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STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT

(SESA)

Teita Estate Comprehensive Mixed Land Use Master Plan

DRAFT REPORT

Dr. David Masereti Makori
LEAD EXPERT
Contacts: +254720928721; davidmakori@gmail.com

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Author:	Dr. David Masereti Makori
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Project Proponent:	Teita Estate Limited
Address:	P.O. Box 18488-00500, Nairobi
Signature:	……..
Lead Expert:	Dr. David Masereti Makori
Contact:	+254720928721; davidmakori@gmail.com
NEMA Reg. No:	2917
Address:	40618-00100, Nairobi
Signature:	……..

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List of Experts

	Name	Designation	Qualifications
1	Dr. David Makori	Team Leader	PhD Geography
			Msc. Environmental Planning and Management
			Lead Expert, NEMA Reg. No. 2917
2	Mr. Gerald Maina	Environmental and Wildlife Expert	Msc. Environmental Planning and Management
			Lead Expert, NEMA Reg. No. 10659
3	Mr. Henry Oindo	Environmental and Fauna Expert	BSc. Environmental Conservation and Natural Resources Management.
			Ass. Expert Reg. No. 9936
4	Ms. Loise Makena	Geospatial engineer	BSc. Geomatic Engineering
5	Mr. Johnstone Mutua	Surveyor	BSc. Geospatial Engineering
6	Mr. Lewis Mwambia	Planner	B.A. Planning
7	Ms. Racheal Njeri	Geospatial analyst	BSc. Geospatial Information Science
8	Dr. Anastasia W. Kagunyu	Sociologist	PhD. Sociology/Anthropology
9	Paul Owino Odak	Planner	MA. Planning
10	Mr. Allan Odieri	Forester	BSc. Forestry
11	Mr. Meinrad Nyangaga	Hydrogeologist	BSc. Geology
12	Ms. Lavender Ondere	Geographer	B.A. Geography
13	Ms. Rose Waswa	Avian Expert	Bsc. Natural Resource Management

Contents

LIST OF ABBREVIATIONS

AD	Anaerobic Digestion
ALARP	As low as reasonably practicable
AMR	Annual Monitoring Report
CDA	Coast Development Authority
CIDP	County Integrated Development Plan
CSR	Corporate Social Responsibility
EA	Environmental Audit
EIA	Environmental Impact Assessment
EM&MP	Environmental Management and Monitoring Plan
EMCA	Environmental Management and Coordination Act
GIS	Geographical Information Systems
GoK	Government of Kenya
KENHA	Kenya National Highway Authority
KRDS	Kenya Rural Development Strategy
KWS	Kenya Wildlife Service
MEMR	Ministry of Environment and Mineral Resources
NCA	National Construction Authority
NEC	National Environment Council
NEAP	National Environment Action Plan
NEMA	National Environment Management Authority
NRMP	Natural Resources Management Programme
NWRMS	National Water Resources Management Strategy
PPP	Policy, Plan or Program
PRSP	Poverty reduction strategy paper
SEA	Strategic Environmental Assessment
SERC	Standards and Enforcement Review Committee

SEO	Strategic Environmental Objective
TOR	Terms of Reference
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WRA	Water Resources Authority

UNITS

CO	Carbon Monoxide
dB(A)	Decibel Amperes
KES	Kenya Shillings
Km	Kilometres
Km/h	Kilometre per hour
Km^2	Square Kilometre
M^3	Cubic metre
Mm	Millimetres
Ppm	Parts Per Million

DEFINITION OF TERMS

Air quality: means the concentration prescribed under or pursuant to the Environment Management and Coordination Act 1999 (2015 amendment) of a pollutant in the atmosphere at the point of measurement;

Analysis: means the testing or examination of any matter, substance or process for the purpose of determining its composition or qualities or its effect (whether physical, chemical or biological) on any segment of the environment;

Baseline data: Data that describes issues and conditions at the inception of the SEA. It serves as the starting point for measuring impacts and performance and is an important reference for evaluation.

Biological diversity: means the variability among living organisms from all sources including terrestrial ecosystems, aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, among species, and of ecosystems

Buffer Zone: means distinct or established areas that separate potentially competing users and that serves to lessen the danger of potential conflicts.

Ecosystem: means a dynamic complex of plant, animal, micro-organism communities and their non-living environment interacting as a functional unit;

Effluent: means gaseous waste, water or liquid or other fluid of domestic, agricultural, trade or industrial origin treated or untreated and discharged directly or indirectly into the aquatic environment;

Environment: includes the physical factors of the surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics and includes both the natural and the built environment;

Environmental Audit: means a systematic evaluation of activities and processes of an on-going project to determine how far these activities and programmes conform with the approved environmental management plan of that specific project and sound.

Environmental Monitoring: means the continuous or periodic determination of actual and potential effects of any activity or phenomenon of the environment whether short-term or long-term.

Indicator: A signal that reveals progress (or lack thereof) towards objectives; it provides a means of measuring what actually happens against what has been planned in terms of quantity, quality, and timeliness.

Lead Agency: means any Government Ministry, Institution, Department, Parastatal, State Corporation or Local Authority, in which any law vests functions of control or management of any element of the environment or natural resources

Integrated Environmental Assessments: includes Environmental Impact Assessment, Archaeological Assessment, Social Impact Assessment, Health Impact Assessment and Cultural Impact Assessments.

Master plan: a dynamic long-term planning document that provides a conceptual layout to guide future growth and development. Master planning is about making the connection between buildings, social settings, and their surrounding environments.

Mitigation measures: include engineering works, technological improvements, management, and ways and means of minimising negative aspects, which may include socioeconomic and cultural losses suffered by communities and individuals, whilst enhancing positive aspects of the project.

Plan: A purposeful, forward-looking strategy or design, often with coordinated priorities, options, and measures that elaborate and implement policy.

Policy: A broad statement of intent that reflects and focuses the political agenda of government and initiates a decision cycle. A general course of action or proposed overall direction that a government is/ will pursue; a policy guides on-going decision making.

Program: A coherent, organized agenda or schedule of commitments, proposals, instruments, and/or activities that elaborate and implement policy.

Scoping: The process of defining the extent and detail of a SEA, including the identification of strategic issues.

SEA Expert: An expert registered and licensed as per the SEA Guidelines

Social Impact Assessment (SIA): is the process of identifying and managing the social/ human impacts of projects

Stakeholder: Those who may be interested in, potentially affected by, or influence the implementation of a PPP. In the context of a SEA applied to development cooperation, stakeholders may include government, donor agencies, local communities, NGOs, and civil society.

Strategic Environmental Assessment (SEA): A range of analytical and participatory approaches that aim to integrate environmental consideration into policies, plans, and programs and evaluate the interlinkages with economic and social considerations.

Sustainable Development: means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs by maintaining the carrying capacity of the supporting ecosystem.

Tier: A layer or ranking in a hierarchy, as in policy, plan, or program

Threshold: Levels that should not be exceeded; points at which irreversible or serious damage could occur, either to ecosystems and/or to social systems (health, safety, or wellbeing).

Trade-offs: Refers to losing one quality or aspect of something in return for getting another quality or aspect. It implies a decision made with the full comprehension of both the up- and down-side of a choice.

NON-TECHNICAL SUMMARY

Background Information

Teita Estate is a leading international producer and exporter of sisal products. Teita Estate Limited has identified the need to introduce a comprehensive mixed land use pattern at the Teita Sisal Estate, which is aimed at enhancing the economic productivity of the area through the proposed estate zoning and subdivision into distinct land use zones.

The proposed mixed-use development site is located 3 kilometres from Mwatate Town, along Voi – Mwatate Road. The development is anchored on the tenets of mixed-use developments which is one of the ten principles of smart growth that promotes community design and developments and incorporates it with economy, public health and environment. In this case, the proposed development blends various compatible land uses including commercial, light industrial, residential with pockets of adequate public amenities and support infrastructure. The end game is a well thought out sustainable human settlement where people can live, work and play.

The purpose of this SESA report is to share the findings of the possible impacts on the biophysical and socio-economic environment upon implementation of the proposed Master Plan. It also sought to provide information on the plan proponent, an outline of the proposed plan, mitigation measures for identified negative impacts, an environmental management and a monitoring plan to ensure effective implementation of the mitigation measures, and a description of the SESA process including the assessment's outcomes and recommendations.

Methodology and Criteria for undertaking the SESA

The SESA was carried out in line with the provisions of the Environmental Management and Coordination Act, (EMCA, Cap 387), the Environmental (Impact Assessment and Audit) Regulations 2003, Draft Environmental Management and Coordination (Strategic Assessment, Integrated Impact Assessment and Audit) Regulations 2018, the 2012 National Guidelines for Strategic Environmental Assessment in Kenya, as well as international guidelines on SESA. The main activities in this SESA study included:

i. Description of the proposed master plan including the objective, purpose, and rationale
ii. Identification of alternative options and strategies, implementation plan and time scale
iii. Areas and sectors affected by the proposed master plan
iv. Field missions for baseline environmental analysis
v. Collection of baseline data including data on ecological processes and services
vi. Review and analysis of existing policy and legislative frameworks for environmental protection and existing environmental protection programs and their objectives
vii. Review of all relevant development plans for the area within the study boundaries
viii. Identification of alternatives options and justification of preferred alternatives and linkages between on-going projects and proposed plan
ix. Prediction and evaluation of impacts, including cumulative effects
x. Preparation of an Environmental and Social Management and Monitoring Plan (ESMMP)
xi. Identification of gaps and alternatives actions
xii. Stakeholder consultations and public participation

xiii. Presentation of findings and stakeholder dialogue
xiv. Compilation, validation and submission of final SESA report

Objectives of the SESA Report

This SESA utilised a set of SESA objectives that cover each of the environmental topics scoped into the assessment covering different section of SESA. The objectives have been further outlined in section 1.1.5.

- ✓ Reduce emissions from the transport sector by reducing the need to travel to school and shopping hence contribute to the wider targets to reduce greenhouse gas emissions
- ✓ Adapt the different proposed land uses to the predicted effects of climate change
- ✓ Reduce all forms of air pollution related to the residential, industrial, commercial and transport land uses and improve air quality
- ✓ Improve quality of life and human health and increase sustainable access to essential services, employment and the natural environment
- ✓ Reduce noise and vibration associated with the construction stage, transport network, industrial processing and agriculture
- ✓ Promote, invest in, build and maintain infrastructure to support the development of high-quality places
- ✓ Improve the living standards and environment of the residents of Mwatate County
- ✓ Provide recreational and green spaces for the residents of Mwatate closer to their living environment
- ✓ Promote and improve the sustainable use of the land and natural resources
- ✓ Reduce use of natural resources by providing other alternatives
- ✓ Protect, maintain and improve the quality of water bodies, wetlands and the marine environment from any direct or indirect impacts from the project, and protect against the risk of flooding, surface and underground water pollution and water wastage
- ✓ Promote water recycling and water harvesting
- ✓ Protect, maintain and enhance biodiversity and ecosystem services, avoiding damage to or loss of designated and undesignated wildlife or geological sites
- ✓ Safeguard and improve soil quality particularly high value agricultural land and carbon-rich soil
- ✓ Protect cultural heritage resources and their settings.
- ✓ Protect the landscape and deliver environmental benefits through sustainable and high-quality design and place-making

Scope of the proposed Master Plan

The intended Teita Estate Comprehensive Mixed-Use Master Plan will comprise of several spatial land use patterns, which will include 58.38% residential, .08% industrial, 4.26% commercial, 8.2% on agricultural activities and 1.9% education. Others will consist of public utilities and purposes, recreational purposes, transportation and open space. The zones in each of the development phases include:

- ✓ Residential Zone
- ✓ Agricultural zones

- ✓ Public utility zones
- ✓ Public purpose zones
- ✓ Medical facilities
- ✓ Religious facilities
- ✓ Commercial zones
- ✓ Industrial zones
- ✓ Wetlands
- ✓ Transport

1 Introduction

1.1 Background

1.1.1 Overview of The Project

The Strategic Environmental and Social Assessment of Teita Estate Comprehensive Mixed Land Use Development Master Plan is being conducted for approval by the National Environment Management Authority (NEMA). It is meant to provide strategic direction to the proposed comprehensive mixed land use pattern from the current land uses. This Scoping report outlines key areas of focus that shall be addressed during the Strategic Environmental and Social Assessment (SESA) study. Subsequently the experts have recommended that upon the completion of the SESA process and issuance of NEMA approval on the Teita Estate Comprehensive Mixed Land Use Master Plan, hereafter referred to as the 'Master Plan', Environmental &/Social Impact Assessments (ESIA) be undertaken for the various individual project phases to address site-specific impacts of specific projects and EIA/ESIA licenses issued by NEMA.

Teita Estate Limited sought the services of a lead expert, Dr. David Masereti Makori, to carry out a SESA of the proposed Master Plan in fulfilment of Regulation 42 of the Environmental (Impact Assessment and Audit) Regulations of 2003, that requires all Policy, Plans or Programmes to be subjected to a SESA. The SESA process shall entail carrying out the study in accordance with the set regulations and guidelines. This submission of the draft report, shall be followed by the final SESA report after review by NEMA, and follow up to provide any additional information to enable approval of the Master Plan. The purpose of this draft SESA report is to provide an in-depth analysis of key areas of concern that have been subjected to scrutiny and detailed analysis to ascertain the possible impacts as result of the proposed implementation of the Master Plan, and subsequently develop an adequate and sustainable environmental management and monitoring plan (EMMP). It also sought to provide information on the plan proponent, an outline of the proposed plan and anticipated impacts.

Teita Estate Limited, has identified the need to introduce a comprehensive mixed land use pattern at the Teita Sisal Estate, that is aimed at enhancing the economic productivity of the area through the proposed estate zoning and subdivision into distinct land use zones. The development is anchored on the tenets of mixed-use developments which is one of the ten principles of smart growth that promotes community design and developments and incorporates it with economy, public health and the environment. In this case, the proposed development blends various compatible land uses including commercial, light industrial, residential with pockets of adequate public amenities and support infrastructure. The end game is a well thought out sustainable human settlement where people can live, work and play. The proponent is considering introduction of among key zones within the estate as listed below: -

i. Residential Zone
ii. Agricultural zones
iii. Public utility zones
iv. Public purpose zones
v. Medical facilities
vi. Religious facilities
vii. Commercial zones

viii. Industrial zones
ix. Wetland

The Master Plan is described in detail in Section 2 of this report.

1.1.2 Scope of the Master Plan

The proposals as put up by a team of consultants such as planners, managers, urban planners, engineers, quantity surveyors, environmentalists, physical planners, hydro geologists, zoologists, botanists, sociologists and other ancillary experts as the need be to come up with the most economically viable, environmentally sound, technologically savvy mixed-use dwellings. The proposed components will be put up in such a manner to maximize the intended benefits.

The intended Teita Estate Comprehensive Mixed-Use Master Plan will comprise of several spatial land use patterns, which will include 58.38% residential, .08% industrial, 4.26% commercial, 8.2% on agricultural activities and 1.9% education. Others will consist of public utilities and purposes, recreational purposes, transportation and open space. The following provides details of the proposed facilities:

- Controlled mixed-use development that is governed by a development control code and rules.
- Security that integrates both physical and technology to provide advanced security surveillance systems that include non-controlled ingress and egress both into the city and individual buildings.
- Due to limited water resources, a water resource plan shall include enhanced production and distribution of water within the development.
- Provide reliable power distribution with minimal brown outs, back-up generators and endeavour to provide power demand from renewable energy sources such as solar and wind
- Provision on 24 hours medical and emergency facilities to be incorporated in the development plan, this includes medical facilities, ambulance and fire brigades
- Provision of a zone for the development of commercial facilities within the development
- Allocation of a zone for the development of universities, primary and tertiary education facilities
- Allocation of zones for light industries establishment
- An adequate traffic design that ensures a walkable environment that is not hampered by vehicular traffic
- Anchor the Mixed-use development on sustainability and green initiatives
- Innovative asset and facility management to maintain the built-up environment
- The zones in each of the development phases include:
    - ✓ Residential Zone
    - ✓ Agricultural zones
    - ✓ Public utility zones
    - ✓ Public purpose zones
    - ✓ Medical facilities

- ✓ Religious facilities
- ✓ Commercial zones
- ✓ Industrial zones
- ✓ Wetland
- ✓ Transport

1.1.3 Strategic Environmental and Social Assessment (SESA) Definition

Strategic Environmental and Social Assessment (SESA) refers to a range of analytical and participatory approaches to integrate environmental and social consideration into Policies, Plans and Programs (PPP), and evaluate the inter-linkages with economic and social considerations (NEMA, 2012). SESA is a combination of approaches that use a variety of tools, rather than a single, fixed, prescriptive approach. The SESA process extends its aims and principles upstream in the decision-making process, beyond the plan level, when major alternatives are still possible. SESA is a proactive approach to integrate environmental considerations into the higher levels of decision-making. During a SESA process, the likely significant effects of a Policy, Plan, or Program (PPP) on the environment are identified, described, evaluated, and reported.

1.1.4 Basic Principles for SESA

The Environmental (Impact Assessment and Audit) Regulations of 2003 provide for SESA in compliance to the following principles:

- ✓ The sustainable use of natural resources
- ✓ The enhanced protection and conservation of biodiversity
- ✓ Interlinkages between human settlements and cultural issues
- ✓ Integration of socio-economic and environmental factors
- ✓ The protection and conservation of natural physical surroundings of scenic beauty and the protection and conservation of built environment of historic or cultural significance
- ✓ Public and stakeholder engagement

1.1.5 SESA Objectives

This SESA will utilise a set of objectives that cover each of the environmental topics scoped into the assessment covering different section of SESA. The objectives have been further outlined in section 7.2.

- ✓ Reduce emissions from the transport sector by reducing the need to travel to school and shopping hence contribute to the wider targets of reducing greenhouse gas emissions
- ✓ Adapt the proposed land uses to the predicted effects of climate change
- ✓ Reduce all forms of air pollution related to residential, industrial, commercial and transport land uses and improve air quality
- ✓ Improve quality of life and human health and increase sustainable access to essential services, employment and the natural environment
- ✓ Reduce noise and vibration associated with the construction stage, transport network, industrial processing and agriculture
- ✓ Promote, invest in, build and maintain infrastructure to support the development of high-quality places

- ✓ Improve the living standards and environment of the residents of Mwatate County
- ✓ Provide recreational and green spaces for the residents of Mwateate closer to their living environment
- ✓ Promote and improve the sustainable use of the land and natural resources
- ✓ Reduce use of natural resources by providing other alternatives
- ✓ Protect, maintain and improve the quality of water bodies, wetlands and the marine environment from any direct or indirect impacts from the project, and protect against the risk of flooding, surface and underground water pollution and water wastage
- ✓ Promote water recycling and water harvesting
- ✓ Protect, maintain and enhance biodiversity and ecosystem services, avoiding damage to or loss of designated and undesignated wildlife or geological sites
- ✓ Safeguard and improve soil quality particularly high value agricultural land and carbon-rich soil
- ✓ Protect cultural heritage resources and their settings.
- ✓ Protect the landscape and deliver environmental benefits through sustainable and high-quality design and place-making

1.1.6 Purpose of Teita Estate Comprehensive Development SESA Report

The purpose of this SESA report is to present strategic recommendations that will guide environmental and socio-economic planning during implementation of the Teita Estate Comprehensive Mixed Land Use Master plan.

1.1.7 Terms of Reference for Teita Estate Comprehensive Development SESA Report

The Terms of Reference (ToR) developed for this study are meant to assess the impacts that might result during the construction, operational and decommissioning phase of the proposed project. Specifically, the terms of reference include:

i. Provide detailed descriptions of the proposed project in terms of location, objectives, design, activities, material inputs, outputs, products and waste.
ii. Provide detailed description of the baseline environmental and social economic conditions of the project area.
iii. Review relevant legal, policy and institutional framework applicable in the implementation of the proposed project.
iv. Provide detailed description of the potentially affected environment.
v. Identify, predict and analyse the environment and social economic impacts of the project, including seeking stakeholder's views and/or concerns.
vi. Provide analyses of the project alternatives in terms of site, design, implementation technologies and provide reason for preferred options.
vii. Provide detailed Draft Environmental and Social Management Plan (ESMP) proposing measures for mitigating negative environmental impacts, cost for offsetting such measures, timeframe, responsibility and monitoring frequency and indicators to implement the measures.
viii. Provide action plans for management of occupational/public health and safety concerns.

1.1.8 Methodology of Undertaking the SESA

SESA is a means of systematically assessing the likely impact of a public plan, programme or strategy on the environment. The Environmental (Impact Assessment and Audit) Regulations of 2003 transposes the requirements of the SESA and those bodies preparing qualifying plans are required to undertake a SESA of plans that are likely to have significant environmental effects, if implemented. The SESA aims to offer greater protection to the environment by ensuring public bodies and those organisations preparing plans of a 'public character' (in this case Teita Estate) consider and address the likely significant environmental effects. The SESA also offers a foundation for future stages of the plan assisting an environmentally led design.

This SESA is prepared for the Teita Estate Comprehensive Mixed Land Use Master Plan, hereafter referred to as the 'Master Plan', to explore the potential for positive or negative significant environmental effects. A Screening Report and Scoping Report have been prepared and approved (provided in Appendix 2A and Appendix 2B). Following the screening and scoping stages, the key remaining stages of SESA for the Master Plan are:

- ✓ Draft Strategic Environmental and Social Assessment Report (this stage) – The assessment stage that establishes the likely significant (positive and negative) environmental effects of implementing the Master Plan. The assessment and a summary of key findings are included in the draft Environmental Report, is made available for consultation alongside the Master Plan.
- ✓ Final SESA Report (that responds to SESA consultation comments and any post-consultation updates to the Master Plan reporting).
- ✓ Post Adoption Statement - This statement will be produced after the SESA for the Master Plan has been adopted. It will outline how the assessment and consultation responses have been considered within the finalised Master Plan. It will also include the final environmental monitoring programme for the Master Plan implementation.
- ✓ Monitoring – any significant environmental effects predicted in the SESA will need to be monitored, according to the monitoring programme set out in the Post Adoption Statement, and remedial action taken in response to the monitoring, where required.

The SESA Directive topics, to be considered at all SESA stages, are:

- ✓ biodiversity, fauna and flora;
- ✓ population and human health;
- ✓ water;
- ✓ soil;
- ✓ air;
- ✓ climatic factors;
- ✓ material assets;
- ✓ cultural heritage; and
- ✓ landscape.

Inter-relationships between the environmental topics listed above is also considered. For example, direct effects on soil or the quality of the water environment, as a result of increasing the background levels of pollution within a specific area, could have a secondary significant effect on biodiversity. The potential inter-relationships identified as part of the scoping exercise are outlined in this draft report.

The SESA is developed to incorporate the feedback from statutory Consultation Authorities. These statutory Consultation Authorities include, but not limited to:

i. NEMA
ii. Taita Taveta County Government – Environment and Water
iii. Kenya Wildlife Services
iv. African Wildlife Foundation
v. Taita Taveta Wildlife Conservancy Association
vi. TAVEVO
vii. Izera Ranch
viii. Diaspora University Town (DUT)

The role of the Consultation Authorities within SESA was to bring their individual environmental expertise to the assessment process. This helped to ensure that the future consultation process undertaken by the plan is more robust. This in turn means that the public can gain a better understanding of the likely effect of a plan on the environment and meaningfully contribute to the plan's preparation process by offering an informed view.

In adherence to the requirements of the Environmental (Impact Assessment and Audit) Regulations of 2003, screening was undertaken to determine whether the Master Plan would be likely to have significant environmental effects which would require SESA. A Screening Report was submitted to NEMA in 15th March, 2023 and a response was received on the 21st March, 2023 (refer to Appendix 2). SESA was proposed for the Master Plan as the most appropriate and robust framework for identifying potential environmental effects and opportunities at a high-level. The SESA process also ensures that stakeholders are given an early opportunity to comment on and influence the proposals. Following review of the Screening Report, Teita Estate confirmed the intention to progress with SESA for the proposed Master Plan. Following confirmation through screening that a SESA will be undertaken, a scoping report was was undertaken and approved by NEMA on 27th of April, 2023. The purpose of the scoping stage was to describe the environmental context, by establishing the relevant baseline information, reviewing other relevant alternatives and identifying environmental problems and opportunities.

1.1.9 Work Plan and deliverables for executing the SESA

1.1.9.1 Key deliverables for the SESA

S/No.	Deliverables	Dates
1	Master Plan Brief, Submission and decision to conduct SESA by NEMA	23/02/2022
2	Screening report approval by NEMA	21/03/2023
2	Data collection and submission of SESA scoping report to NEMA	27/04/2023
4	Submission of SESA Draft report	30/06/2023
5	SESA Validation Workshop	31/07/2023
6	Drafting and submission of SESA final report	11/08/2023
7	NEMA approval period	18/08/2023

1.1.10 Budget to Implement the SESA

Teita Estate Limited committed to facilitate financial, administrative, and technical resources to see the SESA process from scoping into implementation stage. The proponent also provided access to master plan information and obliged to facilitate consultative meetings among key SESA consultants, technical teams and stakeholders.

2 Teita Estate Comprehensive Mixed Land Use Master Plan

2.1 Overview of The Master Plan

A sustainable development has to incorporate socio-economic and environment-friendly concepts/ principles by hosting a community of integrated mixed-use development including housing, businesses, industrial e.t.c., seeking to enhance environmental and economic performance through collaboration in managing environmental and resource issues, including energy, water and materials. Consequently, the proposed Master Plan has integrated all the facets of a sustainably developed entity by ensuring that the economic, social and environmental factors are its guiding principles in the design, construction and management. This chapter highlights the purpose, rationale, and objectives, of Teita Estate Comprehensive Mixed Land Use Development Master Plan. It also identified and discusses sectors affected and that interlink with the Master Plan.

Teita Estate Master Plan is an upcoming 3,000-acre comprehensive development located within the newly formed Mwatate Municipality, Taita Taveta County. The development is anchored on the tenets of mixed-use developments which is one of the ten principles of smart growth that promotes community design and developments and incorporates it with economy, public health and environment. In this case, the proposed development blends various compatible land uses including commercial, light industrial, residential with pockets of adequate public amenities and support infrastructure. The end game is a well thought out sustainable human settlement where people can live, work and play.

Since Kenya attained her independence in 1963, the government has through various initiatives tried to address shelter issues key among them formulation of Session Paper No.5 of 1966/67 on Housing Policy, National Strategy for shelter 2000 and most recently the Big 4 Agenda, where housing is one of the four pillars. Despite these efforts, the demand for decent housing has always outstripped the supply especially in urban areas. This is majorly attributed to the rapid urbanization, inaccessibility to land and housing finance coupled with the high cost of infrastructure and low level of investment in the sector by public agencies and parastatals. While the government has majorly focused on provision of support infrastructure, the private sector has emerged as the best alternative supplier of housing. It is against this backdrop that the residential zone of the Teita Estate Master Plan aims to increase the housing stock by creating spaces.

To promote sustainability, foster innovation and provide employment, there is need to have sources of income where people live hence the inclusion of industrial and commercial zones into residential areas. According to the Taita Taveta CIDP of 2018-2022, unemployment rate in the County stands at 45%, which is mainly attributable to low skills among the population and the limited capacity of the industrial sector. As a remedy, the Teita Estate Master Plan proposed a vocational training centre to help improve the low skill levels of the residents.

With land ownership in Taita Taveta county comprising of about 62% in the government owned Tsavo East and West, and 24% in private ranches, only 14% of the total land area is left for occupation by the local residents. Despite the small percentage of available land, the ranch owners and the locals have managed to put forth sustainable agriculture into practice and agricultural activities for production of food crops, cash crops and livestock have been steadily on the rise.

The major challenge that faces urbanization in Taita Taveta has been increased emigration of young population to more fast-growing counties such as Mombasa and Malindi in search of Education and better opportunities. This is mainly attributed to the fact that there are no major workforce seeking entities within the county. Therefore, the opening of this 3000-acre development will open up land to attract more investors to offer more job opportunities to residents as well as spur growth in the newly created Mwatate Municipality.

The Master Plan is strategically located off 18kms from Voi junction connecting Nairobi - Mombasa highway. The highway links to A109 that joins Nairobi to the North and Mombasa to the south. Other keys infrastructure in the region includes the SGR Voi Station, the 60-metre A23 Voi-Taveta Road which is a major gateway and shortest route to Tanzania through Taveta town. The old metre gauge railway and its reserve marks the northern boundary of the Teita Estate and there are plans of reviving the old railway line and construct a new SGR line connecting Voi to Tanzania. This venture will greatly benefit the proposed Teita Estate development. Furthermore, the Master Plan is within a major tourist attraction destination, i.e. the Tsavo East and West National Parks. Figures 1 and 2 shows the national and local setting of the Master Plan.

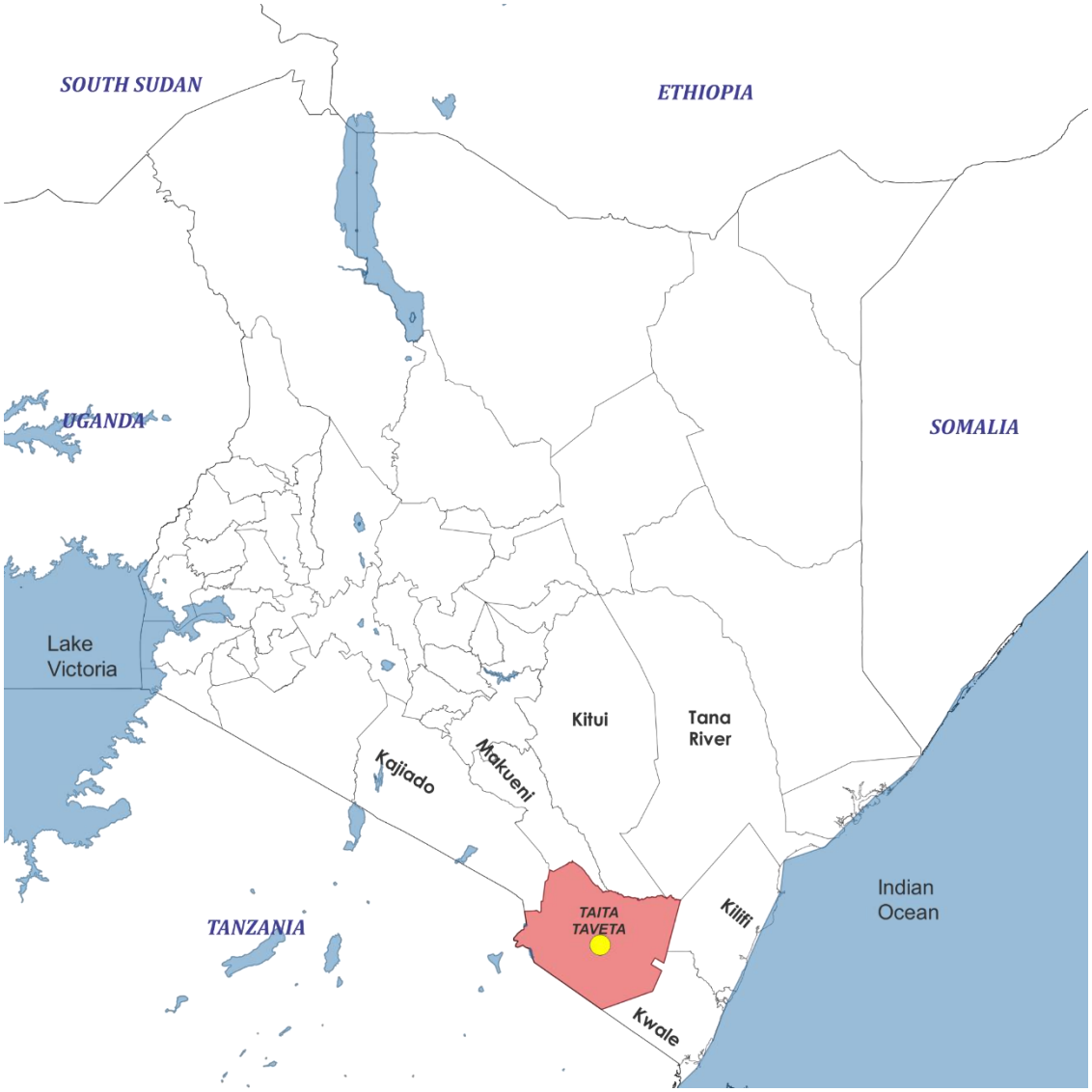

Figure 1: Location of Taita Taveta County in relation to other counties in Kenya

Taita Taveta County has a population of over 340,000 people and borders Kitui, Makueni, Tana River, Kilifi, Kwale and Kajiado counties and Tanzania to the South. The Figure 2 below shows the location of the county in the Kenyan context. The development is located about three (3) kilometres from Mwatate town and in between Mwatunge to the north and about two (2) from Singila Majengo on the south.

