ENVIRONMENT IMPACT ASSESSMENT REPORT

PROPOSED CONSTRUCTION OF KIKUYU ESCARPMENT FOREST RECREATION CAMP, KIAMBU COUNTY

GPS COORDINATES

LA: -1.1120568
LO: 36.6144959

THIS ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT REPORT IS SUBMITTED IN COMPLIANCE WITH PRINCIPLES OF SUSTAINABLE DEVELOPMENT, ENVIRONMENT MANAGEMENT AND COORDINATION (AMENDMENT) ACT (EMCA) 2015

PROPONENT:

ACACIA TRADERS LIMITED

P.O BOX 1123 - 0127

LIMURU

TEL: 0712 505845

AUGUST 2023[c]

LEAD EXPERT:

JOHN IRERI

NEMA REG NO. 6480

P.O BOX 54515-00200

NAIROBI, KENYA

***TEL: 0722* 613831**

EMAIL: edakenya@yahoo.com

REPORT AUTHENTICATION

This is to certify that this Environmental and Social Impact Assessment (ESIA) was commissioned by the proposed project proponent; ACACIA TRADERS LIMITED. The ESIA was carried out by Experts led by a National Environment Management Authority (NEMA) registered Environmental Impacts Assessment (EIA) lead expert. It has been professionally prepared and documented in accordance with the Environmental Management and Coordination Act (EMCA), 1999 Amended CAP 387 and the Environmental Impact Assessment and Audit Regulations 2003 revised. We do hereby confirm that to the best of our knowledge, all information contained in this report is an accurate and truthful representation of findings relating to the proposed project at the time of the assessment

LEAD EXPERT

NAME: JOHN INERI

SIGNATURE:

NEMA REGISTRATION NO: 6480

DATE: 25/08/2023

P.O BOX 54575-00200 NAIROBI

PROPONENT

ON BEHALF OF ACACIA TRADERS LIMITED

NAME: JOSEPH GITAU NDOTOKE

SIGNATURE:

DESIGNATION: DIRECTOR

DATE: 25/08/2023

P.O BOX 1123-0127 LIMURU

ACRONYMS AND ABBREVIATIONS

CFA	**Community Forest Association**
CGK	**County Government of Kiambu**
EA	**Environment Audit**
EIA	**Environment Impact Assessment**
EMCA	**Environment Management and Coordination Act**
ESMP	**Environment and Social Management Plan**
HSE	**Health, Safety and Environment**
KFS	**Kenya Forest Service**
NEMA	**National Environment Management Authority**
PPE	**Personal Protective Equipment**
SOP	**Standard Operating Procedure**
ToR	**Terms of Reference**

EXECUTIVE SUMMARY

The proposed project is located within Kikuyu Escarpment Forest, within Uplands Forest Station in Kiambu County; with a special use licence No. LIC/017/2022. The Uplands forest covers an area of 3,477.5 hectares and the proposed site is within a plantation forest made of red cedar trees mainly. It will be located off Kamandura-Maimahiu tarmac road, approximately 1.2 kilometres before the Ngubi Rangers Outpost site from Nairobi. The turnoff to the site is on the right hand side of the tarmac road; a distance of approximately 300 meters inside the plantation forest. The proponent, Acacia Traders Limited, proposes to erect non-storied recreational use building with a club house; comprising of a kitchen, store, toilet facilities separate for men and women, kitchen, gift shop, equipment store, reception office with a lobby, lounge with a bar and restaurant. Other structures include staff accommodation comprising of 4 bedsitters with separate toilet facilities, a sentry and observation post. Other licensed activities by the Kenya Forest Service (KFS) will include a high ropes course, nature trail, guided walks within the forest. There will be a waste water management system comprising of one adequate capacity bio digester and all facilities will have associated fixtures and fittings as per the architectural plan. The development will be within Uplands Forest plantation located in Limuru area of Kiambu County, which was established under Declaration of Central Forests Legal Notice No. 174 of 20th May, 1964. All the facilities will be on 2.3 acres of land. The facility should attract few high-paying visitors with the overall aim being to improve the forest tourist product and infrastructure while as far as possible retaining the unique wilderness character of the forest. The facility shall be operated under a Special Use Licence (hereafter referred to as the Licence) that will initially be for a period of 25 years that has been issued to the proponent.

The EIA experts have prepared this Project Report to fulfil the legal requirements outlined in the Environmental Management and Coordination Act (EMCA), Cap 397 and Environmental (Impact Assessment and Audit) Regulations, 2003. This EIA Report is based on proponent legal documents review, field data gathered, and discussions with the Proponent. After project screening, the project was found to be in low risk category which warrants approval at the present stage of preparation of a Environment Impact Assessment Report (EIA).

From the Environmental Assessment carried out, the following mitigation measures are recommended to make the project environmentally sustainable and reduce negative impacts:

Table E- 1: Potential adverse environmental impacts and recommended mitigation measures

Potential adverse impact	Mitigation measure
Damage to forest ecosystem	● The proponent shall not pollute damage or disturb land, trees, water, and wild animals ● The proponent should not cause a nuisance or trespass in the forest by others including to neighbouring lands and should take steps to benefit communities benefitting from the forest licensed area of operation ● The proponent shall manage the licensed area sustainably, specifically for recreational values, cultural values and conservation of biodiversity in accordance with Forest Conservation and Management Act, 2016 as well as other applicable regulations including but not limited to those governing land use, environment and waste management, wildlife protection, labour, tourism, occupational safety and health. ● The proponent shall take special precautions against fires, and where it occurs, take necessary measures to put out the fires ● The proponent should have a designated route, road or path for the purposes of carrying out the activities licensed by KFS ● The proponent shall use the licensed area as per the approved Forest Management Plan and should maintain the physical boundaries of the licensed area including existing survey marks, signs and fences and shall keep all buildings and structures in a state of good repair to enhance site aesthetics ● The proponent shall make adequate arrangements for the disposal of waste and sewage and shall have bins colour coded for the purpose of disposal which will include reuse or recycling including practicing the principles of reduces, reuse and

Potential adverse impact	Mitigation measure
	recycle.
Elevated noise and dust generation during site preparation and construction phase	● Control working hours to limit noise, dust and traffic nuisance. Noisy construction activities should be scheduled to hours with minimal interruption i.e. 8:00 AM to 6:00 PM. ● Sprinkle water on areas where dust is likely to be generated ● Follow the gazetted Noise Control Regulations (2009).
Excavation and earthworks resulting into stock piles, soil erosion	● Use the excavated soil as back fill ● Control excavation activities to limit excavation to land which is required for construction ● Securing of the site using iron sheets or other appropriate materials to protect passers-by, animals and control noise ● Excavation should be carried out such that drainage is controlled and water is not allowed to accumulate at the project site. Any water that collects has to be drained and disposed of sensibly, so as not to cause erosion ● Establish controls for surface runoff during excavation e.g. digging trenches around excavated areas and earthworks to control erosive potential of surface runoff.
Removal of overgrowth and bush clearing and Transportation of debris	● Avoid removal of any tree onsite as per KFS guidelines ● Maintenance of equipment for efficiency, minimizing noise production, emissions, spills and consumption ● Erect warning signs prior to commencing construction activities ● Avoid transporting waste during periods of peak traffic activity outside the forest to reduce chances of accidents happening.
Biodiversity preservation	● There shall be no hunting or killing of forest fauna under any circumstances by workers ● There shall be no consumptive utilization of forest resources in the project ● Post warning signs to workers on strategic places onsite to warning against interference with forest resources ● The maximum built up area shall not exceed 30% of the licensed area. ● Ensure facilities blend with their environments, with buildings being within the forest canopy (not appearing above the tree tops), not interrupting beautiful views and having appropriately camouflaged roofs. ● Avoid felling mature trees to create space for construction. Enough trees should be left untouched to conceal building when they are completed and additional vegetation planted after construction to ensure the forest character is retained. ● Minimize the facilities that will be constructed including reducing numbers, dimensions and capacity to ensure that they have the least possible ecological footprint. ● Ensure all facilities have minimal impact on the environment. This should include minimal concrete foundation and concrete walling; use of eco-friendly low-impact construction materials and technologies; avoidance of excessive paving of paths and other surfaces; and avoidance of landscaping and introduction of alien vegetation species ● Restore and improve the forest environment during the facility's life cycle. ● Follow strictly license conditions by Kenya Forest Service (KFS).
Increased Waste handling and disposal from demolition activities	● Develop a solid waste management plan prior to project commencing, identifying optimal waste re-use options and disposal in licensed sites ● Comply with NEMA Waste Management Regulations (2006) ● Comply with County Government of Kiambu legistration on solid waste disposal.
Increased water use demand	● Application and liaison with the Limuru Water and Sewerage Company (LIWASCO) for water supply ● Source construction water from untreated sources to ensure availability in the neighbourhood

Potential adverse impact	Mitigation measure
	● Install automatic taps in the kitchens and low capacity cisterns in the toilets ● Provide for rain water harvesting system onsite
Increased wastewater discharge to sewers	● Liaison with County Engineer to ensure adequacy of sewer facilities. ● Manage the different types of wastes and wastewater effectively during the facility's entire life cycle ● Recycle and reuse waste water from onsite processes i.e. kitchen and cleaning water ● Connect all campsite facilities to the designed bio digester which shall be maintained on schedule.
Increased demand for electricity supply	● Take advantage of natural light, heat, air movements and other features to reduce use of artificial lighting and heating. ● Use energy, water and other materials from sustainable sources wherever possible i.e. solar energy. ● Application and liaison with the Kenya Power (KP) for electricity supply. ● Install automatic sensors for security lighting ● Switching off all lights when not in use ● Install energy saving light bulbs and fluorescent tubes
Conflict with the local community	● Address all community concerns on a timely basis wherever they occur ● Give the forest adjacent community priority to supply labour, fresh produce and other goods and services required during construction and operation phases where they meet project standards.
Occupational health and safety issues	● Develop a site safety action plan detailing safety equipment, emergency procedures, restrictions on site, safety inspections and controls; ● Reporting and recording of health, safety and environmental incidences as per Legal Notice No 40, The Factories (Building Operations and Works of Engineering Construction) Rules 1984.

Construction at the site will be on-going for an approximate period of 6 months at an estimated cost of Ksh 7 million. Through a careful assessment, it has been noted that there are no adverse environmental impacts likely to arise that cannot be mitigated. An annual Environment Audit should be undertaken upon completion of the Project to gauge the level of implementation of Environmental and Social Management Plan (ESMP). Its therefore recommended that NEMA approval can be issued on the basis of this EIA report (EIA) report.

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1 INTRODUCTION

1.1 Background

The proposed project is located within Kikuyu Escarpment Forest, within Uplands Forest Station in Kiambu County. The Uplands forest covers an area of 3,477.5 hectares and the proposed site is within a plantation forest made of red cedar trees mainly. The proposed project is located off Kamandura-Maimahiu tarmac road, approximately 1.2 kilometres before the Ngubi Rangers post site from Nairobi. The turnoff to the site is on the right hand side of the tarmac road; a distance of approximately 300 meters inside the plantation forest. The proponent, Acacia Traders Limited, proposes to erect non-storied recreational use building with a club house; comprising of a kitchen, store, toilet facilities separate for men and women, kitchen, gift shop, equipment store, reception office with a lobby, lounge with a bar and restaurant. Other structures include staff accommodation comprising of 4 bedsitters with separate toilet facilities, a sentry and observation post. There will be a waste water management system comprising of one adequate capacity bio digester and all facilities will have associated fixtures and fittings as per the architectural plan. Other licensed activities by the Kenya Forest Service (KFS) will include a high ropes course, nature trail, guided walks within the forest.

All the facilities will be on 2.3 acres of land. The development will be within Uplands Forest plantation located in Limuru area of Kiambu County, which was established under Declaration of Central Forests Legal Notice No. 174 of 20th May, 1964. A Community Forest Association (CFA) operates in the forest and is involved in various conservation and income generating activities including tree planting, bee keeping among others.

This Report documents the findings of an assessment and study of the proposed project site, project design. Mitigation measures have been proposed for identified impacts and an Environmental and Social Management Plan for the implementation of the proposed measures has been presented.

1.2 Terms of reference

The Terms of Reference (ToR) for this assessment were based on the NEMA *Environmental Impact Assessment and Audit Regulations,* Legal Notice No.31 and 32 of 2019 as indicated in approved ToRs by NEMA.

1.3 Objectives of EIA study

The objectives of the Environmental Impact Assessment (EIA) are:

a) To fulfil the legal requirements outlined in the Environmental Management and Coordination Act (EMCA), Cap 397 and Environmental (Impact Assessment and Audit) Regulations, 2003.
b) To obtain background biophysical information of the site and legal and regulatory issues associated with the project
c) To assess and predict the potential impacts during site preparation, construction and operational phases of the project
d) To make suggestions of possible alterations to the proposed design, based on the assessment findings
e) To propose mitigation measures for the potential significant adverse environmental impacts and safety risks
f) To lower project cost in the long term
g) To comply with NEMA EIA, and Safeguards rules and regulations.
h) To examine, evaluate and assess the likely environmental impacts that would arise with the implementation of the project; and
i) To establish a benchmark for an appropriate environmental management system that aims at sustainability of the Environment.
j) To review and develop an Environmental and Social Management Plan (ESMP).
k) To prepare an Environmental and Social Impact Assessment, and develop ESMP plan compliant to the relevant authorities, and detailing findings and recommendations.

1.4 Methodology

The procedure used in undertaking the environmental assessment included the following:

a) A desk-study to obtain background biophysical information of the site and legal and associated regulatory issues
b) Literature review
c) Site visits assessment for collecting the baseline conditions

d) Assessment and prediction of potential impacts during the site preparation, construction and operational phases of the project
e) Risk analysis
f) Preparation of a Project Report, including the Environmental and Social Management Plan and design of mitigation measures.

Activities for the EIA Report Preparation

a) Generate environmental baseline conditions of the project area.
b) Establish key areas of environmental, health and safety concern focusing on both the positive and negative effects as well as effects to the biophysical, social, economic and cultural components of the environment. The potential impacts must relate to the location; design; construction works and operation activities of the proposed project.
c) Obtain the views and opinions of the interested and affected persons.
d) Describe the results of the proposed project and the potentially affected environments.
e) Outline the legislations and regulations relevant to the proposed project, review the relevant legislative frameworks and show their relevance in relation to the project.
f) Describe and analyze alternatives to the proposed project including the proposed site, designs, technologies and processes and the reasons for preferring the proposed projects' alternative.
g) Analyze impacts and recommend mitigation measures for the adverse impacts and enhancement measures for the positive impacts.
h) Generate comprehensive environmental management and monitoring plans for the proposed project covering the construction, operation and decommissioning phases upon which all mitigation/enhancement measures will be carried out. These plans must specify who will be responsible for implementing these measures and the schedule for implementation and indicating the parameters to be monitored, frequency of monitoring, indicators of performance, organizations/individuals responsible for monitoring and the associated costs.
i) Generate an EIA report in accordance with the EIA regulations as outlined in the Environmental (Impact Assessment and Audit) Regulations, 2003 for submission to NEMA and for further instructions and/or approval.

The study report should provide the following:

a) Nature of project,
b) The location of the project including the physical features that may be affected by the project's activities,
c) The activities that shall be undertaken during the project construction and operation,
d) The materials to be used, products and by-product including waste to be generated by the project and the methods of management and disposal,
e) The potential environmental impacts of the project and mitigation measures to be taken during and after the implementation of the project,
f) An action plan for prevention and management of possible accidents during the project cycle,
g) A plan to ensure the health and safety of the workers and the neighbouring communities,
h) The economic and social cultural impacts to local community and the nation in general,
i) The project budget,
j) Any other information that the proponent may be requested to provide by NEMA, and
k) All these aspects are considered in details in this report which seeks to ensure that all the potential environmental impacts are identified and that workable mitigation measures are adopted.

1.5 Scope of the assignment

The consultant(s) will undertake investigations on social aspects, economic activities, and conservation of natural resources, historical and anthropological heritages, public consultations and disclosures.

The scope of services to be undertaken by the Consultant shall include the following:

Task 1. Detailed Desk-top Review: The Consultant is to review all existing documentation, and previous ESIA reports, and ESMP developed on similar constructions. He/she shall further undertake a detailed study of the proposed warehouse. The Consultant shall then concisely describe each facility assessed, its geographic, ecological, general layout of facilities.

Task 2. Description of the baseline environment: The Consultant is required to collect, collate and present baseline

information on the environmental characteristics of the existing situation around each of the areas the project is to be undertaken. This description should involve but not limited to:

a) Physical environment (topography, land cover, geology, climate and meteorology, air quality, hydrology etc.,
b) Biological environment (i.e., flora and fauna types and diversity, endangered species, sensitive habitats etc.)
c) Social and cultural environment, including present and projected, where appropriate (i.e., population, land use, planned development activities, community social structure, employment and labour market, sources and distribution of income, cultural/religious sites and properties, vulnerable groups and indigenous populations etc)
d) Economic activities, agriculture, livestock, fisheries, small scale industries etc.

Task 3. Legislative and Regulatory Framework: The Consultant shall identify and describe the pertinent regulations and standards- both local and international, governing the environmental quality, health and safety, protection of sensitive areas, land use control at the national and local levels and ecological and socio-economic issues. Thereafter, the Consultant shall identify the project activities that should comply with the identified regulations.

Task 4. Determination of impacts of project facilities and activities: From the detailed field study, the Consultant shall analyze and describe all significant changes brought about by each facility/activity. These would encompass environmental, ecological and social impacts, both positive and negative, as a result of each facility/activity intervention that are likely to bring about changes in the baseline environmental and social conditions discussed in Task 2. The Consultant will make a prioritization of all concerns identified and differentiate between short, medium, long-term and cumulative impacts during construction, operation and decommissioning. The Consultant shall also identify both temporary and permanent impacts. A detailed outline and discussion of specific conditions that might affect the environment which are unique to the type of facility and/or operation being assessed should be provided.

Task 5. Occupational health and safety concerns: The Consultant shall analyse and describe all occupational health and safety concerns brought about by activities during all the phases of the project.

The Consultant shall make recommendations on corrective and remedial measures to be implemented under the environmental management plan.

Task 6. Development of management plan to mitigate negative impacts: The Consultant shall develop a comprehensive environmental management plan. The plan should recommend a set of mitigation, monitoring and institutional measures to eliminate, minimise or reduce to acceptable levels of adverse environmental impacts and/or maximise socio-economic benefits.

The Consultant should provide cost outlays for the proposed mitigation measures as well as their institutional and financial support, time frame and responsibility. This shall be provided for all the project phases.

Task 7. Development of monitoring plan: The Consultant is required to give a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, and definition of thresholds that will signal the need for corrective actions as well as deliver a monitoring and reporting procedure. The Consultant should provide a time frame and implementation mechanism, staffing requirements, training and cost outlays.

Task 8. Comparison: The consultant shall undertake a comparison of possible areas that could have been done with the project funding. These other alternatives shall be compared to the proposed final location; and pros/cons of each site selection detailed.

Task 9. Study Reports: The output will be an Environmental and Social Impact Assessment report prepared in accordance with the regulatory provisions. The report shall be in the English Language and has to be clear and concise. The reports should be in a format acceptable to local competent authorities, international environmental standards. The Consultant shall present the reports to NEMA for approval in the required number of copies.

Task 10. Approval: The Consultant shall present the report prepared under Task 9 for approval by NEMA. The Consultant shall be responsible for making any modifications that the authorities may demand before approval of the report.

1.6 Registration

As required by EMCA (1999), the Lead Expert is registered by NEMA as an 'Expert' (Reg. No. 6480) for conducting "Environmental Impact Assessment and Audits" and is therefore authorised to undertake the EIA and submit a report.

