulations • Train employees on the importance of occupational health and safety requirements and develop work instruction	• Occupational Health and Safety Plan developed and implemented	• Contractor • Proponent • NEMA	• Inspection reports • Record of accidents and near misses	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
	• Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls for use during construction • Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning • Regular medical checks • Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing, at all times • Provision and placement of appropriate fire extinguishers and training personnel on their use • Put clear signage to restricted areas in English and local language • Prohibit unauthorised persons from entering the site through installation of a perimeter fence. • Undertake regular inspection to ensure compliance with OSHA, 2007. • Report all incidences of accidents or near misses and keep proper records of the actions taken. • Promote HIV/AIDs Awareness	• Number of workers trained on occupational health and safety • PPE procured and being used by the workers • Fire extinguishing facilities on site • First aid kit on site • Signage installed on site • Number of inspection missions competed		• Corrective Action Reports	

Table 10-2: ESMP for the Operation Phase

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
Liquid wastes	• Develop and implement Liquid Waste Management Plan in line with the governing regulations • Train employees on the importance of proper liquid waste management and water resource management • Reduce, reuse or re-cycle all liquid waste generated onsite to the extent possible • Dispose all liquid wastes that cannot be recycled or reused to NEMA approved liquid waste disposal facilities a licensed transporter • Prohibit illegal disposal of wastewater into waste resources. • Conduct inspection of wastewater management practices to check for compliance • Emphasise on proper sanitation during operation phase of the project.	• Liquid Waste Management Plan Developed and Implemented • Quantity of liquid waste generated • Quantity of liquid waste correctly disposed to NEMA Approved disposal sites • Number of Waste storage facilities the plant • Number of Sanitation facilities on at the plant • Number of Audits completed	• Proponent • NEMA • Licensed hazardous waste transporter	• Waste Management Plan and Inventory • Inspection reports • Audit Reports	Continuous
Solid Wastes	• Develop and implement Solid Waste Management Plan for the operation phase in line with the governing regulations • Train employees on the importance of proper solid waste management • Reduce, reuse or re-cycle all solid waste generated to the extent possible • Dispose all solid wastes that cannot be recycled or reused to NEMA approved solid waste disposal sites in Meru County using a licensed refuse handler • Maintain proper records of solid wastes to know the quantity of wastes generated on site • Provide adequate waste bins and containers at specific places and ensure they are properly marked with type of wastes • Perform regular inspection of waste management practices onsite	• Solid Waste Management Plan developed and implemented • Quantity of solid waste generated • Number of solid waste storage facilities at the plant • Quantity of solid waste correctly disposed to NEMA Approved disposal sites • Number of completed inspection missions • Annual audits	• Proponent • NEMA • Licensed hazardous waste transporter	• Solid waste management Plan and inventory • Inspection Reports • Audit Reports	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
Visual Impacts	• Develop and implement a site rehabilitation and landscaping plan to restore the site to a better visual state • Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm. • Restore natural vegetation through planting of indigenous trees • Ensure proper storage, regular collection and disposal of waste streams generated. • Carry out the facility inspection work on regular basis	• Site rehabilitation and landscaping plan developed and implemented • Availability of waste management plan developed and implemented • Site inspection missions completed • Annual audits	• Proponent.	• Inspection Reports • Grievance Reports • Audit Reports	Continuous
Hazardous Wastes	• Develop and implement Hazardous Waste Manage Plan in line with the governing regulations • Train employees on Hazardous waste management • Segregate waste by separating hazardous waste from non-hazardous waste • If applicable, containers for storing chemicals or fuels should be securely bundled, labelled and disposed in line with the governing regulations • Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow • Prohibit illegal disposal of hazardous wastes on the solar farm during solar farm maintenance exercise. • Store hazardous materials in designated areas secured with a fence • Undertake regular inspection of hazardous waste management practices onsite.	• Hazardous Waste Management Plan developed and implemented • Number of Trained Workers on Hazardous Waste Management • Amount of Hazardous Waste Segregated • Quantity of accidental hazard spillage • Quantity of hazardous waste correctly disposed • Number of completed inspection missions Annual Audits	• Proponent • NEMA • Licensed hazardous waste transporter	• Inspection Reports • Hazardous Waste Management Plan and Inventory • Audit Reports	Continuous
Occupational Health and Safety	• Develop and implement an Occupational Health and Safety Plan • Train employees on the importance of occupational health and safety • Ensure compliance with the governing regulations • Install a fence regularly by netting breakages in order to prevent accidents involving local inhabitants or wildlife • Fence the entire solar farm to prohibit unauthorized persons from accessing the site	• Occupational Health and Safety Plan developed and implemented • Number of employees trained on occupational health and safety • PPE procured and being used by the employees	• Proponent • NEMA	• Inspection reports • Record of accidents and near misses • Corrective Action Reports	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
	• Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls. • Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning • Regular medical checks • Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing • Put clear signage to restricted areas in Kiswahili, English and local language to reduce risk of accidents • Undertake regular inspection of the plant • Promote HIV/AIDs Awareness	• Fire extinguishing facilities at the plant • First aid kit on site • Signage installed at the plant • Number of inspection missions competed • Annual Audits			