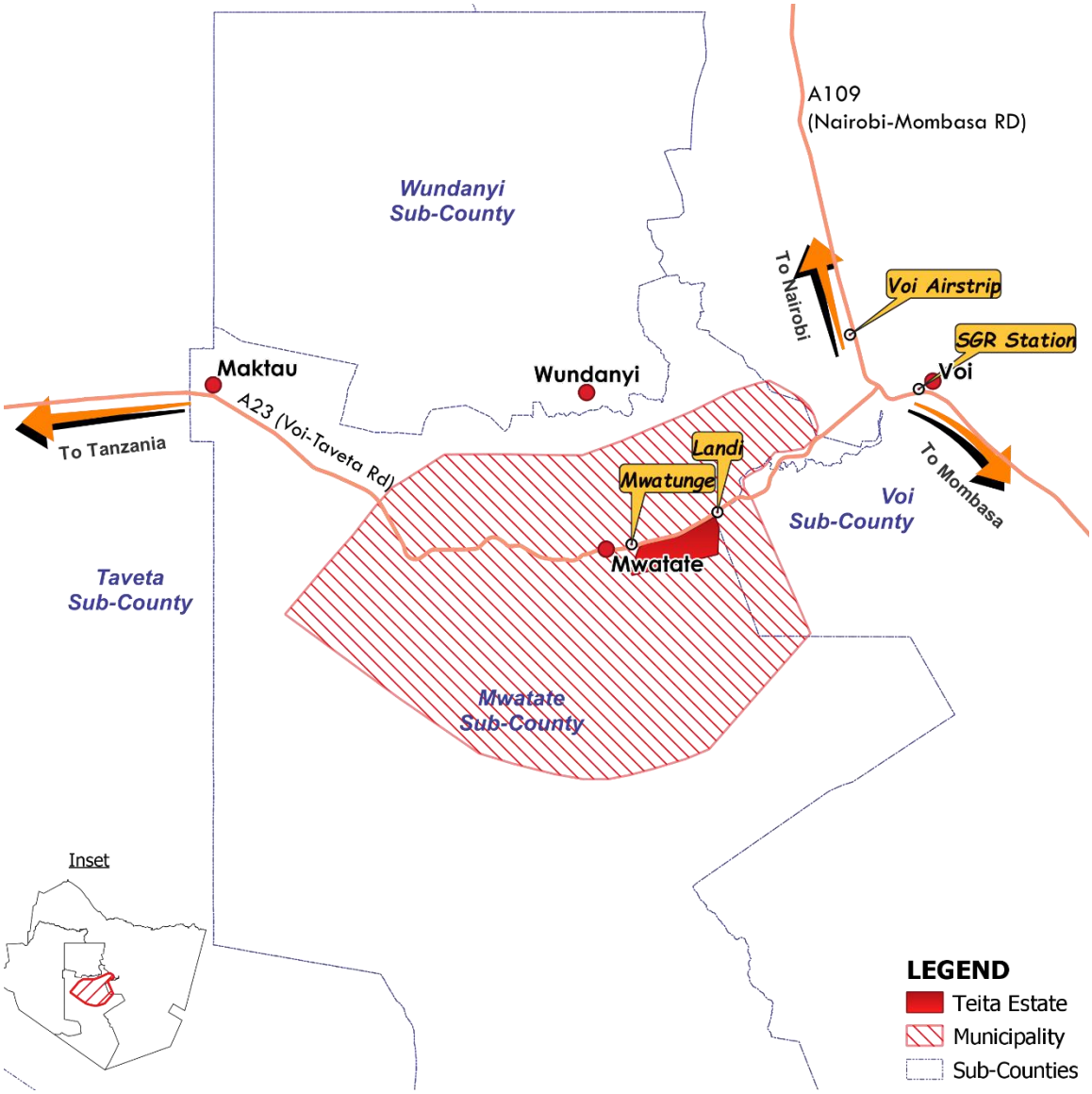

Figure 2: Location of the proposed Teita Estate mixed land use plan in in Mwatate Subcounty, Mwatate Municipality

2.2 Objectives of the Master Plan

The proposed Teita Estate Comprehensive Mixed Land Use Development Master plan aims to safeguard integration of all the facets of a sustainably developed entity and environmental considerations are adhered to. This will be done by ensuring that the economic, social and environmental factors are its guiding principles in the design, construction and management processes. The specific objectives of the plan are to provide the much-needed facilities and services as highlighted below:

- ✓ To develop a housing units with low, medium and high-density units targeting both middle and high-income earners.
- ✓ Open up land for different land uses to allow the locals and other Kenyans access to land and contribute towards addressing the land question
- ✓ Provide affordable land to the locals who have very limited access to land and resources.
- ✓ Provide land for modern agriculture to enhance agricultural productivity in the region
- ✓ To enhance green spaces and wetland protection by providing land for wetlands and parks within the master plan
- ✓ To spur economic activity in the region by providing a good economic environment and clients
- ✓ Improving housing conditions by providing development designs and encouraging controlled development options governed by development control code and rules.
- ✓ Improving living standards through employment creation through the various commercial and industrial installations proposed.
- ✓ To encourage green living and greening the master plan by making water harvesting mandatory, water recycling by using grey water for irrigation, harnessing green energy such as solar and wind and naturally aspirated house designs.
- ✓ Increase medical provision to the residents of Mwatate and Taita Taveta County by establishing medical facilities within the site
- ✓ To improve education status in the region by providing education facilities of all levels of education including tertiary institutions
- ✓ To designate recreational and sports facilities and services providing various sports and recreational activities with public amenities such as green open spaces

2.3 Existing Land Uses and Surrounding Development

The proposed development area is a sisal plantation with concentration of existing developments located mainly across the Voi-Taveta Road opposite the estate, at Singila area, which is mostly for residential purpose and the neighbouring Mwatate town. Additionally, within the plantation exists settlements that are occupied by the sisal workers and major production activities of the sisal farm take place as well. There is also a school and Health centre serving the settlements. Development and features directly adjacent to the land zone include:

- ➢ Accessibility to the Standard Gauge Railway
- ➢ The newly improved Voi-Taveta Road
- ➢ Residential area that are sparsely located adjacent to the facility
- ➢ Sisal plantations in the neighbouring
- ➢ The Tsavo National Park
- ➢ Mwatate town

Although the site is predominantly agriculture in nature, there are also added neighbouring market centres with land uses such as commercial, educational facilities and public purpose facilities. The key towns, near the site include Landi centre, Voi Town, Mwatate town and Singila Majengo.

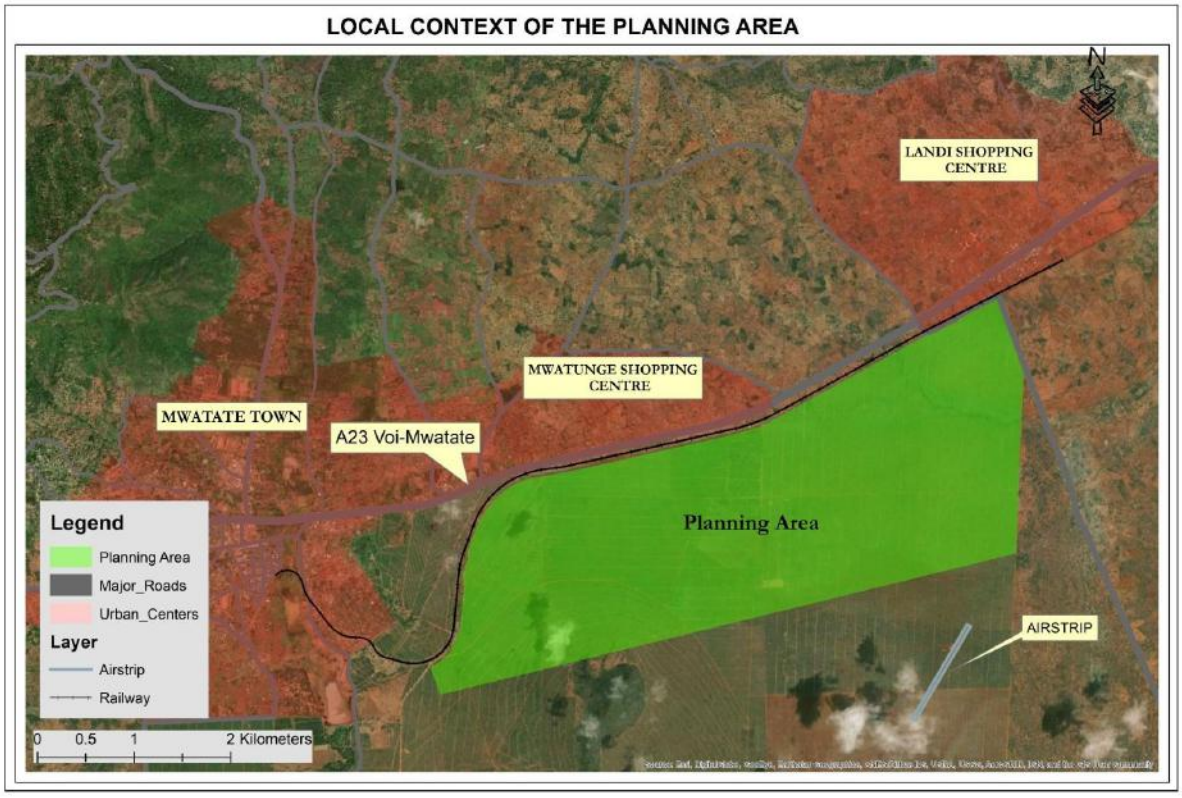

Figure 3: An overview of the Master Plan area showing the land uses surrounding it.

2.4 Current Status of the Study Site

The Master Plan is proposed to cover an area approximately 1,214 hectares (3,000 acres). The land is registered as Mwatate/Mwatate/Block 1/14 under Teita Estate Limited (TEL) on leasehold tenure regime. Currently, the parcel is under sisal with staff quarters, water storage tanks and borehole used for agricultural purposes (Figure 3).

Figure 4: Current status of the proposed Teita Estate Mixed Land use Plan area

The proposed development area is a sisal plantation with concentration of existing developments located mainly across the Voi-Taveta Road opposite the estate, at Singila area, which is mostly for residential purpose and the neighbouring Mwatate town. Additionally, within the plantation there exists settlements that are occupied by the sisal workers and major production activities of the sisal

farm take place as well. There is also a school and Health centre serving the settlements. Development and features directly adjacent to the land zone include:

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- Residential area that are sparsely located adjacent to the facility
- Sisal plantations in the neighbouring
- The Tsavo National Park
- Mwatate town

Although the site is predominantly used for agriculture, there are neighbouring market centres with land uses such as commercial, educational facilities and public purpose facilities. The key towns, near the site include Lindi centre, Voi Town, Mwatate town and Singila Majengo.

The proposed plan will have mixed land uses, among them;

i. Residential zones with various occupation densities
ii. Commercial centres
iii. Industrial centres
iv. Public utilities such as education and health centres
v. Green areas and parks within each court

The SESA team will establish the biodiversity in the Master Plan site, the ecosystem services, pressure patterns and trends.

2.5 Land Use Description

2.5.1 Residential Zones:

Residential land use is main anchor land use within the scheme and occupies 58.38% of the total Master Plan area. The scheme hopes to create a well-planned and orderly neighbourhood that is safe and friendly for the general wellbeing of the residents. To achieve this, Teita Estate Limited will sell serviced plots for housing. The scheme hopes that the plots can be used in the realization of affordable housing within Mwatate area.

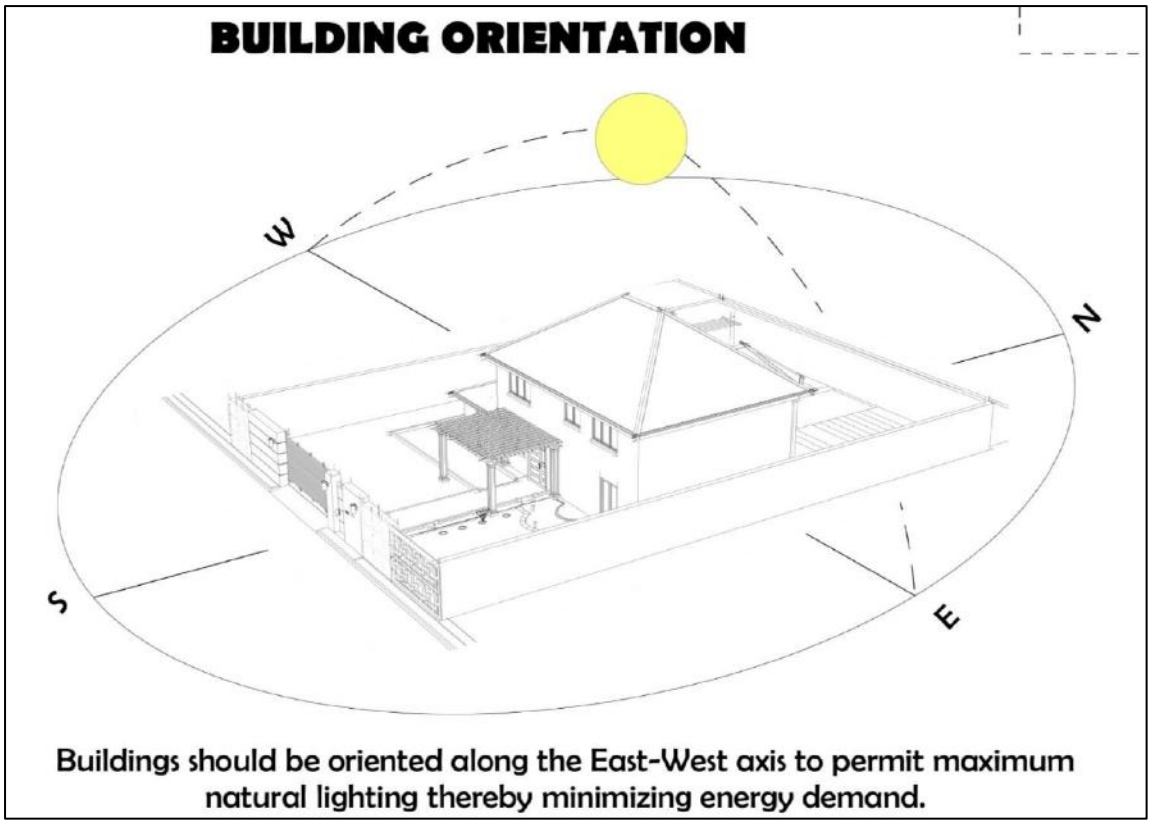


Figure 5: Proposed structural orientation consideration

For orderliness, all the developments will observe the building line and will build a perimeter wall in the site. Landscaping will also be done around the site to enhance aesthetics and promote environmental sustainability. This plan advocates for the incorporation of green buildings in the development for sustainability. Such buildings consume less water, boost energy efficiency, conserve natural resources, produce minimal waste and provide healthier environment for residents as compared to a conventional building. Green building design comprises site planning, design of building envelope, building design with HVAC i.e., heating, ventilation and air conditioning, lighting and water heating.

i. High Density Residential Zone

This residential area is zoned for plots of up to 1/8th acres. The land as provided for is adequate for a single dwelling house, and yards both in the front and back of the parcel providing enough room for a home garden, since this plan advocates for food security. Figures below shows the graphical representation for the high-density residential zone in the Master Plan area.

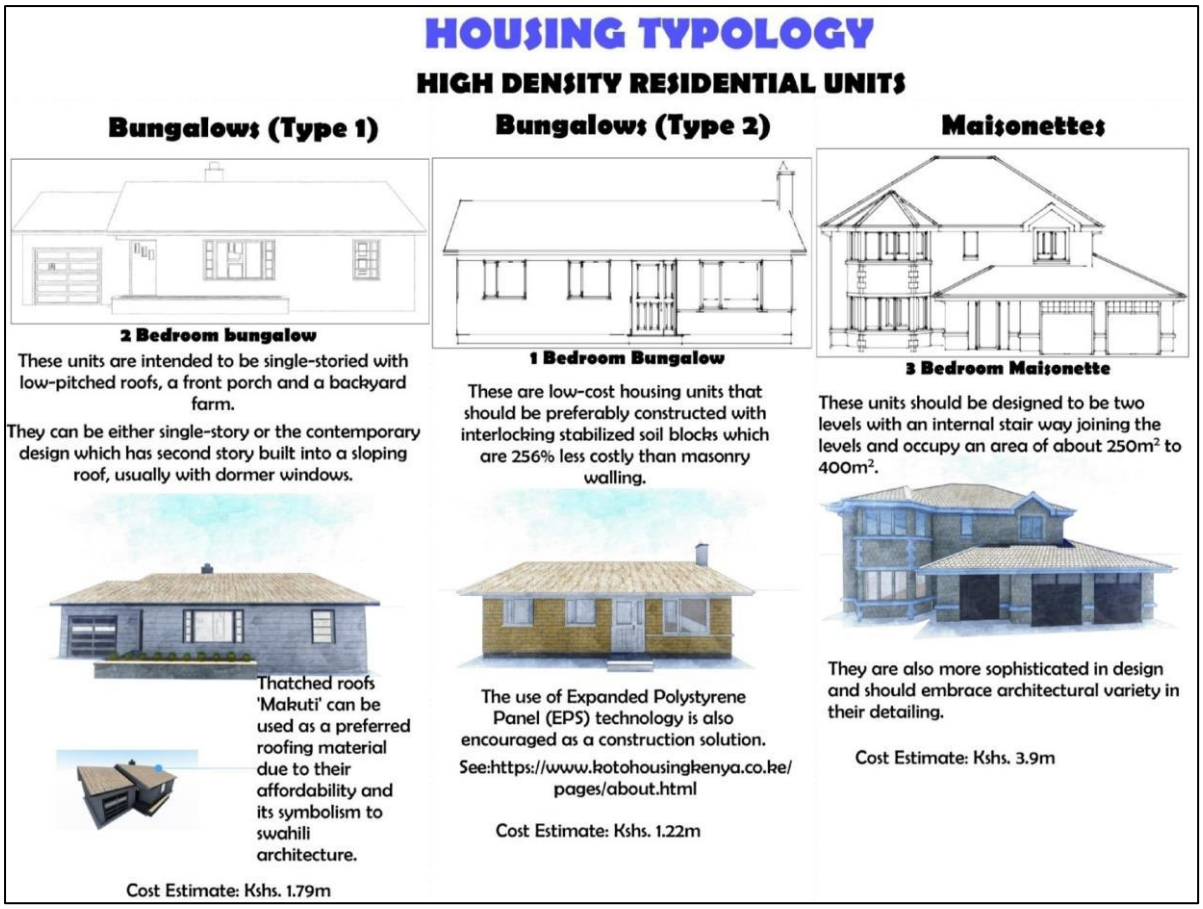


Figure 6: Proposed housing typology

ii. Medium Density Residential Zone

This residential area is zoned for plots of land of measuring a ¼th of an acre. Below is a visual representation of the houses in the medium residential zones.

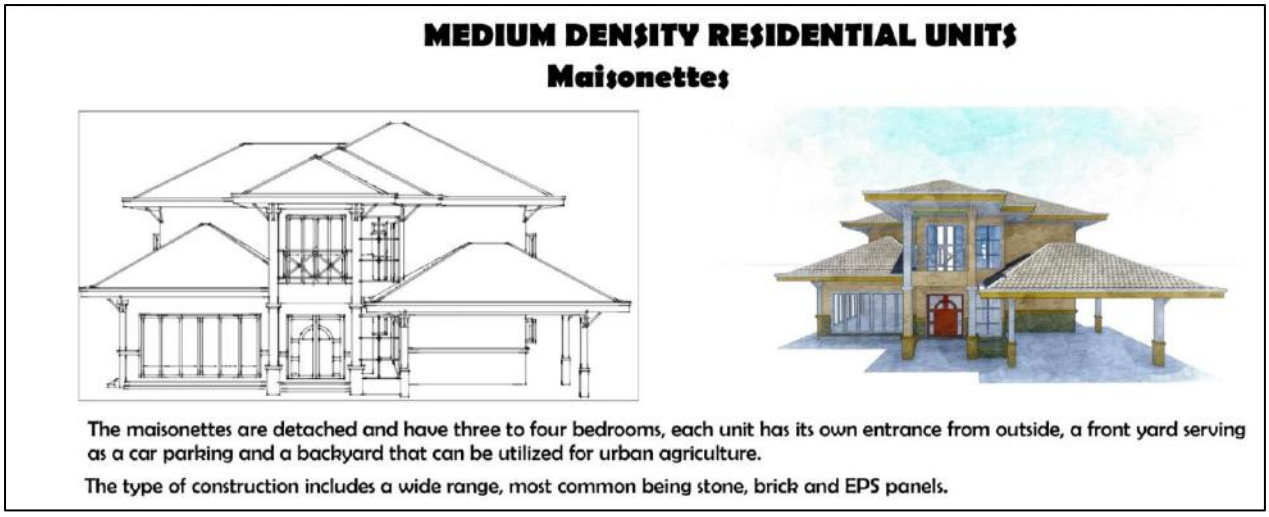


Figure 7: Proposed residential outlay in the medium density residential zone

iii. Low & Super Low-Density Residential Zone

The low residential area is zoned for plots between 2-5 acres of land while the super low zone is reserved for plots between 5-10 acres of land. Below is a visual representation of the houses proposed in these zones.

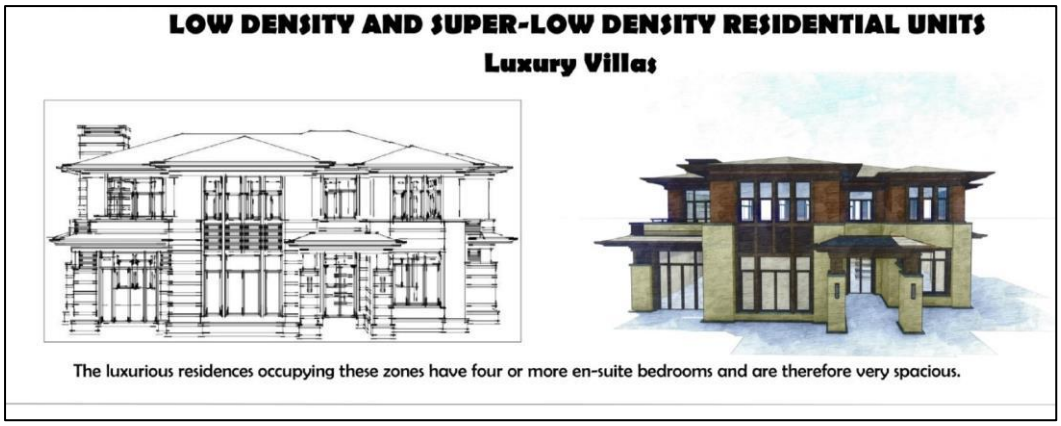


Figure 8: Proposed residential outlay in the low and super low density residential zone

2.5.2 Industrial Zone

The industrial zone occupies 49.48 hectares of land which is 4.08% of the total development area. As earlier indicated, these industries will capitalize on the areas strategic location along A23 road that runs to Tanzania and being only 20 kms from Voi SGR station. The two corridors will be use in the transportation of raw materials and finished products all over the country and even to the neighbouring countries. Since the industries are light industries and non-polluting, the Master Plan envisages low levels of pollution, with stimulation of economy and provision of employment opportunities hence growth of the area and county at large. Examples of such industries include petrol stations, food processing industries, water packaging among others.

Figure 9: Proposed outlay in the industrial zone including a petrol station that will be situated in the zone

2.5.3 Commercial Zone

There are pockets of commercial activities evenly distributed within the development area. This is to ensure accessibility of services and reduce on the need to travel long distance to access these commercial services. This in turn promotes walking and cycling which are majorly provided for in the design of the transportation sector and also reduces the unnecessary use of vehicles which in the long run reduces air pollution.

2.5.4 Educational Facilities

Educational facilities are an integral part of any residential neighbourhood. For this reason, 23.02 hectares of land (1.90%) of the total development area have been set aside. There is an emphasis on even distribution of these facilities for access and to adequately serve the anticipated residents all around the development area. The proposed educational facilities include ECD facilities, primary, secondary and a vocational training centre. ECD facilities will be provided within the residential neighbourhoods. This is meant to reduce walking distance of the young ones.

2.5.5 Hospitals

A hospital is a significant service in an area that is largely residential. For this reason, 7.65 Hectares of land have been set aside. The hospital facility will cater to the resident population within the scheme and within the area.

2.5.6 Cemetery

A cemetery is an important provision in the society, different cultures notwithstanding, as it is a place where people lay their loved ones. The location, size and cultural traditions have to be considered when providing for it. The plan takes cognisance of the different cultures within the target market and therefore has allocated 6.79 hectares of land with separate areas for Christians and Muslims.

2.5.7 Power Sub-station

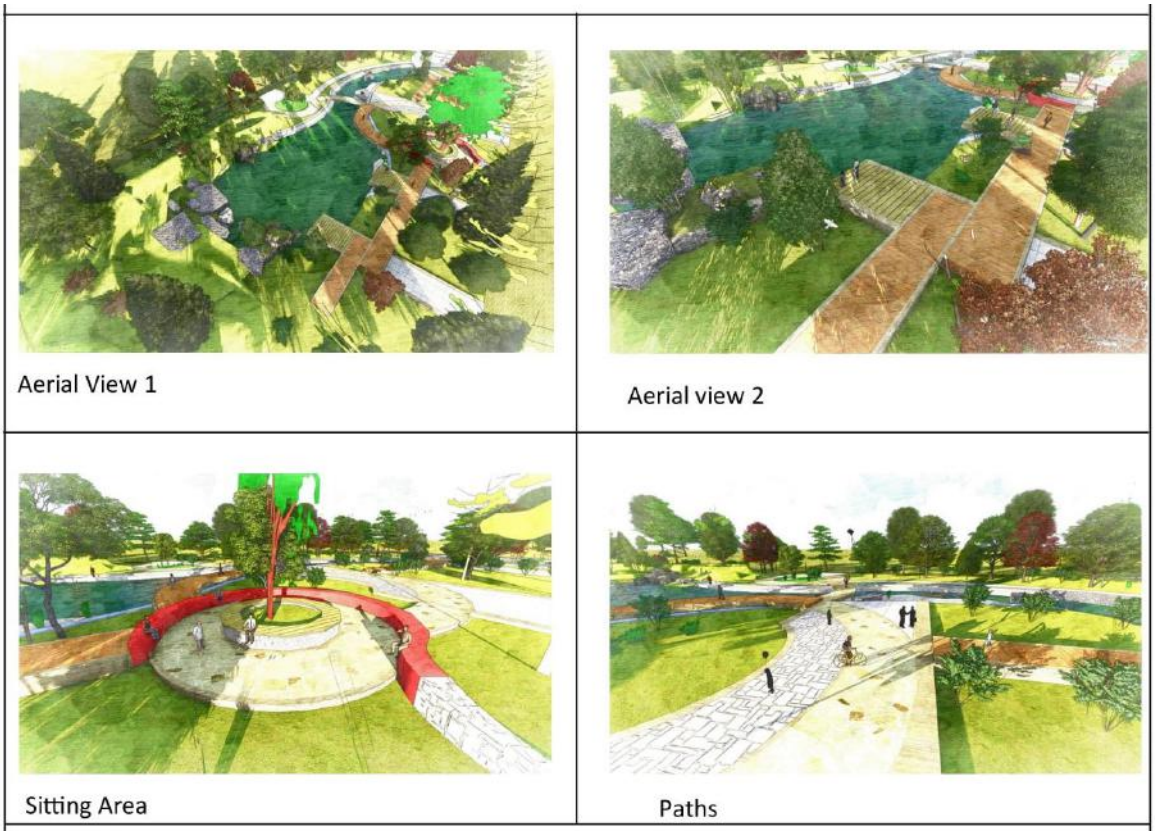
The developer intends to have a dedicated bulk power supply line from Kenya Power. The main reason being the Master Planed load demand from the high consuming uses like industries and also the Master Planed domestic population of 33,000 in the year 2050. Towards this end, 0.19 Hectares of land has been set aside for power sub-stations. In support of this, the roads have adequate reserves to accommodate powerlines, tunnels and transformers. Teita Estate Limited also intends to have utility points along major roads especially within the industrial precinct. Individual plot owners and developers will also be encouraged to adopt green energy available such as solar.

2.5.8 Police Station and Police Post

Where population is high, security is paramount. Police play a major role in our society as they help in maintaining public order and safety by enforcing the law. This is the reason why it is important to provide for a police station and the police posts in this development area. These public facilities have been allocated 1.17 Hectares of land.

2.5.9 Parks

The parks have been allocated 34.53 Hectares of land accounting to 2.84% of the land use allocation. A park is an area of natural, semi-natural or planted space set aside for human enjoyment and recreation. The kind of parks being proposed are neighbourhood parks, public open spaces and landscaped parks. The purpose of parks is to provide spaces and opportunities for both informal active and passive recreation. They are developed and designed for community residents living close to the parks.



2.5.10 Water, Sewer and Waste Management

Mwatate being an arid area faces water scarcity. However, piped water is supplied by Tavevo water and sewerage company. The developer intends to supply the estate with bulk supply of water from the company. In addition, the developer hopes to sink water pans and dams to increase water supply. Further, the developer will incorporate water storage tanks and water harvesting techniques for use on the building designs. Currently, the Master Plan site is not served by the trunk sewer. The developer will also construct onsite waste bins to ensure that solid waste is efficiently managed. The waste will afterwards be collected by licensed private solid waste collector or by the County Government for disposal.

2.5.11 Transportation

Transportation is important especially for mobility and accessibility. This development area has set aside 214.19 Hectares of land for the transportation sector which accumulates to 17.64% of the total land in the development area. This shall consist of:-

- Bus way design concept
- Street crossing sections

- Safety concepts
- Adequate traffic management concept

2.5.12 Urban Agriculture

Agriculture will be incorporated within the residential neighbourhoods. Urban agriculture can be defined as Agricultural production (crops and livestock) in urban and peri-urban areas for food and other uses. One striking feature of urban agriculture, which distinguishes it from rural agriculture, is that it is integrated into the urban economic and ecological system. It is not its urban location which distinguishes urban from rural agriculture, but the fact that it is embedded in and interacting with the urban system. Benefits of urban farming include saving on groceries and helps to increase your physical activity.

2.6 Identification of applicable sectors and plans.

The proposed Teita Estate comprehensive mixed land use development is anticipated to interlink with other regional and local policies, plans and programmes. The development is anticipated to enhance the economic productivity of the area and provide a sustainable human settlement where people can live, work and play. This comprehensive development master links with other plans at the national, regional and county as explained in the following sections:

2.6.1 Linkage at the National Level

2.6.1.1 Vision 2030

Nationally, the proposed Teita Estate Comprehensive Development Master Plan links well with Vision 2030 blueprint. Its chapter four on the Social Pillar involves the building of a just and cohesive society, enjoying equitable social development in a clean and secure environment. This quest is the basis of transformation in some social sectors including education, water, sanitation, housing and sports among others.

In this regard the Teita Estate master plan features learning institutions, health facilities, improved infrastructure and provision of amenities, sports stadia and housing developments thereby contributing towards the achievement of some of key flagship vision 2030 projects.

2.6.1.2 National Water Master Plan 2030

The National Water Master Plan (NWMP) 2030 was launched on 26th March 2014. It is a product of an intensive study of Kenya's water resources and meteorological conditions to facilitate planning for development and management of the same. The proposed Teita Estate comprehensive development master plan fits within the Athi Catchment Areas hence will require to be in line with the development plans and overall NWMP. The Master Plan aims at ensuring protection of water resources within the Master Plan area and management of water including proper rainwater harvesting and creating buffer zones for protection of water bodies. Teita Estate Limited should input all strategies necessary to ensure adequate provision of water to its residents.

2.6.1.3 The National Spatial Plan (NSP) Framework

Kenya under vision 2030 has developed a thirty year (2015-2045) spatial plan that aims at distributing the population and activities on the national space for sustainable social-economic development. The plan envisages optimal productivity, sustainability, efficiency and equitability in the use of the scarce land in Kenya and the territorial space. It also provides a framework for urban

development planning and management. In line with the national spatial plan Teita Estate Master Plan outlines strategies for sustainable utilization renewable energy and water sources.

2.6.2 Linkage at Coast Regional Level

2.6.2.1 Integrated Coast Region Master Plan (2010-2030)

The Integrated Coast Region Master Plan (2010-2030) is a development standards and guidelines for the Coast region. The master plan is developed by Coast Development Authority (CDA), a regional development authority established by an Act of Parliament (Cap 449). It has the mandate to plan and coordinate the implementation of integrated development projects and programmes within the whole of Coastal region. It therefore serves as a repository where all developmental initiatives within the region will revolve around. In this regard the objectives of the Integrated Coast Region Master Plan (2010-2030) link well regionally with those of the proposed Teita Estate comprehensive development master plan.

2.6.3 Linkage at County Level

2.6.3.1 Taita Taveta County Draft County Integrated Development Plan III (2023-2027)

At the County level, the proposed Teita Estate master plan links well with the Taita Taveta CIDP III (2023-2027). Chapter Seven of the CIDP forms the core of the Plan and is prepared along the lines of Medium-Term Expenditure Framework (MTEF) Sectors. It indicates priorities, strategies, programmes and projects proposed to overcome the development challenges identified in previous chapters. The MTEF sectors are; education, recreation, environmental protection, water and housing among others. All the proposed Teita Estate comprehensive development master plan activities are in consistence with Taita Taveta County development goals.

2.6.3.2 Taita Taveta County Spatial Plan

The draft Taita Taveta County Spatial Plan details the spatial utilization of the land and resources in the county and is synchronized with the thematic areas outlined in the National Spatial Plan 2015-2045. It is a ten-year county GIS based database system providing:

a) A spatial depiction of the social and economic development program of the county as articulated in the integrated county development plan;
b) Clear statements of how the spatial plan is linked to the regional, national and other county plans;
c) Contain strategies and policies regarding the manner in which the objectives referred to in paragraph (b)vi which strategies and policies shall: contain a strategic assessment of the environmental impact of the spatial development framework;

Upon completion, the Taita Taveta County Spatial plan will link well with the spatial works conducted for the proposed Taita Estate comprehensive development Master Plan.

2.6.3.3 The Diaspora University Town Plan

The Diaspora University Town (DUT) plan is a plan for development of a Town that settles 90,000 residents and creates 30,000 students as the anchor economic activity on 3,000 acres of land. The Teita Estate comprehensive development master plan will link well with the proposed town developments by providing housing to staff and students of the DUT.

2.6.3.4 The Izera Ecological Reserve Plan

The Izera ecological reserve plan is on a ranch along the Voi- Mombasa road bordering Maungu town. The plan entails the development of an airport, aviation college and holiday homes. The Teita Estate comprehensive development master plan will link well with the proposed town developments.

3 Environmental and Social Analysis of the Master Plan

3.1 Introduction

This Chapter discusses the baseline environmental assessment and detailed analysis of the areas which will be affected during execution of the proposed Teita Estate Comprehensive Master Plan. The chapter provides information on the existing environmental conditions including sensitive areas that would be potentially impacted by the master plan. The objective is to document and establish the environmental baseline to assist in assessing and monitoring master plan impacts.

The chapter begins with a brief outline of the methodology employed in the situational analysis. It further examines the baseline environmental, socio-economic and cultural characteristics of the master plan site and its locality. The data acquired will inform adequate projection of the anticipated impacts and subsequently developing of effective measures towards averting, prevention, risk reduction and compensations.