2 PROJECT DESCRIPTION

2.1 Project design

The proposed project will consist of a non-storied structures constructed of wood, thick, rough machine dressed natural stone walling, jointed in sand and cement reinforced with wide hoop iron straps at every alternate course as well as tarpaulin cover as windows to minimize use of concrete. The front part faces an existing access road to the site. The project will be located on a part of piece of land measuring 2.3 acres with a 9 meter road/firebreak reserve and has building plans (see annexes).

2.2 Project Special use conditions

The proponent must adhere to the following KFS guidelines for constructing of ecotourism and recreational facilities:

- The maximum built up area shall not exceed 30% of the licensed area.
- Ensure facilities blend with their environments, with buildings being within the forest canopy (not appearing above the tree tops), not interrupting beautiful views and having appropriately camouflaged roofs.
- Avoid felling mature trees to create space for construction. Enough trees should be left untouched to conceal building when they are completed and additional vegetation planted after construction to ensure the forest character is retained.
- Minimize the facilities that will be constructed including reducing numbers, dimensions and capacity to ensure that they have the least possible ecological footprint.
- Ensure all facilities have minimal impact on the environment. This should include minimal concrete foundation and concrete walling; use of eco-friendly low-impact construction materials and technologies; avoidance of excessive paving of paths and other surfaces; and avoidance of landscaping and introduction of alien vegetation species.
- Take advantage of natural light, heat, air movements and other features to reduce use of artificial lighting and heating.
- Use energy, water and other materials from sustainable sources wherever possible.
- Give the forest adjacent community priority to supply labour, fresh produce and other goods and services required during construction and operation phases.
- Manage the different types of wastes and wastewater effectively during the facility's entire life cycle.
- Restore and improve the forest environment during the facility's life cycle.

2.2.1 Project facilities

The proposed project facilities are detailed below:

(a) Structural facilities

Table 1: Description of Project Facilities

Facility	Outline/description
Entrance	Main gate, access road
Parking bay	There will be a parking area for vehicles inside the plot
Plot boundary	• Access road • Chain-link fence • Plantation forest
Camp site General layout	**Club House** • Reception office with a lobby • Restaurant • Bar with a lounge • Gift shop • Equipment store • Kitchen with a store • Toilet facilities separate for men and women • Associated fixtures and fittings

Facility	Outline/description
	Staff Accommodation ● 2 men bedsitter units with outside toilet facilities ● 2 women bedsitter units with outside toilet facilities ● Associated fixtures and fittings
	General Compound ● Grass lawn ● Open team building area ● 19 (No.) existing trees to be left as they are currently.
	Sentry and observation post
Waste water treatment system	**One bio digester** ● Buffer tank ● Pre-treatment area ● SBR reactor ● Waste storage area.
Roof	Decla stone coated roofing tiles, timber rafters and tie beams, timber struts, fascia board, timber wall plate, ceiling timber blundering and celotex ceiling boards to structural engineer details

(b) Water supply and storage

The water supply will be obtained from the Limuru Water and Sanitation Company (LIWASCO), a domestic water storage system is recommended in case of an interruption in supply to the premises.

(c) Drainage facilities

Proposed drainage facilities are outlined below:

Storm water drains: There will be channels running perpendicular to the access site at the sides of the plot. These discharge to the existing storm water drain onsite.

(d) Sewage and sullage

The facility will be connected to the designed bio digester as per the approved plan.

(e) Energy supply

Energy will be supplied by the Kenya Power (KP) to the site.

(f) Landscaping

Minimal landscaping will be undertaken on completion of construction with most of the forest area being left in its natural state. Painting walls with first quality plastic emulsion paint is appropriate.

2.3 Project construction and anticipated wastes

Project construction will be supervised by the Project Engineer and the Architect (Supervising Consultant /Project Manager). Construction activities will be divided into the following:

- Site preparation
- Construction activities
- Electrical installations

2.3.1 Site preparation

Site preparation will involve the following activities:

- Clearance of the grounds
- Mobilisation and transfer of materials
- Establishment of offsite office
- Demolition activities
- Excavations
- Levelling and laying of foundations
- Procurement and mobilisation of construction materials.

Wastes anticipated from these activities are:

- Broken stone blocks, sand, cement, paper wrappings, cables and conduits and plumbing material
- Broken window panes and timber frames
- Mild steel sinks and window frames
- Soils and vegetation
- Concrete pipe work
- Exhaust emissions from machinery.

2.3.2 Construction activities

Construction activities and inputs will include:

- Recruitment of labour, both skilled and unskilled
- transportation of aggregate and stone from approved quarries
- Procurement of cement, sand, ballast, timber
- Building works (i.e. construction of foundations, reinforced concrete columns and beams, cladding, storm water drainage and paved facilities)
- Installation of services and interiors of the building
- Connection to the existing water supply; septic and drainage systems
- Disposal of soil and construction waste
- Use of light construction machinery.

The inputs required and anticipated wastes are outlined below:

Table 2: Construction inputs and anticipated wastes

Area of construction	Construction material/input	Anticipated waste
All walls	Building stone.	Stone cuttings from block shaping, dust and undersized/broken stones.
Slabs, beams and columns	Cement, sand, aggregates, steel reinforcement bars, water	Wastewater, used cement bags, steel off cuts.
Formwork, roof support, doors, cabling and support	Timber, medium density fibre board, fixings and fittings, metal cables and ropes.	Used formwork, broken timber, sawdust, spoilt fixings and fittings.
Roof	G CI roofing sheets on timber trusses	Spoilt sheets, waste sheets, timber.
Windows	Mild steel frames, glass and putty.	Broken glass and waste putty.
Finishing and interiors	Paints, varnish, thinners, tiles	Paint containers, waste paint, wastewater, waste thinner, tiles
Water supply pipe work	Plastic galvanised metal steel and concrete pipe work, jointing materials and lagging.	Off cuts and waste material.
Drainage and sewers	Concrete and steel gratings, PVC sewer pipes, jointing materials, manhole covers, block work and sand / cement mortar.	Off cuts, cement bags and spoilt materials.
Water supply	Mechanical piping materials - galvanised mild steel piping and PVC for drainage.	PVC off cuts, waste jointing materials and containers, broken blocks, cement bags and excess materials.
Parking	Sand, cement mixtures, hard core rock	Waste sand, cement, hard core rock
Electrical conduits	PVC for concealed conduits, surface conduits.	Off cuts of PVC.
Transportation, material mixing and lifting	Machinery and fuels.	Exhaust emissions, dust, noise, used oil and oil spills.
Labour provision	Construction labourers.	Sanitary waste.
Operation of equipment	Fuel oil/electricity.	Heat and noise.

Other wastes generated include, plastic cans, used oil, lubricants and filters.

2.3.3 Electrical and mechanical installations

Electrical and mechanical installations include the following:

- Individual power meters
- Power cables
- Fire fighting system

Wastes anticipated from these installations include the following:

- Cable wastes/off cuts
- Metal off cuts.

2.4 Project budget

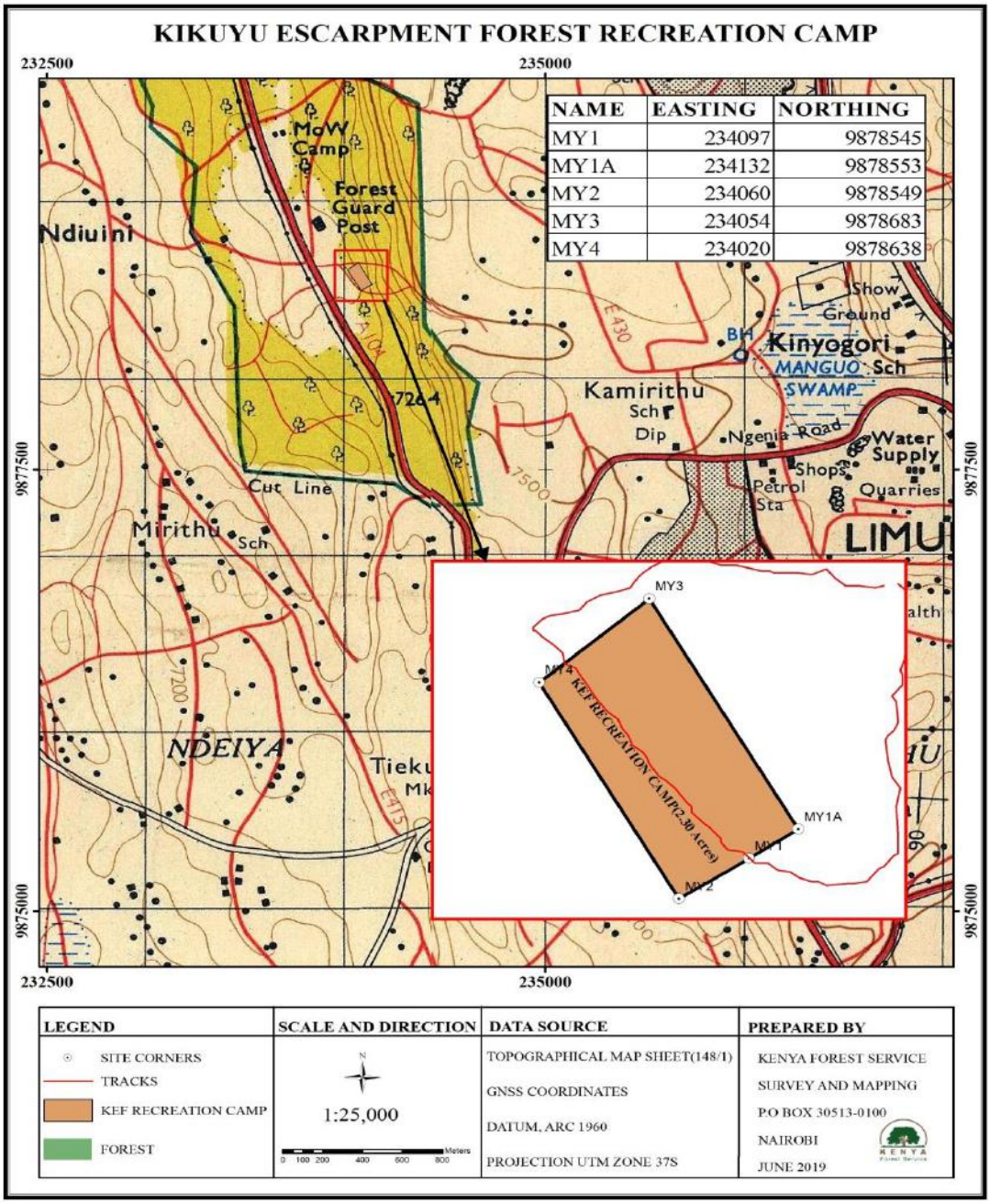
The project is estimated to cost Ksh. 7 Million.

3 BASELINE INFORMATION

3.1 Project location

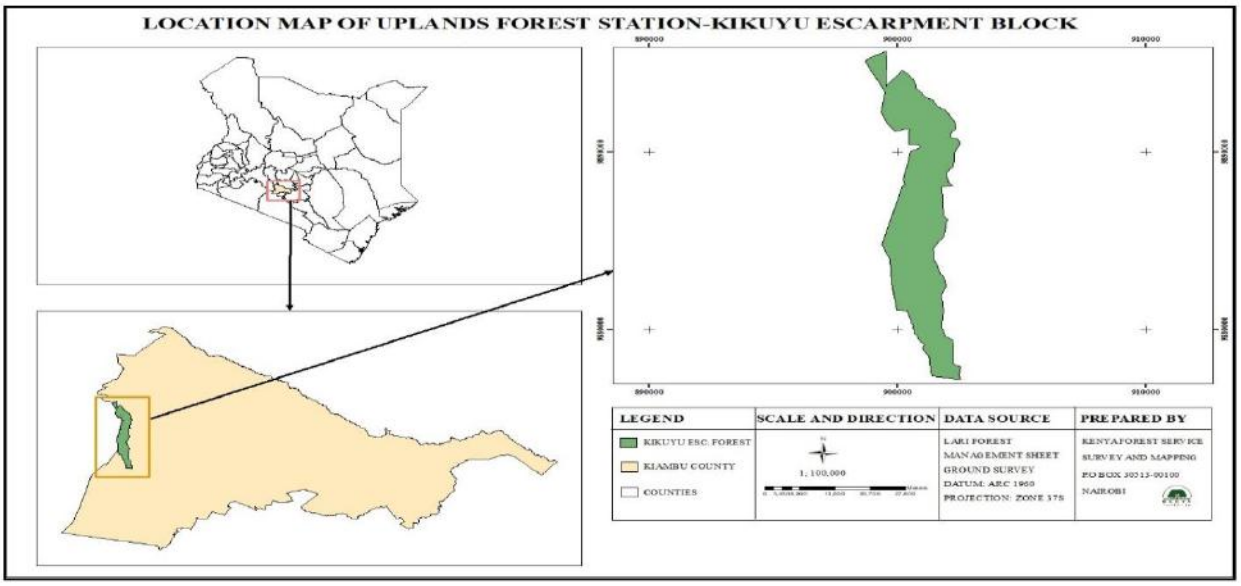
The proposed project is located within Kikuyu Escarpment Forest, near Ngubi Rangers Outpost in Kiambu County; with a special use licence No. LIC/017/2022. The Uplands forest covers an area of 3,477.5 hectares and the proposed site is within a plantation forest made of red cedar trees mainly. The proposed project is located off Kamandura-Maimahiu tarmac road, approximately 1.2 kilometer's before the Ngubi Rangers Post site from Nairobi. The turnoff to the site is on the right hand side of the tarmac road. The 2.3-acre site lies approximately 300m off the highway to Maai Mahiu town, 5km from the Nairobi-Nakuru highway turnoff and 37km from Nairobi City. It lies at an altitude of 2,220m above sea level. The site is within E234060 and N9878549 (coordinates in UTM Arc 1960).

The following map shows the project area:



Map 1: Kikuyu Escarpment Forest Recreational Camp site
Source: KFS

Uplands Forest occupies a total of 3477.4 ha of land. Geographically, Uplands Forest lies within the following coordinates: **Latitude** 1° 03'00S, **Longitude** 36° 39' 00E. Additionally, the forest is positioned within an altitude range of 1,800m to 2,700m above sea level. The forest lies within Kiambu and Nakuru counties. Uplands forest is divided into three blocks namely: Lari block (722.44ha), Kikuyu Escarpment block (1957.76 ha) and Nyamweru block (797.20 ha). The Uplands FSM office is 4km off Nairobi-Nakuru highway at the junction to Githunguri town. The following map indicates location of Uplands Forest in the Kikuyu escarpment, Lari and Nyamweru blocks.



Map 2: Location map of Uplands Forest in Kikuyu Escarpment block

Over the years, the forest has had three informal excisions as follows:

Table 4: Excisions that have been undertaken in Uplands Forest

Block	Beneficiaries	Ha	Dates
Lari	Nyambari Shopping Center	5	Informal
Lari	Juvenalis Secondary School	7	Informal
Lari	Githirioni Secondary School	7	Informal
	Total	19	

Source: Uplands Forest Management Plan 2015-2025

3.2 Legal status of Uplands Forest

Uplands Forest was gazetted as a forest vide proclamation no.48 of 21st December 1943 as part of the Kikuyu escarpment covering a total area of approximately 3,477.5 ha. It is owned and administered by KFS. The forest comprises of three separate blocks whose boundaries are yet to be surveyed and aligned.

With respect to KFS administration, Uplands Forest falls within the Central Highlands Conservancy, Kiambu County and is administered locally by a Forest Station Manager who is in-charge of the station. In turn, the blocks are divided into six forest beats namely (i) Ngubi; (ii) Nyamweru; (iii) Ruiru; (iv) Kimotu; (v) Mathathia; (vi) Roromo.

3.3 Site and Environment Character

The campsite area will be constructed in an exotic red cedar (*Thuja plicata* - an evergreen tree of cypress family) plantation forest that is fully grown. These trees are native to the Pacific north west of North America. The proposed site is well situated and is composed of mainly of overgrown Tithonia *spp* bushes which will be cleared. No single tree will be cleared through the project activities. There are 19 existing mature trees within the campsite area which shall not be cut down or interfered with.

There are no water bodies or any sensitive point that will be interfered with by the project. Its also located near the main tarmac access road from Kamandura to Mai Mahiu and no new road or access point will be created. There is also no bird nesting site, wildlife corridors on or near the proposed site. The campsite area will be constructed in a plantation forest that is fully grown. The proposed site is well situated and is composed of mainly of overgrown bushes which will be cleared. No single tree will be cleared through the project activities. There are 19 existing mature trees within the campsite area which shall not be cut down or interfered with.

There are no water bodies or any sensitive point that will be interfered with by the project. Its also located near the main tarmac access road from Kamandura to Mai Mahiu and no new road or access point will be created. There is also no bird nesting site, wildlife corridors on or near the proposed site.

3.4 Vehicular Access and Road Network

The proposed project is located off Kamandura-Maimahiu tarmac road, approximately 1.2 kilometres before the Uplands Forest Station site from Nairobi. The turnoff to the site is on the right hand side of the tarmac road; a distance of approximately 500 meters inside the plantation forest.

3.5 Land use in the area

The site is mainly exotic plantation forest. There are settlements away from the site where horticultural crop farming is practised.

3.6 Underground and Over Head Utilities

During the time the site was visited, there were no indications of underground utility cables, pipelines within the proposed site. There are no underground utilities such as water, communication or sewer line onsite.

3.7 Sewerage System

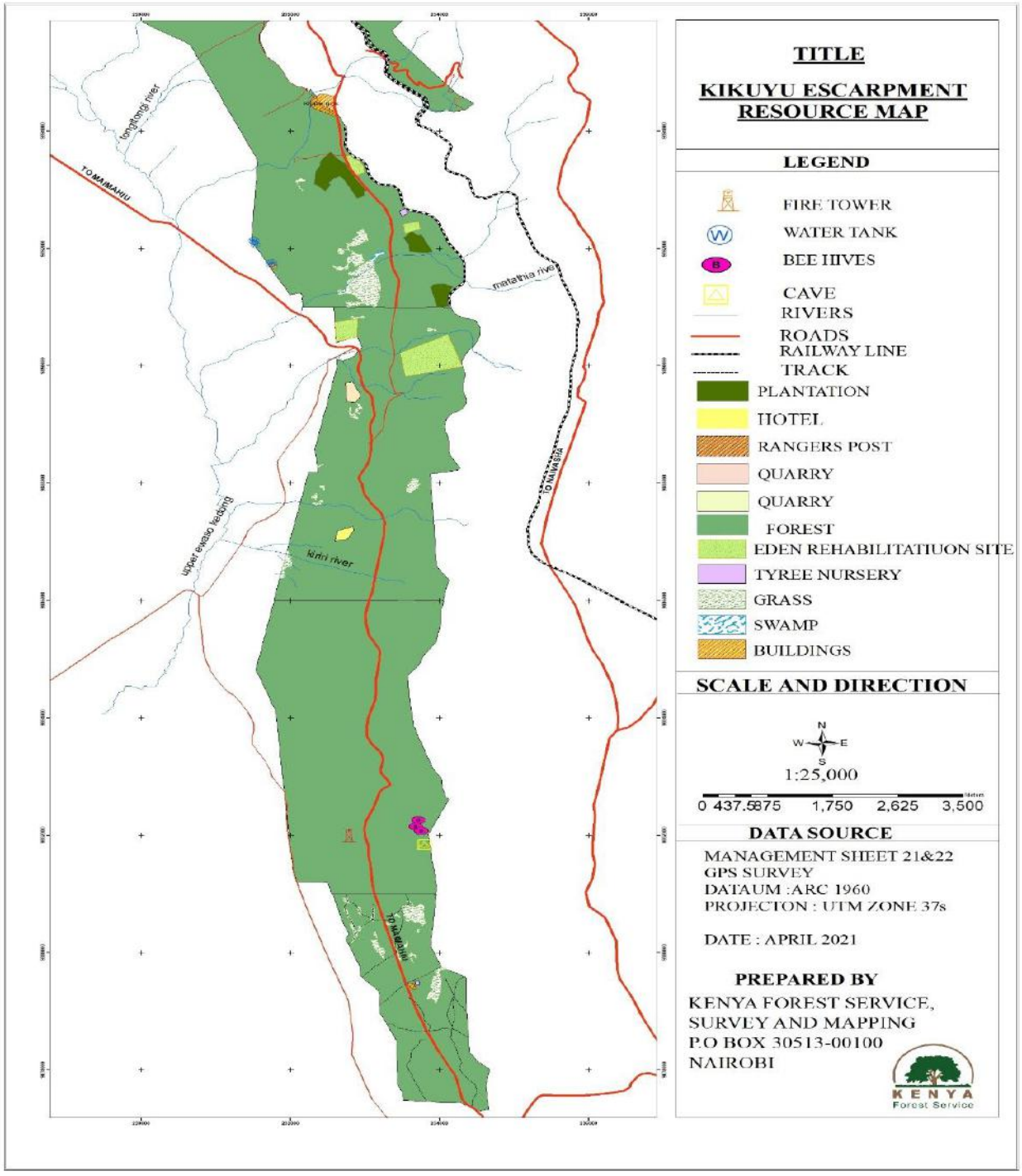
The site has no connection to the municipal sewer system and the proponent has designed a septic and soak pit to serve the facility.