Table 10-3: ESMP for the Decommissioning Phase

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
Solid Wastes	• Develop and implement a Solid Waste Management Plan (SWMP) before decommissioning commencement in line with the governing regulations • The waste streams generated should be re-used, re-cycled and reduced to the extent possible • Dispose all demolition waste that cannot be recycled or reused to a licensed waste disposal site using a licensed waste handler • Rehabilitate the site as appropriate using indigenous vegetation species for landscaping to restore biodiversity	• Solid Waste Management Plan • Quantity of solid waste generated • Number of solid waste storage facilities on site • Quantity of solid waste correctly disposed to NEMA Approved disposal sites • Number of completed inspection missions	• Contractor • Proponent • Licensed hazardous waste transporter	• Solid waste management Plan and inventory • Inspection Reports	Continuous
Occupational Health and Safety	• Develop and implement an Occupational Health and Safety Plan • Train employees on the importance of occupational health and safety • Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls. • Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning • Regular medical checks • Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing • Put clear signage to restricted areas in Kiswahili, English and local language • Prohibit unauthorised persons at the site during decommissioning • Promote HIV/AIDs Awareness	• Occupational Health and Safety Plan developed and implemented • Number of workers trained on occupational health and safety • PPE procured and being used by the workers • First aid kit on site • Signage installed on site • Number of inspection missions competed	• Contractor • Proponent	• Inspection reports • Record of accidents and near misses • Corrective Action Reports	Continuous
Change in Ambient Air Quality	• Train all workers on the management of air pollution from vehicles and machinery • Strictly control the speed limit for all motor vehicles during the demolition exercise. • Sprinkle water on dusty places onsite and on dust to reduce fugitive dust emissions	• Number of Vehicles on site • Quantity of dust emitted • Quantity of emissions emitted	• Contractor • Proponent	• Air Quality Monitoring Reports • Inspection reports	Continuous

Impact	Mitigation Measures	Monitoring Indicator	Responsibility	Monitoring Means	Frequency
	• Provide workers with dust masks	• Workers trained on air quality management • Number of completed inspection missions			
Noise Impact	• All the decommissioning activities will be undertaken during daytime hours • The contractor will be kept informed by the community of any noise or vibration complaints. • Conduct demolition activities in line with the maximum permitted noise levels • Inspection of activities during decommissioning by carrying out regular Noise level test. • Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite. • Develop a regular inspection and scheduled maintenance program for vehicles and machineries in order to abate the noise produced	• Noise monitoring devices procured and installed on site • Levels of noise and vibration produce at the site • Number of PPE procured and being used by workers • Number of Noise complaints received • Maintenance procedure for vehicles and machinery • Number of inspection missions completed	• Contractor • Proponent	• Noise Monitoring Reports • Inspections	Continuous

10.3.2 Other Plans

A number of additional plans will require to be produced by the EPC contractor in support of the ESMP. These plans will provide a system against which to monitor and audit environmental performance. The plans will detail the practical methods required to ensure work is completed in accordance with current best practice, the mitigation measures in this ESIA and legislative and regulatory requirements.

10.3.3 Method Statements

In addition to the above, Project-specific Method Statements and a variety of detailed site-specific plans will be produced to cover the detailed construction methodologies to be employed for all main construction activities.

10.3.4 Health and Safety

The Proponent will require its contractors to comply with international Occupational Health & Safety regulations and standards (for example, EU Directive 89/3918 and OSHA9 standards) in addition to Kenyan safety standards regarding construction works, electrical works, structural climbing and other hazards. In general, construction operations will be planned and implemented in accordance with these standards and with IFC safety guidelines.