3.2 Methodology for baseline analysis

The steps followed during the environmental baseline situation analysis were as follows:

i. Environmental screening and scoping of the proposed Master Plan land uses
ii. Desktop studies
iii. Physical inspection of the proposed development area and surrounding Master Plan areas

3.3 Data sources for Environment Baseline Analysis

The data sources for SESA analysis of Teita Estate Comprehensive Development master plan considered three sub counties bordering the project area, that include Mwatate, Wundanyi and Voi. Publicly available resources were also used to identify environmental constraints and inform the baseline of the study area. The data sources used include the Kenya protected areas, local authority GIS data, Kenya open data and National environmental outlook. Moreover, the offices outlined were contacted for information on environmental analysis;

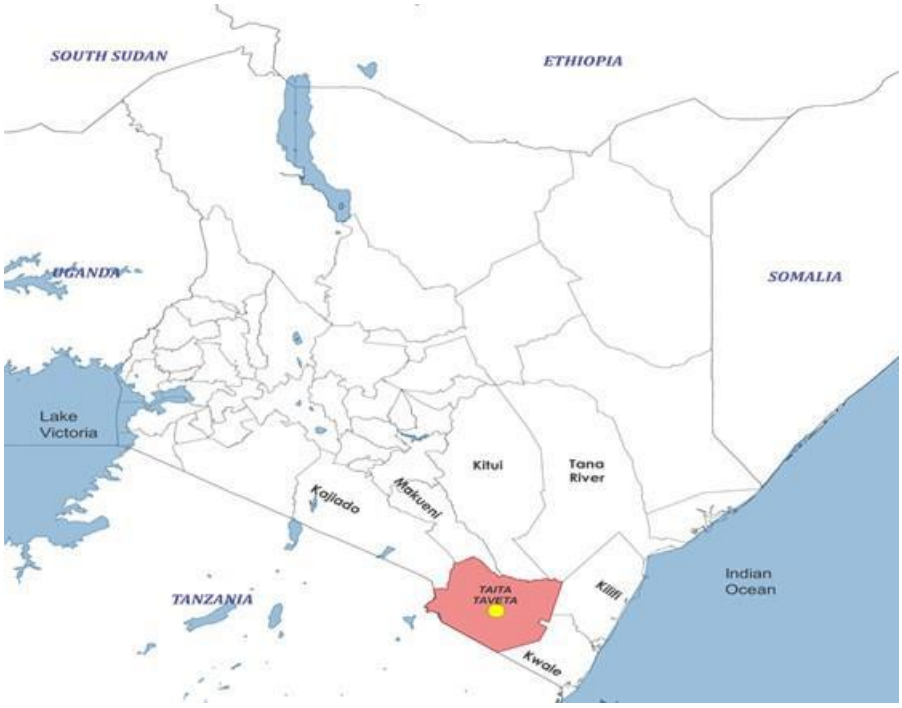
Component	Concerns/desired aims	Data sources
Bio-physical environment	Land, Water, Wildlife	✓ Ministry of Agriculture Taita Taveta County ✓ Tavevo Water and Sewerage Company ✓ Water Resources Authority (WRA), Voi ✓ Kenya Forest Service (KFS), Taita Taveta County ✓ Kenya Wildlife Service (KWS), Voi ✓ African Wildlife Service (AWF), Voi Office
Social-economic	Planning and development	✓ Ministry of land infrastructure and urban development, Taita Taveta County ✓ Planning department, Taita Taveta County
Institutional	Inter-County institutional collaboration and coordination	✓ Related master plans in Taita Taveta County

3.4 Physiographic Analysis

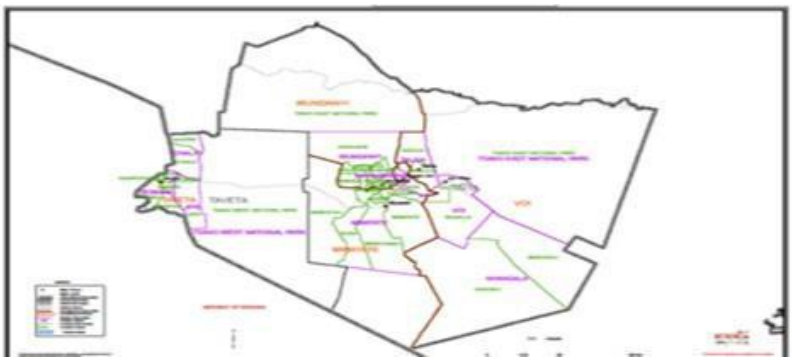
The physical environment describes the topography, landforms geology, soils, climate and meteorology, air quality, and hydrology.

3.4.1 Location and size of Taita Taveta County

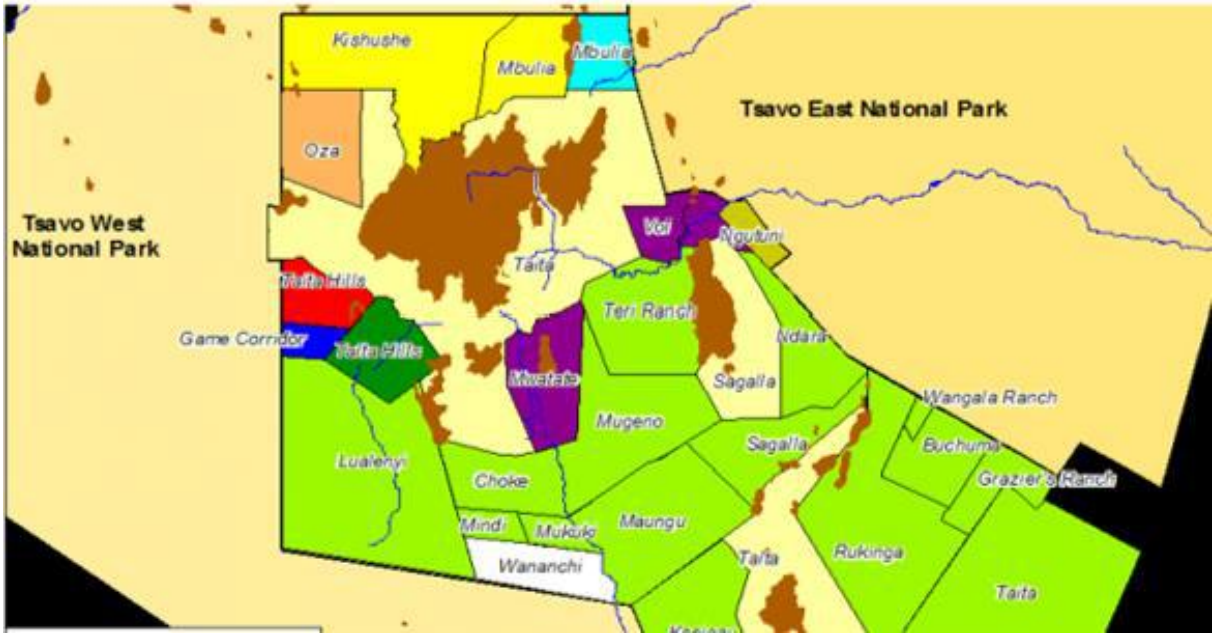
Taita Taveta County is one of the six counties in the Coast region of Kenya. Taita Taveta County is located approximately 200 Km northwest of the coastal city of Mombasa and 360 Km southeast of Nairobi. It borders Tana River, Kitui and Makueni Counties to the North, Kwale and Kilifi Counties to the East, Kajiado County to the North-west, and the Republic of Tanzania to the South and South-west. The County lies between latitude 20 46' South and 40 10' South and longitude 370 36' East and 300 14' East. The total land area in Taita Taveta County, 10,650 Km^2 constitutes the Tsavo National Park (Tsavo East and Tsavo West National Parks), which translates to about 62% of the total land area forming the Tsavo ecosystem.



Moreover, Taita Taveta county has four sub counties namely Wundanyi, Mwatate, Voi and Taveta as in the map below;



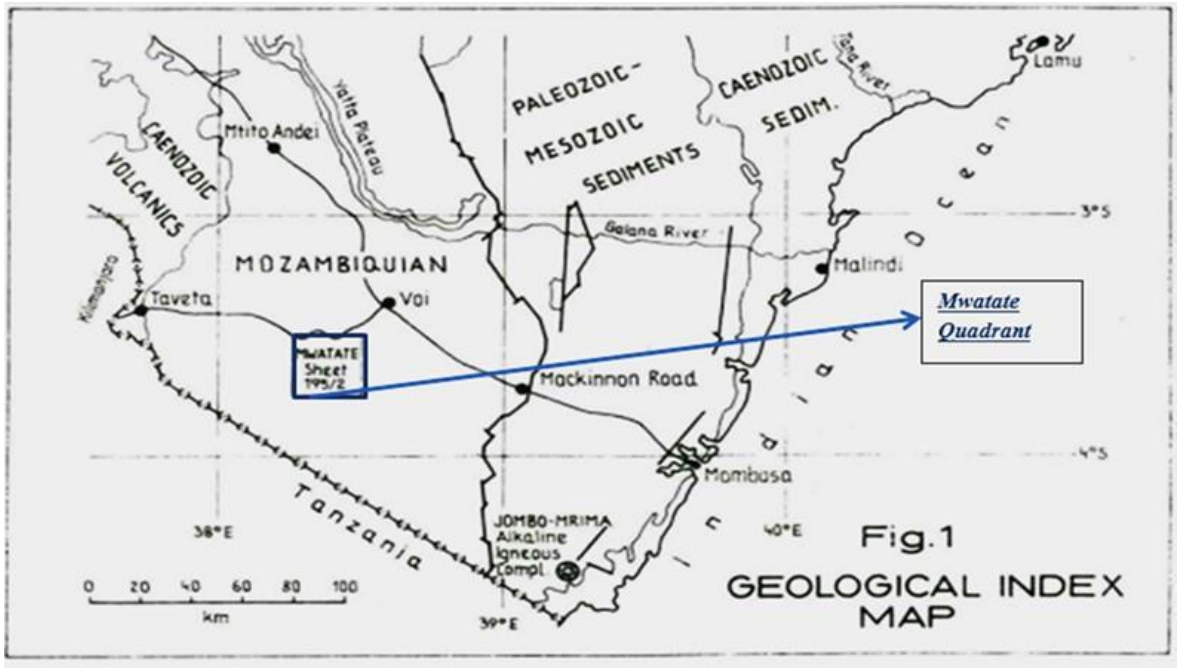
Teita Sisal Estate is located in the town of Mwatate in Taita-Taveta County. It is situated approximately 18 km form Voi Town. Teita Estate borders several conservancies including Mgeno and Teri ranches to the East shown as in the map below.



3.4.2 Geology

Geology is the science which deals with the physical structure and substance of the earth, their history, and the processes which act on them. In this regard the geology, hydrogeology and the various geological structures found in the area and immediate neighbourhood were focused on. The geology of the study area falls under Taita County which is in turn divided into Mozambique Belt and Tertiary Volcanic Belt. The Mozambique Belt encompasses Mwatate, Taita Hills, Kasigau and Kuranze areas while Tertiary Volcanic Belt covers Taveta region (Kella, 1992:4). The section of Mozambique belt underlying Mwatate area is characterized by crystalline rocks of peltic, arenaceous and calcareous sediments with intercalated thin bands of basic sills or lava flows, small lenses of ultramafic rocks emplaced along certain lithohorizons, and a Lu cbarnockite body. With the exception of the latter they are all part of Pre-cambrian age.

To the south of Mwatate a gem-grade of rubies was discovered in 1973 (Pohl, et, al). The rubies are products of desilication of alumina-rich country rocks or pegmatitic fluids caused by ultramafic rocks. These rocks were recognized to occur in lenses forming a belt along strike within the Kurase Series. They were originally dunites and pyroxenites, which were affected by at least the later phase of deformation and metamorphism

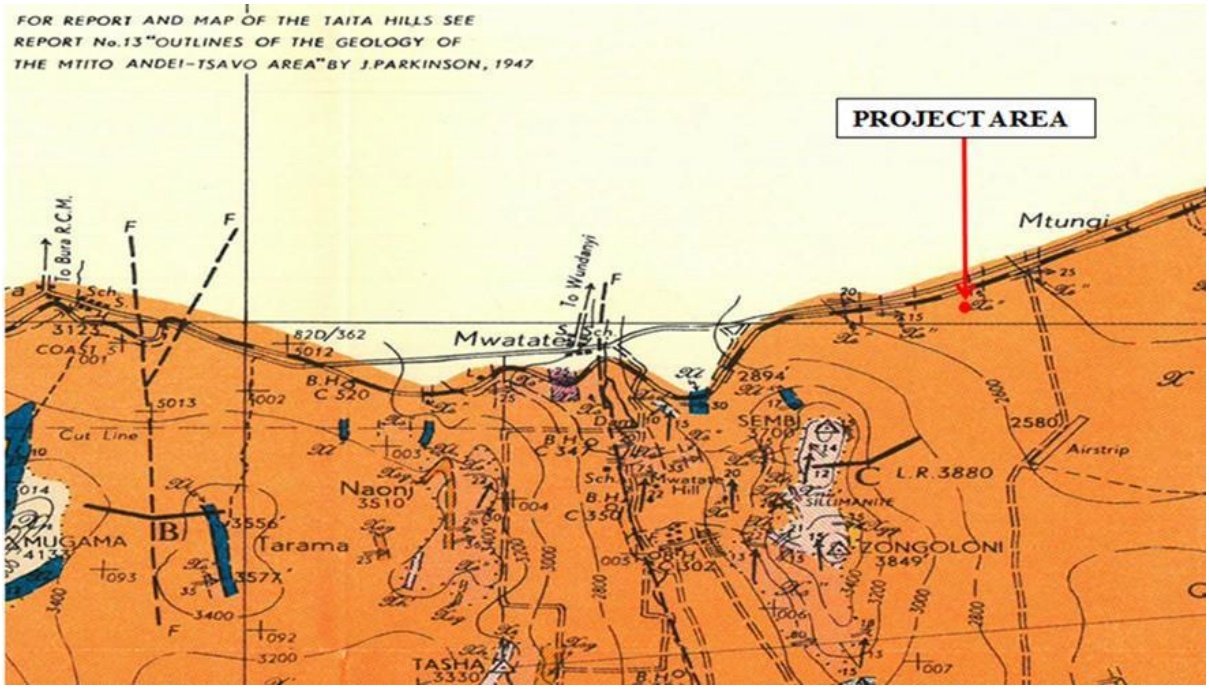


Mozambique belt covering the study area (W.Phol, et.al)

Moreover, the geology of the Teita Estate land proposed for the development is dominated by Archaean gneisses of the Basement System. The Basement rocks throughout the area are covered in the higher parts by sandy alluvium and red-sandy soils, while in the lower parts black cotton soils predominate.

Outcrop of quartzite gneiss

The Basement rock in the area comprises quartzo-felspathic gneisses and the biotite gneisses hidden beneath a layer of recent soils. Most of the ruby and gemstones are found in this County and mostly in the Mozambique belt. Narrowing it down to Mwatate, previous studies indicate occurrences of Vanadium glossularite, marbles and Quartz-feldspars falling under industrial mineralization. The other minerals occurrences in the study area include gemestones that comprise of red garnets and red rose-mapande. The geology map of the study area is as illustrated below.



Additionally, basement system rocks are the oldest rocks in the area, and they underlie the Teita Estate farm comprises quartzo-felspathic gneisses and the biotite gneisses hidden beneath a layer of recent soils. The mineral deposits and occurrences in Taita Taveta County include the green vanadium garnets that were encountered in Mindi and Mikeli Hills during the year 1971. Some years afterwards deposits were discovered in Mgama Ridge, and actual production of the gemstone commenced in 1973. Also, tiny grains of red corundum were discovered around Alia peak, Mgama ridge (E 180 R). The mineral occurs together with red spinel marble horizon within the Lualenyi Member. Several other places also discovered red corundum later. In addition to green grossularite and red corundum, green tourmaline, red garnet (rhodolite), blue zoisite (tanzanite), turquoise, and red spinel have been found in the Mwatate sheet area.

On the other hand, the several industrial minerals to have been prospected in Mwatate include Marbles, limestone, apatite, graphite and sillimanite. The mineral ores at present documented or mapped in the Mwatate sheet area of mineralogical importance only; they include magnetite, pyrite (with base metal sulfides in minor amounts), and rutile. Locally in the Lualenyi Member, elevated geochemical values of Uranium and Thorium are present.

3.4.3 Soil formations

In the area, the dominant soils are cambisols and originate from weathered gneiss and are often gravely to sandy–loamy and shallow and are well drained and moderately fertile. On steep slopes

and transitional zones, the dominant soil types are Regosols, which are shallow soils, have high permeability and low water holding capacity. In some areas, the soils are well drained to excessively drained, dark reddish brown to dark brown shallow to extremely deep, friable to firm and compact, sandy clay loam to clay. The soils are also characterized by high aluminium levels, low calcium levels, resulting in low cation exchange capacity and vulnerable to soil erosion. At the valley bottoms, alluvial soils (fluvisols) are apparently, characterized by young soils with fertility being moderate to high. They receive fresh sediments and nutrients during regular floods and occur in all larger river basins of Bura, Lumi, Mbololo, Mwatate and Voi Rivers.

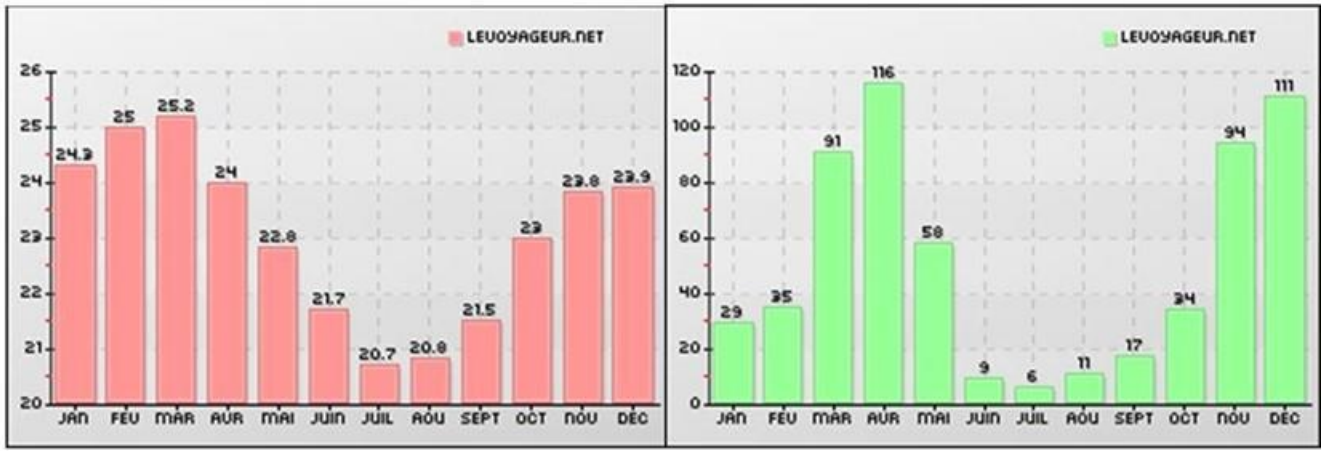
Moreover, the lowlands are characterized by reddish, very deep acid sandy – clay soil (Ferralsols). They are found in most of the Tsavo National Park and the ranches. They are vulnerable to soil erosion, have a low water holding capacity and low soil fertility.

3.4.4 Climate

The study area is generally hot and humid all the year round, except for high catchments areas in the hills. The effect of the south easterly winds influences the climate of the area. The hilly areas have ideal conditions for condensation of moisture, which results in relief rainfall. The county experiences two rainy seasons in a year. The long rains fall between March and May and the short rains between November and December. The mean annual rainfall in the hills ranges from 650 mm to over 1,200 mm in the upper mountain zone.

The lowlands where the study area lies receive between 450 – 750 mm annually and rainfall is more unreliable in amount and distribution. The lower parts are hot with mean temperatures of about 30^0C, with temperatures getting as low as 18.2^0C in the hilly areas. The potential annual evaporation rate is about 1800mm. It is observed that in the area of study climate change and variability is an emerging threat to sustainable environmental and life.

The climate graph of the project area is highlighted below;



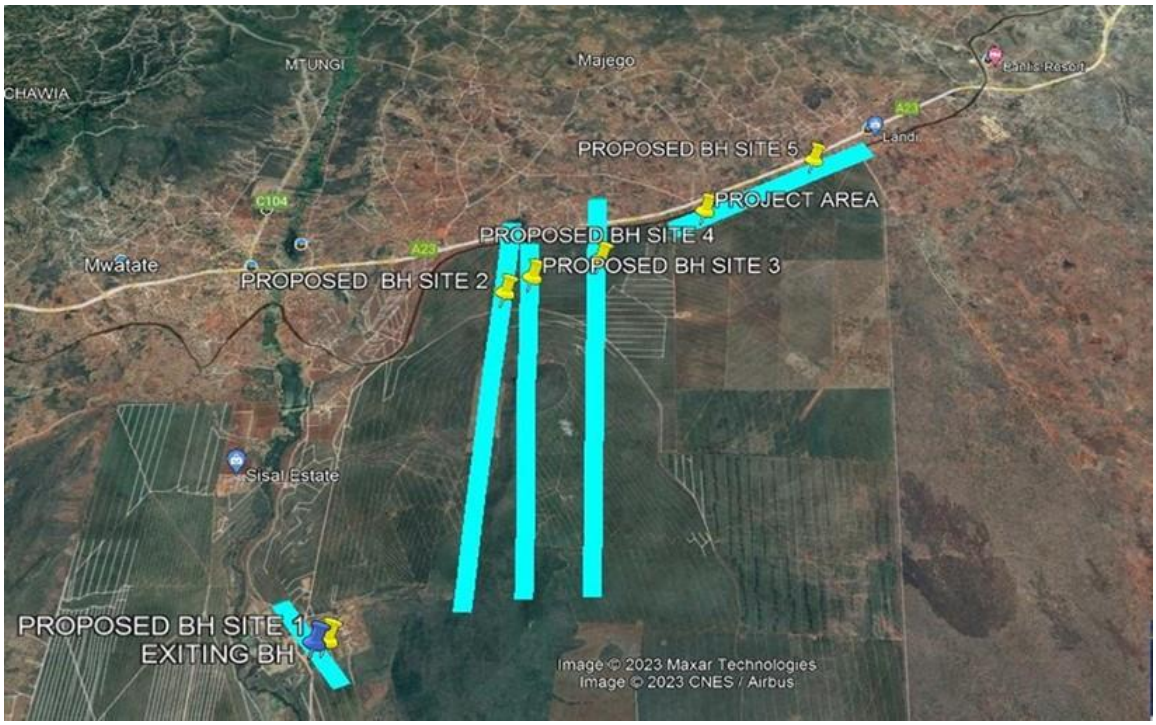
3.4.5 Hydrogeology

The area of study is characterised by several streams and seasonal rivers within the Taita region, with varying discharge levels. Most of the rivers are either major tributaries of larger rivers or seasonal water courses such as those that drain the Davida (Taita) hills. The largest of these rivers is the Tsavo River; a major tributary of the Athi - Galana- Sabaki river system, Tsavo river basin in Taveta and Wundanyi division. Tsavo River arises from Njukini springs in Taveta Division and

it flows into Athi River. Mwatate river basin in Mwatate Division, which constitutes of Bura river as its major tributary and flow southwards through the national park into Kwale County. The main rivers in the County are the Tsavo, Lumi and Voi rivers. Mzima springs is the major water supplier to the TAVEVO Urban Area.

Moreover, in the area of study there are also small springs and streams that include Njukini, Njoro kubwa, Kitobo, Sanite, Maji Wadeni, Humas Springs and Lemonya Springs. Additionally, underground water is also available through boreholes. Moreover, in the Teita Estate proposed development area, the occurrence of groundwater in this area is mainly obtained within the weathered and fractured zones of the Basement rocks. The recharge of groundwater is good since the project area receives a considerable recharge from Basement Hills surrounding the area. Additionally, the yields of boreholes in this zone are expected to be medium to fairly low due to nature of rocks in this area. Boreholes located in highly fractured zones are medium yielding. The estimated yield from the proposed borehole is about 5,000 to 10,000 litres per hour.

The water bearing formations in this area are not uniformly distributed hence the difference in water struck levels and yields of the surrounding boreholes. The flow of groundwater is limited to highly fractured and weathered zones within the basement rocks which are the main rock formations in this area. The map below shows the orientation of the main ground water channels cutting across the proposed development parcel of land.



3.4.6 Water Supply

Mzima springs is the major water supplier to the TAVEVO Water and Sewerage Co. Ltd. area of jurisdiction that is approximately 17,084 km² and is as illustrated in the map below.

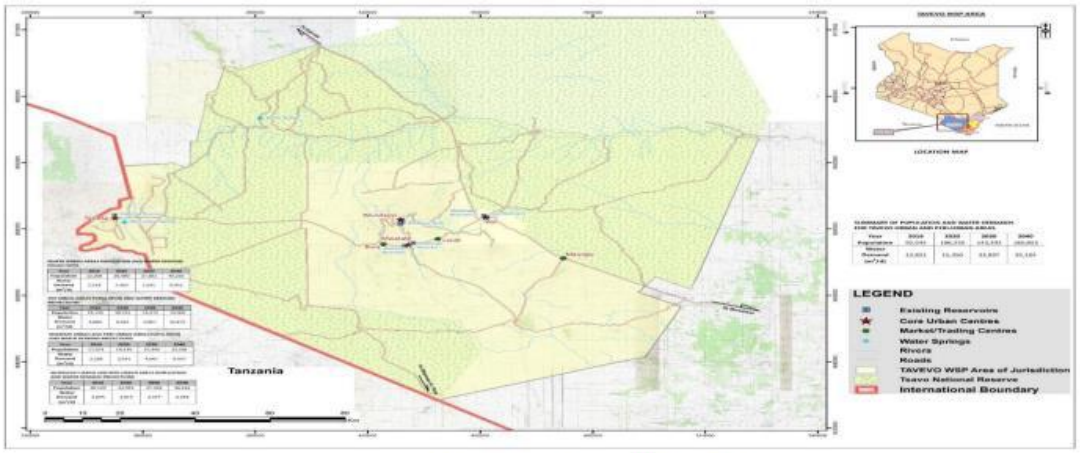


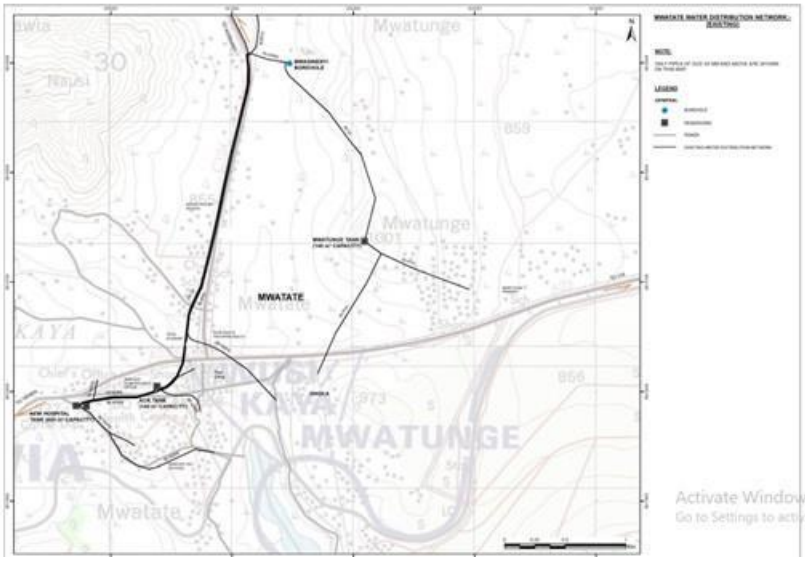
Figure 1.2: Coverage Area of TAVEVO WSP

The bulk water supply system for TAVEVO comprises of two sources;

- ✓ Njoro Kubwa Springs: Current capacity of 3,000m³/d and a potential production of 100,000m³/d. Njoro Kubwa Springs emerge from Kilimanjaro Aquifer and are located 3km South East of Taveta Town.
- ✓ Mzima Springs: Current capacity of 35,000m3/d and a potential production of 105,000m³/d. Mzima Springs located South West of the Chyulu Hills in Tsavo national park

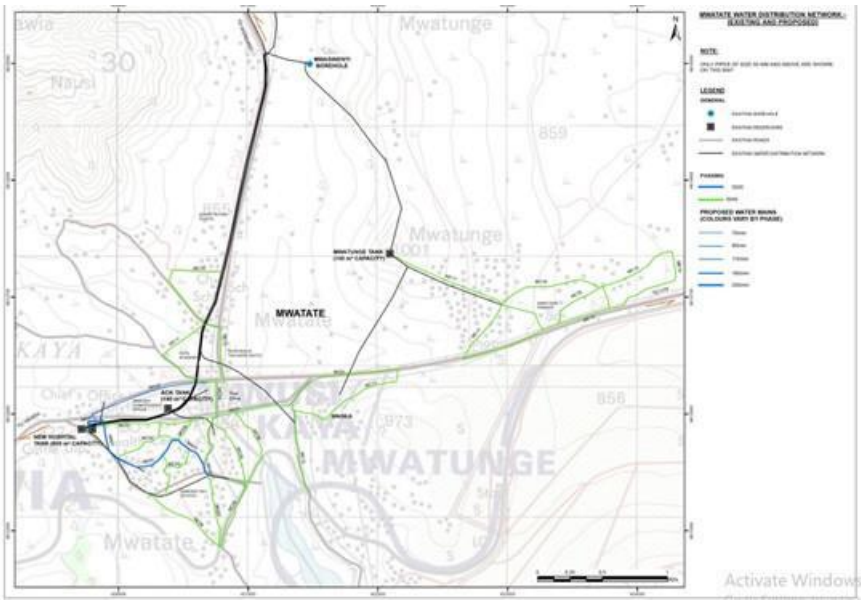
Voi Town is served by the bulk water supply system from Mzima Springs via Mzima pipeline (750 mm dia.) through four offtakes with the water flowing via gravity as shown below.

On the other hand Mwatate Town is served by two local water sources namely Ngiriwinyu River and Mwasinenyi Borehole. Mzima Springs is proposed to serve Mwatate through Mzima II Pipeline which is scheduled to be constructed by Year 2035 (WSMP-Tahal/Bhundia, 2014).



Prioritized Distribution Network Investment Plans for TAVEVO area has an implementation schedule of 3 phases as follows:

- ✓ Short Term Phase (Immediate Interventions): 2017 - 2020
- ✓ Medium Term Phase: 2021 - 2030
- ✓ Long Term Phase: 2031 – 2040



Moreover, in Taita Taveta County there are also small springs and streams that include Njukini, Njoro kubwa, Kitobo, Sanite, Maji Wadeni, Humas Springs and Lemonya Springs.

For the project area there is an addition source of underground water that is also available through borehole abstraction.

3.5 Biological Analysis

The county has 48 forests that comprises of indigenous and exotic forest cover, with approximately 10,000ha of the county are designated as forests. There are also about 21 species of fauna and flora that are not found anywhere else in the world. Indigenous forests cover 41.5% of the area, 12% has exotic forests, 1% contains endemic species and 46% consists of bushland. Small-scale farming of crops, mainly maize and beans is also widely practiced.

3.5.1 Flora

The area of study is characterised by three types of flora;

i. High Altitude/High Elevation Flora: These includes areas such as the mountainous and hilly areas which receive high amounts of rainfall, are cool and experience higher rainfall than the rest of the areas. The areas include Taita hills, Mbololo forests, Ngangao forests and areas of Mwatate. The areas are characterized by a high level of species and generic endemism with the forest ecosystem having more the 2,000 species of plants of which 25 to 30% are endemic. The Taita Hills forests fauna consists of over 400 species with at least 123 endemic plant species. Ngangao and Mbololo forests have 7 of the endemic species.
ii. Midlands of Taita Taveta Flora: These include some parts of Taita Hills which are between 1000 to 1200 metres above the sea level. These areas are characterized by dry spells and have woodland formations composed mainly of different acacia species such as *Acacia mellifera, A. seyal, A. nilotica* and *Euphorbia* species such as *Commiphora* sp., *Ficus* sp., *Tamarindus indica* and *Terminalia brownii*.
iii. Lowland Elevation Flora: This is the areas around Voi. The area is dry and is characterized by arid and semi-arid vegetation which is a characteristic of savanna vegetation. Tall grass, wooded Acacia-Commiphora associations and shrubs dominate the area. In areas where the water table is high such as along Voi river, riverine vegetation dominated by *Croton macrocarpus, Croton megalocarpus, C. dichogamous, Acacia xanthophloea, Milicia excelsa, albizia gummifera, -Kigelia africana, Adansonia digitata, Melia volkensii* and *Ficus thorningii*.

There are some exotic trees that have been planted in the upper areas mainly for agroforestry purposes. They include: *Grevillea robusta, Makhamea lutea, Terminalia brownie, Terminalia spinosa, Mangifera indica, Melia azedarch* and *Azadirachta indica*. There are also some of the endemic plant species include the *African violet - Saintpaulia teitensis*. The threatened plant species include the African sandal wood *Osyris lanceolata* that is medicinal in nature. There is also *Ficus thorningii*: Common in riverine areas such as Voi River. This is mainly threatened by the local community because it's good for roofing.

The area of study also has some invasive plant species that include: *Prosopis juliflora* popularly known as Mathenge weed, *Acacia mearsi, Lantana camara* and *Opuntia* spp such as *Opuntia stricta, Opuntia vulgari*s and *Acacia indica*. The area of study has three sisal varieties that include *Agave sisalana, Agave hildana*, and *Agave* hybrid 11648 that occupies the majority of the land area.