3.5 Site's attractions

- Proximity to Nairobi city (37km) and satellite towns
- Proximity to Rift Valley viewpoint and curio shops
- Strategic location along the tourist route to Maasai Mara National Reserve
- Potential to organize hiking excursions ascending or descending Kikuyu Escarpment
- Solitude offered by the forest environment.

3.5.1 Eco-tourism and recreation

Uplands Forest is located on the higher lands West of Nairobi and beyond the tea estates. The forest can be approached through different major roads from Nairobi. The main one is the Nairobi – Nakuru highway which passes on the top edge of the Escarpment where there are beautiful viewpoints for the Great Rift Valley. This area is for eco-tourism activities. The other one is the Nairobi – Githunguri – Uplands Road which goes up to the forest station. Due to its proximity to urban areas in Nairobi and Kiambu, it provides suitable highland forest hiking opportunities. The map below shows the forests resource map:



Map 3: Kikuyu Escarpment resource map

3.6 Permitted Ecotourism Infrastructure and Facilities on site by KFS

The following ecotourism infrastructure and facilities are permitted at this site:

- High ropes course
- Club house/restaurant
- Nature trails
- Guided walks within the forest
- Community interactions.

3.8 Site flora and fauna

The site has scattered vegetation including short grasses and bushes. There are no trees onsite. There are birds in the area but non nesting site. Also, there are small rodents, hippos in riverine areas as well as hyenas in bush lands. The Photo below shows the site vegetation at the foreground which is composed of bushland:

Photo 1: Site proposed for Kikuyu Escarpment Forest Recreational Camp

Uplands Forest is a montane forest, which is composed of plantations, glades, natural forest, bamboo zone, and bush land. Each of these zones has different flora and fauna species. The escarpment has lost a significant percentage of its natural forest because of poor human activities along the forest boundaries including clearing of forest plantations, and illegal deforestation and forest degradation activities. The shrinkage of vegetation cover has reduced the diversity of trees and shrubs as illegal loggers, charcoal makers and grazers. Since a wide variety of trees, shrubs and grass species still exist; it is recommended that a rehabilitative forest management program to promote this diversity should be adopted.

3.8.1 The indigenous forest

The natural forest, bamboo and bush land comprising of about 1,469.1ha is dominated by indigenous tree species and shrubs. However, Cedar and Podo species remain threatened and there have been proposals to increase acreage under those species. A survey of some of the trees and shrubs identified by the local community and their uses are summarized in the following tables:

Table 5: Important trees within Uplands Forest and their uses

Botanical name	Local name	English Name	Uses
Arudinaria alpine	Murangi (Kyu),	Bamboo	Building, Fruits, Wood fuel
Podocarpus *spp*	Podo	Podo	Building, Medicinal,

Botanical name	Local name	English Name	Uses
			Wood fuel
Prunus africanus	Muiri (Kyu),	African olive	Medicinal, Wood fuel
Dombeya goetznii	Mukeu (Kyu),	African Snow Ball	Nectar, Tuber, Wood fuel, Medicinal
Croton megalocarpus	Mukinduri (Kyu)	Croton	Woof fuel, Charcoal, Medicinal, Nectar
Olea Africana	Mutamaiyu (Kyu)	African Olive	Medicinal, Building
Tamarindus indica	Mkwaju (Swa)		Building, Charcoal
Juniperus procera	Mwangati (Swa), Mutarakwa (Kyu)	Cedar	Building, Charcoal, Medicinal
Acacia seyal	Mugaa (Kyu)	White Thorn	Charcoal, Fruits, Nectar
Clutia abyssinica	Muthimamburi(kyu)		Medicinal
Melia azandrachta	Mwarubaini(kyu)	Neem tree	Medicinal
Waburgia ugandensis	Muthiga(kyu)	Green heart tree	Medicinal
Carisa edulis	Mukawa(kyu)	Conkerberry/ Bush plum	Medicinal
Dodonea visccosa	Murema muthwa(kyu)	Hopbush	Medicinal

Legend

Local Name	*Kyu*-Kikuyu	*Ma*-Maasai	*Swa*-Swahili	Eng-English	Ot-Others

3.8.2 Plantation Zone

Plantations are usually planted with three main species of trees, namely: Cypress *spp*, Pines, and Eucalyptus *spp*. There are also cider plantations, which were set up in the 1920s during colonial period where the project will be located. Plantations are faced with a number of challenges, the main ones being pests and diseases (such as cypress canker, aphids, etc.). Monkeys are also a big challenge as they damage trees. It is in these plantations that the PELIS Programme happens.

3.8.3 Description of fauna found in the forest

Fauna are the vertebrate and invertebrate life found in the forest, which comprise of mammals, birds, reptiles, insects, amphibians and molluscs. Mammals in the forest include Antelope (*Antelope cervicapra*), Giant Forest hog (*Hylochoerus meinertzhagen)*, Hare *(Lepus californicus)*, Mongoose *(Mungos mungo*), Honey Badger *(Melivora capensis)*, Porcupine (*Erethizon dorsatum*), Wild pigs *(sus spp.)*, Tree Hyrax *(Dendrohyrax arboreus)* and other rodent species. Primates include the black and white Colobus Monkey *(Colobus guereza)*, vervet monkeys (*Chlorocebus pygerythrus*) and Olive baboon (*Papio Anubis)*. The carnivorous family/category is comprised of the Leopard *(Panthera pardus*), genet (*Genetta genetta*) and Wildcat (*Felius catus*). Poaching continues to be a challenge especially for Porcupine and other small wildlife in the Kikuyu Escarpment Forest block.

The main bird includes African Spotted Eagle Owl *(Bubo africanus africanus)*, African Eagle Hawk *(Aquila spilogastra)*, Guinea fowl, Great Honey Guide *(Indicator indicator)* Weaver bird *(Ploceus aurantius)*, Wild doves *(Streptopelia roseogrisea)*, Pied crows (*Corvus albus*), African pied wagtail (*Motacilla aguimp*) and Village weaver (*Ploceus cucullalus*).

Insects include butterfly-Papilio *spp,* wild bees (*Apis melifara melifera*) as well as Grasshoppers *(*Macrotona *spp,* Romalea *spp)* and Locusts among others.

Reptiles include Common Lizard, Snakes including spotted and stripped forest snakes (Philothamnus *spp*.), and Chameleons (Chamaeleo *spp*).

3.9 Threats to Uplands forest conservation

Uplands Forest is enclosed by human settlements that are highly populated. There is high dependency by the community on the forest resources exerting great pressure on the forest resources. The key threats to the forest that were identified include but are not limited to;

- Illegal extraction of trees,
- Illegal grazing,
- Illegal abstraction of water,
- Forest fires,
- Illegal and unplanned recreational activities,
- Forest pollution and Insecurity in some sections of the forest.

3.10 Biophysical description of the forest

3.10.1 Climate

The climate in the upper part of the forest (i.e., Nyamweru and Lari blocks) is cold and wet with a mean temperature of 15-20^{o}C and annual average rainfall of about 700 – 2200 mm. The 60% reliability of rainfall is 1000-2200mm for the 1st rains and 700-900mm for second rains. Climate variability in the three blocks is diverse owing to the presence of an escarpment. Details for this are therefore not available as there are no records available for the Kikuyu escarpment block due to lack of weather instruments.

(a) Rainfall Patterns within Uplands Forest

The rainfall within the areas has been on a decline as observed from analysis of rainfall data recorded and acquired from the Uplands Forest station. During the life of the 2013-2017 PFMP, annual rainfall decreased gradually as indicated in the Table and Figure below.

Table 6: Total annual rainfall for Uplands (2001-2019); Source: Uplands Forest Station

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Annual Rainfall (mm)	1440	1644	2040	1200	936	1860	1200	1296	1080	2016	1440	1056	1385.50	1189.90	1541	1302	1096	1636	1769

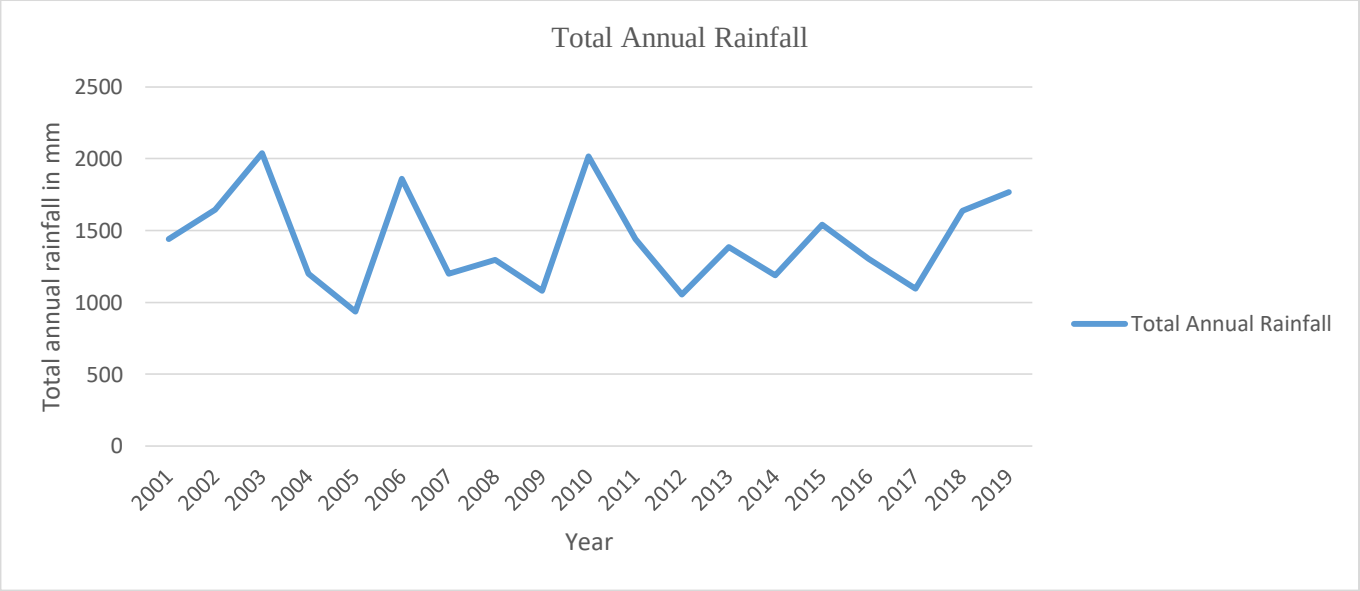


Figure 1: Total annual rainfall for Uplands Forest from 2001-2019

3.10.2 Soils and Geology

The soils in Uplands Forest and surrounding areas are influenced by ancient volcanic activity that resulted into moderately to highly fertile soils. The underlying rock is volcanic but varies according to its age.

The dominant landform, which influences the soil types within and around Uplands Forest are: (i) Volcanic plains, and (ii) Lower middle level uplands. In general, the area is dominated by soils which have been developed from ashes and pumice from recent volcanic activity. The soil type can be described as ando-calcaric REGOSOLS though the high zones of the forest and lower zones have different variants distinctly differentiated by their parent rock, mineral composition, organic matter and soil texture classes. The details are described in Table below.

Table 7: Description of soil characteristic within Uplands Forest and adjacent areas

Topography	Unit	Texture	Description
Volcanic plains	298 Pv	l-m Light to medium	The soils are developed on ashes and pumice from recent volcanoes. The soils are excessively drained to well drained, very deep, dark greyish brown to olive grey, loose to very friable, stratified, calcareous, fine sand to sandy loam or silt (ando-calcaric REGOSOLS)
Lower middle level uplands	165 U	m-h – medium to heavy	The soils are developed on undifferentiated Basement System rocks. They are well drained, moderately deep to deep, dark red to yellowish red, friable, sandy clay loam to clay (rhodic and orthic FERRALSOLS; with ferric ACRISOLS)

3.11 Description of other resources of the forest

3.11.1 Non-wood forest products

Uplands forest has useful non-wood products, which are harvested with explicit permission of KFS after fulfilling all necessary requirements for such approvals. Some of the important non-wood products include:

- Medicinal plants and herbs
- Moss for decorating flowers and flower gardens
- Asparagus fern
- Murram and stones
- Red soil, murram and stones are mainly mined in Maai Mahiu and Ngubi areas.

- Beekeeping
- Ecotourism
- Grass cut and carry

3.11.2 Description of eco-tourism and other scenic features of importance

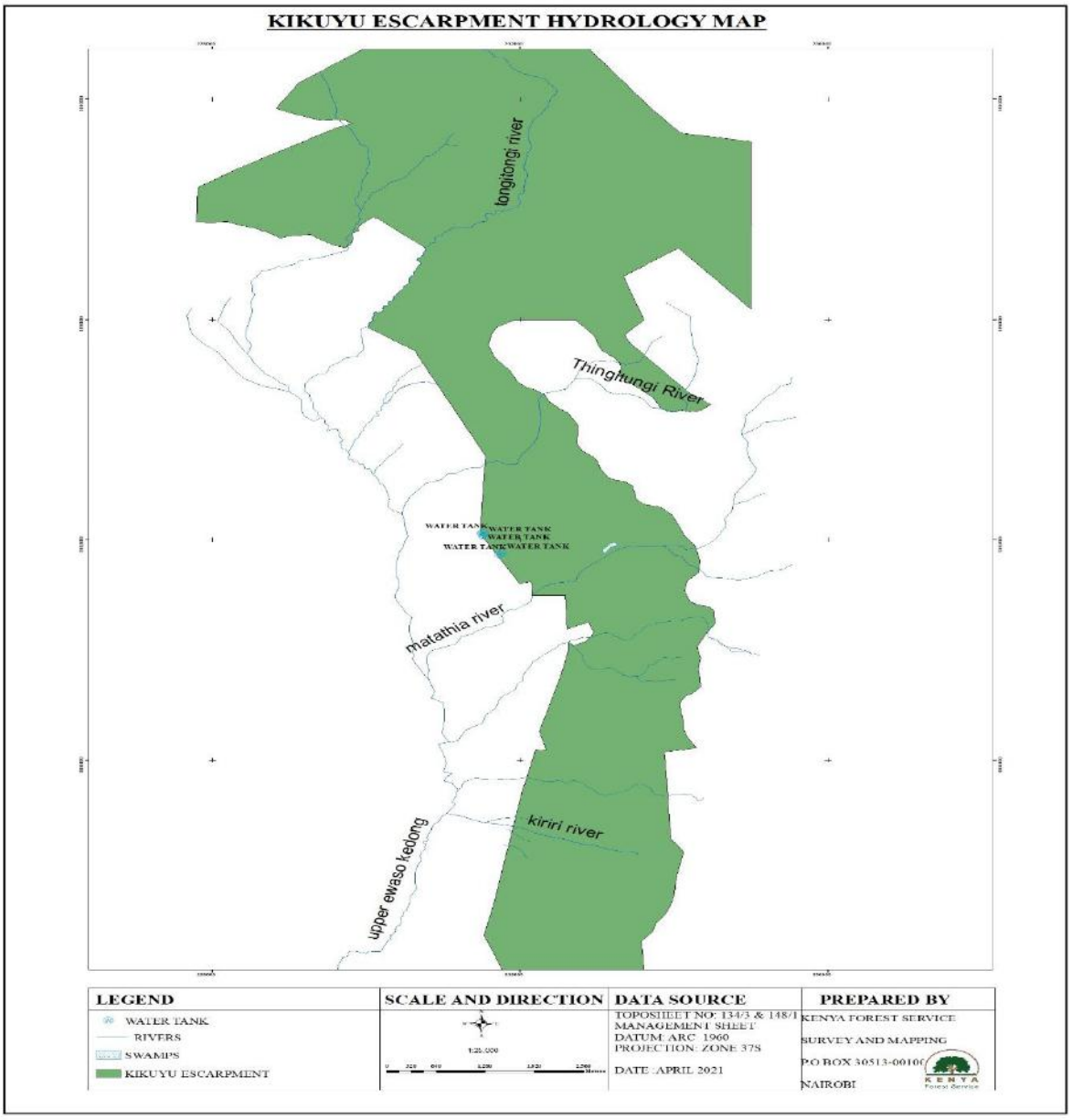
Located on the periphery of Aberdare ranges overlooking the Rift Valley, sections of Uplands Forest provide some of the most magnificent viewpoints of the Great Rift Valley. The rocky outcrops forming sharp scarps and historical caves all provide a wonderful dream destination. *Ihiga ria guoya* balancing at the edge of the escarpment overlooking Ewaso Kedong valley is a wonderful picnic site that can be used to promote adventurous parachuting services. The huge scary rock, seemingly balancing with a very narrow foundation, harbors a dark cave that could serve as a habitat for a number of wild animals.

3.11.3 Hydrology

Uplands Forest and adjacent forest areas forms the upper catchments of some major rivers including River Bathi, Nyamweru, Kimaiti, Birinjiki, Ndamathia and Mukuruiti. The gazetted forests and private forests around the Upland areas are sources of numerous springs and streams, which join to form these rivers. Different communities along its course identify the rivers using different names. On upper parts of Bathi, there are several tributaries that drain into Bathi river including, Gikira, Muiri and Kwandeto. Other rivers within the same Escarpment include Ruiru, Mathanja, Gachobe, Kamera, Karagi and Mukurwe. The flow regime has been declining due to destruction of the upper forest catchment, farming along the riparian zone, and over abstraction.

The rivers have several tributaries as they meander across the landscape providing water for ecological, livelihood and commercial purposes. In addition, these rivers are of high livelihood importance as small scale, subsistence oriented economic activities dominate over 80% of the river catchment. Further, the river catchment is low commercial purpose at inter-management unit level. Other rivers forming this drainage system include Rivers Ruiru, Gachobe, Karugi, and Mukurwe.

The sustainable management of Uplands Catchment Area is dependent upon the vibrancy of a Water Resource Users Association (WRUA) that involves the communities at the upper catchment, mid catchment, and the lower part of the catchment. The need to link the activities of CFAs and WRUAs is very critical as Uplands Forest is an integrated ecosystem providing a myriad of ecosystem services. There are a total of 54 water projects on various rivers and tributaries. The following maps showing the hydrology in Uplands Forest per block



Map 4: Kikuyu Escarpment hydrology

3.12 Kiambu County Physiographic and Natural Conditions

3.12.1 Physical and Topographic features

Kiambu County is divided into four broad topographical zones; Upper Highland, Lower Highland, Upper Midland and Lower Midland Zone. The Upper Highland Zone is found in Lari constituency and it is an extension of the Aberdare ranges that lies at an altitude of 1,800-2,550 metres above sea level. It is dominated by highly dissected ranges and it is very wet, steep and important as a water catchment area. The lower highland zone is mostly found in Limuru and some parts of Gatundu North, Gatundu South, Githunguri and Kabete constituencies. The area is characterized by hills, plateaus, and high-elevation plains. The area lies between 1,500-1,800 metres above sea level and is generally a tea and dairy zone though some activities like maize, horticultural crops and sheep farming are also practiced.