There will be a workforce manager in charge of all activities, and in charge of compliance with health and safety requirements. This individual will report directly to the Proponent project manager and will have independent lines of reporting to the Proponent's upper management. Prior to beginning work on the site, the workforce manager will develop a safety program to cover construction and then operation of the site. The program will describe in detail the potential hazards and the ways in which they will be prevented or avoided. All construction workers (including contractors) will be required to complete a training program that covers the safety program, and training will cover hazard awareness, job- and site-specific hazards, emergency procedures for fire, illness or injury, and natural disaster.

Besides training, the safety program will include detailed requirements for inspecting, testing, and calibrating safety equipment, for monitoring the working environment for hazards, and for monitoring worker health. In addition, all incidents and accidents will be recorded if they resulted, or nearly resulted, in damage to equipment or injury or to humans or animals, will be recorded. On an annual basis, the Proponent will report to the lenders and shareholders on the status of the overall safety program, including information on training and on incidents.

Beyond the safety program, the Proponent will compensate farmers for livestock that may be killed as a result of site-related traffic.

Workplace inspections will be undertaken on a regular basis to monitor H&S aspects on site.

10.3.5 Environmental Notices

Posters and notices shall be used as appropriate to communicate nuisance abatement, environmental protection and waste management issues, such as the Contractor's environmental policy, environmental objectives, site-layout plans, and good and bad environmental practices to the workforce and interested parties.

Notice boards shall be established at strategic locations within the site and at the boundary where it interfaces with the general public.

The project environmental coordinator or nominee will be responsible for maintaining the information on the notice boards up-to-date.

10.3.6 Environmental Audit

Environmental audits are fundamental to ensuring that the actions for each objective contained within the ESMP are established and maintained on the Project. Audits will take place provisionally every month from the start of the construction works.

Before an audit the following documents will be consulted in order to check conformance where applicable:

- Consents and licences.
- Planning Permission and conditions.
- Records of any previous environmental audits, non-conformance notices, complaints and environmental incidents.

The measures to control significant aspects outlined in the ESMP and their effective implementation will be checked during regular environmental audits of the site, during the site construction phase.

The local government environmental official, representatives from the local community and liaison committee members will be invited to attend the audits.

The results of the audit will be recorded on the environmental audit report and any non-conformances found will be formally recorded along with the action required.

Each non-conformance will be issued to the relevant person/s to take the corrective / preventative action detailed within an agreed timescale.

The Environment Manager will monitor the progress of actions and once action has been taken it will be checked and if satisfactory the non-conformance will then be closed out. If there are any outstanding actions at the next audit, these will be priority items to check.

The audit results will be reported at the site liaison committee.

10.3.7 Environmental Monitoring

A programme of Environmental and Social Monitoring will be undertaken in order to verify the effectiveness of the proposed mitigation measures in reducing impacts and also to allow mitigation measures to be refined or developed as needed to further address potential impacts or to develop plans for future development. More specifically, the objectives of the monitoring program are to:

- Record project impacts during construction and operation.
- Meet legal and community obligations.
- Evaluate the effectiveness of the mitigation measures and identify any shortcomings.
- Allow refinement and enhancement of mitigation measures to further reduce impacts.
- Allow identification unforeseen issues or changes in operations and provide information for development of mitigation measures to deal with those issues or changes.

The environmental and social monitoring program was developed in accordance with the best international practices for the solar energy sector.

Details of monitoring together with results will be summarised in a monitoring report which will be submitted to the Lenders for approval. Each monitoring report will cover a period of three months and will be submitted one month subsequent to the end of that monitoring period.

1.1.1 Review of ESMP

The ESMP will be reviewed periodically during construction. This is likely to occur on a two-monthly basis. During the first year of operation, the ESMP will be reviewed every six months. Following this period, the ESMP will be reviewed annually.

The results of the review will be used to update the ESMP if deemed necessary to either ensure targets are met or to ensure continual improvements in environmental performance.

10.3.8 Summary

The most effective form of mitigation is to design the Project to avoid environmental impacts at source. Many environmental impacts have been avoided by sensitive layout and/or by commitment to the use of particular construction techniques and mitigation measures. In addition, construction and reinstatement techniques, that minimise environmental impacts, are well established.