3.5.2 Forest Cover

The Taita Taveta County total forest cover is about 280 Km^2, representing 0.51% of the total County area (CIDP-TT, 2014). The county has a total of 78 forest parcels, but 52 parcels are yet to be gazetted, an exercise that is to be undertaken by the county government. The gazetted forests

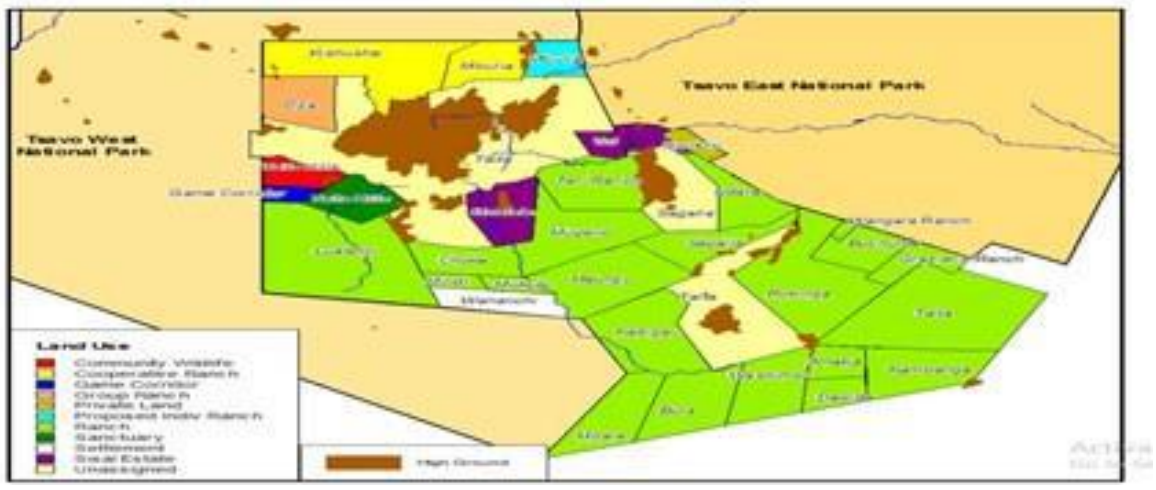
covers an area of 1,489.8 Ha whereas the non-gazetted ones cover an area of approximately 9,000 Ha (TTCIDP, 2014). The indigenous forests in the County possess unique biodiversity, being home to varied flora and fauna. Over 20 endemic species of African violets (e.g. *Saintpaulia teitensis*) occur exclusively in Taita Taveta. Also, the Taita Thrush and the Taita Apalis are birds‟ endemic only to the county. The Taita Falcon and the Taita Fiscal were first discovered at the hills but occur elsewhere too. However, climate change seems to have worsened the problems already faced by forests from encroachment for agriculture, over-extraction of timber and non-timber products e.g. charcoal production.

Forested areas are confined to the Taita hill tops (approximately 2% of the forest cover) where remnants of the original Afromontane forest vegetation are restricted to isolated mountain peaks There are 48 Kenyan Eastern Arc forests which have survived on hill tops in the County, of which 28 are gazetted and are under government protection and management. They range in size from small 500 square metres with a few remnant trees to modestly vast 2 square kilometres indigenous and exotic forest mountains.

The Taita Hills forest hold a unique biodiversity with 13 taxa of plants (such as *Ceropegia verticillata*, and *Zimmermannai ovata*) and 9 taxa of animals such as birds (Taita thrush, Taita apalis and Tita white eye) endemic to the Taita Hills. In addition, 22 plant species found in the Taita Hills forests are typical of the Eastern arc forests.

3.5.3 Wildlife

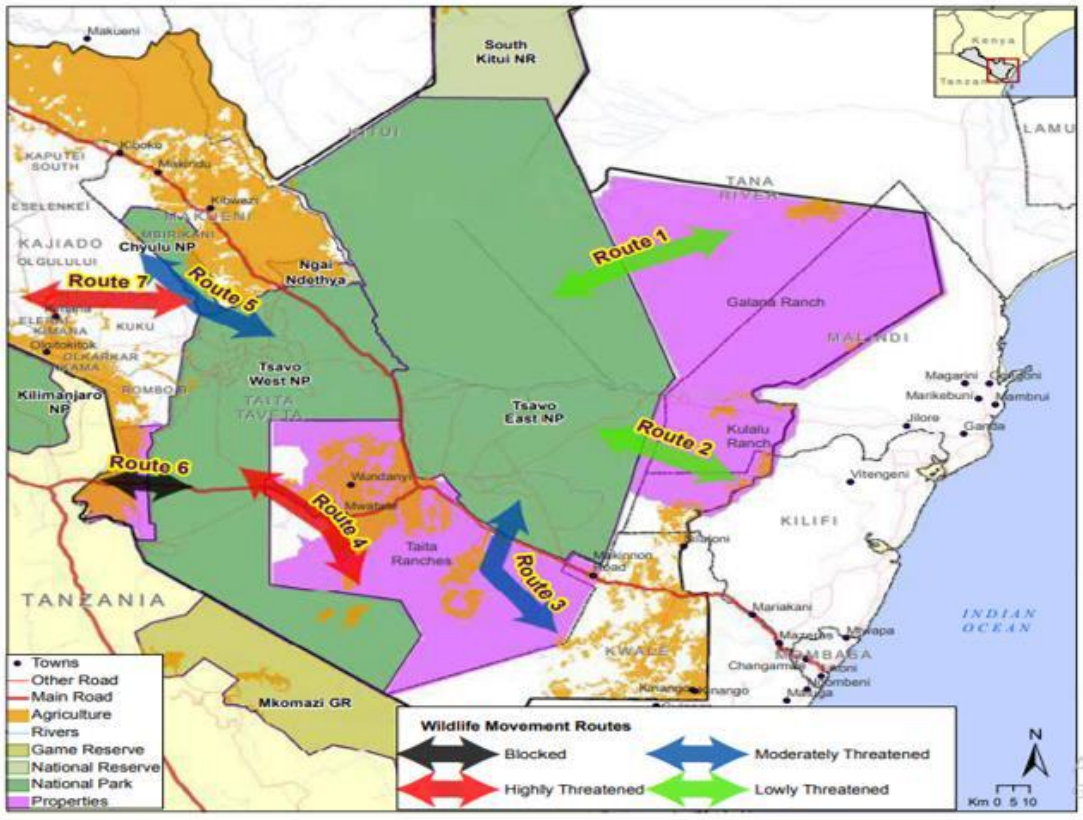
The Tsavo Ecosystem is the largest protected area complex in Kenya and is particularly important for its migratory wildlife species, especially the elephants that are known to migrate from the Tsavo West NP to Mkomazi Game Reserve. The Tsavo ecosystem contains a high number of endangered species, partly by virtue of its large size (44,000 km^2). It has the largest population of elephants in the country, and hosts populations of black rhinos, African wild dogs, Hirola (Hunter's hartebeest), and Grevy's zebras, all of which are classified as threatened. The latter two species (Hirola and Grevy's zebra) were translocated to the conservation area to give them increased protection. Essential wildlife areas and connections include the Tsavo West NP, the Chyulu NP, the Tsavo East NP, the Galana Ranches, and dispersal areas in Taita-Taveta County, as well as trans-boundary areas as shown in the map below.



Land use on the Taita ranches

3.5.3.1 Wildlife migratory routes and corridors

Most of the of the larger mammals and carnivores in the Tsavo ecosystem come under intense human pressure in the dispersal areas on which they depend for their requirements. Some pathway for elephants is now covered with a patchwork of settlements and agricultural activities, crisscrossed by fences, curtailing elephant movements and causing human-elephant conflicts. Wildlife migratory routes in the Tsavo ecosystem are as indicated in the map below.



3.5.3.2 Birdlife

The parks, sanctuaries and forests in and around Taita Taveta County are home to a prolific birdlife that features over 500 species. The preliminary biodiversity survey conducted for this SESA report entailed establishing the presence or absence of birds through sighting, sounds and/or habitat that are conducive for bird occurrence. This formed a basis for the actual field assessment. From the assessment, it was projected that the development will have minimal disturbance to birds in the Master Plan area. The project area is predominantly under sisal farming, a land use that offers feeding grounds for the birds with little or no nesting grounds for the same. However, the levels of noise anticipated to be generated during construction and occupation periods will determine the pattern of the birds. Higher noise levels will lead to less frequent visits by the birds to the site. Additionally, the change in land use such as creating agricultural patches depending on the types of crops, may influence visits from specific bird species, hence leading to positive avian impacts. This may also lead to a spin-off effect increasing bird predator levels, such as snakes and the black crowned craws, to the site. It should also be noted that creating of open green spaces and the water points within the project site will attract a larger population of birds. This is highly encouraged due

to the interdependent nature of birds and their effect to the natural environment, biodiversity and visual and acoustic appeal.

Species inventory and monitoring

Field visit were conducted within the project site and the environs considered to be within minimum flight reach. 10 sites were sampled within the larger project environs for assessment. One-hour durations were set for observations. The method used for identification involved observation of birds, the evidence of their existence by feathers, nests and/or chirping noise. The areas were sampled during early morning, late evening, and in mid-morning and late afternoon hours. Approximately 54 species of birds were identified during the field assessment. 11 species were recorded within the proposed Teita Estate master planning area. While these is approximately 20% of the population, the birds recorded may either be residents or feeding in the site while they could be nesting outside of the project area and estate. This is due to the fact that very few nests were spotted within the site and the kind of vegetation in the site was predominantly sisal, acacia and Commiphora species, which limits the potential to offer nesting ground for the birds. The list of the identified species bird species is provided below.

Habitat assessment and classification

There exists good habitat for breeding, feeding and nesting in the area surrounding the proposed master plan project site, especially in the adjacent Mgeno Ranch and the hills on the southern parts of the project area. The natural vegetation is abundant and there is a substantial amount of birds adoptable to these environments. Close analysis of the bird species recorded indicated that the feeds include nectar, fruit, plants, seeds, carrion, and meat (small animals and other birds). Such an established food web indicates that the surrounding environment is capable of maintaining the population of birds within and around the project site. However, it was noted that there are bird feeders deliberately established in some resorts within a 30-kilometre buffer of the site, which act as pull factors for bird species. The establishments within the project area could be encouraged to establish such pull factors which will complement feed sources in the natural environment, reducing the anticipated impacts the project could have on birds.

Stakeholder consultation and engagement

A stakeholder consultative engagement was conducted within a 50 km buffer of the project site using an interview schedule that was designed for this purpose. A list of bird species reported within Mwatate and Taita Taveta County as whole was enumerated as shown below;

i. African cuckoo
ii. African Jacana
iii. African ostrich
iv. Bearded woodpecker
v. Blacksmith lapwing
vi. Buff-crested bustard
vii. Crowned lapwing
viii. Donaldson-Smith's nightjar

ix. Eastern yellow-billed hornbill
x. Emerald-spotted Wood-dove
xi. Eurasian hoopoe
xii. Fork-tailed drongo
xiii. Grey heron
xiv. Grey heron (cinerea)
xv. Hildebrandt's francolin
xvi. Klaas's cuckoo
xvii. Kori bustard
xviii. Mourning collared-dove
xix. Red-eyed dove
xx. Ring-necked dove
xxi. Teita fiscal
xxii. Western cattle egret
xxiii. White stork hamerkop
xxiv. White-bellied go-away-bird
xxv. White-browed coucal
xxvi. White-throated bee-eater

Recommendation on biodiversity conservation

The assessment carried out for this report was deemed as a reconnaissance. Identification of presence of species was done and distribution by species noted. However, due to time constraint and nature of the findings (few species within the project site) the statistical composition relative abundance and habitat composition over time was not possible. However, the associations were noted in form of the type of birds ranging from insect, fruits, seeds or meat eaters. The association of existing birds to the habitat was also noted with wading birds being identified in the watering points. It was noted that minimal threats to the bird species from a change of habitat within the project site will be realized. However, it is paramount that the reserves within a 10-kilometre buffer next to Mwatate Town remain intact as more that 80% of the bird species identified reside in these areas. In addition, an establishment of similar reserves and water areas is highly encouraged. Specifically, the project should establish the probability of maintaining small fruit trees and bushes for provision of feeding grounds for the birds as an alternative to the proposed crops.

Bird siting biodiversity assessment report

These birds were sited in the project area and within a 20-kilometre buffer of the Master Planning area. Records were made from observation of birds, evidence of their existence by feathers, nests and/or chirping noise. A comprehensive list and photos for identification is provided below.

1. Fork-tailed drongo

2. House Crow

3. Common swift

4. Little Swift

5. Common Myna

6. Rosy-throated Longclaw

7. Swahili sparrow

8. African Rail

9. Red-billed firefinch

10. Cardinal quelea

11. Bearded woodpecker

12. Stone partridge

13. Common bulbul

14. Barn Owl

15. Rufous-naped lark

16. Golden-breasted bunting

17. Rufous-tailed scrub robin

18. Black-lored babbler

19. Orange-tufted sunbird

20. Black-crowned tchagra

21. Common Sandpiper

22. Dusky crested flycatcher

23. Mourning collared dove

24. Little ringed plover

25. Mocking cliff chat

Grouse

26. Somali Bunting

27. Grosbeak Weaver

28. Gray Wren-Warbler

29. Grey-headed kingfisher

30. Eastern chanting-goshawk

31. Black-winged stilt

32. Caspian Tern

33. Grasshopper Buzzard

34. Egyptian Goose

35. Eurasian Marsh-Harrier

36. Eurasian Sparrowhawk

37. Lesser black-backed gull

38. Montagu's harrier

39. Red-rumped Swallow

40. White wagtail

41. Cattle egret

42. Cattle egret

43. White-rumped Swift

44. Great grey shrike

45. Eurasian Golden-Oriole

46. Chestnut-headed Sparrow-Lark

47. Common quail

48. Thrush Nightingale

49. Tufted duck

50. African pipit

51. Guinea Fowls

52. Taita thrush

53. Dunlin

54. Laughing dove

3.6 Social Economic Analysis

3.6.1 Population

Taita-Taveta County is at the onset of a transitional population structure where 0-14 year who constitute 39% of the total population are declining, while the youthful population of 15-34-year olds who constitute 33.5% of the total population are increasing. This is due to declining fertility rates among women as shown by the highest percentage household size of 0-3 at 48%. Based on the Medium Growth Rate Variant adopted in the study, the estimated population of Taita Taveta County (2023) is 350,000 and is projected to increase to 453,009 by 2040.

3.6.2 Land Ownership

The land in the County is predominantly communally owned in the rural Taita lowlands used as ranges for pasture. However, in the urban centre approximately 35% of land parcels have title deeds (ICDP for Taita Taveta County 2012-2017). Moreover, land adjudication is currently going on to ensure all land owners are issued with title deeds.

3.6.3 Land Use

The County accommodates a wide range of land uses including formal and informal, urban and rural settlements and these are complimented by economic, transport and public and social infrastructure. The total land area in Taita Taveta County is 17,059.1 km² . Of this, total agricultural land is approximately 10,630 km², with arable land constituting about 2,055 km². The rest is range land, suitable for livestock rearing. Approximately 14,307.2 Km² of land is non-arable. The percentage of arable and non-arable land area is 12% and 88% respectively. Additionally, the Tsavo East and West National Parks cover an approximate area of 10,650 Km², which translates to about 62% of the total land area. Water bodies cover approximately 16 Km², leaving about 22% of County land for settlement and agricultural activities.

Land available for household farming activities is reduced drastically due to the presence of a total of 28 ranches which combined, cover an approximate area of 773.5 km². Eight of these belong to the Kenya Government, nine to group ranches and 11 are privately owned. The average size of the ranches is 2,762.5 Ha. Large scale sisal farming for fibre production further reduces land available for settlement and household farming activities. There are three companies that produce sisal for both domestic and export markets. Rain fed agriculture is the dominant activity by most households as a subsistence and/or economic undertaking.

3.6.4 Settlement Patterns

Majority of Taita Taveta County residents have a similar socio-economic background and are likely to live in the same areas because their income usually influences their decision as to where to purchase or rent a home. The settlement patterns are also influenced by rainfall patterns, topography, infrastructural development, proximity to urban centres, security and availability of natural resources. The climatic conditions are strongly influenced by altitude and physiographic features. The settlement patterns are nuclear concentrated within urban centres along the main roads (Voi – Mombasa Highway and Voi -Taveta Highway). Wundanyi Sub-County is the most densely populated with 106 people per km². Mwatate is the second largest in terms of density at 55 people per km² while Voi Sub-County has the lowest density, which stands at 15 persons per Km² due to large tracts of land being under sisal farming and the presence of Tsavo East National Park.

3.6.5 Energy

Taita Taveta County is endowed with vast renewable energy (RE) resources including wind, solar, biomass, hydropower for both on-grid and off-grid systems. Despite the potential of renewable energy, the County's grid connection remains very low. The majority of Taita Taveta County's population depends on wood fuel for cooking. With estimates that nearly 90 percent of households use firewood or charcoal for cooking and heating. Population under the grid in the County is 57.5% which translates to 96,256 households. The buffer population to be served by the grid in the County is 18.7% which translates to 62,218 households and off grid population is 23.8% which translates to 39,898 households (off grid solar market assessment brief for 14 underserved counties of Kenya).

On the other hand, about 2% of residents in Taita-Taveta County use Liquefied Petroleum Gas (LPG), 5% use paraffin, 69% use firewood and 24% use charcoal. Wundanyi and Mwatate Sub Counties have the highest level of firewood use in Taita-Taveta County at 80% each. Voi Sub-

County has the highest level of charcoal and paraffin use at 34% and 9% respectively. (CIDP Taita Taveta – 2018 - 2022).

The number of consumers connected to the national electricity grid stands at 3,963, while 15% of the total households have access to electricity for lighting. 46% use lanterns, 35% use tin lamps, and 1% use fuel wood. Voi constituency has the highest level of electricity use at 19%. There are 86 trading centres that are connected to the grid, while the rest, i.e. 62 trading centres are not connected. Therefore, with Teita Estate comprehensive development will have access to the grid, adequate sources of fuel for plant and equipment, and access to renewable sources of energy outlined above.

3.6.6 Sanitation

Voi, Wundanyi and Mwatate have no sewerage system with the use of on-plot sanitation systems for disposal of effluent being prevalent. The major problem faced is the lack of a proper sludge management system such as a Sludge Handling Facility for the discharge of septage by the exhaust vacuum tankers. Septage from septic tanks is discharged directly to the environment including unrestricted public utility sites such as near the solid waste disposal sites.

Wastewater Master Plans for Voi and Taveta towns (MIBP/CES/BOSCH, 2017) propose the construction of Sludge Handling Facilities as well as long-term plans such as construction of Water-Borne Sanitation System to serve the Towns up to Ultimate Horizon of Year 2040. Moreover, in Wundanyi and Mwatate Urban Centres (Year 2040), implementation of improved On-Plot Sanitation Systems complemented with Sludge Handling Facilities would ensure sustainable environment and a healthy population.

3.7 Social Cultural Analysis

The land where the project is proposed is not inhabited, apart from some settlement, in adjacent land, by the sisal workers of diverse cultural background. In addition, the neighbouring towns and centres are mainly cosmopolitan hence no significant cultural changes will be expected by the Master Plan implementation.

3.7.1 Archaeological and cultural sites

The social cultural analysis did not find any resources of archaeological, paleontological, historical, architectural, religious (graveyards) aesthetic or other cultural significance resources that could be affected. However, Teita Estate development will be responsible for "chance finds procedures", in case culturally or archaeological valuable materials are uncovered during excavation. Some key procedures will entail:

i. stop work immediately following the discovery of any materials with possible archaeological, historical, paleontological, or other cultural value, announce findings to relevant authorities for further action
ii. protect artefacts as well as possible use of plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artefacts.

4 Legislative and Policy Context

4.1 Introduction

It is a legal obligation within the Laws of Kenya that a master plan of such magnitude adheres to certain legal parameters. This section therefore describes the Policy, Legal, and Institutional framework pertaining to the Teita Estate Comprehensive Mixed Land Use Master Plan. The policy, legal and institutional frameworks have been put in place to ensure that such development master plans and projects adhere to environmental conservation. In this regard this SESA will be undertaken in strict adherence to the Republic of Kenya policy, legal and administrative framework for environmental management. Some of the relevant legal and administrative frameworks that shall be of relevance in the SESA process are outlined below.

4.2 The Constitution of Kenya 2010

The Constitution of Kenya (2010) Article 42 of the Kenyan Constitution states thus: Every person has the right to a clean and healthy environment which includes:

a) To have the environment protected for the benefit of present and future generations through legislation and other measures, particularly that are contemplated in article 69.
b) To have obligation relating to the environment fulfilled under article 70. Section 69 states that: The state shall;
    i. Encourage public participation in the management, protection and conservation of the environment.
    ii. Establish systems of environmental impact assessment, environmental audit and monitoring of the environment.
    iii. Eliminate processes and activities that are likely to endanger the environment

Every person has a duty to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and those of actual resources. It is anticipated that the proposed Teita Estate comprehensive development will be guided by the spirit of the Kenyan constitution considering environmental protection and conservation.

4.3 Key Policies Relevant to the SESA

4.3.1 National Environmental Policy

The broad objectives of the national environmental policy include;

i. Optimal use of natural resources while improving environmental quality;
ii. To conserve resources such that the resources meet the needs of the present without jeopardizing future generations in enjoying the same;
iii. Develop awareness that inculcate environmental stewardship among the citizenship of the country;
iv. Integrate environmental conservation and economic activities in the development process
v. Ensure that national environmental goals contribute to international obligations on environmental management

To achieve this, it is a policy direction that appropriate reviews and evaluations of developmental plans and operations are checked to ensure compliance with the environmental policy.

4.3.2 The National Housing Policy 2004

The sessional paper no. 3 of 2004 on national housing policy outlines the government of Kenya commitment in provision of affordable housing. The main goal of the policy is to facilitate the provision of adequate shelter and a healthy living environment at an affordable cost to all socioeconomic groups in Kenya in order to foster sustainable human settlements. This will minimize the number of citizens living in shelters that are below the habitable living conditions. It will also curtail the mushrooming of slums and informal settlements especially in the major towns.

Chapter two of the housing policy outlines one of the objectives of the policy as to promote inclusive participation of the private sector, public sector, community-based organisations, Non-Governmental Organisations, co-operatives, communities and other development partners in planning, development and management of housing programmes.

The proposed Teita Estate master plan provides adequate land for low medium and high-end residential premises. This provision links very well with the goals and objectives of the national housing policy of 2004. Further, in the national housing policy, the government of Kenya commits to facilitate investments in the housing sector. Based on the provisions of the national housing policy 2004, the proposed Teita Estate master plan builds on the government agenda on housing.

4.3.3 The National Industrialization Policy Framework for Kenya 2012-2030

The main objective of the national industrialization policy is to enable the industrial sector to attain and sustain annual sector growth rate of 15% and make Kenya the most competitive and preferred location for industrial investment in Africa leading to high employment levels and wealth creation. Specific objective number 6 of the policy focuses on developing at least 2 Special Economic Zones and 5 SME Industrial Parks.

This specific objective anchors well with the proposed Mixed-Use master plan objective on industrial development. Under the master plan, substantial land has been set aside for special economic zones.

4.3.4 The Integrated Coastal Zone Management (ICZM) Policy, 2013

The ICZM policy is rooted in the understanding that the coastal and marine environment is a limited spatial area and a distinctive system in which a range of environmental and socioeconomic interest interconnect in a manner which requires a dedicated and integrated management approach. The policy brings together all those involved in the development, management and use of the coastal zone within a framework that facilitates the coordination and integration of activities and decision-making processes. The objectives of the policy are to: -

a) Promote integrated planning and coordination of coastal developments across the various sectors;
b) Promote sustainable economic development to secure livelihoods of coastal communities;
c) Conserve the coastal and marine resources and environment for sustainable development;
d) Manage environmental risks associated with changes in shoreline and climate;
e) Develop capacity in research and education and enhance stakeholder awareness and participation in sustainable resource management;
f) Establish effective institutional and legal frameworks for implementation of the ICZM policy.

4.3.5 The Regional Development Authorities Policy, 2007

This policy calls for equitable socio-economic development through the sustainable use of natural resources by formulating integrated regional development plans in consultation with all those involved, closing gaps in regional resource mapping and attracting resource-based investment that benefit communities. The policy is the framework for streamlining and strengthening the Coast Development Authority (CDA), Tana, and Athi Rivers Development Authority (TARDA) in coastal zone development and management.

The proposed project links with the goals of the policy in the framework for streamlining and strengthening the Coast Development Authority (CDA), EAC development agenda, Tana, and Athi Rivers Development Authority (TARDA) in coastal zone development and management.

4.3.6 National Climate Change Response Strategy (NCCRS), 2010

The purpose of this strategy is to put in place robust measures needed to address most of the challenges posed by climate variability and change through thorough impact assessments and monitoring of various projects. According to Climate Change Projections, in this country we are likely to experience hotter drier sunny seasons, warmer wetter rainy seasons, rise in sea levels and an increase in extreme weather events.

These climatic changes will impact on our daily lives and the buildings that we work and live in must be adapted to cope with such changes. With time, both existing buildings and the construction of new buildings will have to adapt to cope with the conditions climate change may produce. A range of new ways to design, construct, upgrade and occupy buildings so that they are more energy efficient as well as resilient to threats such as flooding and drought is proposed. In the construction sector, priority inclusion areas should include energy efficient innovations and technologies, and utilization of low-carbon appliances and tools; the utilization of eco-friendly energy resources such as wind, solar, biogas etc; as well as possible utilization of biofuels.

4.3.7 Sessional Paper, No. 1 of 2017 on National Land Use Policy

This policy has been developed, incorporating all activities that are likely to have an impact on the use of land and its resources. The overall goal of the national land use policy is to provide legal, administrative, institutional and technological framework for optimal utilization and productivity of land related resources in a sustainable and desirable manner at national, county and community levels. The Policy is premised on the philosophy of economic productivity, social responsibility, environmental sustainability and cultural conservation. Key principles informing it include efficiency, access to land use information, equity, elimination of discrimination and public benefit sharing.

4.3.8 Public Health Policy of 2014-2030

The Kenya Health Policy, 2014–2030 gives directions to ensure significant improvement in overall status of health in Kenya in line with the Constitution of Kenya 2010, the country's long-term development agenda, Vision 2030 and global commitments. It demonstrates the health sector's commitment, under the government's stewardship, to ensuring that the country attains the highest possible standards of health, in a manner responsive to the needs of the population.

This policy is designed to be comprehensive and focuses on the two key obligations of health: realisation of fundamental human rights including the right to health as enshrined in the

Constitution of Kenya 2010 and; contribution to economic development as envisioned in Vision 2030. The public health policy calls upon the individual project proponents within Mixed Use Development Plan to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. All developments must have amenities/utilities that are essential for safeguarding public health for all people using the facilities.

4.3.9 Kenya Environmental Sanitation and Hygiene Policy 2016 – 2030

The Kenya Environmental Sanitation and Hygiene Policy (KESHP) 2016-2030 provides broad guidelines to both state and non-state actors at all levels to work towards universal access to improved sanitation leading to improved quality of life for the people. Primarily, KESHP aims to increase the proportion of the population with access to improved sanitation to 100% by 2030 and ensure a clean and healthy environment for all in Kenya.

KESHP proposes a range of complementary activities including the provision of sanitation services and maintenance of sanitary facilities for proper collection, treatment and environmentally sound disposal of liquid and solid wastes, water treatment and safety, promotion of hygiene practices, public education, sanitation marketing, regulation and legislation supported by clearly mandated institutions, sustainable financing and research and development.

4.4 Legal Framework

The following pieces of legislations are applicable to the proposed Teita Estate master plan.

4.4.1 Environmental Management and Co-ordination Act (EMCA) Cap 387

This Act aims at coordinating environmental protection activities in the country. In its preamble, the Act states that every person in Kenya has a right to a clean and healthy environment. The Act defines the legal and administrative co-ordination of the diverse sectorial initiatives in the field of environment. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment. This Act is guided Policy wise by the National Environmental Council, while the day-to-day enforcement falls under the Director General of the National Environment Management Authority. The Environmental Management and Coordination Act (EMCA) CAP 387 provides for the legal framework for the management of the Kenyan environment. Under the act, section 57A, all Policies, Plans and Programmes for implementation shall be subject to a Strategic Environmental Assessment.

Under the act, all proposed projects that are likely to have significant impact on the environment according to the Second Schedule will undergo an Environmental Impact Assessment (EIA). According to section 58 of the Act, second schedule, and the environmental (Impact Assessment and Audit) Regulations, 2003, all new enterprises and projects must undergo EIA. The independent developments under the proposed master plan will therefore be subjected to EIA. Under EMCA CAP 387, there are a number of regulations geared towards sustainable development. The applicable regulation to the proposed Teita master plan are discussed below:

4.4.1.1 Environmental Management and Co-ordination (Environmental Impact Assessment and Audit) Regulations, 2003

Under these regulations, it is stated that no licensing authority under any law in force in Kenya shall issue a trading, commercial or development permit or license for any micro project activity likely to have cumulative significant negative environmental impact before it ensures that a

strategic environmental plan encompassing mitigation measures and approved by the Authority is in place.

Section 42 and 43 address Strategic Environment Assessments; section 42(1) requires lead agencies in consultation with NEMA to subject all policy, plans and programmes for implementation to a Strategic Environment Assessments while regulation 42 (3) commits the government and all lead agencies to incorporate principles of SEA in the development of sector or national policy.

4.4.1.2 The Environmental Management and Coordination (Amendment) Act 2015

The Act aims at coordinating environmental protection activities in the country. In its preamble, the Act states that every person in Kenya has a right to a clean and healthy environment. The Act defines the legal and administrative co-ordination of the diverse sectorial initiatives in the field of environment. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment. This Act is guided Policy wise by the National Environmental Council, while the day-to-day enforcement falls under the Director General of the National Environment Management Authority.

Under the act, all proposed projects that are likely to have significant impact on the environment according to the Second Schedule will undergo an Environmental Impact Assessment (EIA). According to section 58 of the Act, second schedule, and the environmental (Impact Assessment and Audit) Regulations, 2003, all new enterprises and projects must undergo EIA. The independent developments under the proposed master plan will therefore be subjected to EIA. Notably, under EMCA CAP 387, there are a number of regulations geared towards sustainable development.

4.4.1.3 Environmental Management and Coordination (Water Quality Regulations) 2006

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment. Everyone is required to refrain from any actions, which directly or indirectly cause water pollution and therefore an offence to contravene the provisions of these regulations.

4.4.1.4 Environmental Management and Co-ordination (Waste Management Regulations) 2006

The Minister for Environment and Natural Resources gazetted these regulations in 2006. These Regulations may be cited as the Environmental Management and Co-ordination (Waste Management) Regulations, 2006. Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment.

The Act provides for how waste should be handled from transportation to disposal. It also includes provisions that waste should be transported by licensed transporters to licensed disposal facilities. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

4.4.1.5 Environmental Management and Co-ordination (Air Quality) Regulations, 2014

The objective of this Act is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, CAP 387.

The regulation also covers any other air pollution source as may be determined by the Cabinet Secretary for Environment, Water and Natural Resources in consultation with the Authority. Emission limits for various areas and facilities have been set. It also provides the procedure for designating controlled areas, and the objectives of air quality management plans for these areas.

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

The regulations determine that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

The regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Any person(s) intending to undertake activities in which noise is suspected to be injurious or endangers the comfort, repose, health or safety of others and the environment, must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions. Failure to comply with these regulations attracts penalties as prescribed under these regulations.

4.4.1.7 The Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006

The purpose of the regulations is to monitor the status and the components of biological diversity in Kenya and take necessary measures to prevent and control their depletion so as to ensure that conservation of biological diversity resources is achieved. Part II, Section 4 of the regulations states that (1) a person shall not engage in any activity that may;

a) have an adverse impact on any ecosystem;
b) lead to the introduction of any exotic species;

c) lead to unsustainable use of natural resources,

4.4.2 Water Act, 2016

The Water Act, 2016 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, and requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage.

Part II, section 18, of the Water Act 2016 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Authority (WRA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the Authority.

Developments envisioned by mixed use Development Master Plan will require to keep water use consumption for monitoring purpose and as part of legal compliance to the regulations. Water sources such as boreholes and wells will be expected to undertake EIA and seek WRA approval as the authority is liable for management, conservation, use and control of water resources.

4.4.3 Forest Conservation and Management Act, No. 34 of 2016

The Act gives effect to Article 69 of the Kenyan 2010 Constitution about forest resources; to provide for the development and sustainable management. The Act applies to all forests on public, community and private lands. The principles of the Act lay emphasis on (a) good governance in accordance with Article 10 of the Constitution; and (b) public participation and community involvement in the management of forests; among others.

The Act, establishes the Kenya Forest Service to conserve, protect and manage all public forests in accordance with the provisions of this Act. Teita Estate development master plan affects patches of privately-owned farm. It is appropriate to ensure initiation of participatory forest management in the green spaces envisioned by the master plan so that the local community can have a significant input with Kenya Forest Service (KFS) office playing a coordination role. Further, the master plan land uses will need to ensure that disruption of the environment in forested areas is minimised and appropriate mitigation strategies are established and implemented.

4.4.4 The Agriculture, Fisheries and Food Authority Act of 2013

The Act provides for the establishment of the Agriculture, Fisheries and Food Authority, the administration of matters of agriculture and the preservation, utilization and development of agricultural land and related matters. The Act requires each county government to keep a register of land development orders and land preservation orders, which they may issue under this Act. In this regard the Teita Estate development master plan should ensure sustainable development principles are adopted throughout the entire development cycle.

4.4.5 The National Land Commission Act, No. 5 of 2012

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution 5(1) provides to monitor and have oversight responsibilities over land use planning throughout the country among other provisions.

4.4.6 Physical and Land Use Planning Act, 2019

The Act makes provision for the planning, use, regulation and development of land and for connected purposes. Article 5 under principles and norms of physical and land use planning notes that every person engaged in physical and land use planning development activities shall be in a manner that integrates economic, social and environmental needs of present and future generations.

The 3rd Schedule of the Act Article 1 gives considerations for Easements and Wayleaves. Article 4 notes major developments should be subjected to environmental and social impact assessment. The proponent and contractors of the proposed master plan should ensure compliance with the provisions of the act and land use planning.

4.4.7 County Governments Act, No. 17 of 2012

The Act vests responsibility upon the County Governments in planning of development projects within their areas of jurisdiction be it projects of importance to the local County government or those of national importance. Section 102 of the Act provides the principles of planning and development facilitation which include integration of national values in county planning, protect the right to self-fulfilment within the county communities and with responsibility to future generations, protection of rights of minorities and marginalized groups and communities, promotion of equity resource allocation, among others.

Section 114 and 115 indicate and gives guidelines in planning of projects of national significance and instils the aspect of public participation in every aspect of the planning process through clear strategic environmental assessments; clear environmental impact assessment reports; expected development outcomes; and development options and their cost implications.