The upper midland zone lies between 1,300-1,500 metres above sea level and it covers mostly parts of Juja and other constituencies with the exception of Lari. The landscape comprises of volcanic middle level uplands. The lower midland zone partly covers Thika Town (Gatuanyaga), Limuru and Kikuyu constituencies. The area lies between 1,200-1,360 metres above sea level. The soils in the midland zone are dissected and are easily eroded.

Other physical features include steep slopes and valleys, which are unsuitable for cultivation. Some parts are also covered by forests.

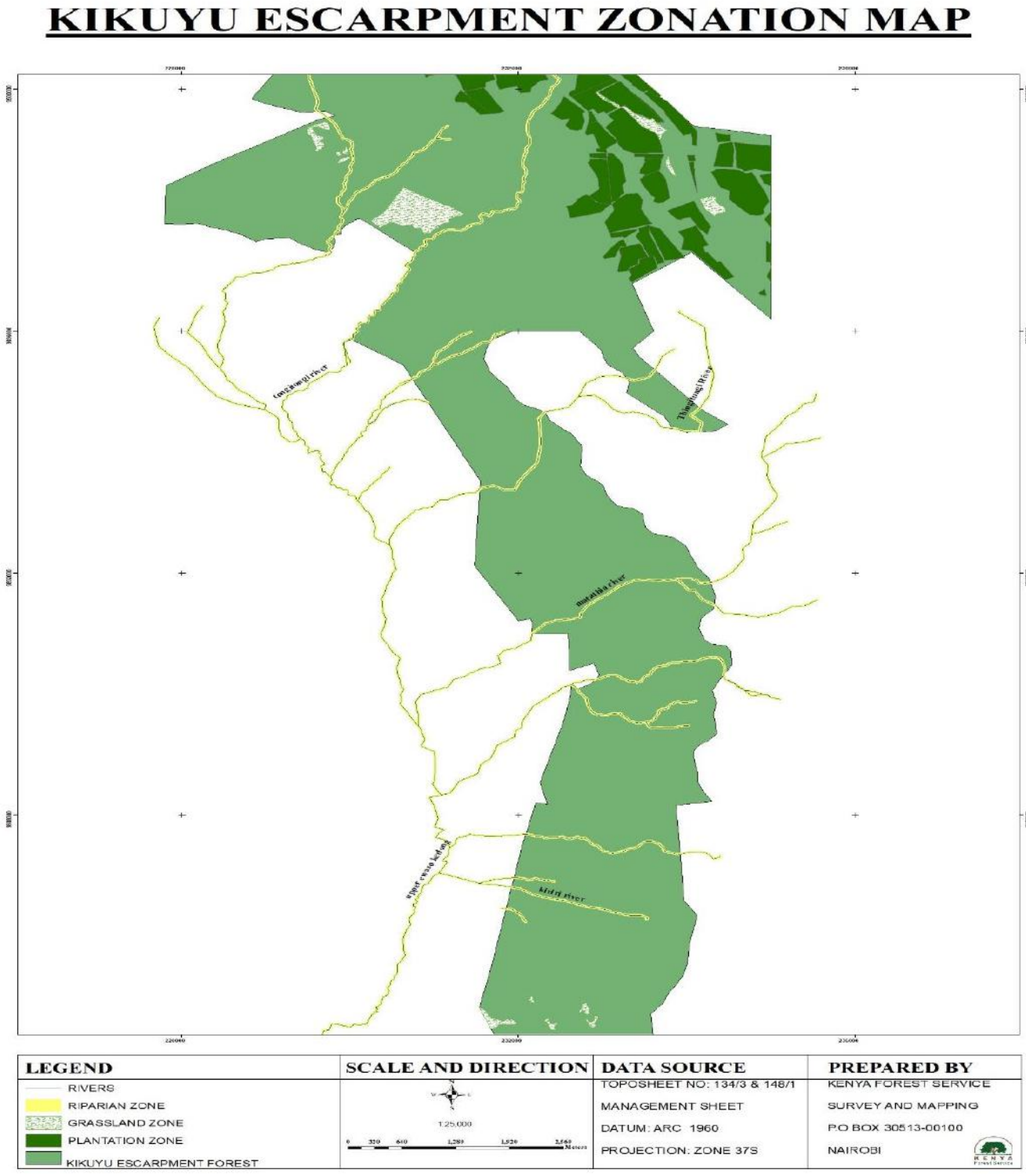
The county is covered by three broad categories of soils which are: high level upland soils, plateau soils and volcanic footbridges soils. These soils are of varying fertility levels with soils from high-level uplands, which are from volcanic rocks, being very fertile. Their fertility is conducive for livestock keeping and growth of various cash crops and food crops such as tea, coffee, horticultural products, pyrethrum, vegetables, maize, beans, peas and potatoes. These soils are found in the highlands, mostly in Gatundu South, Gatundu North, Githunguri, Kiambu, Kiambaa, Lari, Kikuyu, Kabete and Limuru Constituencies. Low fertility soils are mainly found in the middle zone and the eastern part of the county which form part of the semi-arid areas. The soils are sandy or clay and can support drought resistant crops such as soya beans and sunfloweras well as ranching. These soils are mostly found in parts of Juja, Thika Town, Ruiru, Kabete, Limuru, Gatundu North and Gatundu South Constituencies.

Most parts of the county are covered by soils from volcanic footbridges. These are well drained with moderate fertility. They are red to dark brown friable clays, which are suited for cash crops like coffee, tea and pyrethrum. However, parts of Thika Town, Ruiru, Juja and Lari constituencies are covered by shallow soils, which are poorly drained, and these areas are characterized by low rainfall, which severely limits agricultural development. However, these areas are suitable for ranching and growth of drought resistant crops.

3.12.2 Ecological conditions

Water in the county is from two principal sources-surface and sub-surface. The county is divided into several sub-catchments areas. The first one is Nairobi River Sub-catchment which occupies the southern part of the county with the major rivers being Nairobi, Gitaru, Gitathuru, Karura, Rui Rwaka, and Gatharaini. The second one is Kamiti and Ruiru Rivers Sub-catchment which is located to the north of the Nairobi river sub-catchment. It has eight permanent rivers which include Riara, Kiu, Kamiti, Makuyu, Ruiru, Bathi, Gatamaiyu and Komothai.

The third one is the Aberdare plateau that contributes to the availability of two sub-catchments areas comprising of Thiririka and Ndarugu Rivers. The main streams found in the two areas include Mugutha, Theta, Thiririka, Ruabora, Ndarugu and Komu. They flow from Nairobi, Kamiti, Ruiru, Thiririka, and Ndarugu sub-catchments to form Athi River sub-catchment. The fourth is the Chania River and its tributaries comprising of Thika and Karimenu Rivers which rise from the slopes of Mt. Kinangop in the Aberdares range. The map below shows resource zonation map for the forest:



Map 5: Kikuyu Escarpment Resources zonation map

3.12.3 Climatic conditions

The county experiences bi-modal type of rainfall. The long rains fall between Mid-March to May followed by a cold season usually with drizzles and frost during June to August and the short rains between mid-October to November. The annual rainfall varies with altitude, with higher areas receiving as high as 2,000 mm and lower areas of Thika Town constituency receiving as low as 600 mm. The average rainfall received by the county is 1,200 mm. The mean temperature in the county is 26°C with temperatures ranging from 7°C in the upper highlands areas of Limuru and some parts of Gatundu North, Gatundu South, Githunguri and Kabete constituencies, to 34°C

in the lower midland zone found partly in Thika Town constituency (Gatuanyaga), Kikuyu, Limuru and Kabete constituencies (Ndeiya and Karai). July and August are the months during which the lowest temperatures are experienced, whereas January to March is the hottest months. The county's average relative humidity ranges from 54 percent in the dry months and 300 percent in the wet months of March up to August.

3.13 Forestry, Agro Forestry and Value addition

3.13.1 Main Forest types and size of forests

Uplands Forest was gazetted as forests vide Proclamation No. 48 of 21st December 1943 as part of the Kikuyu Escarpment covering a total area of approximately 3,477.5 hectares. It is part of the Aberdare Forest Ecosystem. Uplands Forest is a montane forest made up of natural forest, plantations, glades, bamboo zone and bushland. The main indigenous tree species are *Podocarpus falcatus, Prunus africana, Dombeya goetznii, Olea africana, Juniperus procera.*

The main forests types in the county are natural, plantation and private forests. Exotics are mainly planted in private farm forests but the data on the specific forest size is not available through plans to carry out a survey are in process. The county has eight gazetted forests with the major ones being Kieni and Kinale forests. The total acreage of Kiambu county gazetted forest is 40,032.81 Ha as shown in table below:

Table 8: Kiambu County forests by name

	Forest name	Area(Ha)
1.	Kieni	13,723.6
2.	Kinale	10,504.87
3.	Kireita	4,722.15
4.	Ragia	3,591.0
5.	Upland	3,477.4
6.	Kamae	3,024.49
7.	Thogoto	764.0
8.	Muguga	225.3
	Total	**40,032.81**

3.13.2 Main Forest products

The main products from gazetted forests are timber and water. Timber is mainly used for:-

a) Supporting construction industry
b) Power line transmission
c) Fuel wood

Private forestry plays a key role in substituting dominance in sourcing vital forest products and services from gazette forests. Small scale to large scale woodland establishment on the farm is evident and farmers have majored on Timber production, Fodder production, Medicinal herbs, Riparian rehabilitation, Apiculture, Aquaculture, Fruit tree production. This sector is becoming interesting and playing a major role in livelihood empowerment as well as finance resource mobilization. The interaction between forests and the adjacent community is worthwhile. The communities downstream directly depend on the water resource in the forest where abstraction is being embraced. This results in the increase of farms production that upscale food security levels within Kiambu and also adjacent counties. It also further promotes health status of the communities and thus resulting in increased productivity.

3.13.3 Farm forestry

The main income generating activity in the county is commercial forestry. Farmers plant trees for commercial purposes in the form of timber and poles.

3.14 Administrative and Political Units

The county is subdivided into twelve sub counties and sixty wards. Kiambu County has twelve constituencies and sixty wards.

3.15 Demographic Features

According to the 2009 Kenya Population and Housing Census, Kiambu County population stood at 1,623,282 which are projected to be 1,942,505 by 2018. The population is further projected to reach 2,090,592 by the end of 2022. The 2009 Population and Housing Census indicate that the county had an urban population of 936,411 in 2009 and in 2018 was projected to be 1,241,984. Urban population is expected to reach 1,318,727 in 2018 and 1,396,081 by the end of 2022.

Kikuyu towns have the highest number of people living in urban areas, followed by Thika and Karuri towns respectively. This high population in urban centres can be attributed to the proximity of the county to Nairobi as most of the people work in Nairobi and reside in the county. In addition, industrial development in some districts like Thika West and Ruiru attract more labour force. In these areas, urban planning should be effectively undertaken to avoid strain on the physical amenities from growth of informal settlements. In addition, community policing should be enhanced to reduce insecurity. Also, more infrastructural facilities like transport network, housing, schools and health centres should be built.

3.15.1 Population density and distribution

Kiambu County had a population of 638 persons per square kilometer, according to the 2009 census. This is projected to be 936 persons/km^2 by the end of 2022. Kabete Sub County has the highest population density of 2329 persons/km2 which is projected to reach 3056 people per square kilometer. The least densely populated sub county is Lari with 282 persons/Km^2.

3.16 Infrastructure Development

3.16.1 Roads and Rail Network

The county has a total of 5533 Km of roads network. 249 Km of road are yet to be opened. The roads under bitumen standards are 865.4 KMs, 1051km on gravel, 3167km on earth surface. The county is served by Thika Super Highway from Githurai-Ruiru-Juja-Thika on average of 50Kms and A104 Uthiru-Kikuyu-Kamandura-Kinungi on average of 65 which 25.1km of it is on rehabilitation expansion programme. It is also served by a railway line which is 131km and has Railway stations in Kahawa, Ruiru, Juja, Thika, Kikuyu and Limuru. There exist bus parks in all sub counties 9 paved and 4 unpaved. Other institutions that are mandated to undertake roads and Transport programmes includes; Kenya National Highways Authority (KENHA), Kenya Rural Roads Authority (KERRA), Kenya Urban Roads Authority (KURA) and National Transport Security Authority (NTSA). The Department envisages providing sustainable mobility for all by inclusion of non-motorised traffic lanes for the people as well as reduction of air pollution to road users.

3.16.2 Information, Communication Technology

Kiambu County has 98 percent mobile network coverage owing to its location and proximity to the city. Landline coverage has been on the decline due to adoption of new technology and ease of using mobile phones. There are a total of 19 post offices and 14 sub post offices which are fairly distributed in the county. These post offices are; Ruiru, two at Thika, Juja, Githunguri, Karuri, Kiambu, Kikuyu, Limuru and Matathia-Lari post office. There are quite a number of cyber cafes offering internet access hence easy access of communication. This has been possible due to introduction of fibre optic cables in the county. Many residents listen to local FM and radio stations mainly Kameme, Inooro and Coro FM for primary information in addition to other national stations. The citizens are able to watch a variety of TV stations operating in the country. There is one Huduma centre located at Thika where citizens access government services.

3.16.3 Energy access

Kiambu county 98 percent coverage of electricity with effective coverage on the last mile programme. There has been an increase in the connectivity of rural household to electricity due to rural electrification programme. The total household connected to electricity is 70 percent, and this number is expected to rise to 100 percent in the year 2022. Solar energy has less than 5percent coverage, while Biogas use is at 25 percent especially by farmers in Githunguri, kikuyu, Limuru and other sub-counties where dairy farming is practiced. Wind coverage as a source of

energy is not active; however it is being tested in a pilot project in Nachu-Ndeiya. This has been supported by UN habitat in the promotion of renewable energy. Utility directorate has installed flood mast as follows; 56 no. 30m high, 9no. 20M high and 139 no. 15 M high all distributed in all the sub counties and 235 street lighting through WB financing. Kenya power and Lighting Company has played a key role in street lighting, installation of flood masts; 12 in Thika, 11 in Kiambu, 5 in Kikuyu, 11 in Limuru, 11 in Ruiru, 11 in Juja and 9 in Kiambaa. These flood masts are of 30M in height.

3.17 Land and Land Use

Land in Kiambu is put under diverse uses these include industrial, agricultural, commercial, wetland forest and public land where we have public utilities and amenities.There are three categories of land; public land is approximately 5%, community land 0.01%, whereas private land is approximately 94.99%.

The average mean holding size of land is approximately 0.045 hectares on small scale and 69.5 hectares on large scale. The small land holdings is mostly found in upper parts of Gatundu North, Gatundu South, Kiambaa, Limuru and Kikuyu constituencies. Indeed the registered land regime facilitated the fragmentation of land beyond what was economical hence majority of farmers are converting their farms into residential plots to supplement the meagre income from the farms. The large land holdings are usually found in the lower parts of the county especially in Juja constituency and the upper highlands in Limuru and Lari constituencies.

The official land records indicate that 85 per cent of land owners in the Kiambu County have title deeds to their land and there are no recorded cases of incidences of landlessness. The remaining 15 per cent have not received their title deeds. Though 85 per cent of land within the County is registered there are a big number of registered lands that has been subdivided and the titles not registered. Land tenure refers to the terms and conditions under which rights to land and land based resources are acquired, retained, used, disposed of, or transmitted. Incidence of landlessness is not there as the group to be considered landless is the young adults who through inheritance they will finally own land.The size of land in the County is 1,878.4 Km^2 for arable land and 649.7 Km^2 non-arable lands whereas 15.5 Km^2 is under water mass

3.18 Employment

Most of the employees in Kiambu are wage earners. These are people who are not employed permanently and are supposed to be paid on a daily basis. Their wages are based on agricultural legal notice. According to the Labour office- Kiambu, 75% of them are employed in the tea and coffee estates and horticulture. Among the wage earners are foreigners, especially Ugandans who are illegally employed because they lack entry and employment permits. Most of the wage earners are illiterate.

3.19 Oil and Other Mineral Resources

The arid parts of the county mainly Ndeiya and Karai in Limuru and Kabete constituencies contain diatomite deposits that are unexploited. There is therefore great need for investment in the area to determine economic viability of the deposits. Exploration for other mineral deposits also needs to be enhanced to determine whether other deposits are available especially in the arid areas of Ndeiya and Karai.

Mining involves extraction of minerals from the ground/earth. The main mining activities include natural gas exploitation in Lari constituency by Carbacid Company Limited and extraction of ballast, hardcore, gravel, murram, sand and building stones in Juja, Gatundu South and Gatundu North Constituencies.

3.20 Industry and Trade

The county is well endowed with 118 designated markets spread across the county. Main markets are Gatundu Modern Market in Gatundu South, Kamwangi market in Gatundu North, Juja Market in Juja Sub county, Jamhuri and Madaraka markets in Thika, Githurai and Ruiru in Ruiru Subcounty, Githunguri market in Githunguri Sub county, Wangige main Market and Wangige egg shed in Kabete sub county, Kangangi market in Kiambu Sub County, Limuru Barter Hawaker market in Limuru, Karuri market in Kiambaa Sub County, Dagoretti and Kikuyu Markets in Kikuyu Sub County and Kimende market in Lari Sub county. Wangige egg shed is the biggest open egg market in the entire region of East and Central Africa.

The county has a gazetted and an established industrial park; Tatu City in Ruiru Sub County. The park is also a Special Economic Zone. The county has many industries especially in Thika, Juja, Ruiru and Limuru towns with a concentration of manufacturing sub sector. There also exist many Jua Kali groups with approximately 30 officially registered. There are more than 200 bodaboda sheds for bodaboda operators across the county.

The county host major industries for all sector of the economy with a concentration of Agro processing and manufacturing sectors. These industries act as a major source of employment and market outlet for agricultural and non-agricultural products both for domestic use and export. The agro processing industries are spread across the county and include Farmers Choice Ltd, Kenchic Co. Ltd, Brookside Dairies, Githunguri Dairies, Ndumberi Dairies, Limuru Milk and Palmside Dairies, among others. Thika sub County has more than 58 industries which include Bidco Oil Industries, Thika Motor Vehicle dealers, Thika Pharmaceutical Manufacturers Limited, Devki Steel Mills, Broadway Bakeries, Kenblest Industry, Kel Chemicals, Thika Rubber Industries Limited, Macadamia Nuts, Campwell Industry and Kenya Tanning Extracts Limited. In Ruiru Sub County, the major industries include Clay Works as well as Spinners and Spinners. The Bata Shoe Factory which is the country‘s major producer of leather products is located in Limuru Sub County.

The county is well endowed with all types of businesses which include mega stores, large traders, transport operators, financial services providers among others. The total number of registered business is estimated at 72,000. Thika Sub County has the highest number of registered businesses estimated at 10,000 whereas Gatundu North Sub County has the minimum number estimated at 1,199. Mega stores, large traders and petrol filling stations are estimated at 63, 5,348, and 219 respectively. Financial services provider are spread across the county with more than 560 service providers registered. Kiambu County has a total of 2,647 SMEs and over 50,000 Micro Enterprises. These enterprises have boosted the county’s economy through provision of goods and services, enhancing competition, fostering innovation, generating employment and in effect made the county have the highest per capita income in the country.

3.21 Financial services

There are a total of 18 commercial banks operating in the County. In addition, there are 31 microfinance institutions, four village banks, 12 insurance companies and 520 SACCOs in the county. Where main entities does not exist physically, they have adopted agency banking models to reach their services across the county. This is an indication of vibrant economic activities across the county that are able to sustain the financial sector making it one of the fastest growing sectors in the county over the last five year before enactment of interest rates.