The ESMP will ensure that the requirements detailed within this ESIA together with the Equator Principles and IFC Performance Standards are incorporated into the construction and operation of the Project.

11 Monitoring, Evaluation and Reporting

Monitoring, evaluation and reporting is vital for any plan. Consequently, the success of the ESMP will depend on effective monitoring, evaluation and reporting system. The system will ensure that mitigation measures or strategies are implemented effectively, allow response to new and developing issues of concern in a timely manner and provide feedback on significant environmental changes for remedial actions. This chapter presents the monitoring, evaluation and reporting arrangements for the ESMP developed in Chapter 10 of this Report.

11.1 Monitoring

The overall objective of environmental and social monitoring is to ensure that all construction, operation and decommissioning activities comply with the legal and regulatory requirements so that all mitigation measures are implemented effectively. The items to be monitored for this ESIA will include but not limited to: Air quality, Noise Quality, Socio-economic aspects, Vegetation and Biodiversity, Wastes, Archaeological and Cultural Heritage, Occupational Health and Safety, Visual and Landscape. The key measurement indicators for these aspects are contained in the ESMP. The Proponent will employ various monitoring techniques including supervision and regular site inspections. Monitoring activities will be undertaken at two levels as discussed below.

11.1.1 Internal Monitoring

The objectives of internal monitoring will be to ensure that the ESMP is implemented correctly to meet the legal requirements as stipulated in the EMCA, 1999. It will be the responsibility of the Proponent to conduct regular internal monitoring and audits on the implementation of the ESMP. To do this, the Proponent will have to develop the capacity of its staff to carry out internal monitoring activities. Capacity building would ensure that the project staff has adequate manpower in all aspects of ESMP for effective monitoring.

Monitoring should be participatory. This may be achieved through establishment of an Environmental Monitoring Committee (EMC) that would foresee an effective mechanism for monitoring the implementation of ESMP and improving communications amongst the stakeholders. The EMC would also work with the external monitoring expert

11.1.2 External Monitoring

The Proponent will hire an external expert to carry out external monitoring. NEMA has the overall responsibility for issuing approval for the project and ensuring that their environmental guidelines are followed during project implementation. Their role therefore will be to review environmental monitoring and environmental compliance documentation submitted by the Proponent.

11.1.3 Monitoring Indicators

These are the measurements, statistics or values that provide a proximate gauge or evidence of the effects of environmental management programs or of the state or condition of the environment that could result from the implementation of the proposed project. The key environmental indicators that need to be monitored have been factored into the project's ESMP in chapter 10.

11.2 Auditing

Regular audits will enable the Proponent to evaluate the success of ESMP implementation and will provide information for corrective action. In this regard, the Proponent will undertake an Annual Audit of the ESMP and submit the report to NEMA. The main objectives of the Annual Audit will be to:

- Find out any significant environmental hazards and their existing control systems in place.
- Determine environmental and safety problems which are not adequately controlled and suggesting how the control system in place can be improved.
- Provide information that would be used to improve an environmental health and safety management system.
- Comply with the legal requirements as stipulated in the EMCA, 1999 (amended in 2015).

Additional auditing will be undertaken by the Proponent on a quarterly basis and the results used to optimise the management systems in place on site.

11.3 Reporting

Regular reporting on the progress of implementation of the ESMP will be critical in adjusting strategic directions and measuring performance. Progress reports will be made on quarterly basis. The reports will outline, in summary, the performance on key measurement indicators. The results of internal and external monitoring will be clearly documented for all the phases of the project.

12 Conclusions and Recommendations

12.1 Introduction

The aim of this study was to carry out an assessment of the proposed 10MW Lewa Solar Park Project to determine whether or not the project and the associated infrastructure would have any adverse environment and social effects. The study has been undertaken in accordance with EMCA, 1999 (amended in 2015) and the Environmental (Impact and Audit) Regulations, 2003.

The study involved an assessment of the baseline environment; review of the relevant legislation; stakeholder engagement including public participation and consultation; identification of potential environment impacts during the pre-construction, construction, operation and decommissioning phases of the project; and development of an appropriate management framework for the mitigation of negative effects associated with the proposed project.

Based on the study findings, the following conclusions have been reached; and the following recommendations made.