4.4.8 Urban Areas and Cities Act, No. 13 of 2011

The Act came into function with regard to Article 184 of the Constitution providing regulations on the classification, governance and management of urban areas and cities and further providing the criteria of establishing urban areas. Part III of the Act gives the regulations and functions of every city or municipality with regard to integrated development plans, which shall include but not limited to environmental plans and disaster preparedness, within the area of jurisdiction in achieving objects of devolved governments under section 174 of the constitution, while maintaining the socio-economic rights of the people.

Moreover, in the first schedule, the Act enlists the services that any municipality, City or Town shall provide to its residents, which include but not limited to traffic control and parking, water and sanitation, refuse collection, solid waste management, pollution abatement services among others.

4.4.9 The Energy Act, 2019

The energy Act aims to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; and for connected purposes. Article 178 of the act gives provisions for installation of energy infrastructure along roads, and railways, government property, including forests, National parks, reserves, and heritage sites, for the purpose of the production, conveyance and supply of energy.

The implementer of Development Master Plan should ensure close linkage with the County Government of Taita Taveta as they have power to ensure efficient use of energy and its conservation. All developments envisioned by the master plan are expected to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

4.4.10 Occupational Safety and Health Act, No. 15 of 2007

The Act covers provisions for health, safety and welfare. This Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work.

Some of the areas addressed here are machinery safety, chemical safety and health, safety and welfare. Special provisions are also provided in the ILO conventions on safety and health in construction recommendation, 1988 R175.

4.5 Institutional Framework

The SEA process extends the aims and principles of Environmental Impact Assessment (EIA) upstream in the decision-making process. Section 57A of EMCA (Cap 387) and Environmental (Impact Assessment and Audit) Regulations, 2003 recognizes SEA as a measure of environmental impact assessment at strategic level such as policy, plans and programmes. EMCA (CAP 387). Section 57a requires all Policies, Plans and Programmes for implementation to be subjected to Strategic Environmental Assessment (SEA).

The Regulations section 42 and 43 address SEA; section 42(1) requires Lead Agencies in consultation with NEMA to subject all policy, plans and programmes for implementation to a SEA. Regulation 42(3) commits the government and all Lead agencies to incorporate principles of SEA in the development of sector or national policy.

Some of the key institutions which are relevant to the proposed Teita Estate mixed use development include;

1. National Environment Management Authority (NEMA),
2. Kenya Forestry Service (KFS),
3. Kenya Wildlife Service (KWS),

4. Water Resources Authority (WRA)

Moreover, the environmental bodies that shall be relevant to the proposed project include;

i. The National Environment Council
ii. The National Environment Management Authority
iii. The Standards and Enforcement Review Committees
iv. The County and Sub- County Environment Committees

4.6 Multilateral Agreements/Treaties

There are number Multi-Lateral Environmental Agreements (MEAs) that are relevant to the proposed project that are discussed in the following section

4.6.1 Vienna Convention on the Protection of the Ozone Layer

Intergovernmental negotiations for an international agreement to phase out ozone depleting substances concluded in March 1985 with the adoption of the Vienna Convention for the Protection of the Ozone Layer. This Convention encourages intergovernmental cooperation on research, systematic observation of the ozone layer, monitoring of CFC production, and the exchange of information. The convention's declaration demands a voluntary attempt at monitoring development processes, their resultant emissions and the impacts on the ozone layer for purposes of knowledge and information sharing in order to combat the same.

The Master Plan proposes industrial development, and therefore the SEA report has determined and put in place measures to minimize the emissions that affect the ozone layer through technological monitoring of gaseous emissions and their toxicity levels for purposes of minimizing the same.

4.6.2 United Nations Convention on Biological Diversity (UNCBD)

The convention promotes the protection of ecosystems and natural habitats, respects the traditional lifestyles of indigenous communities, and promotes the sustainable use of resources. The project activities especially during construction will impact negatively to the flora and fauna of the respective construction areas. In this regard, both the proponent and the contractor must ensure that the activities of the proposed project do not affect the immediate ecosystems negatively and that the livelihoods of the local people are not negatively affected but rather enhanced.

4.6.3 African Convention on the Conservation of Nature and Natural Resources

This convention reaffirms the importance of natural resources both renewable and non-renewable resources, particularly the soil, water, flora and fauna. The main objective is to facilitate sustainable use of nature and natural resources

4.6.4 Convention on International Trade in Endangered Species (CITES)

The Convention on International Trade in Endangered Species of Wild Fauna and Flora is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. CITES provides a framework to be respected by each party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level.

4.6.5 United Nations Convention to Combat Desertification (UNCCD)

The purpose of the UNCCD is to address the problem of the degradation of land by desertification and the impact of drought particularly in arid and dry semi-humid areas. NEMA is the focal point for the Convention.

4.6.6 Kyoto Protocol to the United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change provides the basis for concerted international action to mitigate climate change and to adapt to its impacts. Its provisions are farsighted, innovative and firmly embedded in the concept of sustainable development. According to Article 2, the Convention's ultimate objective is "to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [originating in human activity] interference with the climate system.

4.6.7 Earth Summit on Sustainable Development Agenda 21

Agenda 21 entails a comprehensive plan of action to be undertaken globally, nationally and locally by organizations affiliated to the United Nations, governments, and other groups in every area in which human's impact on the environment. Kenya continues to implement Agenda 21 plan of action by incorporating its principles in national policies, plans, programmes and strategies. The provisions have also been incorporated in the Teita Estate master plan to promote sustainable development, which comprises of the three (3) underlying tenets of economic, social and ecology, which are well articulated in the SESA.

4.6.8 Sustainable Development Goals (SDGs)

The 17 Sustainable Development Goals aims at transforming the world with 9 of these goals having some bearing on Teita Estate master plan. They include Goal number 1 - aiming at reducing poverty, Goal 4 - clean water and sanitation; Goal 7 - affordable clean energy; Goal 8 - decent work and economic growth; Goal 9 - industrial growth, innovation and infrastructure; Goal 11 - sustainable cities and communities; Goal 12 - responsible consumption and production; Goal 13 - climate action; and Goal 15 - life on land. In this regard, the master plan has aligned to the SDGs as relevant to its implementation.

5 Baseline Profile

Section 42 of the Environmental (Impact Assessment and Audit) Regulations of 2003 requires that the following be identified when undertaking a SESA:

- ✓ relevant aspects of the current state of the environment and its likely evolution without the implementation of the plan or programme;
- ✓ environmental characteristics of areas likely to be affected;
- ✓ relevant existing environmental problems; and
- ✓ relevant environmental protection objectives at the international or national level

The study considered three sub-counties bordering the project area. The study area was considered appropriate for an initial high-level review of potential effects on SESA topic, and shall be extended or reduced as required following the Preliminary Assessment as part of the SESA process. Three subcounties including Tsavo Nation Park were identified as areas of interest. These include;

i. Mwatate
ii. Wundanyi
iii. Voi

Online mapping and publicly available resources were used to identify environmental constraints and inform the baseline of the study area. The sources used include:

i. National water data
ii. Kenya water towers
iii. National land use/landcover maps
iv. Kenya protected areas
v. National mineral data
vi. Local authority GIS data
vii. Kenya open data
viii. National environmental outlook
ix. KWS repositories
x. African Wildlife Fund repositories

All of the SESA topics were 'scoped in' to the Master Plan SESA. A summary of the key national-level baseline findings for each SESA topic and the inter-relationships between the topics is provided on the following pages.

The set-out standards and environmental emission and considerations were documented in this section of the draft SESA report.

Key strategic inter-relationships between SEA topics

i. Climate change and associated extreme weather such as flooding of the water environment disrupts the lives of individuals and communities, limiting access to vital services and impacting on the population's physical and mental health.
ii. Climate change affects the unique Kenyan landscape and threatens cultural heritage resources through coastal erosion, flooding, and wetter, drier conditions.
iii. Climate change affects the delicate balance of Kenya's biodiversity and the associated ecosystem services. Changes to rainfall trends and flood patterns (the water environment) also affect biodiversity, for example through waterlogging of terrestrial habitats. Increasing temperatures transform Kenya's biodiversity; as temperatures and drought conditions increase, distinctive species may struggle or be lost while invasive non-native species may thrive.
iv. Material assets on the residential, transport and commercial sectors are impacted by climate change due to increases in disruptive events such as flooding, landslides, drought, and heatwaves, compromising the safety of the infrastructure and people resulting in frustration and social stresses. Construction materials also have embodied carbon and their lifecycle contributes to climate change.
v. Soil preserves cultural heritage resources and supports the agriculture and forestry industries, which provide resources for the population.
vi. Soil quality is key for maintaining biodiversity, as the trees and vegetation and the wildlife that feed on them and pollinate depend on it. Soil biodiversity is also important.
vii. Soils may be altered by changes to rainfall patterns, erosion and increased temperatures due to climate change, while the release of CO_2 sequestered in wetland soils from development contributes to climate change. Wetland conservation is therefore essential for climate change mitigation.
viii. Biodiversity in green space and landscapes provides opportunities for people to enjoy and experience nature, enhancing quality of life and improving health and wellbeing.
ix. Landscape incorporates cultural heritage resources, which help to shape the historic landscape. Cultural heritage and landscape both contribute to a sense of place.
x. Landscape elements (e.g. trees and woodland) are increasingly recognised and accounted for as natural capital and as such comprise material assets.
xi. Air pollution can contribute to climate change and also affect human health and biodiversity, through the deposition of dust and other pollutants on habitats. Habitats can also help to manage air pollution.
xii. Water quality is important for population and human health as drinking water and has biodiversity value, such as providing habitat for aquatic species. Flooding affects population and human health, soils, biodiversity, landscape, cultural heritage and material assets.
xiii. Forestry resources in the study area have significant value for biodiversity, landscape, soil (e.g. slope stability) and climate change mitigation.
xiv. The Teita Estate Mixed Use Master Plan will affect multiple SESA topics – cumulative and synergistic effects across the topics as described in this report.

6 Public Participation/Stakeholder Engagement

6.1 Introduction

Engaging with stakeholders from the beginning of the SESA process is important as each organisation or individual bring their environmental expertise to the assessment process, and ensures that the consultation process undertaken by a proponent is more robust. This in turn means that the public can gain a better understanding of the likely effect of a plan on the environment and meaningfully contribute to the plan's preparation process by offering an informed view. Consultation with the wider public is also undertaken at different stages in the SESA and is crucial for ensuring transparency in the SESA decision-making process.

Public participation in SESA is meant to reduce conflict through early identification of contentious issues and provide an opportunity for the public to influence project design in a positive manner. Public participation is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 (2015 amendment) section 58. It is an important process through which stakeholders including interested parties, organizations, beneficiaries and members of public living in project areas (both public and private), are given an opportunity to contribute to the overall project design by making recommendations and raising concerns about the project before its implementation. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation.

The general objectives of the consultation and public participation are:

i. Disseminate and inform the stakeholders about the Master Plan with special reference to its key components and location.
ii. Create awareness among the public on the need for the SESA for the proposed Master Plan.
iii. Gather comments, suggestions and concerns of the interested and affected parties.
iv. Incorporate the information collected in the SESA study.

Moreover, public participation/engagement enabled;

a) Improve transparency and increase public confidence in SESA Study
b) Identify the social, bio-physical, economic and environmental concerns as perceived by the public.
c) Identify the positive and negative impacts that the Master Plan should consider.
d) Identify and record contentious issues that could later bring conflict.
e) Obtain local input into the design of the Master Plan, alternatives and mitigation measures of negative impacts of any nature.

6.2 Stakeholders Identification and Engagement Plan

Stakeholders consulted during the SESA study were identified in accordance with the areas/sectors that are affected directly or indirectly by the proposed Master Plan. The criteria used to identify various stakeholders was based on the legal mandates of various institutions, assessment of the different interests of the stakeholders, stakeholder power rights and responsibilities and their role in the proposed Teita Master Plan. The identified stakeholders and the engagement plan is outlined below;

Stakeholder category	Potential role in the SESA activity	Engagement strategy	Follow-up strategy plan
National government lead agencies	• Provide their views on the effect of the proposed Teita Estate master plan • Interlinkages of the Plan with other existing Plans • Identify any Improvement needed for the plan	• Invitation to public consultation meetings • Special consultations at the organizational levels • Review of any relevant existing documents	• Invitation to SESA validation meeting • Participate in Monitoring and evaluation of the implementation of SESA recommendations
Private sector organisations	• Provide ideas to improve the master plan • Provide challenges and the current trends applicable to mixed use developments master plan	• Invitation to public consultation meetings • Special consultations at the organisational levels • Invitation to SESA validation meeting • Participate in Monitoring and evaluation of the implementation of SESA recommendations	• Invitation to SESA validation meeting • Participate in Monitoring and evaluation of the implementation of SESA recommendations
Professional associations/Academia organisations	• Lead in research and consultancy	• Invitation to public consultation meetings • Special consultations at the organisational levels	• Invitation to SESA validation meeting • Participate in Monitoring and evaluation of the implementation of SESA recommendations
Political leadership	• Play a major role in awareness raising on the master plan • Can influence on various policies, programs and plan related to master plan	• Invitation to public consultation meetings	• Invitation to SESA validation meeting
Civil Society Organisations	• Help in incorporation of gender and vulnerable people issues in the master plan. • Enhance awareness of the master plan on the ground	• Invitation to public consultation meetings • Special consultations at the organisational levels	•Invitation to SESA validation meeting •Participate in Monitoring and evaluation of the implementation of SESA

6.3 Approach on Stakeholders Consultation

Key government lead agencies officials, County government officials, civil society organisations, private sector institutions and political leaders, interested and affected individuals and institutions within and neighbouring the proposed Teita Estate mixed use development were consulted in the SESA study. The exercise was conducted by experienced experts via interviews and discussions under the guidance of interview schedules developed to capture the general and specific concerns, comments and issues comprehensively. The purpose for such interviews was to identify the positive and negative impacts that were studied into detail during the SESA draft stage and subsequently promoted proposals on the best practices to be adopted and mitigate the negative impacts respectively.

6.4 Methodology for Public Consultations

Views and concerns from the residents, local leaders, surrounding institutions and development partners in the Teita Estate mixed use development who in one way or another would be affected or have interest in the proposed Master Plan were sought through interviews, key stakeholder consultations and public meetings as stipulated in the Environmental Management and Coordination Act, (Cap 387).

The stakeholders were consulted during screening, scoping, up to the SESA draft study. During the consultation process, the stakeholders were taken through the Master Plan including the objectives and possible impacts associated with implementation activities. The following steps were followed in carrying out the SESA public consultation process:

i. identification and compiling a database of interested and affected individuals and institutions
ii. interview schedules were designed to different target groups and local community members in the proposed master plan.
iii. public meetings in the locality and around the proposed mixed-use development area
iv. Key Stakeholder Meetings at various levels and with different target groups in the County

The public consultation and participation were conducted through:

a. Household socio-economic survey.
b. Key stakeholder consultation interviews.
c. Public participation meetings
d. 1st key stakeholders meeting.
e. 2nd key stakeholder's consultation meeting

6.5 Public Consultations

In relation to the master plan, public consultations were done in the form of consultation for a gazette notices on 22nd April 2022 (Appendix 4) and 25th October 2019 respectively.

CPP Method	Date	Venue
Focus Group Discussion	9th December, 2022	Mwatate
Focus Group Discussion	9th December, 2022	Singila
Key Informant Interview	9th December, 2022	Mwatate
Focus Group Discussion	10th December, 2022	Lindi

Focus Group Discussion	10th December, 2022	Mwatate
Focus Group Discussion	10th December, 2022	Voi
Structured questionnaires	8th, 9th, 10th, December, 2022	Randomly
Public Baraza	31st March 2023	Chief's office ground- Mwatate
Key Informant Interviews: - ✓ KWS ✓ NEMA ✓ Diaspora University ✓ Izera Ranch Management ✓ CECM- Environment & Water ✓ County Physical Planning ✓ TAVEVO ✓ Taita Taveta Conservancies Association ✓ KWS Research Institute	Different dates	✓ Tsavo East HQ ✓ Mwatate ✓ Voi office ✓ Izera ranch ✓ County Offices - Voi ✓ Mwatate ✓ ✓ TAVEVO offices - Voi ✓ Voi office ✓ Tsavo East

6.5.1 First public consultation

The first public baraza was held on 31st of March 2023 in Mwatate Town at the Chiefs ground.

Meeting Venue	**Targeted stakeholders**	**Date and time**	**No. of participants**
Chiefs Ground, Mwatate Town	✓ Local community ✓ Local administration officers ✓ NGOs representatives ✓ KWS representatives ✓ County representatives ✓ Political leaders ✓ County government representatives ✓ Nyumba kumi	31st March 2023, 10:00 am	194

Comments arising from the first consultative meeting are as summarised in the table below;

S/No.	**Positive impacts**	**Discussion**
1	Development of infrastructure and social amenities	Participants were optimistic the development would improve the areas infrastructure
2	Employment benefits for the locals	During the discussion the locals were positive that the proposed development would create job opportunities to locals as well as across the country during and after implementation. However, they emphasized the need of prioritizing on the locals when offering job opportunities
3	Improved business environment	The locals expressed hope that the proposed development was likely to positively impact on the local economy through

		enhancement of business opportunities such as building materials industry, food industry and other symbiotic industry that will form linkages to the light industries that have been proposed in the development masterplan
4	Improved water supply	The locals noted that the plans as per the master plan to drill boreholes, restore wetland, rehabilitate Mwatate dam as well as explore the opportunities around Njoro Kubwa spring would boost the water needs of the area. The local leadership implored the developers to consider options of additionally factoring in the locals outside the project scope in regards to water supply for maximized benefit.
5	Improved sanitation facilities	Waste water and solid waste management was highlighted as an issue of concern within the Mwatate municipality. The locals present expressed key concerns over the associated health risks that are attributed to poor sanitation. With adequate plans for waste water treatment and solid waste management, the locals viewed the master plan for the proposed development as a game changer that will form the basis for emulation across the municipality.
6	Improved security	The plans to have a police station and a police post within the development area was applauded as this was noted to be essential towards enhancing security. Additionally, the county leadership through the already existing structures were requested to work closely with the developers to ensure adequate cooperation towards security enhancement in all the development phases of the proposed project.
7	Increased housing facilities	The project having been comprised of proposed residential areas ranging from super low to high density residential areas, will greatly help towards resolving the housing issues that was noted to be an issue in the neighbouring Mwatate town. Based on the proposed controlled development policy, the locals were hopeful that the housing facilities will be of improved standards.
8	Economic growth	Upon implementation and actualization of the proposed master plan, the locals were positive that the area would witness significant economic transformation through the various investment platforms as designed in the master plan. Income sourced from the job opportunities within the estate would also greatly enhance cashflow in the local economy.
Negative impacts		
1	Habitat loss	There were fears that clearing of the sisal plantation would to some extent interfere with the habitat for the fauna that live within the plantation and thus affect the biodiversity and organism distribution in the area. They however noted that the likely organisms to be affected would be rodents and insects.
2	Water pollution	Based on the terrain, the locals expressed concerns over possibilities of water pollution and contamination should the construction works fail to adhere to Environmental Management plan that shall be developed for the specific development works

3	Human – Wildlife conflict	Taita Taveta county being a largely conservation area with 64% comprised of the Tsavo East and West parks, human-wildlife conflicts are a common occurrence as had been expressed during the public consultation. The

6.5.2 Recommendations from first public baraza

The following suggestions were made during the first consultative meeting;

- ✓ Locals should be provided with more affordable land acquisition deals during the selling period
- ✓ Job opportunities should be offered to locals as first priority to stir development in the area as well as build the spirit of project ownership
- ✓ During the subdivision, the proponent should consider issuing individual titles to the distinct land properties
- ✓ Adherence to all the regulatory provisions during the plan implementation stages
- ✓ Consultation with the locals during the various implementation phases
- ✓ Implementation of the proposed development as per the master plan without significant alterations i.e., areas set for light industries should not be substituted with heavy industries for fears of pollution cases
- ✓ Proper plans to adequately handle resultant waste water and solid waste that shall emanate from the operationalization of the development infrastructure
- ✓ Explore avenues to ensure the project area maximizes on eco-friendly investment opportunities
- ✓ Locals to be given opportunity to name the estate to create a sense of ownership
- ✓ As a corporate social responsibility, the execution of the plan should incorporate strategies of enhancing water supply to the neighbouring locality

6.5.3 Second public baraza

In addition, another public engagement was held on the 10th of December, 2022 across all the sub-counties around the project area.

Meeting Venue	**Targeted stakeholders**	**Date and time**	**No. of participants**
Mwatunge	✓ Local community ✓ Local administration officers ✓ KWS representatives ✓ NGOs representatives ✓ County representatives ✓ Political leaders	10th December, 2022, 10:00am	34
Mwatate	✓ Local community ✓ Local administration officers ✓ KWS representatives ✓ NGOs representatives ✓ County representatives ✓ Political leaders	10th December, 2022, 12:00hrs	29

Singila	✓ Local community ✓ Local administration officers ✓ KWS representatives ✓ NGOs representatives ✓ County representatives ✓ Political leaders	10th December, 2022, 3:00pm	38

S/No.	Positive impacts	Discussion
1	Development of infrastructure and social amenities	Participants were optimistic the development would improve the areas infrastructure
2	Employment benefits for the locals	The respondents were positive that the Teita Estate Comprehensive Mixed Land Use Master Plan would create numerous employment opportunities for both skilled and unskilled labour alike, during the construction and operational phases. Even though most of the Teita Estate Comprehensive Mixed Land Use Master Plan would need skilled labour force during operation, people expressed hope that they would be able to access employment once the Teita Estate Comprehensive Mixed Land Use Master Plan project commences mostly as casual workers. The respondents were also optimistic that they would take up relevant training to take up jobs during operation stage.
3	Improved business environment	The respondents and participants were optimistic that business opportunities would arise during construction of the Mixed-use Development
4	Improved water supply	The participants were optimistic that the proposed water supply and management strategies incorporated in the master plan such as water pans and boreholes for water extraction would improve the availability of water in the area.
5	Improved sanitation facilities	The locals during the public participation commented that most households lack sanitary facilities and they were hopeful that with the development, there will be improved sanitation facilities due to the proposed integrated waste management plan.
6	Improved security	The respondents were optimistic that the proposed master plan development activities will lead to improved security situation in the neighbourhood due to the number of people that will reside in the areas
7	Increased housing facilities	The respondents were positive that the proposed residential zones would boost availability of affordable and improved housing conditions in the area
8	Economic growth	With the proposed master plan, investors will be attracted to invest their money in the proposed development through enterprises, business among others. The use of locally available materials and labour for the proposed master plan development activities will contribute towards growth of the local and national economies by contributing to the gross domestic product.
9	Transfer of skills	The members of the public suggested that with the Teita Estate Comprehensive Mixed Land Use Master Plan project being a source of employment. Many different skilled workers would be employed from

		within and without the area. This would lead to a transfer of skills and gaining of experience during the implementation phase.
10	Improve Networking and Culture Exchange	The development will attract various people from different counties and countries and this will promote cultural integration of knowledge and exchange of a wide range of ideas.
Negative impacts		
1	Increased pressure on infrastructure	Some participants were concerned that due to magnitude of the proposed master plan, its execution will increase pressure on existing infrastructure such as roads, water supply system, waste handling facilities, electricity etc. This would be due to increased volumes on human and vehicle traffic along the access road.
2	Habitat loss	Members of the public expressed concerns that during the construction phase of the project, there would be clearance of vegetation, which would lead to the negative impacts. The clearance of vegetation would affect the scenic beauty and ecological functioning of these sensitive areas. Also, the clearance of vegetation would have impacts on the soil particularly increased soil loss which subsequently might impact on the water quality and ecosystem productivity.
3	Alteration of land	The proposed master plan for mixed land use upon implementation will significantly alter the scenic landscape and terrain of the project area, unless managed properly this can lead to adverse environmental implications
4	Water pollution	The residents feared that execution of the master plan would lead to increased population in the area, the natural water ways would be polluted through sewage effluent and water from industries. This would also affect the quality of water that is being utilized by locals in the area
5	Air pollution	The locals expressed concern over the possibility of generation of large amount of dust and fumes within the execution stage of the master plan. They noted that surrounding areas might encounter air pollution from excavation works and transportation of construction materials and industries.
6	Noise pollution	The residents expressed fear over noise and vibrations likely to occur during the execution of the master plan. They highlighted construction equipment and other moving machines in the construction sites
7	Human – Wildlife conflict	Interference with the natural ecosystem due to the planned change of use would result into human-wildlife conflict as well as fear of the propagation of the poaching culture
8	Increased waste generation	Population influx in the area as well as commercial/production activities will result into significant waste generation in the area. This thus will require adequate plans for waste management in order to avert possibilities of waste management nuisance.

6.5.4 Recommendations from the second public baraza

The recommendations provided in second public baraza are listed below;

a) The local community should be granted the priority on purchase of land
b) Solid waste management should be addressed well before implementation of the project

c) Waste water management should be elaborate
d) The project should enhance partnerships establishment between the local community and the inhabitants
e) Appropriate measures should be instituted to curb against rising insecurity
f) Through collaboration with KWS, the developers should consider electric fencing of the section neighbouring Mgeno ranch to inhibit human-wildlife conflicts
g) Adherence to the provisions of the EMCA 1999, 2015 amendment regarding environmental protection and conservation.
h) Re-forestation through landscaping works and beautification to restore lost vegetation cover
i) Prioritizing on the locals on job opportunities
j) Establishment of grievance redress channel for improved community relation
k) Provision of alternative water sourcing points for the wildlife to reduce human-wildlife conflicts
l) Liaise with the KeNHA to work on structural adjustments that will help in traffic management at the project area access points

6.5.5 Questionnaires

Structured questionnaires were administered to key identified stakeholders in the project area to seek their views in relation to the proposed Teita Estate Comprehensive Mixed Land Use Master Plan. The list of some of the individuals who responded to the questionnaires are tabulated below.

Name	**Relation to the proposed project site locality**
Ruth Majala	Resident
Yusuf Juma	Resident
Apollo Njenga	Resident
Musa	Resident
Oliver Mwanyumba	Resident
Jonnes Mwakisha	Sargent at Arms-T/T County assembly
Roahus Mwadime	Resident
Amon M. M.	Resident
Timothy Mwa	Resident
Fredrick Mwandee	Resident
Zipporah M.	Resident
Kevin Kanyingiri	Physical Planner-T/T County gov't
Rebecca Wanjiru	Health care worker
Caroline Kipande	Accountant-Mwatate
Peter Msembi	Security guard Mwatate
Renson Mjomba	Worker-Teita Estat Sisal Plantation
Stephen Mwanana	Worker-Teita Estat Sisal Plantation
Stephen Mborele	Businessman
Jane Wakio	D.H.P
Ndoyo Sakayo	Businessman
Nicholas Kambucha	Chief
Paul Kangangi	Church Leader

Raphael Shimba	T/T County gov't
Masden Mwangangi	Sub-county water officer
D. K. Sewene	Enforcement and Compliance
Peter Shulo	Dep. Director Energy
Justus Kioko	Env. Officer
Emaniel N.	H.O.D Mining
Anyonah Kalo	National Government

6.6 Public Review and SESA Disclosure Process

Upon submission of the draft SESA report to NEMA; within fourteen (14) days of having received the SESA study report NEMA will undertake administrative review of the Draft Report to ensure that the Draft SESA is adequate to enter the stakeholder-review process.

Once the draft report passes the administrative review, NEMA distributes the draft SESA report to stakeholders for comments. NEMA then sends the draft SESA report to relevant stakeholders. Stakeholders generally have 30 working days (from the date of dispatch) to submit comments on a plan level SESA. However, NEMA may extend this review period in some instances.

On public review, NEMA will prepare a summary of the SESA report (advert) and invite the public to make oral or written comments on the report. NEMA will, at the expense of the proponent:

1. Publish an advert in the Kenya Gazette and
2. Newspaper that has a nationwide circulation

The invitation for public comments or 'the advert' will state;

i. The nature of the proposed development master plan
ii. The location of the area under the proposed development master plan
iii. The anticipated impacts of the proposed development and the proposed mitigation measures to respond to the impacts
iv. The times and place where the full report can be inspected (in this case, NEMA Headquarters, NEMA website , www.nema.go.ke, Permanent Secretary (PS) Office Ministry of Environment and Forestry, Teita Estate Ltd, davidmakori@gmail.com or by phone to +254720928721 and NEMA Taita Taveta County Office) and
v. The period within which the authority shall receive comments;
The public generally has working 30 days (from the date of the first advertisement) to submit comments on a Plan. NEMA may constitute a Technical Advisory Committee (TAC) to review and provide independent technical comments on the Plan level SESA. Committee reviews will be done within a period of 60 days.

Upon receiving stakeholders' comments, NEMA will communicate to the SESA expert to incorporate stakeholder comments into the Draft SESA Report. The SESA expert submits the corrected version of the SESA within sixty (60) days.

In coordination with NEMA, Teita Estate Ltd will hold a validation workshop to engage the public/ stakeholders in reviewing and validating the corrected SESA report. NEMA will

coordinate with the SESA Consultant on the additional corrections arising from the validation workshop to finalize the SESA report.

NEMA will make the final decision for the development master plan SESA through issuing an approval with conditions. The decision will be communicated within 60 days. Teita Estate Ltd will need to consent in writing to the approval conditions before implementing the plan

6.7 Validation Meeting

The purpose of the meeting will be to present and validate the draft SESA report for Teita Estate development master plan. The meeting will also be intended to receive oral or written comments from stakeholders to integrate environmental and social considerations into the final SESA report of the master plan for purposes of ensuring its long-term sustainability. Invitation to the SESA validation workshop will be guided by the stakeholder engagement plan with representation from various stakeholders in the county.

7 Impacts Identification and Analysis

7.1 Introduction

The environmental baseline information, stakeholder engagement, policy review and literature review form the basis for impacts identification and evaluation for this draft SESA report. The impacts that are expected to arise from the comprehensive development master plan execution could either be termed as positive, negative, short-term, long-term, temporary, or permanent depending on their area of cover and their stay in the environment.

This chapter gives a highlight of impacts analysis. The positive and negative impacts likely to originate from the execution of the proposed comprehensive development master plan are described below.

7.2 Impact Analysis and Quantification

The master plan impact analysis will be summarised for each SESA topic with a colour-coded scoring of each implementation option, as shown in Table 5. This will be accompanied by a narrative that provides the rationale to the scoring.

Table 1: Scoring criteria for the master plan implementation options

Score	Description	Colour coding and symbol
Significant positive impact	The proposed master plan option has major positive environmental and social impact	++
Positive impact	Proposed project option has positive environmental and social impact	+
Minor negative impact	The implementation option has potential for a minor negative or uncertain environmental effect.	-
Major negative impact	The implementation option has potential for a significant negative environmental effect.	--
No change	No change to the environment	**Nc**
No impact	Negligible or no impact	**0**
Specific	Localized or specific impact	**Sp**
Widespread	Widespread impact covering a large spatial expanse	**W**
Reversible	Minor impact with a reversible nature	**R**
Irreversible	Impact which cannot be reversed	**Ir**
Short term	Short term impact	**Sh**
Long term	Long term impact	**L**
Temporary	Impact temporary in nature	**T**
Permanent	Impact permanent in nature	**P**

Following the assessment, any potentially negative impacts identified will be discussed with the project team to consider a reasonable implementation alternative in the context of the master plan objectives, and effective mitigation or enhancement recommendations. The recommendations will respond not only to direct impacts but also indirect, secondary and cumulative impacts. Cumulative impacts will be considered at both intra-plan (the impact of a combination of interventions) and the inter-plan (the impact of the plan alongside other plans and policies). The inter-plan assessment will be undertaken towards the end of the assessment.

The anticipated environmental and social economic impacts are highlighted in Table 6 below.

Table 2: Impact characterization

Impacts	Pre-Construction	Construction	Operation	Remarks
Loss of vegetation/fauna	-, p, ir	-, p	-,p	Clearing of vegetation will be necessary for the construction. However, clearing activities could encourage soil erosion. Unnecessary clearing of vegetation should be avoided
Soil erosion		-, Lt, sp	-	Earthworks (during construction, and creation of gravel pits) will have an impact on soil erosion, which may continue even after construction. Incorporating appropriate soil conservation measures and proper drainage facilities during construction would mitigate impacts during operation. During operation, maintenance of structures would also prevent soil erosion.
Solid waste generation	-, t, r,sht	-, t, r,sht	-, t, r	During the construction phase, solid waste will be generated: cleared vegetation, spoils and domestic refuse. During operations the waste will vary with the residents – papers, agricultural wastes, plastics etc. Apart from visual impacts, debris can affect water quality
Changes in hydrology/ drainage		-, r, t	+	The proposed Teita Estate Comprehensive Mixed Land Use Master Plan project will likely alter the hydrology because of the structural developments. Hence, runoff will be channelled through culverts. This will be a temporary problem occurring during the construction works. Sufficient and right positioning of culverts will be made to ensure that there is no future blockage by siltation and plant overgrowth that will impede water flow. As a result, drainage will be improved
Noise pollution		--, t, r	--, r	During construction noise pollution is expected, but this will be temporary in nature. During operation, noise pollution will affect settlements/households near the proposed Teita Estate Comprehensive Mixed Land Use Master Plan project site.
Pressure on water resources	--, t	- -		The hydrological regime will be affected during the construction work and water quality will be altered
Air pollution		--, t, r	--, W, r	During construction, there will be air, dust from construction activities and emissions, but this will be temporary in nature.