3.22 Environment and Climate Change

Over the years there has been an increase in environmental deterioration through depletion of resources, destruction of ecosystem, habitat and extinction of wildlife. Kiambu County is not exceptional from the increased environmental degradation. The major degraded areas in Kiambu County are forests and Rivers. Kinale and Kieni forests have faced major deforestation due to population demand for shelter and fuel and encroachment for farming demand. In addition rivers like Athi River have experienced much pollution through dumping of waste which comprises of effluents, agricultural chemicals and industrial waste.

The major contributors to environmental degradation are; increased population leading to massive deforestation and encroachment of water catchment areas. In addition, industries have emissions that have led to lot of air and water pollution. Farming has also led to pollution due to the release of various agrochemicals in the water sources.

The county experiences bi-modal type of rainfall. The long rains fall between Mid-March to May followed by a cold season usually with drizzles and frost during June to August and the short rains between mid-octobers to November. The annual rainfall varies with altitude, with higher areas receiving as high as 2,000 mm and lower areas of Thika Town constituency receiving as low as 600 mm. The average rainfall received by the county is 1,200 mm. The mean temperature in the county is 26°C with temperatures ranging from 7°C in the upper highlands areas of Limuru and some parts of Gatundu North, Gatundu South, Githunguri and Kabete constituencies, to 34°C in the lower midland zone found partly in Thika Town constituency (Gatuanyaga), Kikuyu, Limuru and Kabete constituencies (Ndeiya and Karai).

3.22.1 Solid waste management facilities

The main solid waste management facilities in Kiambu County include landfills, dumpsites, incinerators, recycling facilities and bio-decomposers. These solid waste management facilities are spread across the county as follows: one landfill in Kangoki which is a pilot project, Gatuanyaga Asbestos disposal site, six dumpsites in Gatundu South, Kiambu, Ruiru, Gacharage, Limuru and Githunguri. There are eight incinerators for girls' secondary schools (demonte-fort), Lang'ata Hospital in Githurai and Thika Level 5 Hospital. The recycling facilities include; two Taka Taka solutions (composting facility) in Kiambaa Sub County and three Alternative Energy Solutions Limited (AESL) - Prolysis plant in Thika Sub County. There is also a bio decomposer in Kangoki composting facility which is a pilot project in Thika.

3.23 Water and Sanitation

Kiambu County is endowed with both surface and ground water resources. The county has sixteen permanent rivers originating from Aberdare Ranges, which is the main water tower for the county. The major rivers that meet the county water demand are; Ndarugũ, Thiririka, Ruiru, Kamiti and Kiu, all of which eventually drain into Athi River, and five major wetlands are; Kikuyu, Lari, Theta, Kiganjo and Gacii wetlands.

The eastern part of the county that includes Thika, Gatundu, Ruiru and Juja is well endowed with surface water from Chania, Thika, Karimenu, Ruabora, Ndarugu, Thiririka, Theta, Mukuyu, Ruiru rivers. The western part of the county that includes Limuru, Kikuyu, Kiambu, Karuri, Lari and Githunguri areas has limited surface sources, hence rely on underground water sources mainly boreholes. However, some areas of ground water sources have high fluoride levels which cause negative effects to both people and livestock, and residue effects in crops.
In the county, 46% of the populations are not currently served by Water Service Providers (WSPs). These areas are served by Community Based Organizations (CBOs), private water operators and direct abstraction from surface and ground water sources.

Kiambu County is considered as 60% urban with numerous peri-urban centres mushrooming rapidly due to land use changes. There are twelve main urban centres within the county out which five, namely, Thika, Kiambu, Limuru, Ruiru and Juja urban centres have convectional sewer treatment system. Apart from Ruiru and Juja treatment works the rest of the treatment works are old and currently treating beyond their design limits. Kiambu sewer treatment works was constructed in 1974 with a design capacity of 1,000m^3/day. It's currently receiving 2,200m^3/day; Limuru was commissioned in 1984 with a design capacity of 540m^3. It's currently receiving 2000m^3/day; Thika was constructed 1978 with a design capacity of 6,100m^3/day. The treatment facility is currently receiving 8,000m^3/day. In order to address the shortfalls, Thika treatment works is currently undergoing improvement through donors funding.

3.24 Health Access

The county has public and private health facilities spread across the county. In total, there are 505 health facilities; 108 are public health facilities, 64 are faith based health facilities and 333 are private health facilities. The public health facilities are broken down as follows as per the KEPH levels.

i. 70 Dispensaries offering Level 2 Services
ii. 24 Health Centres providing Level 3 Services
iii. 11 Hospitals providing Level 4 Services
iv. 3 Hospitals offering Level 5 Services

Kiambu County is ranked among the 18 high burden counties with a prevalence rate of 5.6 % according to the latest HIV estimates released in 2016. With the County ranking 6th in terms of the HIV burden in the Country, the implications of the HIV epidemic in the county are enormous as they mainly affect the young and productive members of the society. The adverse effects continue to affect all the sectors economically and socially as most resources are directed to treating the infected and other support to affected individuals and families. (Kenya HIV Estimates, 2015). To date, the county has made significant progress in the fight against HIV/AIDS. The Modes of HIV Transmission Study (MoT) report of 2008 and Kenya AIDS Indicator Survey (KAIS) in 2012 indicates the HIV prevalence for the county as still high with new HIV infections estimated at 4,273 among the adults, 1,199 among the young people (age 15-24 years), 353 among adolescent (age 11-19 years) and 76 among the children (0-14 years) annually. The total number of infected population is around 70,971.

4. POLICY LEGAL AND REGULATORY FRAMEWORK

4.1 The Constitution of Kenya 2010

Article 42 of the Bill of Rights of the Kenyan Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures'. Under Chapter 5 (Land and Environment), Part 1 is devoted to land. It requires that land be used and managed in 'a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles:

(i) Equitable access to land;
(ii) Security of land rights;
(iii) Sustainable and productive management of land resources;
(iv) Transparent and cost effective administration of land; and
(v) Sound conservation and protection of ecologically sensitive areas.

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress. The project should ensure compliance with the constitution in so far as equitable sharing of the resources, between the stakeholders. Further, the project should ensure the sustainability of livelihoods and biological resources within the project areas are protected.

4.2 Vision 2030

Vision 2030 is the new country's development blueprint covering the period 2008 to 2030. It aims at making Kenya a newly industrializing middle income country providing high quality life for all its citizens by the year 2030. The vision has been developed through an all-inclusive stakeholder consultative process, involving Kenyans from all parts of the country.

The vision is based on three pillars namely; the economic pillar, the social pillar and the political pillar. The vision 2030 comes after the successful implementation of the Economic Recovery Strategy (ERS) for Wealth and Employment Creation 2003-2007.

The Kenya Vision 2030 economic pillar aims at providing prosperity of all Kenyans through an economic development programme aimed at achieving an average GDP growth rate of 10% per annum over the next 25 years from the year 2008. The social pillar seeks to build a just and cohesive society with social equity in a clean and secure environment'. On the other hand, the political pillar aims at realizing a democratic political system founded on issue based politics that respects the rule of law, and protects the rights and freedoms of every individual in the Kenyan society.

4.3 Policy framework

There are several policies in place at the national and international levels to ensure that development projects are both socially and economically sustainable. These policies are discussed below:

4.3.1 National Environment Policy (2013)

This Policy proposes a broad range of measures and actions responding to key environmental issues and challenges. It seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support the achievement of the desired objectives and goal.

Chapter Six of this policy addresses a wide range of issues relating to environmental quality and health. The areas covered include air quality, water and sanitation, waste management, radiation, toxic and hazardous substances, noise, HIV and AIDS and environmental diseases. Its alive to the fact that climate change poses significant environmental challenges for Kenya as evidenced by the frequent droughts and water shortages.

It also recognizes that freshwater resources and wetlands form an important part of Kenya's natural resources with considerable provisioning, regulatory and supporting services. Their provisioning services include the storage and

retention of water for domestic, agricultural and industrial use. Their regulating services include modifying water flows, recharging and discharging groundwater resources and diluting or removing pollutants. Their supporting services are important for soil formation and retention as well as nutrient cycling. These ecosystems also provide habitats for a great number of plant and animal species.
The contractor will restore work areas and will not cause environmental pollution in the course of project implementation.

4.3.2 Policy on Sexual and Gender Based Violence (SGBV) 2017

This is a model law designed for entrenchment in county legislation to address sexual and gender based violence. The legislative framework is comprised of laws that govern conduct in the society. The law provides a set of enforceable rules and guidelines that compel or prohibit certain types of behaviour. Policies enshrine government commitments and priorities and provide the framework for achieving these goals. Laws and policies must therefore work hand in hand to achieve development goals, advance human rights and create a just and equitable society. Despite government interventions in terms of legislative and/or policy framework, SGBV still remains a serious challenge to society. There is impunity and every day Kenyans are treated to news in the media of people subjected to various types of violence ranging from rape, physical assault and emotional abuse.
There has been progress in addressing SGBV at the National level. The County governments have not been left behind. They are equally making inroads towards a holistic approach through some of their legislative and policy frameworks to enhance enforcement and implementation. This Policy provides for strategies to facilitate and enhance implementation of the national legislation and policy frameworks on SGBV at the County government level contextualized to the respective county needs. The policy framework is hoped to be gender transformative and gender synchronized to bring long-term and sustained change. There is need to ensure that the framework is actionable, well-coordinated and sufficient resources are allocated for its implementation at County level.

This policy is important and the County Government of Kiambu and the County Assembly will need to entrench this law so as to address SGBV in projects and county in general.

4.3.3 National Environment Policy (2013)

The goal of this Policy is: Better quality of life for present and future generations through sustainable management and use of the environment and natural resources. Under section 3.1 the objectives of this Policy are to: (a) Provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and natural resources. (b) Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources. (c) Ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods. (d) Promote and support research and capacity development as well as use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, Strategic Environmental Assessments (SEAs), Environmental Impact Assessments (EIAs), Environmental Audits (EA) and Payment for Environmental Services (PES). (e) Promote and enhance cooperation, collaboration, synergy, partnerships and participation in the protection, conservation, sustainable management of the environment and natural resources. (f) Ensure inclusion of 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. (g) Promote domestication, coordination and maximization of benefit from Strategic Multilateral Environmental Agreements (MEAs).
To satisfy the requirements of this policy, environment friendly practices will be undertaken during project implementation such as:

- Rehabilitation of areas of completed works including restoring disturbed areas, access roads, unused materials sites, planting grass on dam embankment.
- The proponent has fulfilled the requirements of this policy by conducting an EIA for the project and an annual Environment Audit is recommended.

4.4 Legal framework

Previously, environmental management activities were implemented through a variety of instruments such as policy statements and sectoral laws and also through permits and licences. For example, the Physical Planning Act of 1996 empowers local authorities to request existing facilities to conduct environmental assessments, while under

the Local Government Act of 1998; it is an offence to emit smoke, fumes or dust which may be a source of danger, discomfort or annoyance.

With the enactment of the Environmental Management and Co-ordination Bill in December 1999, the institutional framework for environmental management was strengthened. The Environmental Management and Co-ordination Act (EMCA) of 1999 provided for the establishment of a National Environment Management Authority (NEMA), which became operational in July 2002, with the statutory mandate to co-ordinate all environmental activities. The Environmental Management and Co-ordination Act (EMCA, the Act), received Presidential assent on 6 January 2000 and was gazetted on 14 January 2000. This Act was amended in year 2019 to align it with Constitution of Kenya (2010).

4.4.1 Environmental Management and Co-ordination Act CAP 387

The main objective of the Act is to:

- Provide guidelines for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya
- Provide a framework legislation for over 77 statutes in Kenya that contain environmental provisions
- Provide guidelines for environmental impact assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.

The *Second Schedule* to the *Act* specifies the projects for which an EIA or environmental audit must be carried out. Legal Notice No. 32 of 2019 is crucial in this project as it categorizes the class of the project. This project is therefore classified as high risk and requires a full EIA study.

The proponent is required to follow the requirements of EMCA CAP 387.

4.4.2 County Governments Act (2012)

Section 109 of the Act helps counties to ensure effective coordination of spatial developments. Sub section 2 part C states in part; spatial County Plan shall:

- Indicate desired patterns of land use within the county
- Address spatial construction or reconstruction of the county
- Provide strategic guidance in respect of the location and nature of development within the county
- Set out basic guidelines for a land use management system taking into account any guidelines, regulations or laws as provided under Article 67 (2) (h) of the Constitution of Kenya
- Set out capital investment framework for the Counties development programs
- Contain a strategic assessment of the environment impact of the spatial development framework

The proponent should therefore follow the requirements of the Act and comply with relevant laws and regulations.

4.4.3 Climate Change Act, 2016

This Act provides a framework for promoting climate resilient low carbon economic development (Art 3-2). It aims to:

- 'Mainstream climate change responses into development planning, decision making and implementation;
- Build resilience and enhance adaptive capacity to the impacts of climate change;
- Formulate programmes and plans to enhance the resilience and adaptive capacity of human and ecological systems to the impacts of climate change;
- Mainstream and reinforce climate change disaster risk reduction in strategies and actions of public and private entities;
- Mainstream intergenerational and gender equity in all aspects of climate change responses;
- Provide incentives and obligations for private sector contributions to achieving low carbon climate resilient development;

- Promote low carbon technologies to improve efficiency and reduce emissions intensity by facilitating approaches and uptake of technologies that support low carbon, and climate resilient development;
- Facilitate capacity development for public participation in climate change responses through awareness creation, consultation, representation and access to information;
- Mobilize and transparently manage public and other financial resources for climate change response;
- Provide mechanisms for, and facilitate climate change research and development, training and capacity building;
- Mainstream the principle of sustainable development into the planning for and decision making on climate change response; and
- Integrate climate change into the exercise of power and functions of all levels of governance, and to enhance cooperative climate change governance between national government and county governments'.
- The Act establishes a National Climate Change Council, chaired by the President, with Deputy President as vice-chair that provides an overarching national climate change coordination mechanism. It also establishes the Climate Change Directorate - Secretariat to the Council and the lead agency of the government on national climate change plans and actions.

  The prerogatives of the National Climate Change Council include (Art 6):
- Ensure the mainstreaming of the climate change function by the national and county governments;
- Approve and oversee implementation of the national climate change action plan
- Advise the national and county governments on legislative, policy and other measures necessary for climate change response and attaining low carbon climate change resilient development;
- Approve a national gender and intergenerational responsive public education awareness strategy and implementation programme;
- Provide policy direction on research and training on climate change including on the collation and dissemination of information relating to climate change to the national and county governments, the public and other stakeholders;
- Provide guidance on review, amendment and harmonization of sectoral laws and policies in order to achieve the objectives of the act;
- Administer the climate change fund;
- Set the targets for the regulation of greenhouse gas emissions'.

The Act allows the Council to impose climate change obligations on private entities (Art 16), and stipulates investigation, monitoring and enforcement powers.

The Act also mandates the Cabinet Secretary to formulate a National Climate Change Action Plan, to be then updated every five years, with implementation review conducted every two years.
The Act allows Citizens to apply to the Environment and Land Court "alleging that a person has acted in a manner that has or is likely to adversely affect efforts towards mitigation and adaptation to the effects of climate change" and the court may order a discontinuance or prevention of these actions, and may "provide compensation to a victim of a violation relating to climate change duties." It is stipulated that no proof of loss or injury by the applicant is necessary (Art 23).

The Act also empowers the National Climate Change Council to assign duties relating to climate change and implementation of the Climate Change Action Plan to both public and private entities (Part IV). It also establishes the Climate Change Fund as the financing mechanism for priority climate change actions and interventions approved by the council.

This Law is very critical in the project because it outlines requirements for integrating climate change issues and will be implemented in the course of project development.

4.4.4 Sustainable Waste Management Act (2022)

The new Sustainable Waste Management Act (SWMA) is a radical step in waste management in Kenya whereby a linear model is discarded and a circular model of waste management is embraced. The Act provides for new governance framework in waste management with establishment of Waste Management Council, expanded role of County Governments and Extended Producer Responsibility Schemes. In addition, the Act prescribes the need to establish new infrastructure for waste management such as segregation at source, proper transportation, material recovery facilities, and closure of dumpsites, sanitary landfills, and national waste information system. The following tables show a summary of the law:

Table 3: Summary of the SWM law

Section	Prescription
Section 6	CS shall establish a Waste Management Council
Section 6(11)	CS shall establish a Waste Management Secretariat for the Waste Management Council
Schedule 1 (15)(1)	CS shall second a senior officer from the Ministry to serve as Secretary to the Waste Management Council
Section 7(2)	CS shall make regulations for the operationalization of the WM Council
Section 12(6)	CS shall in consultation with NEMA and County Governments gazette the National Color Coding System for Waste Management
Section 19(2)	CS shall within six months of coming to force of SWMA Gazette the category of private sector entities that shall be required to prepare waste management plans which shall be based on the volume of production of waste
Section 34	CS shall in consultation with CS responsible for Education and NEMA, develop a curriculum on sustainable waste management
Section 35(1)	CS shall in consultation with County Governments develop a timetable for county governments to adopt the SWM Act and regulations made thereunder
Section 9 (2)	County Governments shall ensure that County Waste Management legislation is in conformity with SWMA
Section 9(4)	County Governments shall provide central collection centres for materials that can be recycled
Section 10(1)	CS shall in consultation with NEMA and County Governments, make policies and regulations for proper administration of the SWMA
Section 11(1)	County Governments shall in consultation with relevant national government agencies, the public and other stakeholders, develop county legislation
Section 13(3)	CS shall make regulations on Extended Producer Responsibility
Section 15(3)	CS shall develop a national Waste Management Strategy and Action Plan which shall be reviewed every 5 years

Section	Prescription
Section 17(a)	Each County Government shall enact a county sustainable waste management legislation
Section 18	Each County Government shall prepare and submit to the County Assembly for approval an integrated county waste management plan once every 5 years

These laws are pertinent in management of solid and liquid waste for development projects. The county governments should formulate waste policies and laws conforming to this law; and the proponent will implement this law as it is.

4.4.5 The Factories and Other Places of Work Act

This is an Act of Parliament to make provision for health, safety and welfare of persons employed in factories and other places, and for matters incidental thereto and connected therewith.

4.4.5.1 Building Operations and Works of Engineering Constructions

The provisions of the Factories Act relevant to engineering construction works are contained in the Abstract of the Act for Building Operations, and Works of Engineering Construction Rules. These are summarised in the table below:

4.4.5.2 Health

Part IV of the Factories Act, Chapter 514, addresses provisions concerning health. These provisions are to be enforced by the Department of Occupational Health and Safety of the Ministry of Labour. Details of the various requirements are outlined in Table below.

4.4.5.3 Safety

Part V of the Factories Act elaborately deals with safety requirements, mainly from the point of view of avoiding accidents and injuries at work. The table below outlines the safety requirements under the Act.

4.4.5.4 Health and Safety Committee Rules

These rules are described in Legal Notice No. 31 of the Kenya Gazette Supplement No. 25 of 14 May 2004 and apply to all factories and other workplaces that regularly employ twenty or more employees. Among other items, the rules state that:

- The occupier of every factory or other workplace shall establish a Health & Safety committee
- The Committee shall consist of safety representatives from the management and the workers
- The factory occupier shall appoint a competent person from the management staff to be responsible for safety, health and welfare in the factory or workplace; and the person appointed shall be the secretary to the Committee
- Every member of the Health & Safety Committee shall undertake a prescribed basic training course in occupational health and safety within a period of six months from the date of appointment or election, and thereafter further training from time to time
- The occupier of every factory or workplace shall cause a health and safety audit of the workplace to be carried out at least once in every period of twelve months by a registered health and safety adviser.

The above legal notice also describes the functions and duties of the Health & Safety committees, meetings and minutes, and roles in the Committee. It further describes the duties of the occupier and those of the Health & Safety Adviser.