12.2 Conclusions

The study concludes as follows:

1. A unique specificity of the Project is that the project owners will be international environmental organisations who seek to create sustainable financing for wildlife conservation, biodiversity protection and benefit to rural communities. The owners will therefore reinject all profits from the sale of electricity to Kenya Power to fund environmental conservation in Kenya and development of the project area; Lewa Wildlife Conservancy and Borana Conservancy being two beneficiaries.
2. The proposed project will stabilise the grid power supply, which will cushion the grid against power fluctuations. Increased power supply will help improve access to electricity and thus spur investments. As a result, the project fits well into Kenya's development agenda of increased economic growth and social development in a clean and secure environment.
3. The proposed project is clean energy which will reduce Kenya's vulnerability to climate change, through a reduction in the use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and increase the carbon load. The project therefore feeds directly into Kenya's low carbon pathway strategies.

4. The proposed project will contribute in a great way to the realisation of the various GoK flagship projects under the Vision 2030, such as the Standard Gauge Railway System, Special Economic Zones, Information and Communication Technology Parks, Growing Manufacturing Sector and the LAPSSET Project, all which would require energy to operate.
5. The proposed project will create employment, improve infrastructure, spur economic growth, reduce incidences of charcoal burning, improve local capacity in renewable energy development technologies and increase GoK revenue base through levies.
6. The proposed project has potential to cause some level of negative environmental and social effects during construction, operation and decommissioning. However, there will be no significant and enduring effects to be associated with the proposed project.
7. The bulk of the potential negative effects will be during construction phase of the project. During operation, there will be no significant negative effects from the project. As such, most of the project impacts are of low magnitude, localized in extent and short-term in duration related only to specific project phases.
8. The potential negative effects of the proposed solar park can be avoided, minimised or reduced through proper implementation of the identified and recommended mitigation measures or strategies contained in the ESMP of this Report.
9. The project alternatives have been selected on the basis of sound environmental and social consideration. The project design has followed a technical and an environmental optimisation process to minimise negative impacts. The project footprint is only 70 acres (0.283 km^2). The project's power evacuation infrastructure involves the construction of only 6.5km 33 kV transmission line, which will follow an existing public (KenHa) road reserve. The 33kV transmission line is classified as low voltage with negligible or insignificant environmental consequences.

12.3 Recommendations

The general recommendation from the ESIA study is that the proposed 10MW Lewa Solar Park Project should be allowed to go ahead. In view of this and to ensure the environmental and social sustainability of the proposed project, it is recommended hat Proponent implements the following:

1. Fully implement the project's ESMP to mitigate negative impacts and enhance the positive impacts. The ESMP requires that the proposed project follows the recommended mitigation measures; and livelihood and community benefit enhancement strategies.

2. Develop internal capacity in environmental monitoring, audits and reporting to provide an enabling environment to address environmental and social issues competently, timeously, effectively and in a culturally appropriate manner. Internal capacity development may be realised through setting up an Environmental Monitoring Committee (EMC) that would foresee an effective mechanism for monitoring the implementation of ESMP and improving communications amongst the stakeholders. The EMC would also work with the external monitoring expert
3. Comply with all the relevant laws in Kenya, including subjecting the proposed project to statutory annual environmental audits under EMCA 1999 (amended in 2015) and other governing legal frameworks.
4. Develop a Human Resource Policy that would identify and prioritise local community employment opportunities to ensure gender equity in human resource recruitment.
5. Develop a Stakeholder Engagement Plan and commit to a pro-active and continuous stakeholder engagement process to address emerging project issues and to continue the enlightenment of the community on project benefits. Community engagement should be undertaken in close collaboration with the local administration (local chiefs, local sub-chiefs and the county leadership)
6. Develop a Community Development Plan through a participatory process to identify and prioritise areas of development that the proposed project can support to allow the host community share in the project benefits.
7. Establish a local project implementation committee that would bring together the neighbouring communities, county government, ward administrators, chiefs and sub chiefs. The role of such a committee would be to oversee the implementation of the ESMP throughout the project lifecycle following a participatory framework.

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ANNEXURES TO THE ESIA

Annexure I: Grid Connected System Simulation Parameters

Annexure II: Copy of the EOI Approval

Annexure III: Letter of Intent Kisima Farm Limited

Annexure IV: Kisima Land Title Deed

Annexure V: Project Implementation Schedule

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Annexure VII: Public Consultation Minutes of Meeting

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