				During operation, air pollution will affect settlements/households. Mitigation is possible through consideration on the part of the proponent, or legal enforcement.
Material sites and workman's campsites issues	+,t - p, r, sp	+,t P,-, r, sp		Material site owners will benefit from the sale of construction materials. This is considered to be a temporary positive impact Negative impacts may result from pits that are not reinstated/ landscaped or fenced. Impacts may include hazards to children and livestock, and water accumulating in the borrow pits providing a breeding ground for mosquitoes
Changes in land use: loss of agricultural land and produce		--,Sp, Ir ,	L -,Sp	During construction and operation there will be changes in land use, the area is highly agricultural (sisal plantation) and the Teita Estate Comprehensive Mixed Land Use Master Plan project implementation will lead to changes in land use in the area and set precedence for other developments in the Teita Estate Comprehensive Mixed Land Use Master Plan project area Reduction of agricultural area and activities will reduce agricultural productivity in the area.
Public health issues	-, t, r, w	-, p, r,w		During construction and operation, increased dust, noise and air pollution levels could impact on public health. Immigrant workers on Teita Estate Comprehensive Mixed Land Use Master Plan project site are associated with the spread of sexually transmitted diseases. Awareness campaigns in the area would help to mitigate this problem
Health and safety	---, Sh, Sp	--, Sp	--, Sp	Health and safety outcomes such accidents, injuries, fire, death during the course of construction, preconstruction and operation activities are anticipated. These are negative impacts and their effects maybe specific or widespread i.e. affecting several PAP's.

7.3 Discussion of Assessed Impact Factors on Environment

7.3.1 Physical Characteristics

The development master plan is anticipated to affect soil during the implementation stage. Clearing of some of the sisal plantation to pave way for construction activities may expose the soil at site to agents of erosion such as wind and water. Moreover, areas where excavations will be carried will also be prone to erosion processes. The impact of Teita Estate development on soil during implementation stage is within low effects.

Negative effects of the plan on ground water and water quality may occur from oil leaks and spills from construction equipment which may leach through the ground surface to contaminate groundwater. During operation stage, impact may mostly occur from industries with inadequate liquid waste management system, which may result to wastewater contaminating water sources in the area. However, the expected impact on ground water and water quality is within low effects.

Some negative effects of the development master plan on physical processes include floods that may result from surface paving and an increase in buildings in the area. This may lead to limited percolation rates during the rainy seasons. However, the expected impact magnitudes on the development plan on floods are within low effects.

7.3.2 Biological Conditions

The proposed development master plan activities that will alter land cover such as land clearing, excavations and construction of buildings will most likely result to loss of sisal within the project area to pave way for construction. The expected impact magnitudes of the development plan on sisal are within medium-high effects. The excavations and construction of buildings will most likely result to loss of shrubs and grass within the project area to pave way for construction. The expected impact magnitudes of the development plan on sisal, is within low effects.

There are no forest plantations within the proposed area of the master plan development. Forest plantations in the neighbourhood will not be affected, where impacts may occur due to spill over effects will be very minimal.

The proposed plan area is extensively a sisal plantation with few habitats for birds, and rare to come across birds or birds' nests. No Important Bird Area is at or near the proposed plan area. The proposed plan area is also not a migratory corridor for any birds' species. The numerosity of birds is relatively small, of which there are no significant effects on them. On the other hand, the construction of water facilities and growing of crops may have positive impacts by attracting certain birds' species. The magnitude of expected impacts of the development plan on birds is negligible.

The development area being a sisal plantation, the greatest impact during excavation and construction will be on rats and snakes due to their established niches within the sisal plantation. The rats find food from the sisal plantation while the few snakes within the area prey on them. Clearing of most of the sisal plantations for the master plan development to take place will lead to loss of habitat to the rats. This will result to a spin-off negative effect to the snakes which will experience food shortage due to depletion of rats. The magnitude of expected impacts of the development on rats and snakes is within medium-high effects.

Insects such as ants and grasshoppers found within the sisal plantations may decrease in number especially through the proposed plan activities during implementation stage. This includes activities which may result to modification of their habitat and alteration of ground cover including land clearing.

The expected impact magnitudes on insects are within low effects. Surface excavations will affect the micro-fauna and intensify the negative effects on them, while soil erosion from the development impacts will further lead to their reduction. The expected impact magnitudes on micro-fauna are within medium-low effect.

7.3.3 Social Cultural Factors

The development plan area is under sisal plantation which will be cleared during excavation and construction. In this regard, agriculture being the main activity in the proposed development plan area will be highly impacted negatively. Therefore, the magnitude of the expected impacts of the development plan on agriculture is within high effect.

The general lifestyle of the local community will be affected either positively or negatively. This will mainly be during construction and operation phases activities that will provide vast employment opportunities to the local community. This will include unskilled, semi-skilled and skilled labour opportunities. The negative magnitude of expected impacts of the development plan on cultural patterns is within low effects. Positive effects magnitude is expected to rise with the implementation of the plan.

The risk of accidents or hazards on employees and local community members is small for there are no settlements in the development area. The zoning of the industrial area in the plan is located far from the residential zone. A few accidents may occur during excavation and the construction period of various developments. Mitigations for the community and employee's occupational health and safety have been provided in this report's environmental and social management and monitoring plan. The expected impact magnitude on occupational health and safety is within low effects.

The proposed development excavation and construction phase will affect food chains. This is due to alteration of habitats, land clearing and changing ground cover that will result to certain species being exposed and others moving away leaving their predators in challenging conditions to get food. However, the expected impact magnitude is within low effects for the development plan area has few animal and plant species.

7.4 Positive Impacts on the Physical Environment

7.4.1 Optimal Use of Land

The land proposed for the development is under sisal production and noting that land is held with high regard in Kenya, optimised land use is encouraged. In this regard, when the proposed development is complete and executed as per the master plan, a lot of economic returns will accrue from mixed development activities compared to the current gains from sisal farming. Moreover, the development plan activities that are expected to economically benefit the locals, county and national government through revenues earned from their operations. In the long-term the proposed development will be more profitable economically.

7.4.2 Landscaping and Aesthetics

The implementation of the proposed mixed-use development plan, will involve landscaping activities in different zones that is currently under sisal growing. The execution of the planned development, green zones will in the long-term improve the master plan area's visual landscape beauty and make it aesthetically attractive thereby resulting to positive impact.

7.5 Negative Impacts on the Physical Development

7.5.1 Changes Land, Soils and Geology

The execution of the proposed development plan will affect the soil and geology of the land through depletion of the local soil resource from excavation, soil degradation from compaction leading to increased surface runoff and soil erosion. Also mining or quarrying of rocks and murram if not well planned can result to land degradation.

Spillage of hazardous construction chemicals including oils, fuel, grease, paints, solvents, curing and acids among others may lead to soil contamination. Moreover, the importation of soil for landscaping and fill activities may lead to introduction of invasive species or noxious weeds and pathogens such as bacteria, fungi and nematodes.

Increased soil erosion, storm water generation and sedimentation is likely to be expected, usually an indirect impact of sisal bushes clearance and from increase in the built up areas. Soil erosion could alter downstream hydrology and increase flooding. It may also interfere with water quality directly through increasing turbidity levels, siltation and indirectly from contaminants carried with eroded soil particles.

Mitigation Strategies

The above impacts can be mitigated and will be adequately addressed as per Strategic Environmental and social Management Plans (SESMPs) developed.

7.5.2 Increased Water Demand

The proposed Teita Estate mixed land use developments will result in increased water demand that will exert pressure on existing water sources. Excessive exploitation of water as a natural resource has a negative impact on the environment. The anticipated increase in water demand necessitated a hydrological study of the area discussed in section 3.4 above.

Mitigation Strategies

To reduce excessive consumption of water in the proposed mixed-use development activities the following mitigation strategies will be employed

- ✓ Conduct a hydrological study
- ✓ Account for the actual water demand for the development relative to proposed land uses
- ✓ Encourage rainwater and storm water harvesting
- ✓ Adopt water systems that are efficient and not prone to wastage
- ✓ Adopt systems to recycle wastewater
- ✓ Monitoring water consumption to inform future planning

7.5.3 Increased Energy Demand

The implementation of the mixed-use development activities will require fuels to run construction equipment and vehicles during construction phases. Energy or power from the main grid will be required for powering of equipment during excavation and construction phases. Moreover, energy from main grid will be required for lighting and powering of equipment in residential, commercial, and industrial establishments in the operation phase.

Noting that fossil fuel is non-renewable, its excessive use results to emissions of greenhouse gases (GHGs) emissions and related impacts on environmental sustainability. On the other hand, electricity generation in Kenya is mainly from hydro and geothermal sources and therefore high consumption can impact negatively on their sustainability.

Mitigation Strategies

To reduce energy consumption the following strategic measures need be employed;

- ✓ Adopt renewable energy opportunities including solar and wind energy
- ✓ Ensure machines, equipment and transport systems are energy efficient
- ✓ Undertake energy audits to inform efficient energy management systems
- ✓ Implement energy management/conservation options as highlighted in the energy ESMP
- ✓ Put in place systems to monitor energy consumption and aid in future planning.
- ✓ Adhere to requirements of energy laws and regulations

7.5.4 Increase Solid Waste and Effluents Generation

During excavation waste will result from soils, rocks and vegetation. In the construction phase waste generation will result from reject materials (damaged bricks, concrete and plastics), packaging materials (paper, polythene, plastic, and metal), and wastewater and used oil. Subsequently sustainable waste management systems needs to be adopted to avoid poor waste disposal that can pollute the environment or area aesthetics.

Moreover, during operation phase the households, commercial and industrial developments are likely to generate significant amounts of effluents, whose proper handling is critical to avoid surface and ground water pollution generate.

Mitigation Strategies

To mitigate the adverse impacts of solid and effluents waste, the following strategies need be employed;

- ✓ Adopt a circular economy approach to waste management in the development area
- ✓ Segregation of waste in the different zones (domestic, commercial, and industrial) for efficient management.
- ✓ Consider the use of recycled or refurbished construction materials.
- ✓ Implement waste management options as highlighted in the waste ESMP
- ✓ Adhere to requirements of waste management laws and regulations 2006
- ✓ Contracting a licensed waste company for collection, transportation and disposal
- ✓ Pre-treatment of industrial effluents before discharge as per wastewater regulations

- ✓ Proper effluent management plans including recycling of wastewater.
- ✓ Adhere to requirements of wastewater laws and regulations 2003

7.5.5 Air Quality Degradation

The land proposed for development is under sisal plantation which is a CO_2 sink. Subsequently the land conversion from sisal estate to mixed use developments will remove this CO_2 natural sink. The development will also introduce activities likely to emit GHGs resulting from increased use of fossil fuels to run equipment vehicles and machineries. Moreover, upon completion of the development, air pollution sources will result from transportation and industrial activities.

Mitigation strategies

The development will implement measures to reduce air pollution as follows;

- ✓ Use of renewable sources including solar energy
- ✓ Creation of green zones to act as carbon sinks
- ✓ Adhere to air quality laws and regulations including Air Quality Regulations 2014.

7.5.6 Increased noise impacts

The proposed mixed-use development works will result in noise generation from equipment and machines in use during excavation, construction and operation phases. Moreover, increase in ambient noise levels is expected with the completion and occupation of the developments. However, noise impacts can be mitigated through a noise abatement scheme.

Mitigation Strategies

To mitigate noise pollution the following measures can be employed;

- ✓ Establishment of buffer zones between different land uses will attenuate noise, further reducing the potential impacts.
- ✓ Employment of noise attenuation mechanisms for point sources
- ✓ Adherence to noise ordinances such as the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009

7.6 Positive Impacts on the Biological Environment

Landscaping of various land use zones will introduce exotic and indigenous tree species that are adaptive to the area. The landscaped areas will increase tree cover at the sites proposed for green spaces and improve environmental conditions by minimising air pollution and offsetting GHGs through CO_2 absorption. The green spaces also provide for storm water attenuation, thereby acting as a measure for flood mitigation including preservation of biodiversity and nature conservation.

7.7 Negative Impacts on Biological Factors

7.7.1 Vegetation Cover Loss and Habitat Fragmentation

The development plan will entail clearing of the sisal plantation that is expected to have adverse effects on the environment such as reduction of biodiversity and exposure of soil to surface run-off.

Mitigation Strategies

The following measures can mitigate the loss of vegetation cover and habitat fragmentation;

- ✓ Carry out landscaping of different zones,
- ✓ Maintain the proposed green spaces as per the master plan

7.7.2 Habitat Alteration

The implementation of the mixed-use development will result in habitat alteration and loss of a section of sisal agricultural land.

Mitigation Strategies

The following mitigation strategies can be employed to cushion habitat alteration:

- ✓ Maintain the proposed green spaces as per the Master Plan
- ✓ Formulation and implementation of a Biodiversity Management Plan
- ✓ Adherence to Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006

7.7.3 Loss of Biodiversity and Species

The sisal plantations host wildlife such as snakes and a wide range of rodents. Like plant communities, wildlife habitat may be impacted negatively both from direct and indirect activities associated with the development. Human-wildlife conflicts will thus be exacerbated while the movement of livestock and humans may also be impeded.

Alteration, fragmentation, or destruction of wildlife habitat can result in the direct loss or displacement of species and the ability of the ecosystem to support other biological resources such as the plant communities upon which the wildlife relies on for survival. In the event that there are rare or endangered animal species they may be rendered locally extinct.

Mitigation Strategies

The following mitigation strategies can be employed to cushion the local biodiversity from negative impacts of the proposed development:

- ✓ Consider introducing exotic and indigenous species in green spaces to compensate for the loss
- ✓ Consider developing watering pans for wild animals in areas adjacent to the project area to allow for migration in the neighbouring ranches bordering the migration and dispersal corridor

7.8 Positive Impacts on Socio-Economic Aspects

Employment opportunities will be created during the implementation of various phases of the mixed used development zones. This will be a significant positive impact since unemployment rates are currently quite high in the county. Moreover, the set aside zone for light industries, when operational will offer benefits including job opportunities and revenue generation to the county and national government through taxes, rates and fees.

The development has also allocated a zone for setting up a school and a hospital facility thereby leading to expansion of educational, health and social facilities and improved provision of these basic services.

7.9 Negative impacts on Socio-Economic Aspects

7.9.1 Health and Safety Risk

The implementation of the mixed-use developments will result to known workplace safety risks. Safety hazards are likely to increase resulting in a possible increase in accidents involving workers and/or the public. Development works will expose workers to occupational health and safety risks and injuries resulting from accidental falls or use of hand tools and construction equipment

During operation phase of some of the developments, potential health and safety hazards may arise in the event of a lack of adequate facilities, protection measures, worker protection measures, and non-adherence to OSHA, 2007 regulations. Adequate health and safety plans will therefore require to be implemented to mitigate all foreseeable health and safety risks in the development. Due to population influx, there is concern for increased spread of communicable and infectious diseases.

Mitigation Strategies

To mitigate the community and workers from health and safety risks the following strategies need be implemented

- ✓ Establish an emergency plan to assist in managing occupational hazards and risks for the development.
- ✓ Risk management plans should also be established with other facility control and safety systems.
- ✓ Provide for the safety, health and welfare of workers and all persons at workplaces
- ✓ All places intended to be used as a workplace must be registered by DOSHS before they are occupied.
- ✓ Establish monitoring measures, hazard identification and risk assessments and Safe Work Method Statements (SWMS) for all activities intended to be done at the development.

8 Alternative Options of the Master Plan

8.1 Introduction

This chapter discusses the alternative analysis of various Master Plan options. The analysis includes employing alternatives to achieve the same plan, use of alternative approaches, and the no intervention. The chapter further discusses the implication of key Master Plans to the proposed Teita Estate mixed use development. Additionally, the justification of the preferred alternative is discussed in the succeeding section and its linkages with the on-going development projects.

The Teita Estate master plan opted different land uses including residential, commercial, industrial, green spaces, and public amenities. However, much as the development conforms to land zoning provisions, there is need to widen the scope of potential alternative developments that may suffice needs other than the designated use. In this regard the SESA team identified four possible alternatives to which the land can be used as discussed in the following subsections.

8.2 Option 1 – The Agricultural Use Option

The development area is currently under sisal plantation with agriculture being the predominant activity in the neighbourhood of the development area. This option would provide revenues to Teita Estate from sale of sisal products. Moreover, the sisal plantations would promote carbon sequestration. However, if the agricultural land use option is compared to the comprehensive mixed land use development option, it may not be the most optimal way to use prime land in the neighbourhood of an urban area.

8.3 Wildlife Conservancy

Wildlife conservancy promotes environmental sustainability by providing stability to different natural processes of nature and maintenance of essential ecological processes. Moreover, a wildlife conservancy provides environmental sustainability benefits by acting as a carbon sink through absorption of GHGs. It also has socio-economic benefits for it provides natural beauty sites for tourism thereby generating much needed foreign exchange. However, this section of the larger Teita Estate is located near human settlements that would cause human wildlife conflict.

In this regard, the wildlife Conservancy option is therefore not compatible to the proposed Teita Estate section of land. Moreover, as much as this land use option is important, the economic gain is low as compared to the current option of utilizing it as comprehensive mixed-use development.

8.4 Linear Development Master Plan

During scoping process, the linear development master plan was reviewed. Its analysis found that the design was too linear in nature and considered land economy over important tenets such provision of green areas in every court, curvilinear road networks to reduce incidents of accidents, application of green planning concepts, natural water ponds and provision of schools, especially ECD within each court. Therefore, it was decided that the linear land use plan (as shown in the figure below) be dropped and hence the team embarked on development of a mixed-use master plan.

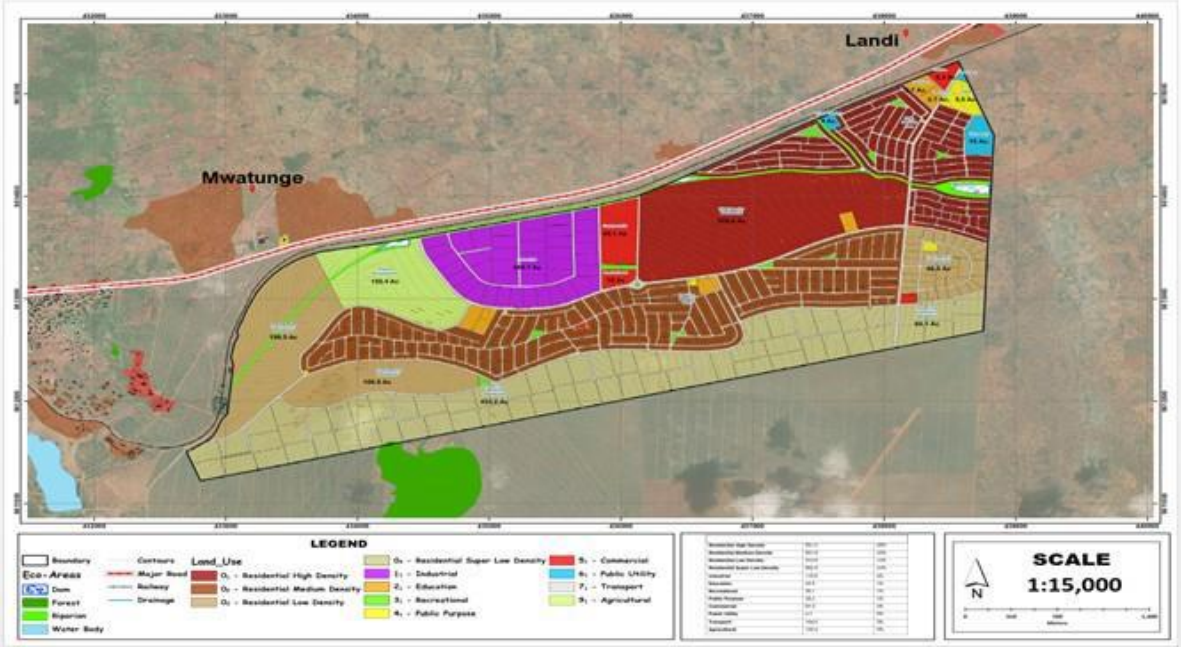


Figure 10: Linear land use master plan

8.5 The Proposed Comprehensive Mixed-Use Development

This option focuses on developing 3,000 acres of sisal land for mixed use purposes, including residential, commercial, industrial, educational, agriculture and green spaces. The option reckons that Kenya's urban areas have the perennial challenge of housing shortage, more so for the low and middle-income population due to the high urban population influx and growth rate. Taita Taveta County is no exception to the scarcity of the high-middle-low income housing. This mixed-use development option seeks to address this challenge of deficit in the housing sector.

Moreover, the commercial development shall promote the economic development by providing more space for doing business. The light industry development will promote the various professional, businesses, service provision elements and also production for export hence earning the country foreign exchange. Additionally, the proposed master plan will employ environmental conservation through select native and exotic plant species and agricultural areas serving as green spaces. Moreover, the development plan will employ energy and water conservation measures as well as circular economy approach to solid waste and waste water management. In this regard this option is economically and environmentally sustainable.

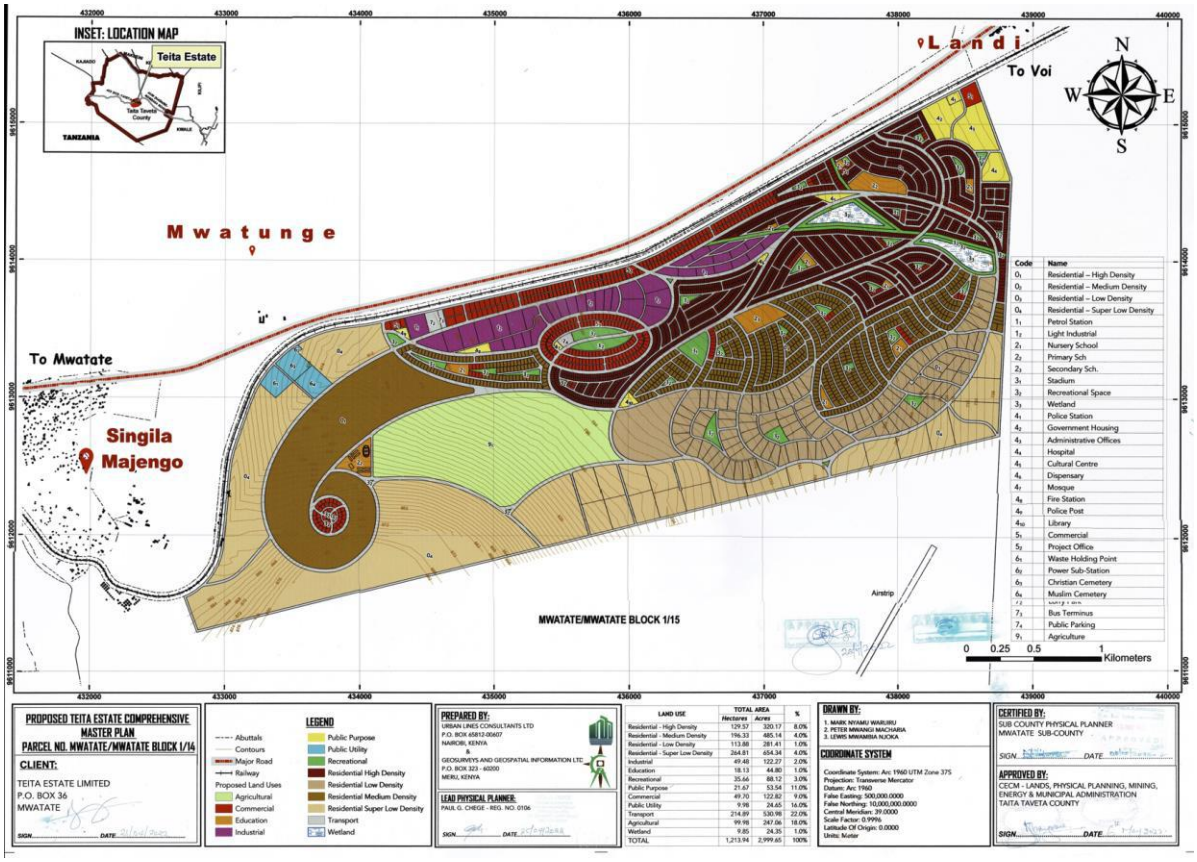


Figure 11: Comprehensive mixed-land use development master plan

8.6 Justification of Preferred Alternative – Mixed Use Development Option

Considering the analysis of the three alternative options, this master plan has opted for the mixed-use development for it will result to optimal use of the land. Moreover, the mixed-use development will also result in providing socio-economic and environmental benefits from the proposed plan area. To this end, the proposed Teita Estate master plan will integrate socio-economic and environmental guiding principles in the design, implementation and operation phases.

9 Environmental and Social Management Plan

9.1 Introduction

The Teita Estate Master Plan is an upcoming 3,000-acre comprehensive development located within the newly formed Mwatate Municipality, Taita Taveta County. The project area is in plot number Mwatate/Mwatate/Block/1/14, land owned by Teita Estate Limited and currently predominantly under sisal plantation. The Master Plan is anchored on the tenets of mixed-use developments which is one of the ten principles of smart growth that promotes community design and developments and incorporates it with economy, public health and environment. In this case, the proposed development blends various compatible land uses including commercial, light industrial, residential with pockets of adequate public amenities and support infrastructure. The end game is a well thought out sustainable human settlement where people can live, work and play. The Master Plan development consists of the following key zones;

i. Residential Zone
ii. Agricultural zones
iii. Public utility zones
iv. Public purpose zones
v. Medical facilities
vi. Religious facilities
vii. Commercial zones
viii. Industrial zones
ix. Wetland

The Teita Estate mixed use development activities are anticipated to result in various positive and negative impacts. These impacts and their mitigation measures are highlighted in the table below. The proposed mitigation strategies are aimed at minimizing the negative impacts while enhancing the positive ones.

No	Issues	Mitigation Strategy	Recommended mitigation measures
1	Integrated environmental landscaping	Sustainable protection of the region's species and habitats	✓ Ensure integrated land use and landscaping of different zones ✓ Ensure adequate tree cover to enable percolation of rainfall and reduction of runoff ✓ Ensure compliance with the Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, and Access to Genetic Resources and Benefits Sharing) Regulations, 2006
2	Biodiversity conservation	Sustainable protection of species and habitats	✓ Ensure non-interference with migratory routes/corridor in the region ✓ Conservation of indigenous plant species

			✓ Ensure compliance with the Wildlife Conservation and Management Act, 2013
3	Water resources conservation	Sustainable water resources utilisation	✓ Undertake hydrogeological survey for the development area to determine the sustainable ground water abstraction levels ✓ Promote integrated water resources management in the development area through water recycling systems and re-use practices ✓ Adherence to Water Act 2016, Water Resource Management Rules 2007, Water Resources Management (Amendment) Rules, 2012 and Environmental Management and Co-ordination (Water Quality) Regulations, 2006
4	Energy conservation	Sustainable energy utilisation	✓ Energy conservation through use of renewable energy, efficient technologies and systems. ✓ Ensure compliance with the Energy Act, 2019 and subsidiary legislations under Energy Act, 2019
5	Solid and effluent waste management	Sustainable solid waste and effluent waste management practices	✓ Adopt integrated solid waste management plans ✓ Adopt waste water management plans ✓ Adherence to Environmental Management and Co-ordination (Waste Management) Regulations 2006 ✓ Ensure compliance to Environmental Management and Co-ordination (Water Quality) Regulations 2006
6	Occupational Health and Safety	Adherence to workplace health and safety protocols	✓ Adhere to procedures for hazard identification, risk assessments and Safe Work Method Statements (SWMS) ✓ Ensure health and safety trainings and awareness programmes ✓ Adherence to Occupational safety and health Act (OSHA, 2007), Subsidiary legislations under OSHA 2007 and Work Injury Benefits Act, 2007
7	Enhancing socio-economics of the region	Catalyse economic growth of Taita Taveta County	✓ Adherence to labour rights including gender non-discrimination, equal pay for work done, and mainstreaming gender requirements ✓ Ensure compliance to statutory and non-statutory records and Employment Act, 2007

8	Socio-Cultural Protection	Protection of cultural resources for future generations	✓ Ensure stakeholder's engagement for cultural resources communication ✓ Ensure all developers/contractors have in place 'chance find procedure' ✓ Ensure compliance with the National Museums and Heritage Act, 2006

9.2 Environmental and Social Monitoring Plan

The Environmental and Social Monitoring Plan is vital for this SESA development plans. The monitoring plan will help in assessing the effectiveness of proposed mitigation measures as well as assessing changes in environmental conditions. The monitoring plan will also help to provide warning of significant deterioration in environmental quality for further preventive action. The monitoring frequency and indicators have been recommended for each management action. Regular monitoring using the recommended indicators will indicate the level of progress regarding ensuring environmental sustainability in the proposed development plan.

The parameters of the proposed development plan that were identified for monitoring include: water quality, air quality, solid waste generation, occupational health and safety risks, soil erosion, storm water drainage and livelihoods. These parameters are highlighted in the table below.

Environmental aspect	**Monitoring area**	**Monitoring parameters**	**Lab equipment & other requirements**	**Monitoring frequency**	**Responsible**
Biodiversity loss	Land area under sisal farm Bushlands around the site	Individual species count Biomass index Rainfall volumes	Periodic ecological surveys Wildlife inventory	Continuous	Teita Estate KWS, KFS
Soil erosion	Excavated areas Sloppy areas	Turbidity in storm water Floods	Soil analysis Lab analysis	Continuous	Developers Contractor
Water quality & quantity	Boreholes Water treatment plant	Abstraction rates Physical & biochemical composition pH, TTS, TDS	Sampling bottles Cooler box NEMA accredited lab	Twice per year	Teita Estate WRA
Air quality	Commercial & industrial zones	CO_2, SO_2, NO_2, TSP Dust particles	Air sampling equipment	Continuous	Developers Contractor NEMA
Solid & liquid waste generation	Industrial, commercial & residential zones Waste water treatment plant	Waste composition pH, TTS,TDS	Sampling bottles Cooler box NEMA accredited lab Weighing scale Waste sampling bins	Continuous	Developers NEMA
Occupational Health & Safety risks	Construction sites Industrial zones	Accidents & incident reports records OHS trainings	Incident log book Accident reporting book	Continuous	Developers DOHS
Socio-economic	Planning & implementation phase	Number of jobs created Incomes earned	Qualitative and quantitate analysis	Annually	Developer

10 Conclusion and Recommendation

The proposed Teita Estate mixed use development will spur economic development in Taita Taveta County. Moreover, the execution, the proposed mixed-use development will bring along numerous positive impacts including optimised land uses, creation of employment opportunities and supply of houses and office spaces in the County.

In this regard it is recommended that the mitigation strategies and ESMMP provided in this SESA report be duly implemented. In line with the EMCA Cap 387, EIAs be carried out for all individual projects before construction.

Taking into consideration the scope of Teita Estate mixed use development, the anticipated positive impacts, and the mitigation measures provided for identified negative impacts; it is our recommendation that NEMA approves this SESA draft report to pave way for the execution of the next stage in this study, i.e. the SESA final Report.

11 Next Steps

Comments on the scoping report and the proposed approach to SESA can be provided by email to: davidmakori@gmail.com or by phone to +254720928721, or by post to the address provided in the cover page.

The specific dates are yet to be confirmed for the remaining SESA stages after the draft report. However, the indicative timeframes for the key SESA milestones are as follows:

- ✓ Appraisal of interventions/SESA assessment and drafting of SESA report – May to June 2023;
- ✓ Submission of the draft SESA report
- ✓ Consultation on SESA – June to July 2023;
- ✓ Validation workshop – July/August 2023 and
- ✓ Final SESA report and adoption – August to September 2023.

Timescales for consultation will be discussed with NEMA, the Consultation Authorities, the proponent and expert team to allow sufficient notice for feedback to be provided.

The full report can be inspected from (in this case, NEMA Headquarters, NEMA website, www.nema.go.ke, Permanent Secretary (PS) Office Ministry of Environment and Forestry, Teita Estate Ltd, davidmakori@gmail.com or by phone to +254720928721 and NEMA Taita Taveta County Office

12 References

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13 Appendix 1

13.1 Decision to Conduct SESA

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-363 010, 0735-013 046
Telkom Wireless: 020-2101370, 020-2183718
Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/PR/5/2/24090 **23rd February 2023**

Business Administrator
Teita Estate Limited
P.O Box 36,
Mwatate

RE: STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA) REQUIREMENTS FOR THE PROPOSED TEITA ESTATE COMPREHENSIVE MIXED LAND USE MASTER PLAN AT TEITA ESTATE – PLOT NO. MWATATE.MWATATE/BLOCK/1/14 IN MWATTATE SUB-COUNTY, TAITA TAVETA COUNTY

The National Environment Management Authority (NEMA) has reviewed the Environmental and Social Impact Assessment for the proposed Teita Estate comprehensive mixed land use master plan prepared by Geosurveys & Geospatial Information Limited firm of experts and the following observations have been made:

1. This is a comprehensive land use master plan. The plan proposal is to introduce a mixed use land use pattern at Teita Sisal Estate that is aimed at enhancing economic productivity of the area through proposed estate zoning and subdivision into distinct land uses zones while avoiding/mitigating the environmental degradation and social conflicts associated with the utilization of natural resources.
2. The Plan seeks to blend the various proposed land uses for a sustainable human settlement where people can live, work and play where economy, public health and environment are incorporated for smart growth.
3. The Plan prescribes the establishment of several zones namely; commercial, light industrial, residential with pockets of adequate amenities & support infrastructure, agricultural, public utility & public purpose, wetlands and transport among others to enhance sustainable development.
4. The Land Use Plan will lead to several projects that will require to be subjected to site specific Environmental and Social Impact Assessment (ESIA) process.
5. The Plan will lead to relatively high utilization and consumption of natural resources

In view of this, you are required to subject the proposed Teita Estate comprehensive mixed land use master plan to the Strategic Environment and Social Assessment (SESA) process.

ANNEX I – SESA PROCESS AT A GLANCE

The SESA process is outlined below:

Stage I : Establishing the Context

- The Plan Owner provides a brief of the Mixed land use master plan to NEMA
- NEMA screens the brief to determine whether a SESA is required. Results are communicated within seven (7) days

Stage II : Implementing the SESA

- NEMA advises the Plan owner to select licensed SESA Experts who will prepare a scoping report
- The Plan owner submits three (3) hard copies and a soft copy of the scoping report to NEMA
- NEMA reviews the adequacy of the scoping report and communicates the decision to the Programme owner within twenty-one (21) days

Stage III : Detailed SESA Study and Draft SESA Report

- Once the scoping report is approved, the SESA Experts conduct the SESA study and prepare the draft SESA report
- The draft SESA is subjected to a quality assurance procedure before it is submitted to NEMA
- The Plan owner then submits ten (10) hard copies and one (1) electronic copy along with the prescribed processing and monitoring fee of Kshs. 1,000,000 to the Authority

Stage IV : Informing and Influencing Decision Making

- NEMA distributes the draft SESA Report to stakeholders for review – thirty (30) days
- Public Review - A notice regarding the draft SESA report is published in two (2) newspapers with nationwide circulation, the Kenya Gazette and over the radio by the Plan owner. The public has sixty (30) days (from the date of the first advertisement) to submit comments.
- Stakeholders' comments are incorporated and in coordination with NEMA, the Plan owner will hold a validation workshop to engage the public/stakeholders in reviewing and validating the corrected SESA Report
- The PPP owner the submits five (5) hard copies and one (1) electronic copy of the final SESA Report to NEMA

Stage V : Decision Making

- The Authority will make the final decision on Plan SESA.