4.4.5.5 Noise Prevention and Control Rules

NEMA has gazetted noise regulations that safeguard those likely to be affected by the project.
Other existing rules are described in Legal Notice No. 25 of the Kenya Gazette Supplement No. 22 of April 2005 and state the noise regulations that apply to every factory, premises, place, process and operations to which the provisions of the Factories and Other Places of Work Act (Cap 514) applies.

The proponent should therefore register the site as a work place and obtain relevant certificates of compliance of Directorate of Occupational Safety and Health. Relevant committees should be set up and proper records kept especially on accidents and incidents and health.

4.4.6 The National Land Commission Act, 2012

The National Land Commission of Kenya is an independent government commission whose establishment was provided for by the Constitution of Kenya to, amongst other things, manage public land on behalf of the national and county governments, initiate investigations into present or historical land injustices and recommend appropriate redress, and monitor and have oversight responsibilities over land use planning throughout the country. It was officially established under The National Land Commission Act, 2012.
Pursuant to Article 67(2) of the Constitution, the functions of the Commission shall be –
i. To manage public land on behalf of the national and county governments;
ii. To recommend a national land policy to the national government;
iii. To advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;
iv. To conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;
v. To initiate investigations, on its own initiative .or on a complaint, into present or historical land injustices, and recommend appropriate redress;
vi. To encourage the application of traditional dispute resolution mechanisms in land conflicts;
vii. To assess tax on land and premiums on immovable property in any area designated by law; and
viii. To monitor and have oversight responsibilities over land use planning throughout the country.

Under the National Land Commission Act, the Commission shall:
i. On behalf of, and with the consent of the national and county governments, alienate public land;
ii. Monitor the registration of all rights and interests in land;
iii. Ensure that public land and land under the management of designated state agencies are sustainably managed for their intended purpose and for future generations;
iv. Develop and maintain an effective land information management system at national and county levels;
v. Manage and administer all unregistered trust land and unregistered community land on behalf of the county government; and
vi. Develop and encourage alternative dispute resolution mechanisms in land dispute handling and management.
There is no likelihood for land acquisition for the project.

4.4.7 The Forest Conservation and Management Act 2016

By virtue of being situated in high rainfall areas, forests comprise the main water catchments in Kenya. In recognition of this role, a major policy goal of reservation and management of state forests is to enhance conservation of forests for catchment conservation. This was amplified in the first ever policy statement published in form of the White Paper No. 1 of 1957 and later on restated after independence, with very few modifications, as Sessional Paper No. 1 of 1969-A Forest Policy for Kenya. Alongside Sessional Paper No. 1 of 1968, other policy statements with strong bearing on conservation forestry include;-The National Energy Policy of 1987, Sessional Paper No. 1 of 1986 on Economic Management for Renewed Growth and Sessional Paper No. 6 of 1999 on Environment and Development among others. To drive state policy on forests, the Forest Act Cap 385 was enacted in 1922 and revised in 1962 and 1982 with the aim of providing for enforcement of the policy provisions. However, owing to general lack of public appreciation of the role of forests, coupled by lack of political goodwill, weaknesses in Cap 385 were exploited to facilitate officially sanctioned conversion of forests to other uses thereby causing the national forests cover to decline from an estimated 3% at independence to the current less than 2%. Thus, under Cap 385, Kenya lost a considerable area of important catchment forests around Mt. Kenya and its outliers.

The need to enhance protection of state forests for multiple uses and expand stakeholder involvement in forest management saw the drafting of new forestry legislation which was ultimately issued as the Forests Act 2005. Among many key features, the new legislation sets a precedent by providing a framework, including an array of incentives and systems for support for the development of partnerships for sustainable management, conservation

and utilization of types of forest areas in the country. Further, the New Act tightens the procedure for conversion of state forests by demanding that all proposed excisions to be discussed by Parliament, and only after being preceded by an Environmental Impact Assessment. This new development will hopefully create stability in the management of water catchments in state owned forests which, coupled with the need for ESIAs for any development proposed in privately owned forests will go some way in securing the integrity of catchment forests. The proponent will have non consumptive utilization of the forest and will participate in its conservation. There will be no utilization of physical forest resources in the proposed project. Presently, public forests in Kenya are managed according to the Forests Conservation and Management Act, 2016. This Act establishes the Kenya Forest Service (KFS) and stipulates its functions, among them being development of programmes for tourism and recreational use of public forests in Kenya. It further provides for engagement of private sector in sustainable management of public forests by use of permits, contracts, joint management agreements, concessions, and special use licenses.

4.4.8 The Wildlife Conservation and Management Act, 2013

The Wildlife Conservation and Management Act, 2013 mandates the Kenya Wildlife Service to manage and conserve wildlife within and outside protected areas and to support community initiatives towards wildlife conservation. It also mandates KWS to play an advisory role and provide flexible regulations that enable the people to get optimum returns from wildlife through non-consumptive uses. Uplands forest is a habitat to a variety of fauna especially birds, reptiles and insects, which can be an attraction to tourists, educationists and researchers from whom the community can generate income.

4.4.9 Grass Fires Act, 2012

The Grass Fire Act, Cap. 327 provides for protection of the vegetation from fire by regulating burning of bushes, shrubs, grass, crop waste and stubble through issuance of permits to carry out planned burning within protected areas, trust land and in private lands. The act recognizes controlled burning as a natural resource conservation measure to help in controlling pests, invasive plant species and improving pasture especially in rangelands. Escarpment block of Uplands Forest is a high fire risk area and may face fire outbreaks especially during the dry seasons. This Act will be very relevant for the control of forest fire occurrence in the project.

4.4.10 The Energy Act, 2019 and National Energy Policy

The Energy Act 2019 dated 14th March 2019, deals with firewood, charcoal, biomass, biogas, improved stoves and use of briquettes. Utilization of solar energy, wind, biodiesel, geothermal, hydropower and small hydro's fall under this Act. The policy ensures that the relevant ministries, NGOs, and other organizations address environmental problems associated with the supply and use of energy (charcoal, fuel wood and other forms of energy). The broad objective of the energy policy is to ensure adequate, quality, cost effective and affordable supply of energy to meet development needs, while protecting and conserving the environment. Uplands forest is a source of fuel wood for the adjacent communities thus the Energy Act and policy relate very well with management of the forest.
There shall be no utilization of forest products to generate energy for the project. The proponent shall use sustainable sources of energy including solar and gas.

4.5 Administrative framework

In 2001, the Government established the administrative structures to implement the Act. The main administrative structures are described in the following sections:

4.5.1 The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment.

The proponent should follow and implement all directives and improvement orders issues by NEMA at all stages of the project cycle.

4.5.2 The Public Complaints Committee

The Act (EMCA 2019) amended has also established a Public Complaints Committee (PCC), which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

Any aggrieved party by the project should make reports on NEMA website or call the emergency numbers provided to report incidents. Also, a report can be made to the PCC.

4.5.3 Standards and enforcement

Part VIII of the Act deals with environmental quality standards. It establishes a Standards and Enforcement Review Committee (SERC) whose functions include the establishment of standards for all environmental media

EIA/EA Legal Notice No. 31 and 32 of 2019 should be followed as well as Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2019

4.6 Regulatory framework

4.6.1 Environmental (Impact Assessment and Audit) Regulations, 2003

These are entrenched under section 147 of the EMCA. They were published in the Kenya Gazette supplement no.56 legislative supplement no. 31, legal notice no.101 of 13th June, 2003.The regulations provide a framework for conducting ESIA and Environmental Audit and apply to all policies, plans, programmes, project and activities specified in parts IV, V and the second schedule of EMCA 1999.
This EIA is being conducted in conformity with these regulations and EMCA, (CAP 387) and an ESIA report has been prepared.

The proponent is required to follow the requirements of these regulations and perform annual Environmental Audits for the facility.

4.6.2 Environmental Management and Coordination (Waste Management) Regulations, 2006

The government has established regulations to provide details on management (handling, storage, transportation, disposal and treatment) of various waste streams which include: domestic, industrial, hazardous, toxic, biomedical and radioactive waste with an emphasis on waste minimization and clean production. The aim of these regulations is to protect human health and the environment; they define the responsibilities of waste generators and the duties and requirements for transportation and disposal of waste. The regulations require a waste generator to dispose waste only to a designated waste receptacle. These regulations were published in the Kenya gazette supplement no.69 legislative supplement No. 37, Legal Notice No.121 of 29th September, 2006.

The proponent shall ensure that cleaner production measures are incorporated in the project and that all non-hazardous waste is disposed at NEMA/ County government designated sites. The proponent will also contract a licensed waste handler to collect waste. They will also comply with the NEMA and CGK regulations on waste management.

4.6.3 Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009

Part 2 of the regulations states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. The noise will be determined if loud, unreasonable or unusual by factors such as: Time of day, Proximity to residential area, Whether the noise is recurrent, intermittent or constant, The level and intensity of noise, whether the noise has been enhanced in level or range by any type of electronic or mechanical means, whether or not the noise can be controlled without much effort or expense to the person making the noise.

Section 5 of the regulation warns against operating beyond the permissible noise levels while Section 6 gives guidelines on the control measures for managing excessive noises. The regulation states that a day starts from 6.01 a.m. to 8.00 p.m., while night starts from 8.01 p.m. – 6.00 a.m. Construction sites near the silent zones are allowed

maximum noise level of 60 dB (A) during the day, whilst night levels are maintained at 35 dB (A). The time frame for construction sites is adjusted and the day is considered to start at 6.01 a.m. and ends at 6.00 PM while night duration starts from 6.01 p.m. and ends at 6.00 a.m.
Part 3 Provision relating to noise from certain sources states that where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority (NEMA) may impose requirements on how the work is to be carried out including but not limited to requirements regarding; Machinery that may be used and the permitted levels of noise as stipulated in the second schedule and third schedule of these regulations.

In view of this regulation, the contractor should observe the noise and vibration regimes. These regulations apply because the Kiambu County Government has not enacted its own regulations on noise management.

4.7 Multi-Lateral Environmental Agreements (MEAs)

4.7.1 The Convention on International Trade in Endangered Species of Flora and Fauna (CITES)

The Convention regulates the international trade in wild plants and animals that are at risk of extinction because of trade. The convention seeks to control trade not only in live species, but also in dead specimen and their derivatives. CITES identifies the species that it protects and classifies them into three categories namely those that are currently at risk of extinction, those that probably may be at the risk of extinction if the trade in them is unregulated and those that member states have listed since they are under managed and require the co-operation of other states to succeed in their protection. Kenya ratified to the Convention in 1978 and it was domesticated in the Wildlife (Conservation and Management) Act. Uplands forest is habitat to *Osyris lanceolata* (Sandal wood) which is highly valued for cosmetic and medicinal use.

4.7.2 United Nations Framework Convention for Climate Change (UNFCCC)

The objective of this convention is to establish methods to minimize global warming and in particular the emission of greenhouse gases. The UNFCCC requires that all parties stabilize greenhouse gases concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system within a period sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. Uplands management plan considers this convention through advocating for the protection, conservation and sustainable use of its resources thus enhance the forest capacity to store Carbon and prevent leakage through degradation or exploitation.

4.7.3 Kyoto Protocol to UNFCCC, 1997

The Kyoto Protocol required signatories to reduce their greenhouse gas emission levels to 5% below 1990 levels by the year 2012. Kenya falls under Non-Annex I for developing countries that have no greenhouse gas emission reduction obligations but may participate in the Clean Development Mechanism. Under this Annex, Kenya is already engaged in the sale of carbon credit and Uplands Forest (Ngubi block in Kikuyu escarpment) through ESCONET are engaging in carbon credit.

4.7.4 United Nations Convention to Combat Desertification (UNCCD)

The purpose of UNCCD is to address the problem of the degradation of land by desertification and the impact of drought, particularly in arid, semi-arid and dry semi-arid areas. The forest extends to the drier Rift Valley thus the convention is relevant to this plan in governing the land use in the forest adjacent areas.

4.7.5 Sustainable Development Goals (SDGs)

Sustainable Development Goals (SDGs) are universal in the sense of embodying a universally shared common global vision of progress towards a safe, just and sustainable space for all human beings to thrive on the planet. This plan addresses the following SDGs:
Goal 1. End poverty in all its forms everywhere.
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
Goal 7. Ensure access to affordable, sustainable, and reliable modern energy services for all.
Goal 13. Take urgent action to combat climate change and its impacts.
Goal 15. Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forest, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Forests are key to combating climate change, protecting biodiversity, and providing food security to people. Deforestation and desertification, which is caused by human activities and climate change, pose a major challenge to sustainable development, and have affected the lives and livelihoods of communities. It is important therefore to conserve Uplands Forest to shield the forest adjacent community from impacts of climate change.

4.7.6 African Convention on the Conservation of Nature and Natural Resources

The convention came into force in 1969. It reaffirms the importance of natural resources both renewable and non-renewable, particularly soil, water, flora and fauna. The objective is to facilitate sustainable use of these resources. It emphasizes on preventive and precautionary measures to conserve and preserve these natural resources. The provisions of the Convention are contained in the AFFA Act No 13 of 2013 and the Wildlife Conservation and Management Act 2013 which are relevant in the implementation of this plan.

4.7.7 New Partnership for Africa Development (NEPAD)

NEPAD is an initiative based on common vision, firm and shared conviction to eradicate poverty and place the continent on the path to sustainable growth and development as well as participate in global economic and political arena. NEPAD recognizes the range of issues necessary to nurture the regions, environmental base and sustainable use of natural resources as vast and complex; and that a systematic combination of initiatives is necessary for the development of a cohesive environmental programme.

The NEPAD strategic framework to promote Africa's sustainable development has been prepared through a consultative and participatory process under the leadership of the African Ministerial Conference on Environment (AMCE). The plan is comprehensive holistic and integrates sustainable development principles (UNEP, 2003). The environmental initiative of the plan addresses a range of crosscutting issues such combating land degradation, drought and desertification, climate change and conservation of wetlands. Uplands forest plays a crucial role in addressing the mentioned cross cutting issues.

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5. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND RISK ASSESSMENT

This chapter presents an assessment of environmental impacts from the planned project design outlined in earlier chapters, and proposes mitigation and management measures to prevent and control these impacts.

5.1 Site preparation

Prior to commencing preparation activities, the Proponent should submit to the County Government of Kiambu plans and drawings of the proposed building project. Upon commencement of the project, the Contractor should apply to the Town Engineer for a permit to dispose of excavated waste to approved dumping sites. Site preparation activities, anticipated impacts and corresponding mitigation measures are outlined in the matrix below:

Table 9: Anticipated impacts and corresponding mitigation measures during site preparation phase

Preparation activity	Anticipated impact	Recommended mitigation measure	Likelihood	Ranking
Mobilisation and transfer of materials stored	Increase in activity and traffic in the area.	This will not disrupt normal activity in the area and can be carried out in phases.	Probable	2
Earthworks and excavations	• Collection and stagnation of surface runoff • Increase in susceptibility to soil erosion • Production of spoil from excavated ground • Reduction in aesthetic value of the area. • Removal of vegetation • Disturbance to fauna in the forest	• There shall be no cutting of trees onsite • Excavation should be carried out such that drainage is controlled and water is not allowed to accumulate. Any water that does collect has to be drained and disposed of sensibly, so as not to cause erosion • Establish controls for surface runoff during excavation e.g. digging trenches around excavated areas and earthworks to control erosive potential of surface runoff • Control excavation activities to limit excavation to land which is required for construction • Cordoning the site off using iron sheets or other appropriate materials to protect passers-by and control noise. • There shall be minimal movement of machinery and switching off material delivery vehicles once onsite	Probable	2
Levelling and laying of foundation	Noise and dust.	• Water sprinkling and use of screens to control dust • Maintenance of equipment for efficiency, minimising noise production, emissions and spills • Cordoning the site off.	Probable	2
Occupational health and safety	• Health hazard • Physical injury from slipping falling and handling equipment.	• Carefully plan for construction of sanitary facilities connected into an existing sewer • Provide personal protective equipment (PPE) appropriate to working area (e.g. ear plugs, dust masks, leather gloves, helmets) for staff and visitors to site • Regular site reporting on health, safety and environment (HSE) issues to the	Probable	2

Preparation activity	Anticipated impact	Recommended mitigation measure	Likelihood	Ranking
		County NEMA office ● Develop a monitoring programme to assess noise performance in accordance with the revised Noise Prevention and Control Rules (April 2005), ● Follow the gazetted Noise Control Regulations (2009) by NEMA ● Assessment of HSE mitigation measures and recording of any matters arising as per Legal Notice No 40 the Factories (Building Operations and Works of Engineering Construction) Rules 1984.		
Production of waste	Soil degradation and surface water pollution.	● Develop a solid waste management plan prior to project commencing, identifying optimal waste re-use options and licensed disposal areas; ● Waste should not be burned on site or dumped in undesignated waste disposal areas ● Minimise waste production by utilising best available techniques for site preparation ● Re-use construction waste to the maximum extent possible ● Proper handling and storage procedures for hazardous wastes e.g. fuel oil should be stored in areas with hard standing and containment to handle spills ● Excavation activities and dumping of spoil should be properly managed such that land which is not required for buildings is left undisturbed.	Possible	1
Totals				**9**

LEGEND

Likelihood

Probable	**–**	**Very likely to happen**
Possible	**–**	**Some chance of happening**
Improbable	**–**	**Small chance of happening**

Rank

1 – Acceptable	**–**	**little to no effect on the project**
2 – Tolerable	**–**	**effects are felt but do not seriously affect the project**
3– Unacceptable	**–**	**cause's major disruption to the project**
4– Intolerable	**–**	**projects may not recover**

In order to ensure that environmental protection is taken into account during site preparation, these issues must be specified in the tender documents.

5.2 Construction

Key aspects to be considered during construction are:

- Preservation of bio diversity
- Procurement of construction materials
- Building works
- Energy utilisation, major energy consuming activities
- Energy sources for these activities include grid electricity from the power mains and diesel or petrol powered machinery/vehicles.
- Water utilisation,
- Waste production, construction waste
- Occupational health and safety
- Socio-economic aspects
- Archaeological findings and aesthetics.

Anticipated impacts and corresponding mitigation measures for the mentioned activities are outlined in Table below:

Table 10: Anticipated impacts and corresponding mitigation measures during construction phase

Activity	Anticipated impact	Recommended mitigation measures	Likelihood	Ranking
Procurement of construction materials:	Natural resource depletion if not rationally done through activities such as quarrying, rock mining, timber logging.	• There shall not be any cutting of trees onsite • The tender documents should specify required standards and certification for procurement of all materials and appliances; • The sources of all construction materials should be from approved sources; for example, hard stone for building should be obtained from NEMA licensed quarries; • As far as possible, environmentally friendly and materials should be used. Materials not to be used for construction of the facility include: – High alumina containing material – Wood slab in permanent formwork to concrete – Calcium silicate bricks or tiles – Asbestos in any form – Asbestos substitutes or any naturally occurring or man-made mineral fibres – Lead, lead paint or any other materials containing lead which may be inhaled, ingested or absorbed • Vermiculite, unless it is established as being fibre-free • Any products containing cadmium that are regarded as being injurious substances Any other substances regarded as being deleterious building materials which are not in accordance with statutory requirements or with current accepted good building practice at the time of specification or construction. • The Project Manager should ensure that the Contractors are instructed in the use of all materials that may have negative environmental (including health) effects	Possible	2

Activity	Anticipated impact	Recommended mitigation measures	Likelihood	Ranking
		● If any material or substance is used that is at any point in the future deemed to be deleterious to health, then it must be replaced with an acceptable alternative.		
Building works	Health and safety risk from accident and incidents Negligence and inappropriate construction design; Noise and dust generation. Disturbance to fauna in the forest	● Adhere to safety regulations outlined in the CGK by-laws, Building Order 1968 (Building Code) and the Building Operations and Works of Engineering Construction (The Factories and Other Places of Work Act Cap 514); ● The Project Manager should ensure strict safety management through close attention to design, work procedures, materials and equipment ● Schedule noisy construction activities to hours with minimal area activity. ● There shall be minimal movement of machinery and switching off material delivery vehicles once onsite	Possible	2
Energy utilisation	Energy wastage; Increase in project costs.	● Develop an energy management plan ● Construction machinery and vehicles should be maintained and used in accordance with manufacturer's specifications, to maximise efficiency and lower use of energy, e.g. drivers of construction vehicles should be instructed not to leave them idling for extended periods ● Construction workers should be sensitised on the importance of energy management.	Improbable	1
Water utilisation	Water wastage; Increase in project costs; Poor hygiene and sanitation.	● Monitor water consumption and utilisation ● Sensitise construction workers on the importance of proper water management.	Possible	2
Occupational health and safety	Health and safety risks from: ● Physical injury from slipping falling and handling equipment ● Fire; ● Inhalation of gas, oil or paint fumes and dust; ● Handling hazardous materials.	● Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls. ● Daily site inspections should be done to ensure safe work practises are adhered to; ● All workmen should be provided with personal protective equipment (e.g. nose masks, ear muffs, helmets, overalls, industrial boots, etc); ● The contract documents should stipulate health, safety and environment regulations and work procedures ● The Contractor must appoint a foreman with knowledge on health, safety and environment regulations ● All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate (Section 62 of the Factories and Other Places of Work Act); ● Site personnel should be encouraged to report	Possible	2

Activity	Anticipated impact	Recommended mitigation measures	Likelihood	Ranking
		"near-miss incidents" in order to avoid potential problems and increase safety awareness ● Statistical records on accidents and incidents should be collated and analysed on a monthly basis and forwarded to the Proponent and contractor and / or displayed on the notice boards.		
Forest resources depletion	Biodiversity damage	● There shall be no hunting or killing of forest fauna under any circumstances by workers ● There shall be no consumptive utilization of forest resources in the project ● Post warning signs to workers on strategic places onsite to warning against interference with forest resources ● The maximum built up area shall not exceed 30% of the licensed area. ● Ensure facilities blend with their environments, with buildings being within the forest canopy (not appearing above the tree tops), not interrupting beautiful views and having appropriately camouflaged roofs. ● Avoid felling mature trees to create space for construction. Enough trees should be left untouched to conceal building when they are completed and additional vegetation planted after construction to ensure the forest character is retained. ● Minimize the facilities that will be constructed including reducing numbers, dimensions and capacity to ensure that they have the least possible ecological footprint. ● Ensure all facilities have minimal impact on the environment. This should include minimal concrete foundation and concrete walling; use of eco-friendly low-impact construction materials and technologies; avoidance of excessive paving of paths and other surfaces; and avoidance of landscaping and introduction of alien vegetation species. ● Restore and improve the forest environment during the facility's life cycle. ● Follow strictly license conditions by Kenya Forest Service (KFS)	Possible	2
Community concerns	Conflict with the local community	● Address all community concerns on a timely basis wherever they occur ● Give the forest adjacent community priority to supply labour, fresh produce and other goods and services required during construction and operation phases where they meet project standards.	Possible	2
Total				**13**

LEGEND

Likelihood

Probable	**–**	**Very likely to happen**
Possible	**–**	**Some chance of happening**
Improbable	**–**	**Small chance of happening**

Rank

1 – Acceptable	**–**	**little to no effect on the project**
2 – Tolerable	**–**	**effects are felt but do not seriously affect the project**
3– Unacceptable	**–**	**cause's major disruption to the project**
4– Intolerable	**–**	**projects may not recover**

5.3 Commissioning and operation

Key aspects to be considered during commissioning and operation are:

- Energy utilisation
- Water use and disposal
- Solid and liquid waste generation and disposal
- Area security
- Building maintenance and monitoring

Compliance with Environmental Management and Monitoring Plan developed in this report is important in addressing the issues highlighted in the following table:

Table 11: Anticipated impacts and corresponding mitigation measures during operation phase

Activity	Anticipated impact	Recommended mitigation measures	Likelihood	Ranking
Energy utilisation	Increase in energy demand; Potential increase in frequency of power outage.	● Maximise the contribution of daylight to reduce use of artificial lighting in the houses; ● Select the most efficient lighting system design and minimum lighting level appropriate for the required application ● Install energy saving lighting system; ● Select the most effective lighting controls for optimal operating efficiency and minimum energy wastage automatic security lighting system.	Possible	2
Solid and liquid waste generation and disposal	Soil and water pollution	● Regular housekeeping at the waste storage area ● A standard septic tank of adequate capacity to be constructed	Possible	2
Socio-economic activities:	Community conflict with the proponent Increase in human population and activity in the area.	● Address community concerns on a timely basis ● Provide the local community with jobs and supply of foodstuffs where feasible ● Adhere to CGK regulations on provision of public utilities.	Probable	2
Forest conservation	● Utilize only the permitted area for the project and only carry out permitted activities in the forest ● There shall be no consumptive utilization of the forest resources onsite ● No tree shall be cut for the projects use	Status of the forest Inspection findings	Possible	2
Totals				**8**

LEGEND

Likelihood

Probable – Very likely to happen
Possible – Some chance of happening
Improbable – Small chance of happening

Rank

1 – Acceptable – little to no effect on the project
2 – Tolerable – effects are felt but do not seriously affect the project
3– Unacceptable – cause's major disruption to the project
4– Intolerable – projects may not recover

5.4 Decommissioning phase

Due to the long-term life of the project and related components, a decommissioning audit will be undertaken at least 1 year before the process starts following a notice to decommission the facility. The decommissioning process will be guided by a comprehensive decommissioning plan developed through the decommissioning audit process. However, the following features will need to be decommissioned upon completion of the works:

- Contractor's camp and installations that shall be required to be removed without compromising on the safety and general welfare of the residents, workers and visitors. Special care will be given to wastes and dust emitted in the process
- Material stores that will comprise fresh materials and used items. Each category will be moved safely out of site ensuring minimal or no impacts to the environment and school setting
- Wastes and debris holding sites will be cleared with maximum re-use of the debris either on paving the passageways or other grounds such as compound.

De-commissioning phase will involve the following:

- Notification of intent to all relevant regulatory agencies;
- Liaise with project Consultants including architects, engineers, and environmentalists to ascertain guidelines, anticipated de-commissioning impacts and mitigation measures.
- Inform NEMA on the planned demolition activities
- Return the EIA licence to NEMA

The impacts anticipated from de-commissioning activities include but are not limited to the following:

- Damage to forest vegetation
- Disturbance to fauna
- Change in energy and water supply demand
- Waste generation
- Various socio-economic impacts.

5.4.1 Decommissioning Flow Table

Construction Projects are designed to have an average stability of over 50 years after which minor renovations might be necessary, however, in the event that the proponent prefers to decommission the project, the following steps should be considered:

Table 12: Decommissioning Flow

Steps	Action	Actor
Step 1	**Project concept** Development of an Objective Worksheet and checklist incorporating references, legal and policies framework Undertake decommissioning audit	Proponent then
Step 2	**Prepare Road Map for Decommissioning Design** Conduct design review to validate elements of the design and ensure design features are incorporated in the decommissioning design. Public consultations	Proponent then
Step 3	**Prepare and Award Contract** Prepare a contract that incorporates validated project information and award to a contractor as per the Procurement rules.	Proponent then
Step 4	**Execute Decommission Works** Implement design elements and criteria on the Project in accordance with specifications and drawings. Inspect during decommissioning and at Project completion to ensure that all design elements are implemented according to design specifications.	Contractor
Step 5	**Non-Conformance, Corrective/Preventive Action** Determine root cause Propose corrective measures Propose future preventive measures.	Proponent

6. ANALYSIS OF ALTENATIVES

In considering the project options, the following aspects were considered. These included:

i. No Action
ii. Proposed development in another location
iii. Alternative construction Technology

6.1 No Action Alternative

This means that the status quo remains and the proponent will have to abandon the project hence leaving the site underutilized. The proponent shall have to look for alternative expensive land which may not be available and will involve new approval process in the county which will be more costly and time consuming as compared to implementing the proposed development project on the identified site.

This will be more costly to the proponent and will additionally waste time for the planned construction Period as well as result in loss of the expected benefits to the proponent and workers. The proposed project has no viable alternative because the identified demand is for tourism/recreational use structures in the area. No Action will also have a negative impact on growth of tourism and the country's economy.

6.2 The proposed development in another location

No other locations were considered in conjunction with the proposed location for implementation of this project. This is as a result of the fact that the proponent does not have another alternative plot of land. However, the current site offered the following advantages over other locations considered:

- Non availability of alternative space in other forests – this is the only site that KFS tendered for ecotourism development in Uplands Forest Station
- An open area within a serene forest environment
- Proximity to the main tarmac road is an added advantage because of ease of access.

There is no other available land for use by the proponent in the area; no other location was able to offer the comprehensive package as indicated above. As a result, no location that was more suitable or amenable than the present site was identified in the area. The recommended alternative is the "Proposed Alternative" because it recognizes the viability and need for the proposed development, is designed to address environmental issues and concerns, meets or exceeds all local regulatory requirements and supports communication and close relations during all stages of the development between the proponent and the surrounding residential community.

6.3 Alternative building Technology and construction materials

Alternative building technologies are available to the proponent i.e. prefabricated structures, use of compressed/stabilized blocks et al. the chosen technology is use of masonry stone cut blocks which are cheaper to use and purchase. Prefabricated structures may not be viable because of delays in procurement of materials and their long term viability and manufactures support is not assured; hence the proposed building technology choice. The proposed materials do not contain vermiculite or asbestos which are carcinogenic.

Use of sand, cement screed, machine cut building stones is most appropriate. Use of stabilized soil blocks may not be viable for the proposed project. Use of clay roofing tiles is not recommended since they contain high levels of fluorine; hence, the rain water from the gutters is not suitable for domestic use. Use of silicon/construction sand will create employment for the local people during construction phase hence spreading project benefits. There are no alternative construction materials to the proposed materials of water, sand, aggregate (rocks, gravel, ballast, etc.), steel metals, red volcanic soil and cement, among other notable construction materials, given that they are the recommended by the local architects as they are also easily available and are of good quality and standards required for the proposed development project construction.

7. PUBLIC PARTICIPATION

7.1 Introduction

The proposed project is well supported by the local community and stakeholders agree fully with the implementation of the project. This is evidenced by their comments in the minutes (see Annexes) the end of this report. Public information dissemination should be continuously carried out by the proponent to help in timely addressing of issues that may arise out of project operations in future.

As part of the ESIA process, stakeholder consultations were undertaken in accordance with the EMCA (Cap 387).

7.2 Stakeholder forum outcome

Public consultation was realized through a public stakeholder meeting on 1st October, 2022 at the Ngubi Rangers Outpost near the proposed project site. The number of stakeholders who were consulted were 30 and the analysis of the deliberations is as detailed in sub sections below.

They community gave their input about the potential benefits of the proposed project and related activities. The minutes of the meetings held and photographs taken during stakeholders' participation are provided in Annexes. Generally, the stakeholders were unanimous in support for the proposed project implementation, appreciating its potential benefits. The following is therefore an analysis of the meeting outcome (minutes and attendance list is attached in the annexes):

7.3 Stakeholders meeting outputs

The following is therefore a presentation of stakeholder consultation outcome:

Positive project impacts

- The forest land will be put into better economic use by KFS and local community
- Reduction in crime rate in the area through gainful employment as guards, tour guides et al
- Better utilization of the forest resources
- Creation of job opportunities during the construction phase and operational phase such as caretakers and technicians cooks.
- It will act as a source of revenue to both the national and county government through payment of relevant taxes and levies charged.
- It will ensure optimal land use
- It will act as a source of income to the proponent at occupation phase.

Negative impacts

- Solid waste generation
- Interference with flora and fauna
- Risk of accidents and incidents i.e. injuries, fires

Proposed Mitigation measures

- Bins will be installed in the project area at strategic points for containing waste
- No tree will be cut down in the course of project implementation. No hunting will be permitted in the course of project implementation. Rangers will be fully involved in securing the project area.
- First Aid Kits should be provided onsite as well as making arrangements with emergency services at Limuru Town for evacuation and treatment of any casualties. OSH Act, 2007 shall be followed to prevent accidents and incidents.
- No fires will be started outside the permitted cleared project area by the proponent. The project management will follow the fire alerts issued by KFS to the letter. A fire suppression system will be installed for the project.
- Addressing of community issues raised at any time on a timely basis

MIN 03/04/2022: PLENARY SESSION

The following were deliberations during the plenary session in the meeting:

Comment: Local youth members should be provided with employment on a preferential basis and will the local youths be employed as tour guides?

Response: The local community members will be given first priority in employment creation. Where skilled workers are not locally available, they will be sourced from elsewhere.

Q: Can the proponent create space for a curio shop or Mpesa or car wash businesses by the CFA in the project?

A: The proponent has stringent permit conditions by KFS and there are specific activities allowed at the site.

Q: Can the local community be given shares in the project?

A: The permit allows only Acacia Traders Limited to operate the site. Therefore, the proponent cannot do subleasing or pass ownership with shares to other entities.

Q: Will the facility have a sewer line?

A: The project designs incorporates a bio digester system for disposal of septic waste.

C: If everyone is allowed to the forest, will it not lead to forest destruction?

A: The project permitted area will be fenced off and no unauthorised access will be allowed to the forest. In addition, Forest Rangers will still be guarding the forest.

C: The community accepts the project implementation

A: The proponent is very grateful for community cooperation through the CFA and looks forward to a long term beneficial engagement.

7.4 The following was the stakeholder's resolution

The stakeholders gave consent to the project to be implemented through a unanimous show of hands and expressed appreciation of the opportunities to be created by the proposed project in promotion of development in the area.

Photo 1: (front side in a cap) The KFS Uplands forest ecosystem conservator making a presentation

Photo 2: (center) The Lead Expert making a presentation

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MITIGATION PLAN

In this chapter, an environmental management plan has been prepared to cover the design, construction, defects liability, operation and maintenance of the building.

The preceding table presents the environmental management plan. It outlines corresponding management strategies proposed in earlier chapters that will be employed to mitigate potential adverse environmental impacts and assigns responsibility for the implementation of the mitigation measures. Mitigation measures should be reflected in the Conditions of Contract and Bills of Quantities. It is the responsibility of the Project Manager / Supervising Consultant to ensure incorporation of these measures into these two documents.

The Project Manager should define project specific responsibilities, terms of reference and lines of communication. It is imperative that this Project Report is made available to the relevant Project Team members. The Project Team is likely to comprise of the following:

- Project Manager / Designer / Supervising Consultant
- Project Engineers (civil/mechanical/electrical engineers)
- Project Contractor.

Prior to mobilisation, the Contractor should include all proposed mitigation and management measures in his schedule of works, and the Project Manager / Supervising Consultant should ensure that the schedule and environmental management and monitoring plan is complied with. This will lend a sense of ownership to the Contractor, in addition to instilling a thorough understanding of the pertinent issues. The responsibility for supervision and implementation of all the proposed mitigation measures during construction and the defects liability period will lie with the Project Manager and the Contractors, respectively. After the defects liability period, responsibility for maintenance lies with the property owner, including monitoring activities.

8.1 Positive environmental and social impacts

The will include the following:

- It will lead to contribution by the proponent to forest conservation through awareness creation and tree planting activities and related eco-tourism activities
- The project will lead to sustainable use of forest resources in the country through non consumptive utilization
- Provision of employment opportunities during construction and operation phases to professionals and local community members
- It will lead to improvement of the local community economy through increased sources of income from eco-tourism activities
- It will lead to reduction of idleness in the community through provision of gainful employment as guides
- It will help in reducing crime rate in the area through provision of new sources of income for the youth i.e. curio traders, guides, security personnel et al.

8.2 Environmental management and mitigation during planning and site preparation phase

This involves studying the specified environmental concerns and refining the environmental management plan (ESMP) for the site. The Project Manager should ensure that the specified mitigation measures in the ESMP are implemented in the design, site preparation, construction and defects liability period.

8.3 Environmental management and mitigation during construction phase

Environmental due diligence should be incorporated into the project implementation as follows:

- Training and awareness creation on all environmental issues
- Control of health and safety risks of the contractor’s workmanship
- Prevention of negative environmental impacts during construction
- Control of the residual risk of accidental environmental damage.

As part of the construction progress reports, environmental considerations should be covered and progress indicated on the implementation of mitigation measures, as outlined in the ESMP. Upon completion, all temporary structures, including concrete footings, formwork and slabs, all construction materials and debris will be removed

from the site and the area reinstated, as required. Construction aspects to be monitored will include, but will not be limited to the following issues:

- Forest conservation
- All erosion and sediment control
- Handling of hazardous materials as part of construction activities
- Movement of machinery
- Occupational health and safety
- Collection and disposal of wastes
- Management of pollution incidents.
- Biodiversity conservation

8.4 Environmental management and mitigation during commissioning and operation phases

8.4.1 Health and safety risk

Health and safety risks should be minimised by:

- First aid and fire fighting training of the occupiers of the building
- Displaying emergency preparedness and response procedures at strategic areas of the building, including the stairs
- Designating fire/emergency assembly point
- Providing warning signs where there are other hazards

8.4.2 Waste management

There will be designated vermin proofed garbage collection enclosure where all solid wastes will be stored awaiting collection. The owner will contract a certified waste handler including informing the CGK environment department and ensure that the waste collection is prompt to avoid any foul smell from the waste collection point. The site will include provision for regular cleaning.