14 Appendix 2A

14.1 SESA Screening Report Decision

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-363 010, 0735-013 046
Telkom Wireless: 020-2101370, 020-2183718
Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/SEA/5/2/081 **21st March 2023**

Business Administrator
Teita Estate Limited
P. O. Box 36
MWATATE

RE: STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT REQUIREMENTS FOR THE TEITA ESTATE COMPREHENSIVE MIXED LAND USE DEVELOPMENT MASTER PLAN ON PLOT NO. MWATATE/MWATATE/BLOCK/1/14 TAITA TAVETA COUNTY

The National Environment Management Authority (NEMA) has reviewed the Plan brief for the Teita Estate Comprehensive Mixed Land Use Development Master Plan on Plot No. Mwatate/Mwatate/Block/1/14 Taita Taveta County and the following observations have been made:

1. This is a Plan brief to introduce a comprehensive mixed land use pattern at Teita Sisal Estate.
2. The Plan is aimed at enhancing the economic productivity of the area through the proposed estate zoning and subdivision into distinct land use for the benefit of the local community.
3. The Plan seeks to manage human settlement by creating liveable and functional centralized places for the members to live, work and play and forestall the possibility of spontaneous and unregulated settlement.
4. The Plan prescribes the establishment of several spatial land use patterns namely residential zones, commercial zones, industrial zone, hospitality zone, educational institutions zone, recreation zones, agriculture zone and support trunk infrastructure.
5. The comprehensive mixed land use development master plan will lead to several projects that will require to be subjected to the Environmental and Social Impact Assessment (ESIA) process.
6. The Plan will lead to relatively high utilization and consumption of natural resources

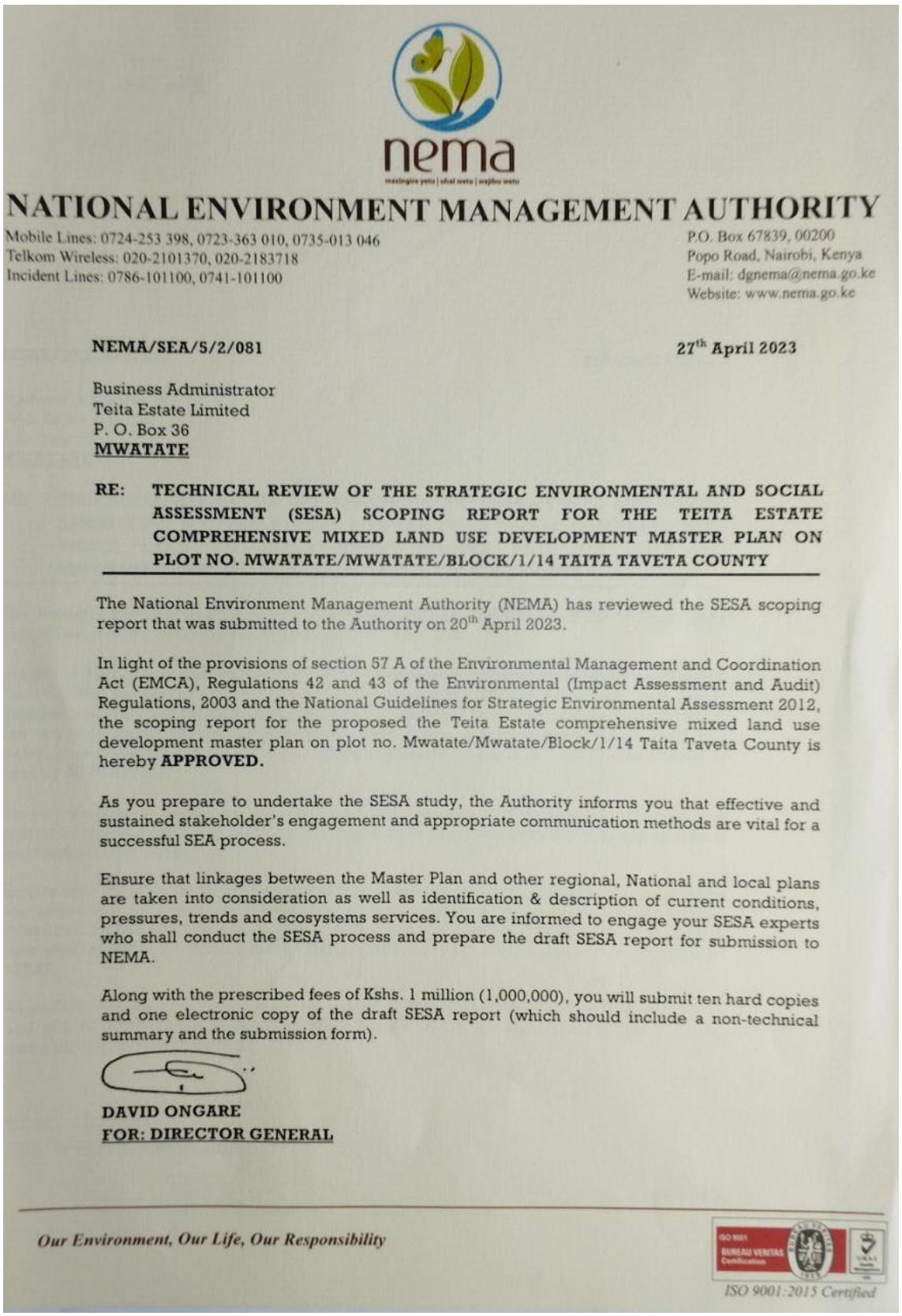
In view of this, you are required to subject the Teita Estate Comprehensive Mixed Land Use Development Master Plan to the Strategic Environment and Social Assessment (SESA) process.

Kindly get in touch with firms that are registered by the Authority and have expertise in the SESA process who will prepare and submit a scoping report to the Authority for review in line with the provisions of section 57A of the Environment Management and Coordination Act (EMCA), 1999 and the National Guidelines for Strategic Environmental Assessment in Kenya.

ZEPHANIAH OUMA
FOR: DIRECTOR GENERAL

15 Appendix 2B

15.1 SESA Scoping Report Decision



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

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Telkom Wireless: 020-2101370, 020-2183718
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P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/SEA/5/2/081 **27th April 2023**

Business Administrator
Teita Estate Limited
P. O. Box 36
MWATATE

RE: TECHNICAL REVIEW OF THE STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA) SCOPING REPORT FOR THE TEITA ESTATE COMPREHENSIVE MIXED LAND USE DEVELOPMENT MASTER PLAN ON PLOT NO. MWATATE/MWATATE/BLOCK/1/14 TAITA TAVETA COUNTY

The National Environment Management Authority (NEMA) has reviewed the SESA scoping report that was submitted to the Authority on 20th April 2023.

In light of the provisions of section 57 A of the Environmental Management and Coordination Act (EMCA), Regulations 42 and 43 of the Environmental (Impact Assessment and Audit) Regulations, 2003 and the National Guidelines for Strategic Environmental Assessment 2012, the scoping report for the proposed the Teita Estate comprehensive mixed land use development master plan on plot no. Mwatate/Mwatate/Block/1/14 Taita Taveta County is hereby **APPROVED.**

As you prepare to undertake the SESA study, the Authority informs you that effective and sustained stakeholder's engagement and appropriate communication methods are vital for a successful SEA process.

Ensure that linkages between the Master Plan and other regional, National and local plans are taken into consideration as well as identification & description of current conditions, pressures, trends and ecosystems services. You are informed to engage your SESA experts who shall conduct the SESA process and prepare the draft SESA report for submission to NEMA.

Along with the prescribed fees of Kshs. 1 million (1,000,000), you will submit ten hard copies and one electronic copy of the draft SESA report (which should include a non-technical summary and the submission form).

DAVID ONGARE
FOR: DIRECTOR GENERAL

Our Environment, Our Life, Our Responsibility

ISO 9001:2015 Certified

16 Appendix 3

16.1 Notice on the proposed Master Plan

DAILY NATION | Friday, October 25, 2019

ST. JOHN EVERLASTING GOSPEL CHURCH

NOTICE TO THE GENERAL PUBLIC

Trust Deed No:722/1

The undersigned being trustees of St. John Everlasting Gospel Church wish to bring to the attention of members of the public that our Church seal was lost/misplaced between the months of November, 2017 to July, 2019.

Notice is hereby given that St. John Everlasting Gospel Church will not be liable for any transactions entered irregularly and /or illegally with any part facilitated by otherwise unauthorized persons during the aforementioned period when the Church seal was/misplaced.

The Trustees of St. John Everlasting Gospel Church would wish to advice members of the general public to report any transactions entered into by unauthorized persons to the Church offices at Imara Daima Estate or to the nearest police station.

Dated 14th October, 2019.

Trustees Names & Contact Address

1. Salmon Ogwel, P.O. Box 55987-00200, Nairobi.
2. Samson Oseno Mbadi, P.O. Box 55987-00200, Nairobi.
3. Sarah Otieno Ochieng, P.O. Box 55987-00200, Nairobi.
4. Joyce Akinyi Ogutu, P.O. Box 55987-00200, Nairobi.

Cc: **Evans O. Ogada, Advocate, C/o Zed Achoki Hussein Advocates LLP, Nairobi.**

UPPER HILL SCHOOL

Tel: 0733 442 563

INVITATION TO TENDER 2020

Upper Hill School invites tenders from eligible bidders for supply of goods and services provision.

S/No. ~ TENDER NO ~ ITEM DESCRIPTION ~ ELIGIBILITY

1. UHS/01/2020 ~ Supply of dry white maize and beans ~ OPEN
2. UHS/02/2020 ~ Supply of white rice and green grams ~ OPEN
3. UHS/03/2020 ~ Supply of foodstuffs ~ OPEN
4. UHS/04/2020 ~ Supply of bakers' flour ~ OPEN
5. UHS/05/2020 ~ Supply of fresh vegetables ~ OPEN
6. UHS/06/2020 ~ Supply of beef (meat on bones) ~ OPEN
7. UHS/07/2020 ~ Supply of fresh milk ~ OPEN
8. UHS/08/2020 ~ Supply of fruits (bananas, oranges and pears) ~ OPEN
9. UHS/09/2020 ~ Supply of cleaning equipment and detergents ~ OPEN
10. UHS/10/2020 ~ Supply of printed exercise books ~ OPEN
11. UHS/11/2020 ~ Supply of laboratory chemicals and equipment ~ OPEN
12. UHS/12/2020 ~ Supply of firewood/ briquettes ~ OPEN
13. UHS/13/2020 ~ Supply of sports goods (equipment and uniform) ~ OPEN
14. UHS/14/2020 ~ Supply of students uniform and staff uniform ~ OPEN
15. UHS/15/2020 ~ Supply of eggs ~ RESERVED
16. UHS/16/2020 ~ Supply of computer equipment and accessories ~ RESERVED
17. UHS/17/2020 ~ Supply and servicing of fire-fighting equipment ~ OPEN
18. UHS/18/2020 ~ General stationery ~ OPEN
19. UHS/19/2020 ~ Hardware and electrical items ~ OPEN
20. UHS/20/2020 ~ Servicing and repair of school generator ~ RESERVED

REPUBLIC OF KENYA
IN THE CHIEF MAGISTRATE'S COURT AT MAVOKO
CIVIL SUIT NO. 271 OF 2019

Benjamin Vuli Makau (Suing as the Legal Representative of the Estate of the **George Kithi Vuli-Deceased**) ..... **Plaintiff**

-VERSUS-

Augustamellane Suki ..... **Defendant**

AND

Gibson Ngigi Wanjiru ..... **3rd Party**

SUBSTITUTED SERVICE

TO: GIBSON NGIGI WANJIRU
P.O. BOX 436 - 00900, KIAMBU.

TAKE NOTICE that pursuant to the order of the court issued on 15th October 2019 by Hon. R. Gitau (RM) that service upon you be done way of advertisement, we hereby notify you that this suit has been filed in the Chief Magistrates court in Mavoko by the Plaintiff against the Defendant who now claims liability against yourselves as third parties.

TAKE FURTHER NOTICE THAT if you wish to dispute the Plaintiffs claim against the defendant and the defendants claim against you, you must appear within 15 days after service of this notice on you inclusive on the day of service, otherwise you will be taken to admit the plaintiff's claim and the defendant's claim against you and you will be bound by any judgment given in this suit.

URBANUS K. & ASSOCIATES
ADVOCATES
ADVOCATES FOR THE DEFENDANT

DRAWN AND FILED BY:-
Urbanus K. & Associates Advocates,
Osidai Plaza, Gandhi Avenue, Next to Nairobi West Hospital, 1st Floor, Suite 67,
P.O. Box 1985-00200, **NAIROBI,**
Tel: 0725144039 | Email: info@uklaw.co.ke

REPUBLIC OF KENYA
IN THE EMPLOYMENT AND LABOUR RELATIONS COURT AT NAKURU
CAUSE NO. 188 OF 2017
[Consolidated with 169/2017 to 184/2017]
ROBERT NJUGUNA KARAMU ..... CLAIMANT

-VERSUS-

ECONOMIC HOUSING GROUP LIMITED ..... 1ST RESPONDENT
RONALD KING'ANG'I ..... 2ND RESPONDENT
KANJA WARURU ..... 3RD RESPONDENT
ANTHONY WAINAINA KAMAU ..... 4TH RESPONDENT
MALI RASILI LIMITED ..... 5TH RESPONDENT

SUBSTITUTED SERVICE BY ADVERTISEMENT
[Pursuant to the order of the court dated 15th October, 2019]

To: 1.ECONOMIC HOUSING GROUP LIMITED,
P.O BOX 335-20117, NAIVASHA
2. RONALD KING'ANG'I,
P.O BOX 698 - 00606, NAIROBI
3. KANJA WARURU,
P.O BOX 335-20117, NAIVASHA
4. ANTHONY WAINAINA KAMAU,
P.O BOX 335-20117, NAIVASHA
5. MALI RASILI LIMITED,
P.O BOX 335-20117, NAIVASHA

TAKE NOTICE that a suit has been filed against you in the Employment and Labour Relations Court,Nakuru in which you are named as the Respondents. Service of the summons and Application dated 31/7/2019 on you has been ordered by means of this advertisement. You are required to enter appearance within 21 days from the date of this advertisement. A copy of the Application, Summons, Memorandum of Claim and all other related documents may be obtained from the Employment and Labour Relations Court, Nakuru or from the undersigned advocates chambers.
TAKE FURTHER NOTICE that unless you enter appearance within 21 days from the date of this advertisement, the case shall be heard your absence notwithstanding.
TAKE FURTHER NOTICE that the Application dated 31/7/2019 shall be heard on 19/11/2019.
DATED at **Nakuru** this 23rd day of October 2019
WACHIRA WANJIRU & COMPANY
ADVOCATES FOR THE CLAIMANT

DRAWN & FILED BY:-
Wachira Wanjiru & Company Advocates,
Japanese Flats, Block 1, 1st Floor, Office 2,
George Morara Avenue, Opp. Kalan Stage
Po. Box 4392-20100, Nakuru
Tel: 0720 780133
Email: info@wachirawanjiru.co.ke

PUBLIC NOTICE
THE PHYSICAL AND LAND USE PLANNING ACT (ACT NO. 13 of 2019)
CHANGE OF USER

The Owner of Plot No. **MN/VI/3758, Changamwe,** Mombasa County **off Magongo Road** wishes to change the user of the plot from **Residential to Public Purpose (Religious Institution)** subject to the approval of the County Government of Mombasa. Any interested person or Institution

REPUBLIC OF KENYA
IN THE PRINCIPAL MAGISTRATE'S COURT AT MASENO CIVIL SUIT NO. 34 OF 2018

ISAAC ONYANGO OKELO & ANO ..... PLAINTIFFS

=VERSUS=

REGENCY CAPITAL LTD formerly KISUMU REAL ESTATES LTD ..... 1ST DEFENDANT
WYCLIFF ABOK ..... 2ND DEFENDNAT

SUBSTITUTED SERVICE BY ADVERTISEMENT

TO:
WYCLIFFE ABOK
C/O REGENCY CAPITAL LTD
P.O. BOX 1772-40100
KISUMU.

REGENCY CAPITAL LTD formerly
KISUMU REAL ESTATE LTD
P.O. BOX 1772-40100
KISUMU.

TAKE NOTICE that the above suit has been filed in the Principal Magistrate's Court, Maseno wherein you are named as the Defendants. Pursuant to the orders made on March 28, 2019, summons were directed to be served upon you by way of this advertisement and the same may be collected from the Plaintiff's Advocates offices or in the court registry during working hours

TAKE FURTHER NOTICE that you are required to enter appearance within **FIFTEEN (15) DAYS** from the date of this Advertisement by yourself or somebody authorized on your behalf, failing to which judgment in default of appearance shall be entered against you and orders issued as the court deems fit, your absence notwithstanding.

DATED at **MASENO** this 8th day of **April** 2019

ROGO, OKELLOH, WANGARI & COMPANY
ADVOCATES FOR THE PLAINTIFFS

DRAWN & FILED BY:-
ROGO, OKELLOH, WANGARI & COMPANYADVOCATES
MILIMANI ESTATE ADJACENT TO FIDA
KISUMU OFFICE, OFF BUSIA ROAD
P.O. BOX 966-40100 KISUMU
MOMBASA.

REPUBLIC OF KENYA
IN THE ENVIRONMENT AND LAND COURT AT NAKURU
ELC CASE NO. 62 OF 2019
IN THE MATTER OF ORDER 37 AND ORDER 40 OF THE CIVIL PROCEDURE RULES AND SECTION 3 OF THE LAND REGISTRATION ACT NO. 3 OF 2012 AND SECTION SEVEN AND 38 OF THE LIMITATION OF ACTION CAP 22 LAWS OF KENYA AN ARTICLE 64& 162 (2) B OF THE CONSTITUTION
BETWEEN
KASARANI NO. 41 MATHARE DANCERS (SUING THROUGH ITS OFFICIALS NDUNGU NDUATI, DAVID WANGANGA ... PLAINTIFF

-VERSUS-

SEVEN SELF HELP GROUP (THROUGH ITS OFFICIALS ELIUD MBUGUA, PETER MUCHIRI AND MOSES MUCHIRI ..... 1ST DEFENDANT
ELMONA SELF HELP GROUP (THROUGH ITS OFFICIALS GEORGE GICHUKI, GACHUHI KARIUKI AND ALFRED KINYANJUI ..... 2ND DEFENDANT
DEREK KIHUNGI NGANGA ..... 3RD DEFENDANT
MARK WAGITHIRU CHEGE ..... 4TH DEFENDANT
FREDRICK MACHARIA WAIKAO ..... 5TH DEFENDANT
AGRICULTURAL & INDUSTRIAL HOLDINGS LIMITED ..... 6TH DEFENDANT
LAND REGISTRAR- NAIVASHA ... 7TH DEFENDANT
THE ATTORNEY GENERAL ..... 8TH DEFENDANT

SUBSTITUTED SERVICE BY ADVERTISEMENT
(pursuant to leave granted on 14th day of October, 2019)
TO: FREDRICK MACHARIA WAIKAO, P.O. BOX 946, THIKA.
TAKE NOTICE that an Application and Originating Summons both dated 21st June 2019 have been filed at Nakuru Environment and Landcourt videCase No. 62 of 2019 in which you are named as the 5th Defendant. Service of summon has been ordered by means of an advertisement. A copy of the Application and Originating Summons may be obtained from Nakuru Environment and Land Court P.o. Box 61-20100 Nakuru. **TAKE FUTHER NOTICE** that, unless you enter an appearance within (15) days from the date of this notice the case will be heard in your absence. **TAKE FURTHER NOTICE** that the case is scheduled for mention before the Honourable Judge on 14th November 2019 at 9:00 a.m or soon thereafter .If you do not appear at the time and place above mentioned, such order will be made and proceedings taken as the court may deem just and expedient.
DATED at **NAIVASHA** this..... day of .....2019.
WAIREGI KIARIE AND ASSOCIATES
ADVOCATES FOR THE PLAINTIFF.
DRAWN & FILED BY:- WAIREGI KIARIE AND

BOOK CLASSIFIEDS VIA
SMS TO 2011
Format of sending SMS
AD#advert Category#your ad
E.G if booking for cars type: AD#B085#TOYOTA NZE ... Call

PUBLIC NOTICE
Physical Planning & Land Use Act of 2019
SUB-DIVISION AND CHANGE OF USER

The registered owner of **LR No. 11964/27,** situated in **Nakuru West Sub-County,** proposes to sub-divide and Change the Use of land parcel from **Educational to Residential (Town Houses),** subject to approval by Nakuru County Government. Individuals, institutions or organizations with objections or comments should submit them in writing within **14 days** of the date of this notice to:
County Secretary, Nakuru County Government, P.O. Box 2870-20100, Nakuru.

PUBLIC NOTICE
Physical And Land Use Planning Act Of 2019
SUBDIVISION AND CHANGE OF USER

The registered owner of **Parcel L.R No. 3880/4 S.W of Voi Township** at Mwatate proposes to subdivide and to change user of resultant parcels A and B from Agricultural to Comprehensive Mixed Use, subject to approval by the County Government of Taita Taveta. Individuals, organizations, institutions and members of the public with objections to the proposed development should forward them in writing within fourteen (14) days of this notice to:
County Director of Physical & Land Use Planning, County Government of Taita Taveta P.O BOX 1066-80304, WUNDANYI.

PUBLIC NOTICE
THE PHYSICAL AND LAND USE PLANNING ACT No.13, 2019
CHANGE OF USER

The registered owner(s) of **Bahati /Kabatini Block 1/12270** situated in Bahati within **Nakuru County** wishes to change the use of land from **Single Dwelling Unit** to **Multi Dwelling Units**(flats) subject to the approval of the County Government of Nakuru. Any individual or institution wishing to make any representation or objection to the above application is requested to forward the same in writing within 14 days of the date of this notice to:
The CECM-Lands, Housing & Urban Development, County Government of Nakuru, P.O Box **2870- 20100, Nakuru.**

WHERE TO EAT

A534 Picnic Sites

PICNIC Site Natural Waterfalls Original Cool Picnic Site Tigoni (1963) Restaurant 0746682387 private parties, office Parties

WHERE TO STAY

A571 Hotels

GLORY Palace Hotel, Murang'a rd, serviced apartments, b/bfast, 1,500/- pp sharing,free wifi 0723176777, 0733954682

HOTEL RIO
Tranquility. Hospitality!
Centrally located in Nairobi West.

@SELDOM Hot accommodation si Conferences & Sa 0722511159

@UPRUMYS accomm. single S rences 079636413

CLEANING S

A699 Detergen

INDUSTRIAL cosmetics and Chemicals is locat Jainzala Rd junction.

A716 Office Cl

SERVICES We C Home Cleaning, Upholstery Cleani Sets), Cleaning af Landscaping and Ga 0737407985 or 079

FOR SALE O

A822 Compute

ETR-APPROVED Systems Dejavu Te bld opp Bazaar/ TS Avenue 072610625

A836 Electrical

VACA

Sales executiv with 4 to 5 yea in local marke neighbouring c required for a r sewing machi company.

Must be gradu driving licence

Applicants sh CV **starsewir gmail.com +254722**

A871 Miscellan

17 Appendix 4

17.1 Attendance list of member of Master Plan Consultative Committee

ATTENDANCE SHEET

ACTIVITY: CONSULTATIVE MEETING ON TEITA ESTATES LTD PROPOSED DEVELOPMENT PLAN

DATE 22/04/2022

VENUE TAITA WILDLIFE LODGE

NO	NAME	DESIGNATION	P/No	I.D NO	SIGN
1	LEONARD LANGAT	CCO LANDS	20091213[illegible]66	24070453	
2	Margaret Mwaniki	DCC Mwatate	2007001641	12760255	
3	JAMES MTOA	ASS. DIR LANDS	2017009523[illegible]	28582577	
4	Michael Mutuku	Chief physical planner	20170095226	27830637	
5	HASSAN . A MOHAMUD	CLAO	2020002613	30660548	
6	RAPHAEL KIMBIO	WARD ADMIN -MTT	2020009990	26373657	
7	ENG. MWAMBURI ALBERT	Ag. CCO PW, ROADS ENERGY	20120006135	27113209	
8	ENG. MWAKULOMBA HARRISON	MUNICIPAL ENGINEER.	2003000385	11651181	
9	EDWARD MWAKALAMU	MUNICIPAL MANAGER	10759195	0721255091 ~~0785~~	
10	KIPROTICH NGENO	Env. Officer, NEMA	NEMA/0540/17	25738416	
11	David Makori	Director Geosurveys		2346960	
12	LOISE MAKENA	GEOSURVEYS		30819621	
13	Mark Nyamu	GEOSURVEYS		29308925	
14					
15					

18 Appendix 5

18.1 NEMA Licenses

FORM 5 (r.14(4))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)
THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT
CERTIFICATE OF REGISTRATION AS AN ENVIRONMENTAL IMPACT ASSESSMENT/ AUDIT EXPERT

Certificate No: NEMA/EIA/RC/5449
Application Reference No: NEMA/EIA/ER/11948

This is to certify M/s **David Masereti Makori** of P.O. Box 30775-00100, Nairobi (Address) has been registered as an Environmental Impact Assessment Expert in accordance with the provisions of the Environmental Management and Coordination Act Cap 387 and is authorized to practice in the capacity of a Lead Expert/Associate

Expert/Firm of Experts (Type) **Lead Expert**

Expert Registration No: **2917**

Issued Date : **3/16/2021**

Signature

(Seal)

Director-General
The National Environmental Management Authority

P.T.O.

ISO 9001: 2015 Certified

Conditions For Licensing

1. This license expires on 31st December of the year it is issued.
2. The expert shall comply with code of practice and Professional Ethics for EIA/EA experts.
3. The expert shall comply with the attached conditions.

General Conditions

1. All Environment Experts certified and registered in the accordance with the provision of relevant Regulations, may establish professional associations to complement and implement the objectives of the Code of Practice.
2. An Expert shall act professionally, accurately, fairly and in an unbiased manner in undertaking his work.
3. The Director General, in consultation with relevant stakeholders, may from time to time issue guidelines for the proper conduct of registered Environmental Impact and Audit Experts.
4. Every Environmental Expert shall each year attend at least two relevant seminars organized by the authority for the purposes of improving the professional expertise of its members.
5. No Expert shall exploit the inexperience, lack of understanding, illiteracy or other lack of technical knowledge in environmental matters of a project proponent, owner or the public, for his personal gain.

Receiving Instructions

1. No Environmental Expert shall act for any project proponent unless he has received written instructions form such project proponent or his authorized agent.
2. An Environmental Expert shall not unreasonably delay the carrying out of instructions received from the project proponent of his authorized agent.
3. An Environmental Expert shall discharge his responsibilities to the project proponent with due diligence and integrity.
4. An Environment Expert may terminate a contract on carrying out an environmental impact assessment or audit as stipulated in section 8 of the Code of Practice and Professional Ethics of EIA/EA Experts.

Carrying out an EIA/EA

1. An Environmental Expert shall follow relevant regulations or guidelines and directives issued by the Authority.
2. As Environmental Expert shall take due care and diligence to collect the relevant data to address the significant environmental issues in the various stages of the assessment or audit process and fully acknowledge the source of any data that is not the result of his findings.
3. Environmental Expert shall consult widely with all the relevant agencies, stakeholders, interested parties and the general public on all the matters that likely to affect them.
4. An Environmental Impact Assessment or Audit Report shall be based on the Terms of Reference of the Assignment and shall include all the matters relevant to the findings of the study, all the relevant matters are required by statutory provisions, and must be guided by professional standards and judgments.

Responsibility of Lead Environmental Experts

1. (1) An Environmental Lead Expert shall be responsible for the documents prepared by him/her on behalf of the project proponent.
   (2) An Environmental Expert shall guide the proponent throughout the preparation of the environmental impact assessment and/or environmental audit, and/or during implementation of the Environmental Management Plan.
   (3) An Environmental Expert shall disclose to a client or employer any relationships of conflicting or competing interests that may influence his judgment prior to the carrying out of work.

Misconduct of Environmental Experts

1. An Environmental Expert who contrivances a provision of Code of Practice and Professional Ethics shall be deemed to have committed professional misconduct and shall be subject to disciplinary action by the Authority as appropriate and as stipulated in the Code of Practice and Professional Ethics of Environmental Experts.

Disciplinary Action

1. Where an Environmental Expert is found to have committed professional misconduct by the Environmental Experts' Advisory Committee/Authority shall be punished as stated under section 19 of the code of Practice and Professional Ethics.

Appeals

1. (1) An Expert aggrieved by the decision of the Authority may apply for the review of such decision in the High Court.
   (2) If an application for judicial review shall not have been fined at the expiry of 30 days from the date of the decision of the Authority, the director General may publicize the disciplinary action taken against the Expert.

FORM 7 (r.15(2))

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/18867

Application Reference No: NEMA/EIA/EL/24916

M/S **David Masereti Makori**
(individual or firm) of address
P.O. Box 30772 - 00100 Nairobi

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

registration number **2917**

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

Issued Date: **2/2/2023** Expiry Date: **12/31/2023**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001:2015 Certified

19 Appendix 6

19.1 Proposed Master Plan Outlay

20 Appendix 7

20.1 Curriculum Vitae

20.1.1 David Makori

David Masereti Makori

Work : P.O. Box 3772, 00100, Kenyatta Avenue, GPO, Nairobi., Kenya

Email: davidmakori@gmail.com **Phone:** (+254) 720928721

Gender: Male **Date of birth:** 28/11/1983 **Nationality:** Kenyan

ABOUT ME

Goespatial data scientist and environmental specialist with more than 14 years experience in developing and implementing geospatial and environment policies, and more than 5 years experience in the public (government) sector. Good technical and project management skills with ability to successfully manage multiple projects both in public and private sectors. Special bias to environmental planning and management, waste management coordination and monitoring environmental action plans, preparation and implementation of environmental management systems (EMS), air and noise pollution control, landscaping, geoinformation science and remote sensing and machine (deep) learning algorithms. Bachelors in landscaping, master of environmental planning and management and PhD in geoinformation science.

WORK EXPERIENCE

[31/07/2019 – 04/2021]

Director of Geoinformation and Environment

Geosurveys and Geospatial Information Limited

City: Nairobi

Country: Kenya

Technical head of Geoinformation (GIS and Remote Sensing) and Environment.

1. Supervision of team of staff
2. Consulting clients to ascertain project purpose, needs and information required
3. Negotiating contracts
4. Recruiting and training staff
5. Managing and developing GIS/RS software packages
6. Investigating new GIS/RS applications
7. Preparation of environmental impact assessment (EIA), environmental assessment reports, review, implementation and monitoring.
8. Human resource management
9. Financial and procurement management
10. Reporting

[01/01/2017 – 29/06/2019]

Chief Officer

Nairobi City County Government

City: Nairobi

Country: Kenya

Technical head and accounting officer of environment and natural resources for Nairobi City County Government. Responsible for 665 staff in the County Government. Scope included;

1. Environmental planning and management
2. Preparation, implementation and monitoring of environmental action plans
3. Policy formulation and implementation
4. Preparation of environmental impact assessment (EIA), environmental assessment reports,
5. review, implementation and monitoring.
6. Formulation and implementation of Green and Circular Economy strategies and plans.
7. Preparation and implementation of environmental emergency preparedness plan templets
8. Pollution control and hazard reduction
9. Landscaping and aesthetics

10. Bilateral negotiations and agreements, and coordination of partner relations
11. High level decision making and advice to the cabinet on environmental matter and best practices
12. Training government staff and stakeholders on environmental matters and best practices 12. Human resource management
13. Financial and procurement management

[01/09/2013 – 30/12/2016]

Research Associate

ICIPE

City: Nairobi

Country: Kenya

Responsible for mapping of flowering plants for bee health in Kenya

1. Mapping of melliferous (flowering plants) in study sites for improved bee production and pollination
2. Mapping and modelling of pests and diseases that affect beehealth and their triggers
3. Investigating and modelling the effects of landscape fragmentation from activities such as
4. farming on bee health and honey production
5. Development of maps for the beehealth project
6. Geotechnical support for the EU funded beehealth project

[28/02/2015 – 31/08/2016]

GIS and Remote Sensing Expert

Clinton Foundation

City: Nairobi

Country: Kenya

Consulting GIS and RS expert in the sleek project for the Clinton foundation in collaboration with the Kenyan government, Ministry of Environment.

[02/01/2013 – 29/10/2016]

Part-time Lecturer

Kenyatta University

City: Nairobi

Country: Kenya

Part time lecturer of geoinformation and environment in the departments of Environmental Planning and Management, Environmental Science and Community Development and Environmental and Public Health

[28/02/2014 – 29/11/2014]

Consultant

JICA

City: Nairobi

Country: Kenya

Consultant for the the pilot project on waste collection and transportation in slum areas in corporation with community based organizations (CBO's).

1. Preparation of environmental action plans for the city of Nairobi in consideration of slum areas
2. Preparation of environmental impact assessment for the project areas
3. Implementation of environmental action plans in the project area
4. Policy formulation and drafting for the Nairobi City County Government
5. Training county government officials and other stakeholders on environmental matt ers and best practices

[01/07/2022 – 31/01/2023]

Geospatial Data Science Consultant

ICIPE

City: Nairobi

Country: Kenya
Spatial data analysis on both beneficial insects and pests, flower mapping and land use and landcover mapping.

[01/10/2022 – Current]

Geospatial data science consultant

SERVIR

City: Nairobi
Country: Kenya
Geospatial data science consultant on land use land cover mapping, species diversity modelling, mapping of invasive species and GHG.