8.4.3 Forest conservation

- Utilize only the permitted area for the project and only carry out permitted activities in the forest
- There shall be no consumptive utilization of the forest resources onsite
- No tree shall be cut for the projects use

8.4.4 Environmental monitoring

The environmental performance of the proposed development will be monitored by the management. Reports on environmental performance will include:

- Environmental legislation compliance reporting
- Discharge and effluent monitoring
- NEMA and (CGK) legal and compliance notices
- Biodiversity impacts
- Site maintenance, repairs and modifications
- Health and safety review
- Resource use and conservation on site
- Submission of annual Environmental Audit Report to NEMA

8.5 Environment and Social Management Plan

The following table shows the ESMP for the proposed project:

Table 13: Environment and Social Management Plan

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
Site preparation phase					
Preparation works	Noise and dust generation.	• Water sprinkling and use of screens to control dust; • Maintenance of equipment for efficiency, minimising noise production, emissions and spills; • Cordoning the site off. • Where possible, no truck associated with the work should be left standing with its engine operating in a road adjacent to a residential area. • Provision of noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 65 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area. • Control working hours to limit noise, dust and traffic nuisance. Noisy construction activities should be scheduled to hours with minimal interruption i.e. 8:00 AM to 6:00 PM. • Strictly follow NEMA noise and excessive control vibrations 2016 • Limit noise generation to maximum level of 65 dBA • Its important to note that the site is isolated from any settlement to at least 1 kilometre away, hence this is anticipated to be minimal.	• Daily spot checks; • Regular servicing of equipment.	Project Manager / Supervising Consultant.	Approximatel y 5,000 per month
Removal of overgrowth and bush clearing and Transportation of debris	• Preservation of trees • Fuel consumption and exhaust fumes; • Increase in traffic flow in the area.	• Avoid removal of any tree onsite • Maintenance of equipment for efficiency, minimising noise production, emissions, spills and consumption; • Erect warning signs prior to commencing construction activities; • Avoid transporting during periods of peak traffic activity.	• Number of trees preserved • Fuel consumption; • Frequency of equipment replacement and repair.	Project Manager / Supervising Consultant and Contractor.	5,000 for erection of sign posts and associated monitoring activities once
Occupational health and safety	• Health hazard; • Physical injury	• Carefully plan for construction sanitary facilities connected into an existing sewer;	• Regularly check on performance of	Project Manager / Supervising	10,000 for PPE and

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
	from slipping falling and handling equipment.	• Provide personal protective equipment (PPE) appropriate to working area for staff and visitors to the site; • Regular site reporting on health, safety and environment (HSE) issues by an appointed HSE representative; • Develop a monitoring programme to assess noise performance in accordance with the revised Noise Prevention and Control Rules (April 2005); • Assessment of HSE mitigation measures and recording of any matters arising as per Legal Notice No 40, The Factories (Building Operations and Works of Engineering Construction) Rules	provided sanitary facilities; • Have regular spot checks on use and adequacy of PPE provided • Conduct regular internal assessments on environmental site performance and record findings.	Consultant.	monitoring activities
Construction phase					
Elevated noise and dust generation during site preparation phase	Disturbance to persons in the area and other fauna	• Strictly follow NEMA noise and excessive control vibrations 2016 • Limit noise generation to maximum level of 65 dBA • Time and Activity Constraints, i.e., operations will be scheduled to coincide with periods when people would least likely be affected; work hours and work days will be limited to less noise-sensitive times. Hours-of-work will be approved by the Engineer having due regard for possible noise disturbance to the local residents or other activities. Construction activities will be strictly prohibited between 8 AM and 5 PM. • Give notice as early as possible to sensitive receptors for periods of noisier works such as excavation. Describe the activities and how long they are expected to take. Keep affected neighbours informed of progress. • Schedule noisy activities for less sensitive times; provide periods of respite from noisier works (for example, periodic breaks from jackhammer noise). • The weekend/evening periods are important for community rest and recreation and provide respite when noisy work has been conducted	• Complaints received • Working hours schedule • Noise generation by equipment and vehicles	Contractor proponent	15,000 periodically for monitoring

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
		throughout the week. Accordingly, work should not usually be scheduled during these times. • Internal combustion engines are to be fitted with a suitable muffler in good repair. Maintain tools, machines and equipment so that they are in good conditions. • When equipment is found to be faulty, they must be fixed immediately in order to reduce noise from the equipment. • Fit all pneumatic tools with an effective silencer on their air exhaust port. • Install less noisy movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems must be followed. • Turn off equipment when not being used. • All vehicular movements to and from the site to only occur during the scheduled normal working hours, unless approval has been granted by the Engineer. • Keep good conditions of trucks that use to transport construction materials so they cause no loud noise and control the truck speed, to be not exceeded 30 km/hr when driving through communities, and not exceeded 80 km/hr when driving on highways. • Where possible, no truck associated with the work should be left standing with its engine operating in a road adjacent to a residential area. • Provision of noise protection kits such as ear plug, earmuff, for workers who are working in the area with noise level is higher than 65 dB(A). It is designated as a regulation that workers must wear protection kits in case of working in a noisy area. • Control working hours to limit noise, dust and traffic nuisance. Noisy construction activities should be scheduled to hours with minimal interruption i.e. 8:00 AM to 6:00 PM.			

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
Biodiversity preservation	Depletion of biodiversity in the forest	● There shall be no hunting or killing of forest fauna under any circumstances by workers ● There shall be no consumptive utilization of forest resources in the project ● Post warning signs to workers on strategic places onsite to warning against interference with forest resources ● Follow strictly license conditions by Kenya Forest Service (KFS)	● Number of complaints lodged to authorities ● Pre project conditions versus construction phase conditions ● Number of warning signs erected onsite	Project manager Proponent	No additional cost
Procurement of construction materials	Natural resource depletion if not done rationally through activities such as quarrying, mining, timber logging.	● No construction material will be sourced from the forest ● The tender documents should specify required standards and certification for procurement of all materials and appliances; ● All construction materials to be from approved sources; ● As far as possible, environmentally friendly and sustainable materials should be used; ● The Project Manager/Supervising Consultant should ensure that the Contractors are instructed in the use of all materials that may have negative environmental (including health) effects; ● If any material or substance is used that is at any point in the future deemed to be deleterious to health, then it must be replaced with an acceptable alternative.	● Number of trees left insitu onsite ● Regular inspections during construction. ● Records on material deliveries to the site	Project Manager / Supervising Consultant.	2,000 per month for monitoring activities
Drainage management	● Flooding ● Instability to foundation ● Soil erosion	● Construct an internal drainage system on the side of the building ● Plant trees and suitable vegetation within the plot	● Drainage system ● Erosion	Proponent Project Manager / Supervising Architect	No additional cost
Building works including demolitions	● Health and safety risk from accident and incidents; ● Noise and dust	● Adhere to safety regulations outlined in the Local Government Adoptive by-laws, Building Order 1968 (Building Code) and the Building Operations and Works of Engineering Construction (The Factories and Other Places of Work Act Cap 514); ● The Project Manager should ensure strict safety management through	● Daily spot checks; ● Have regular spot checks on adequacy and use of PPE provided.	Project Manager / Supervising Consultant. Architect	10,000 periodically

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
	generation. ● Disturbance to animals	close attention to design, work procedures, materials and equipment; ● Limit construction to day light hours. ● Adhere to Waste Management Regulations (2006)	● Adherence to approved Plans ● Inspection reports		
Energy utilisation	● Energy wastage; ● Increase in project costs.	● Develop an energy management plan; ● Construction machinery and vehicles should be maintained and used in accordance with manufacturer's specifications, to maximise efficiency and lower use of energy; ● Construction workers should be sensitised on the importance of energy management.	● Service machines and equipment on schedule ● Monitor energy consumption on a daily basis	Project Manager / Supervising Consultant.	15, 000 periodically for monitoring
Water utilisation	● Water wastage; ● Increase in project costs; ● Poor hygiene and sanitation.	● Monitor water consumption and utilisation; ● Sensitise construction workers on the importance of proper water management. ● Source construction water from untreated sources to ensure adequacy in the neighbourhood	● Record and document water consumption ● Report on any irregularities.	Project Manager / Supervising Consultant.	No additional cost
Waste production	Littering, soil and surface water pollution.	● The tender documents should specify the proper disposal of waste during construction and should also ensure that the Contractor leaves the site in a clean and appealing condition on completion of the Works; ● All solid waste generated during construction should be carefully monitored, collected, stored, and taken away for disposal; ● There should be controlled use of raw materials; ● Handling of special wastes, such as waste fuel oil, should be specified; ● Comply with County Government of Kiambu guidelines on solid waste disposal.	● Reporting on all waste production and handling procedures.	Project Manager / Supervising Consultant.	5,000 per month for contracting local waste handlers
Occupational health and safety	Health and safety risks from: ● Physical injury from slipping falling and handling equipment;	● There shall be no lighting of fires or smoking onsite near wooded areas ● Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restrictions on site, frequency and personnel responsible for safety inspections and controls. ● Daily site inspections should be done to ensure safe work practises are adhered to;	Weekly reporting on health and safety considerations and aspects	Project Manager / Supervising Consultant.	10,000 per month for site inspections

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
	● Fires; ● Inhalation of gas, oil or paint fumes and dust; ● Handling hazardous materials.	● All workmen should be provided with personal protective equipment; ● The Conditions of Construction in the tender documents should stipulate health, safety and environment regulations and work procedures; ● The Contractor must appoint a foreman with knowledge on health, safety and environment regulations; ● All injuries that occur on site must be recorded in the accident registers and corrective actions for their prevention be instigated as appropriate (Section 62 of the Factories and Other Places of Work Act); ● Site personnel should be encouraged to report "near-miss incidents" in order to avoid potential problems and increase safety awareness; ● Statistical records on accidents and incidents should be collated and analysed on a monthly basis and forwarded to the Supervising Consultant and / or displayed on the notice boards.			
Forest resources management	Biodiversity damage	● There shall be no hunting or killing of forest fauna under any circumstances by workers ● There shall be no consumptive utilization of forest resources in the project ● Post warning signs to workers on strategic places onsite to warning against interference with forest resources ● The maximum built up area shall not exceed 30% of the licensed area. ● Ensure facilities blend with their environments, with buildings being within the forest canopy (not appearing above the tree tops), not interrupting beautiful views and having appropriately camouflaged roofs. ● Avoid felling mature trees to create space for construction. Enough trees should be left untouched to conceal building when they are completed and additional vegetation planted after construction to ensure the forest character is retained.	● Number of warning signs issued by KFS ● Number of Warning signs erected ● Visual observation's	Project Manager / Supervising Consultant.	20,000 per month for monitoring activities

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
		● Minimize the facilities that will be constructed including reducing numbers, dimensions and capacity to ensure that they have the least possible ecological footprint. ● Ensure all facilities have minimal impact on the environment. This should include minimal concrete foundation and concrete walling; use of eco-friendly low-impact construction materials and technologies; avoidance of excessive paving of paths and other surfaces; and avoidance of landscaping and introduction of alien vegetation species. ● Restore and improve the forest environment during the facility's life cycle. ● Follow strictly license conditions by Kenya Forest Service (KFS)			
Commissioning and operation phases					
Noise generation	Damage to health/hearing disturbance	• Strictly follow NEMA noise and excessive control vibrations 2016 • Sound proof noisy areas to minimize noise • Limit noise generation to maximum level of 65 dBA ● Its important to note that the site is isolated from any settlement to at least 1 kilometre away, hence this may be minimal.	• Complaints records • Noise levels measurements • Condition of sound proofed areas	Project manager	10,000 periodically for monitoring
Forest conservation	Damage to forest ecosystem	● Utilize only the permitted area for the project and only carry out permitted activities in the forest ● There shall be no consumptive utilization of the forest resources onsite ● No tree shall be cut for the projects use	Inspection reports findings Periodic review of forest status	Proponent Project manager	10,000 per month for monitoring activities

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
Environmental management and due diligence	Damage to forest ecology	● The proponent shall not pollute damage or disturb land, trees, water, and wild animals. ● The proponent should not cause a nuisance or trespass in the forest by others including to neighbouring lands and should take steps to benefit communities benefitting from the forest licensed area of operation ● The proponent shall manage the licensed area sustainably, specifically for recreational values, cultural values and conservation of biodiversity in accordance with Forest Conservation and Management Act, 2016 as well as other applicable regulations including but not limited to those governing land use, environment and waste management, wildlife protection, labour, tourism, occupational safety and health. ● The proponent shall take special precautions against fires, and where it occurs, take necessary measures to put out the fires ● The proponent should have a designated route, road or path for the purposes of carrying out the activities licensed by KFS ● The proponent shall use the licensed area as per the approved Forest Management Plan and should maintain the physical boundaries of the licensed area including existing survey marks, signs and fences and shall keep all buildings and structures in a state of good repair to enhance site aesthetics ● The proponent shall make adequate arrangements for the disposal of waste and sewage and shall have bins colour coded for the purpose of disposal which will include reuse or recycling including practicing the principles of reduces, reuse and recycle.	● Complaints and restoration orders issued ● Availability of waste management systems ● Records kept	Proponent Operations manager	10,000 per month for monitoring activities

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
Biodiversity preservation	Depletion of biodiversity in the forest	● There shall be no hunting or killing of forest fauna under any circumstances ● There shall be no consumptive utilization of forest resources in the project ● Post warning signs to visitors on strategic places onsite to warning against interference with forest resources ● Take precaution against destruction of trees and other forest resources and products and where it occurs, inform KFS on a timely basis. The precaution should also include insect infestation, fires outbreaks in adjacent lands, outbreak of diseases and other natural agents. This should be coupled with assisting KFS with any act that is necessary for efficient management and conservation of the forest. ● Follow strictly license conditions by Kenya Forest Service (KFS)	● Number of complaints lodged to authorities ● Pre project conditions versus operational phase conditions ● Number of warning signs erected onsite ● Documented operational procedures for addressing issues that may occur	Project manager Proponent	No additional cost
Septic waste management	Pollution of surface and ground water	● Connect the building to the designed bio digester ● Regularly inspect performance of the bio digester ● Practice due diligence in operations	Records on performance of the bio digester	Proponent Contractor	250,000 for a bio digester
Energy utilization	● Increase in energy demand; ● Potential increase in frequency of power outage.	● Install solar lighting system onsite ● Use clean energy sources including LPG gas and solar for water heating ● Maximize the contribution of daylight to reduce use of artificial lighting in the buildings and compound ● Select the most efficient lighting system design and minimum lighting level appropriate for the required application ● Install energy saving appliances; ● Select the most effective lighting controls for optimal operating efficiency and minimum energy wastage (automatic security lighting, use of energy saver bulbs)	Energy consumption.	Proponent Manager	8,000 for purchase of energy saving bulbs and 60,000 for solar lighting system

Environmental / Social issue/aspect/ activity	Anticipated impact	Management and mitigation	Monitoring activity/aspect	Responsibility	Proposed budget (Ksh)
Water use and disposal	Increase in water demand;	● Installing plumbing fittings, appliances and devices to optimise water use efficiency; ● Trapping of rain water for use at the facility grounds; ● Regular maintenance of sewer and drainage facilities to ensure optimal performance. ● Install automatic taps in sinks ● Install low capacity cisterns in the toilets	Water consumption.	Proponent Manager	30,000 for installation of gutters and storage tank once
Solid waste generation and disposal	Littering and pollution.	● Maintenance of constructed sewer and wastewater handling systems to ensure solid wastes are not being disposed improperly ● Installation of grease traps along kitchen drains ● Regular housekeeping at the waste storage area. ● Contract a licensed waste handler for waste collection or make arrangements with County Government of Kiambu (CGK) ● Install colour coded and labelled bins for holding bins. Practice reduce, reuse, recycle principles onsite	● Monitoring the performance and certification of the contracted solid waste handler. ● Availability of colour coded and labelled bins	Proponent Manager	15,000 for provision of bins and associated waste collection systems once
Community concerns	Conflict with the local community	● Address all community concerns on a timely basis wherever they occur ● Give the forest adjacent community priority to supply labour, fresh produce and other goods and services required during construction and operation phases where they meet project standards.	● Records of complaints ● Number of complaints addressed	Project manager proponent	No additional cost
Facility maintenance and monitoring	Misuse and run down of facilities.	Checking and regulating performance of the installed structures and services to ensure the facility operates as per the intended building design.	Operation of structures and services.	Proponent Manager	5,000 per month for repairs and maintenance activities
Decommissioning phase					
Anticipated risk	Health and safety	Consulting with relevant consultants such as architects, physical planners, engineers and environmentalists in a bid to ascertain guidelines, anticipated de-commissioning impacts and mitigation measures. Perform a close down Environmental Audit	Performance of the development.	Proponent	150,000 once
Rehabilitation of project area	Loss of biodiversity	Replant trees onsite with recommended trees and rehabilitate it to KFS satisfaction Return back the site to KFS with all improvements.	Area of land rehabilitated	Proponent	500,000

9. CONCLUSION AND RECOMMENDATIONS

9.1 Conclusion

The proposed project will not involve any tree clearing and they shall be preserved as they are insitu; the proposed project site will be located on a bushy area which will be cleared without interference with forest resources including strict prohibition of consumptive utilization of the forest resources. The proposed construction of the recreational camp is considered to be of benefit to the public, proponent and the government; adverse environmental and social impacts are mostly localized in nature, short-term, reversible and largely limited to the construction and operation phases. It is therefore expected that the adverse impacts can sufficiently be mitigated with pro-active planning, good engineering and construction practice, and proper implementation of the Environmental and Social Management Plan (ESMP) during the various project phases.

9.2 Recommendations

Based on the foregoing, the EIA Experts recommends that the construction works be executed with full adherence to the outlined mitigation/enhancement measures and all relevant policy and legislative requirements for construction activities be complied with. Among others, the following should be implemented: There shall be no hunting or killing of forest fauna under any circumstances by workers, there shall be no consumptive utilization of forest resources in the project, post warning signs to workers on strategic places onsite to warning against interference with forest resources, follow strictly license conditions by Kenya Forest Service (KFS). The Consultant further recommends that since the project benefits outweigh the negative impacts, NEMA accepts this report and grants an EIA license to enable the construction works to be implemented to completion.

To ensure implementation, mitigation measures should be reflected in the Conditions of Contract. It is the responsibility of the Project Manager to ensure these measures are incorporated into this document.
After project screening, the project was found to fall within Medium risk category which warrants approval at the present stage of a Full EIA report. Overall, it is recommended that this Report can be approved pursuant to implementation of the proposed mitigation measures.

REFERENCES

HLA Consultants and ARA Consulting. *Ecotourism – Nature/Adventure/Culture: Alberta and British Columbia Market Demand Assessment*. 6 volumes. Canadian Heritage, Industry Canada, BC Ministry of Small Business, Tourism and Culture, Alberta Economic Development and Tourism. 1994.

Santelices, O.,and H. Rivas. Planificación Integral en Areas Rurales: Un desafío para la competitividad de los destinos de ecoturismo, Theme A – Ecotourism Policies and Planning, *World Ecotourism Summit Final and Preparatory Meeting Reports*, World Tourism Organization, Madrid, Spain, 2002.
www.world-tourism.org/sustainable/IYE/quebec/cd/start.htm

Scheyvens, R. Eco- and Budget Tourism in Samoa. In Hall, C.M. (ed.). *The High Value of Low-Cost Tourism*. Ecotourism, Wilderness and Mountains Conference, Abstracts:25-26.

Shellum, S. In the Footsteps of a Legend: Hotel Asia Pacific. *ETurboNews*, November 19, 2003.

Soavinski, R. *Proecotu*. Program for the Development of Ecotourism in the Legal Amazon Region, Brazil, Theme A – Ecotourism Policies and Planning, *World Ecotourism Summit Final and Preparatory Meeting Reports*. World Tourism Organization, Madrid, Spain.
www.world-tourism.org/sustainable/IYE/quebec/cd/start.htm

Spenceley, A. *Integrating Biodiversity into the Tourism Sector; Best Practice and Country Case Study, Case Study of South Africa*. Institute of Natural Resources, Pietermaritzburg, South Africa, 2001.

The International Ecotourism Society (TIES). *Ecolodge Footprint and Justification for Biodiversity Conservation*, January 2004.

The Nature Conservancy. *Results of the Ecotourism Program's Conservancy Members Ecotraveller Survey*. September 2002. www.nature.org.

Torres Riesco, J.C. *The Spanish Ecotourism Market*. World Tourism Organization. Madrid, 2001.

Travel Commerce Report. *Research*. Vol 1 (23) July 10, 2002 . Available at: http://www.travelcomexpo.com/2002ny/arch_July10.htm.

Travel Impact Newswire. *Women-Only Travel: The Guys Better Move Over*. August 18, 2003.

Government of Kenya 1972. Grass Fires Act, Cap 327, The Government Printer, Nairobi

Government of Kenya 1989. Regional Development Policy and Act (Cap. 447)

Government of Kenya 2008. Vision 2030, The Government Printer, Nairobi, Kenya

Government of Kenya 2009. The Agriculture (Farm Forestry) Rules

Government of Kenya, 2010. The Constitution, The Government printer, Nairobi, Kenya

Government of Kenya 2012. The County Governments Act, The Government Printer, Nairobi, Kenya

United Nations 2012. Sustainable Development Goals

Government of Kenya 2013. National Government Co-Ordination Act: No. 1; The Government Printer, Nairobi, Kenya

Government of Kenya 2013. The Wildlife Conservation and Management Act: The Government Printer, Nairobi, Kenya.

Government of Kenya, 2015. Environmental Management Coordination (Amendment) Act (EMCA). The Government Printer, Nairobi, Kenya

Government of Kenya 2016. The Water Act: The Government Printer, Nairobi, Kenya

Government of Kenya, 2016. The Forest Conservation and Management Act: The Government Printer, Nairobi, Kenya.

Kenya Forest Service 2018. Strategic Plan 2018-2022

Kenya Forest Service 2018. The National Forest Program

Government of Kenya 2019. Energy Act, The Government Printer, Nairobi, Kenya

Uplands Forest Participatory Management Plan, 2018-2022

Other relevant Government of Kenya Laws and Acts

ANNEXES