[15/07/2022 – Current]

Geospatial science consultant

CIMMYT

City: Nairobi
Country: Kenya
Crop mapping in selected countries in Africa and identification of yield gaps for improved production in the Impact Pathways project.

EDUCATION AND TRAINING

[02/01/2020 – 07/11/2022]

PhD in Geoinformation

University of KwaZulu Natal https://ukzn.ac.za/

Address: Allan Parton, PMB3209, Pietermaritzburg, South Africa

[31/08/2009 – 29/04/2011]

Master of Environmental Planning and Management

Kenyatta University http://www.ku.ac.ke/

Address: Nairobi, 00100, Nairobi, Kenya

[01/09/2004 – 29/04/2008]

Bachelors of Science in Landscaping

Jomo Kenyatta University of Agriculture and Technology https://www.jkuat.ac.ke/

Address: Nairobi, 00100, Nairobi, Kenya

PUBLICATIONS

[2022]

The Use of Multisource Spatial Data for Determining the Proliferation of Stingless Bees in Kenya

Reference: Makori et al., 2022

Stingless/meliponine bees are eusocial insects whose polylactic nature enables interaction with a wide variety of wild plants and crops, enhancing pollination and hence supporting ecosystem services. However, their true potential regarding pollination services and honey production is yet to be fully recognized. Worldwide, there are over 800 species of meliponine bees, with over 20 species documented on the African continent alone. Out of these, only 12 species have been well described in Kenya. Moreover, interest on meliponine bees has increased amid climate change, agricultural intensification and other anthropogenic effects. Nonetheless, stingless bees are largely under researched with no previous documented evidence of their ecological niche (EN) distribution in most African countries. Hence, this study sought to establish the influence of bioclimatic, topographic and vegetation phenology on the current spatial distribution change patterns. Stingless response variables from 490 sample points were collected and used in conjunction with 11 non-conflating features, to build stingless ecological niche models. Six machine learning EN models and an ensemble were used to model the distribution of seven stingless bees' species combined. The results from the EN models

showed that annual precipitation was the most influential variable to stingless bee distribution (contributing 43.09% logit), while potential evapotranspiration and temperature seasonality contributed 21.18% of the information needed to predict the spatial distribution of stingless bees. Moreover, vegetation phenology (21.36%) and topography (14.36%) effects on stingless bees' distribution were moderate. On the other hand, high seasonality in precipitation and temperature indicated high stingless niche variability in the future (2055). The performance of six EN algorithms used to predict distribution of stingless bees were "excellent" for random forest ((true skills statistics (TSS) = 0.91)), and ranger (TSS = 0.90), "good" for generalized additive models (TSS = 0.87), multivariate adaptive regression spline (TSS = 0.80), boosted regression trees (TSS = 0.80), and "fair" for recursive portioning and regression trees (TSS = 0.79). These EN models could be utilized to inform stingless bee farming and insects pollinated mono and mixed cropping systems, by highlighting potential highly suitable stingless bee production regions. Additionally, the findings could be harnessed to increase both bee and agricultural productivity, and forest conservation efforts through improved pollination services.

[2020]

Suitability of resampled multispectral datasets for mapping flowering plants in the Kenyan savannah

Reference: Makori et al.,

Pollination services and honeybee health in general are important in the African savannahs particularly to farmers who often rely on honeybee products as a supplementary source of income. Therefore, it is imperative to understand the floral cycle, abundance and spatial dis- tribution of melliferous plants in the African savannah landscapes. Furthermore, placement of apiaries in the landscapes could benefit from information on spatiotemporal patterns of flowering plants, by optimising honeybees' foraging behaviours, which could improve apiary productivity. This study sought to assess the suitability of simulated multispectral data for mapping melliferous (flowering) plants in the African savannahs. Bi-temporal AISA Eagle hyperspectral images, resampled to four sensors (i.e. WorldView-2, RapidEye, Spot-6 and Sentinel-2) spatial and spectral resolutions, and a 10-cm ultra-high spatial resolution aerial imagery coinciding with onset and peak flowering periods were used in this study. Ground reference data was collected at the time of imagery capture. The advanced machine learn- ing random forest (RF) classifier was used to map the flowering plants at a landscape scale and a classification accuracy validated using 30% independent test samples. The results showed that 93.33%, 69.43%, 67.52% and 82.18% accuracies could be achieved using WorldView-2, RapidEye, Spot-6 and Sentinel-2 data sets respectively, at the peak flowering period. Our study provides a basis for the development of operational and cost-effective approaches for mapping flowering plants in an African semiarid agroecological landscape. Specifically, such mapping approaches are valuable in providing timely and reliable advisory tools for guiding the implementation of beekeeping systems at a landscape scale.

[2017]

Predicting Spatial Distribution of Key Honeybee Pests in Kenya Using Remotely Sensed and Bioclimatic Variables: Key Honeybee Pests Distribution Models

Reference: Makori et al.,

Bee keeping is indispensable to global food production. It is an alternate income source, especially in rural underdeveloped African settlements, and an important forest conservation incentive. However, dwindling honeybee colonies around the world are attributed to pests and diseases whose spatial distribution and influences are not well established. In this study, we used remotely sensed data to improve the reliability of pest ecological niche (EN) models to attain reliable pest distribution maps. Occurrence data on four pests (*Aethina tumida*, *Galleria mellonella*, *Oplostomus haroldi* and *Varroa destructor*) were collected from apiaries within four main agro-ecological regions responsible for over 80% of Kenya's bee keeping. Africlim bioclimatic and derived normalized difference vegetation index (NDVI) variables were used to model their ecological niches using

Maximum Entropy (MaxEnt). Combined precipitation variables had a high positive logit influence on all remotely sensed and biotic models' performance. Remotely sensed vegetation variables had a substantial effect on the model, contributing up to 40.8% for *G. mellonella* and regions with high rainfall seasonality were predicted to be high-risk areas. Projections (to 2055) indicated that, with the current climate change trend, these regions will experience increased honeybee pest risk. We conclude that honeybee pests could be modelled using bioclimatic data and remotely sensed variables in MaxEnt. Although the bioclimatic data were most relevant in all model results, incorporating vegetation seasonality variables to improve mapping the 'actual' habitat of key honeybee pests and to identify risk and containment zones needs to be further investigated.

[2015]

The Utility of AISA Eagle Hyperspectral Data and Random Forest Classifier for Flower Mapping

Reference: Abdel-Rahman et al.

Knowledge of the floral cycle and the spatial distribution and abundance of flowering plants is important for bee health studies to understand the relationship between landscape and bee hive productivity and honey flow. The key objective of this study was to show how AISA Eagle hyperspectral data and random forest (RF) can be optimally utilized to produce flowering and spatially explicit land use/land cover (LULC) maps for a study site in Kenya. AISA Eagle imagery was captured at the early flowering period (January 2014) and at the peak flowering season (February 2013). Data on white and yellow flowering trees as well as LULC classes in the study area were collected and used as ground-truth points. We utilized all 64 AISA Eagle bands and also used variable importance in RF to identify the most important bands in both AISA Eagle data sets. The results showed that flowering was most accurately mapped using the AISA Eagle data from the peak flowering period (85.71%–88.15% overall accuracy for the peak flowering season imagery versus 80.82%–83.67% for the early flowering season). The variable optimization (i.e., variable selection) analysis showed that less than half of the AISA bands (n = 26 for the February 2013 data and n = 21 for the January 2014 data) were important to attain relatively reliable classification accuracies. Our study is an important first step towards the development of operational flower mapping routines and for understanding the relationship between flowering and bees' foraging behavior.

[2015]

Application of hyperspectral remote sensing for flower mapping in African savannas

Reference: Landmann et al.

We tested the suitability and accuracy of hyperspectral data to produce the first African flowering and short-term floral cycle map. The spatial distribution and abundance, as well as the floral cycle, of melliferous plants are of utmost importance for evaluating pollination effects and to understand the relationship between melliferous plants in the landscape and the quantity and quality of bee keeping products. For a study site in Kenya, airborne AISA/Eagle hyperspectral data with 60 cm pixel resolution (400 to 990 nm spectral ranges) was captured in Jan- uary 2014, at the beginning of the prime flowering period, and during the prime flowering period in February 2013. Aerial digital imagery with 10 cm pixel size and Smartphone captures in the field were used for reference data collection. The flowering species were grouped into functional flowering plant groups. Linear spectral unmixing and Change Vector Analysis (CVA) were used on the bi-temporal AISA/Eagle data to produce a hard cover map showing the spatial distribution, abundance and short-term flowering cycle of melliferous plants. Overall accuracies were slightly higher in the February 2013 imagery at the prime flowering period; all flowering plant groups together ("All") could be mapped with an overall accuracy of 83% (n = 512). The "White forbs" flowering plant group was most accurately mapped in both AISA/Eagle acquisition dates. Based on Duncan's inter-class similarity test, the "White forbs" group was also most distinct from other flowering plant groups. There is a need to investigate the effect of spectral endmember variability and upscaling options for space- borne monitoring of the floral cycle at key sites in Africa. Floral cycle maps can help decision

makers and bee keepers to understand how bee colonies interact with the floral environment and what to expect from an apiary in terms of honey flow.

[2023]

Multipronged prediction of spatial proliferation of bee pests in Kenya using natural, anthropogenic and abundance datasets

Reference: Makori et al.

Amid ostensible augmented climate change and anthropogenic influence on natural environments and agricultural systems, global economic prominence of honeybees, *Apis mellifera,* is undisputed. Bee pollination services in agricultural crops and wild plants are vital towards biodiversity conservation and food production, more so in improving food and nutritional security in African savannahs. Notwithstanding, bee farming and beehealth in general are under threat from climate change, agricultural intensification and associated habitat alteration, agrochemicals intensification, diseases and more importantly bee pests. Although previous studies have endeavoured to establish distribution of bee pests, their abundance and spatial proliferation and intensification in Kenya has not been well established. This study sort to determine factors that influence intensification and spatial proliferation of bee pests in Kenya. Abundance data on *Varroa distractor, Oplostomus haroldi, Galleria mellonella* and *Aethina tumida* were collected from apiaries in main agroecological regions in Kenya, both during the wet and dry seasons. Abundance data was fitted with non-conflating bioclimatic variables, vegetation phenological data, topographical variables and landuse under the random forest algorithm in R software, to develop prediction models for the four main bee pests. Results indicated significant seasonal influence on bee pest abundance observations and bioclimatic variables, especially precipitation variables, had the most logit (up to 77.8%) on all bee pests' prediction models. Topographical influence and vegetation phenological influence were moderate (at 14.3% and 6.7% respectively) while anthropogenic influence as denoted by landuse was low (1.2%). High seasonality in bioclimatic variables due to climate change increased projected future (2055) bee pests risk levels both spatially and in intensity across the study site. Three out of four prediction models developed herein ranked excellent while the *G. mellonella* prediction model was ranked fair. Due to the high precision of prediction models developed in this study, they could reliably be used to map out high risk areas where management efforts and resources could be employed to curb spread of the main bee pests. Therefore, these prediction models could provide decision makers with essential tools to assuage spread of bee pests hence improve beehealth.

LANGUAGE SKILLS

Mother tongue(s): Gusii , Swahili

Other language(s):

English

LISTENING C2 **READING** C2 **WRITING** C2

SPOKEN PRODUCTION C2 **SPOKEN INTERACTION** C2

French

LISTENING A2 **READING** A2 **WRITING** A1

SPOKEN PRODUCTION A2 **SPOKEN INTERACTION** A2

20.1.2 Gerald Maina

Curriculum Vitae

Personal information

Name	Gerald Maina Muriuki
Nationality	Kenyan
Telephone	+254 720 812 456
Email	geraldmainah@gmail.com

Key competencies

Environmentalist with over 10 years demonstrable experience in strategic environmental assessments (SEAs), environmental and social impact assessments (ESIAs) development of environmental management and monitoring plans (EMMPs) and projects management.

Education

2010 - 2013, Master of Environmental Planning and Management, Kenyatta University, Kenya

1993- 1997, Bachelor of Environmental Studies, Kenyatta University, Kenya

International training programmes

December 2016 – October 2017, Sustainable Water and Sanitation – Integrated Processes, Niras, Sweden.

April - December 2010, Climate Change Adaptation Policy Fellowship, administered by Global Change System for Analysis, Research and Training (START).

Membership and licenses with professional bodies

Practicing Lead Member, Environment Institute of Kenya (EIK)

Licensed Lead Environmental Impact Assessment/Audit (EIA) Expert

Publications

- Maina, G. (2014): Adaptive Strategies to Water Scarcity: A Case study of Silanga, Kenya.
- Maina, G., Makori, D., and Mireri, C. (2011): Enhancing Hydrological Services in Sasumua Watershed, NMK Publications

Work experience

January 2019 - December 2021, Independent Consultant

Assignments undertaken

- January 2019 – to date - Involved in preparation of strategic environmental assessments, (SEAs), environmental social impact assessments (ESIAs) and environmental management and monitoring plans (EMMPs) for various projects.

July 2010 – December 2018, Project Manager, Water & Sanitation for the Urban Poor (WSUP)

Responsibilities

- Ensuring delivery of water and sanitation projects during scoping, development, implementation, monitoring and evaluation phases.
- Supporting the collection, reporting of projects impact data and advising on the studies and research.

November 2009 - June 2010, Independent Consultant

Responsibilities

- November – June 2010, undertook Environmental Impact Assessment and environmental monitoring plan for various projects.

February 2005 - October 2009, Project Officer - Environmentalist, Practical Action- Eastern Africa

- Coordinating environmental and social impact assessments (ESIA's) for water, sewerage and waste management projects.
- Involved in the analysis of potential impacts of the project on social and natural environment, development of Environmental and Social Management Plan (ESMP) and monitoring framework.

January 2004 – January 2005, Agency Manager, Kenya Agency for Development of Enterprises & Technology

Responsibilities

- Mapping out the natural resource intermediation needs for communities improved livelihoods
- Supporting communities in the management and implementation of natural resource projects
- Formulating plans to provide trainings for beneficiary enterprises and producing progress reports.

April 2000 - December 2003, Development Finance Officer, Faulu Kenya

Responsibilities

- Liaison with local administration in identification and assessment of rural community projects.
- Capacity support to rural community projects in governance and management of project funds.
- Development of progress reports.

January 1998 - March 2000, Project Officer- City Garbage Recyclers

Responsibilities

- Supporting project implementation through integrated solid waste management (ISWM) approach.

Languages and computer proficiency

- Full professional proficiency in English and Kiswahili
- Full professional proficiency in Word, Excel, PowerPoint, and MS Project

Referees

1. Prof. Caleb Mireri
   Department of Environment Planning & Management,
   Kenyatta University
   Telephone: 0722 839 691
   Email: mireri.caleb@ku.ac.ke

2. Philip Oyamo
   Programme Manager,
   WSUP,
   Telephone: 0723 672 098
   Email: oyamogeorge@gmail.com

3. Patrick Mwanzia
   Project Manager,
   Practical Action, Eastern Africa
   Telephone: 0723 816 619
   Email: patrick.mwanzia@gmail.com

20.1.3 Henry Otieno Oindo

Profession: Environmentalist

Date of Birth: 22nd August 1993

Nationality: Kenyan

CAREER OBJECTIVE

To be part of community's sustainable development champion, that focuses on resource utilization for community empowerment while safeguarding the environment for future generations and to avert human induced climate change.

PROFESSIONAL ORGANIZATIONS MEMBERSHIP

- Member of the Environmental Institute of Kenya Membership No. EIK/2/2633
- Member- International Association for Impact Assessment (IAIA)
- Volunteer-Ecosystem Based Adaptation for Food Security in Africa (EBAFOSA)
- Secretariat- Nairobi River Regeneration Project
- Founder- Ecosystem Sustainability and Sensitization Network
- Associate Expert- National Environmental Management Authority, Expert Reg. No. 9936

PROFILE

Environmental specialist and Associate expert with more than 5 years' experience in execution of vegetation analysis, environmental impact assessments, audits and evaluations on environmental regulatory compliance, developing and implementing environment policies, with experience in the public (Nairobi City County Government and Nairobi Metropolitan Services) sector as a project coordinator and an intern. Good technical and project management skills with ability to successfully manage and execute multiple projects both in public and private sector as daily responsibilities. Special bias to vegetation cover enhancement, environmental planning, solid waste management, air and noise pollution control, landscaping, climate change mitigation strategies, geoinformation science and remote sensing and natural resource management. Bachelors in Environmental Conservation and Natural Resources Management and ongoing masters of environmental planning and management.

EDUCATIONAL BACKGROUND

Year	Institution	Award
May 2018 to Date	Kenyatta University	Master of Science in Environmental Planning and Management-Ongoing
May 2013-December 2016	University of Nairobi	BSc. Environmental Conservation and Natural Resource Management *(Second class - Upper division)*
February 2008-November 2011	Lela Secondary School	Kenya Certificate of Secondary Education (KCSE) *(Attained a mean grade of B+)*
January 2000 – November 2007	Apondo Primary School	Kenya Certificate of Primary Education (KCPE) *(Attained (354/500 marks)*

FURTHER TRAINING

i. Kenya Institute of Management, Nairobi April 2012 – June 2012

Certificate in Advanced Computer studies

Database Technologies

- Information systems
- Microsoft office
- Computer Networking
- Graphics
- Systems Analysis and Design

ii. July 2019 United Nations Institute for Training and Research

Certificate in:

- Climate change international Legal Regime
- Specialized module on Cities and Climate Change
- Fundamentals on REDD+
- Indicators for an Inclusive Green Economy-Advanced course

iii. October-December 2021, Environmental Institute of Kenya

- Refresher course on Environmental Impact Assessment
- Short course on Environmental Management Systems
- Occupational Safety and Health

iv. February 2023, United Nations – APCICT

- Certificate in Data Driven Governance

RELEVANT WORK EXPERIENCE

November 2022 to Date, International Center for Insect Physiology and Ecology (icipe)

- Identifying and documenting tree plant species using ODK in the counties of Nyeri, Nanyuki, Muranga, Kiambu, Machakos, Kitui, Makueni, Taita Taveta, Mombasa, Kilifi, Tana River and Garisa.
- Identifying plant species plots for tree diversity sampling and collecting data using the ODK.
- Collecting coordinates and photographs for every tree and shrub sampled
- Documenting the DBH and tree height within the sampled plots
- Collecting and preserved samples of tree species that could not be identified in the field for lab analysis
- Drafting of the preliminary tree species identification report

April 2022 to October 2022, Nairobi Metropolitan Services/Nairobi City County Government

- Supervision works and duties delegation to the sanitation team (300 casuals)
- Mapping of illegal waste accumulation points
- Overseeing CBD Solid Waste Management survey
- Progress report writing
- Casuals' data management
- Stakeholders' engagement in clean up exercises

Technical Assistant (Casual) Nairobi CBD Sanitation programme

October 2021 to March 2022, Nairobi Metropolitan Services (NMS)

Project Coordinator, Nairobi River Regeneration Programme in Dagoretti North and Kibra Sub Counties, Nairobi City County.

Responsibilities:

- Supervision works and duties delegation to the regeneration team
- Mapping of pollution sources
- Public awareness creation on riparian protection and conservation
- Stakeholders' engagement on regeneration strategies
- Progress report writing
- Regeneration programme data management
- Routine programme SWOT analysis

January 2020 to September 2021: Gtech Consultants Limited

Environmental Specialist in Environment and Social Impact Assessment consulting projects for the Kenya Rural Roads Authority (KeRRA) across Kenya

Scope included; -

- Environmental Impact Assessment of the proposed roads projects on the localities biodiversity
- The locality vegetation identification and analysis of anticipated impacts of the proposed project to the existing vegetation cover
- Report writing and outlining recommendations for best practices
- Field research and baseline survey for the proposed roads projects
- Environmental data analysis
- Presentation of the field findings and advising on best environment practices through developing of ESMP and outlining mitigation measures

<u>Projects Undertaken:</u>

- *Consultancy Services for Environmental and Social Impact Assessment (ESIA) Studies: Lot 32 Roads Project in Murang'a County*
  - Project Roads Length- 229.1 Km
- *Consultancy Services for Environmental and Social Impact Assessment (ESIA) Studies: Lot 58 Roads Project in Trans Nzoia and Uasin Gishu Counties*
  - Project Roads Length- 90 Km
- *Consultancy Services for Environmental and Social Impact Assessment (ESIA) Studies: Lot 39 Roads Project in Bungoma County*
  - Project Roads Length- 80 Km
- *Consultancy Services for Environmental and Social Impact Assessment (ESIA) Studies: Lot 57 road projects in Uasin Gishu, Trans Nzoia and Elgeyo Marakwet Counties.*
  - Project Roads Length- 161 Km
- Environmental audits for commercial setups such Radisson Blu, Premier Industries, Chandaria Industries

June 2018 – September 2021: Consulting Associate Expert – GEOSURVEYS AND GEOSPATIAL INFORMATIONS Limited, Nairobi

Responsibilities- Strategic Environmental Assessments, ESIA's, EIA's and Environmental Audits for development projects consulting for Mercy Corps, ACDI/VOCA, Kenyatta National Hospital, Taita Taveta County Government, Gulu Municipality-Uganda.

Scope included: -

- Supervisory role during baseline survey field works
- Developing of environmental and social management plan

- Project site and surrounding vegetation identification and analysis
- Report writing and presentation
- Data analysis and interpretation
- Monitoring and evaluation of environmental compliance levels of facilities/installations

Feb 2017 – May 2018: Intern, Department of Environment, Energy, Water and Natural Resources Nairobi City County Government, Nairobi

Worked at various sub sectors of the department:

- Solid Waste Management-Solid Waste data analysis, operation fleet management, strategy implementations,
- Water, Energy and Sanitation-Nairobi River Regeneration secretariat: Report writing, field visits, data collection and analysis.
- Environmental, Monitoring, Compliance and Enforcement
- Parks and Open Spaces Management
- Natural Resources Management
- Final Disposal and Climate Change- waste characterization and analysis

OTHER ASSIGNMENTS

Baseline Survey on Socio-economic and Environmental Impacts Associated with Development of Access Roads in Informal Settlements in Nairobi County, Research Assistant-Kenyatta University in collaboration with Kenya Urban Roads Authority: July 2022

- Data collection on water quality and impact assessment
- Noise and vibration effects analysis
- Air quality assessment
- Waste water drainage systems analysis
- Solid waste management strategies
- Vegetation analysis

Solid waste management training, Trainer-Childfund Kenya:

- Training of Community based organizations within Starehe Sub County on Solid Wate Management strategies and legal framework guiding waste management in Kenya

Nairobi River Regeneration, Secretariat-Nairobi City County Government:

- Supervision works and duties delegation to the regeneration team
- Mapping of pollution sources
- Public awareness creation on riparian protection and conservation

- Stakeholders' engagement on regeneration strategies
- Progress report writing
- Regeneration programme data management
- Routine programme SWOT analysis

Project Coordinator, Nairobi Metropolitan Services- Uhuru Park and Central Park renovation and rehabilitation project.

- Casuals' data management
- Preparing work progress report
- Supervision of ongoing landscaping works

Content Supervisor, Kenya National Bureau of Statics (KNBS): for the Kenya Population and Housing Census, 2019

Responsibilities:

- Training of enumerators on their roles and responsibilities during the census activity
- Overseeing smooth running of exercise within designated area of supervision
- Monitoring daily data transmission to the National Data Server
- Working in harmony with the assigned enumerator to offer guidance, build team work spirit and address complaints
- Record keeping on resource allocated

Environment Contract Supervisor, Wakiwa Company Limited

Contract subject: Street and other spaces sweeping, litter bin emptying, solid waste collection and disposal at Westlands-CBD and solid waste collection, transportation and final disposal from Embakasi South Sub-county for Nairobi City County Government

Technical Assistant, Technical University of Kenya in liaison with UNHABITAT

March – July 2018: Feasibility and Environmental impact assessment studies for the decommissioning of Ngong Town dumpsite and subsequent establishment of a modern sanitary facility with aspects of material recovery in Kajiado County, Kenya.

LANGUAGES

Language	Reading	Writing	Speaking
English	Advanced	Advanced	Advanced
Kiswahili	Advanced	Advanced	Advanced
Dholuo	Advanced	Advanced	Advanced

REFERENCES

Dr. David Makori
Lead Environment Expert
International Center for Insect physiology and Ecology (icipe)
davidmakori@gmail.com | +254720928721

Dr. Dorcas Sigana
Lecturer University of Nairobi
dsigana@uonbi.ac.ke | +25472303184

Mr. Hibrahim Nyakach
Chief Officer
Environment, Energy, Water and Natural Resources, Nairobi City County Government
ibrakach@yahoo.com | +254729726493

Dr. Paul Ouma
Director Gtech Consultants Limited
oumapaul94@gmail.com | +25472330478

20.1.4 Lavender Ondere

CURRICULUM VITAE: LAVENDAH ALWAKA ONDERE

PERSONAL INFORMATION

Permanent: P.O BOX 688- 50307
Luanda(Kenya) Current: P.O BOX 49842-0010
Nairobi (Kenya)
+254 72 300 00 61
E MAIL lavenderondere@gmail.com

Sex- Female | Nationality- Kenyan| Marital Status- Married
Languages: *English, Swahili* (native speaker)

PERSONAL STATEMENT

I am at an intermediate career in Environmental management with skills in quantitative and qualitative research and project management. I also have a set of cross- cutting skills that make me adaptable to and suitable for different fields of work. I am creative, intelligent, open-minded and with good interpersonal skills. I am also a team player with an independent mind. I am therefore seeking opportunities to strengthen and develop my knowledge, experience and skills in research and/or related fields and to lay a formidable foundation for my career in both the short and long-term.

EDUCATION

2012-DATE	Masters of Science- Environmental Sciences **Kenyatta University** **Course Units:** *Principles of Environmental Health; Occupational Health & Safety Project Planning and Management; Solid and Liquid waste Management; Pollution & Environment al Impact Assessment;; Land Management (including GIS Mapping and Remote Sensing); State, Society & Development; Water Supply and Quality Control; Conservancy; Ecological Footprint*
2006-2010-	Bachelor of Arts Geography **Moi University** **Course Units:** *Environmental Impact Assessment, Project Planning And Managemen And Research Methodology, Solid waste management, Climate Change, Statistics Biodiversity management, hydrology, Remote Sensing, Cartography and Visualization Mapping Science, GIS Database Management Systems, Geospatial Information Systems Digital Elevation Modeling, Digital Image Processing, GIS Spatial Analysis, Applications Of GIS And Remote Sensing, Change Detection, , Among Others.*
2001-2004	Kenya Certificate of Secondary Education (K.C.S.E) **Bunyore Girls High School**, (Kenya) 'O' Level Certificate, mean grade B+

OTHER TRAININGS

→ *29th June 2012. Athi Water Service Board supplier"s consultative workshop*
Theme: Supplier partnership in the new constitutional dispensation
→ *28th February to 4th March 2011:Attended an Envi 4.8 training conducted by Regional center for mapping of resources for development*
→ *19th Nov 2009 Participated in GIS Day organized by Geography Students Association and Geography department Moi University. Presented in the GIS DAY on Soil suitability analysis using IDRIS software*
→ *30th September 2008 Attended KNSDI Seminar iv "Roll Out of Kenya National Data Infrastructure (KNSDI)", AICAD, NAIROBI*
→ *25 April 2008 Attended a GIS workshop organized by Geography association in collaboration with Kenya National Spatial Data Infrastructure (KNSDI) "GIS for Resource Management"" on General applications of GIS, Data Standardization and sharing, Application of GIS in Resource Management in Moi University*
→ *23 April 2008 Attended Moi University Geography Careers Day on the theme "Towards Sustainable Natural Resource Management" on; Geography as Natural Resource, Conservation in Natural Resource Management and Technological Trends in GIS*

WORK EXPERIENCE

07/2014- DATE — Data/ Liaison Officer- Integrated Solid Waste Management Project

JICA/Nairobi City County/SIFA –FRANCHISE PROJECT

→ e n *gage in such initiatives to add value to, strengthen or promote ongoing work on social determinants and inequities of waste management and environmental management.*
→ *prepared a Gis Database for all the households in the project area-Kilimani, Kileleshwa and Kangemi areas*
→ *Coordinated fieldwork on determinations of waste management strategies currently being practiced in Nairobi*
→ *Analyzed the data collection results using SPSS and excel suites and made recommendations to advice on the project*
→Coordinating communication between Community Based Organizations, JICA, NCC and SIFA to ensure success in the project
→*Helped in creating awareness and marketing of Sifa as a new waste management company to the area residents to ensure success of the project*

GIS/ Environmental assistant Project Manager

04/2011–06/ 2014 (3 years) — **Digmap Geosystems Ltd**- Department of GIS, Remote Sensing and Environmental Management**: Nairobi (Kenya)**

→ *Planning and ensuring environmental and mapping projects are done to completions by providing technical and administrativesupport*
→ *Coordinate effective and timely reporting of the project with our partners and clients*
→ *Plan for resources to be allocated for completion of projects and Help in development of annual, monthly and weekly work plans.*

→ *Data capture, Digitization, GIS Analysis, Database creation, Map Composing and Editing of data* →*Hand held GPS Sight acquisition and Map composing. All done in ArcGIS 10 ,Global Mapper & AutoCAD* →*Mapping and Processing of Satellite Imagery-Orthorectification and radiometric correction. All done in Erdas imagine.* →*Maintaining and updating the geodatabase of Digmaps Geosystems, with datasets and records ranging from raw, mid-stage and final products.* →*Writing proposals and EoIs for tender awards and funding,* →*Training of clients after job completion and supervising of other colleagues and interns*	
March 2011- April 2011	Environmental /GIS Intern **National Environmental Management Authority (HQs Nairobi Kenya)**
→ *Environmental Impact Assessment/Auditing and Processing NEMA Licenses* →*Hand held_GPS data acquisition* →*Image processing using ENVI 4.7* →*Updating of the DEAPS maps (District Environmental Action Plans) for all districts in Kenya using GIS* →*Production of maps on forest covers in Kenya, Carrying out Spatial data collection using the GPS, data processing, analysis and Presentation for use in decision making* →*Updating the already existing maps on the SoE (State of the Environment)* →*Assisting in developing a functional Spatial Database for the organization*	
09/2010–02/ 2011	Graduate Intern **Regional Centre for Mapping of Resources for Development (Nairobi, KE)**
→ *Collecting geospatial data, including maps, field observation data, aerial photographs, satellite imagery* →*Assessing accuracy of ancillary data and assist in data cleaning, classification and validation.* →*Carrying out satellite image processing and interpretation.* →*Preparing map products and reports,* → *Searching, identifying and acquiring satellite data, analyzing image quality, implementing image enhancement, processing and classification,* →*Verifying the integrity and accuracy of data contained in remote sensing image analysis systems. All this were done in Arc GIS,ERDAS and Envi Environments*	
05/2009–09/2009	Student attachment ***Kenya Agricultural Research Institute (KARI): GEF/ WorldBank Funded Project_ Western Kenya Integrated Ecosystem Management Project. (WKIEMP), Kisumu (Kenya)***
→ *GIS data entry and documentation of projects geospatial data,* →*Mapping the earth recourses in areas of intervention; Yala and Nyando and map production, Satellite and aerial photographs interpretation* →*Use of GPS for collection of data in the field, Wetland and watershed mapping,* →*Community mobilization and sensitization and Community training for capacity building on tree nursery establishment project management*	
Current Remuneration	Kshs 55,000/=

LEADERSHIP PROFILE

- *Class representative-Msc. Environmental Class of 2014)*
- *Class representative- BA. Geography Class of 2010)*
- *Public Relations officer-Geography Students Association of Moi University*
- *organizing Secretary- Emuhaya Student Organization*

COMPETENCY PROFILE.

✔*Competent in modern geospatial techniques like (GIS), Remote Sensing (RS), Digital Cartography, Image interpretation .Familiarity with related equipment and software*

✔*Commendable project management skills including proposal writing and grant reporting*

✔*Excellent communication, networking and reporting skills.*

✔ *Impeccable leadership track record*

✔ *Organized, creative, adaptable and able to 'think outside the box'.*

✔ *Good command of the process of research and systematic analysis with a keen eye for linking this to Policy and evidence-based action.*

✔ *Team player with an independent mind. Able to multitask yet remain effective.*

✔*Able to operate Office suite packages for document editing and spreadsheet and database management, and to effectively run computer packages for research and data processing*

REFEREES

1. Mr. Henry Murwa	3. MR. SAMSON OMONDI	3. MR. TOM ESIPILA
CEO/FOUNDER **DIGMAP GEOSYSTEMS LTD** NHIF BULDING, RAGATA ROAD Tel: (+254) 722753833 Email: digmap@hotmail.com	**ASSISTANT PROJECT COORDINATOR** **JICA EXPERT TEAM** Tel: (+254) 724 217641 Email:**omoshsam2008@gmail.com**	**MOI UNIVERSITY-GIS/ REMOTE SENSING LECTURER** Tel (+254) 726 370423 Email: esipilat@yahoo.com

20.1.5 Meinrad Ndere

MEINRAD NDERE, GEOLOGIST.

Contact

Mobile: 0790403549

Email: meinradbabu@gmail.com

Address: P.O Box 71-20100, Nakuru, Kenya.

Education & Professional Qualifications

Career and Professional Objectives

- To provide quality and reliable service delivery through the exploitation of acquired knowledge and skills for the achievement of corporate vision and mission.
- To create a lasting impression and a positive attitudinal change among peers and colleagues so as to foster collegial and multi-disciplinary approach to issues for enhanced productivity.

Education & Professional Qualifications

2017 – 2021

- Bachelor of Science in Geology. South Eastern Kenya University. Second Class Upper division.

2013 - 2016

- Kenya Certificate of Secondary Education, Rianyabaro Centre of Excellence, Kisii County.

2008 - 2012

- Kenya Certificate of Primary Education, St Andrews Kaggwa Nyansiongo boys' primary school.

Professional Experience

August 2022

IEBC Deputy Presiding Officer

Duties

- Collecting and ensuring security of all election materials.
- Overseeing efficient and effective management of the election before, during and after the election.
- Liaison with the presiding officer to solve technical issues
- Counting, tallying and announcement of provisional results at the polling station and delivering them to the RO.
- Any other duties as assigned by the Presiding and Returning officers.

April-June 2021

Assisted my training Geologist in geological exploration and field mapping of Nickel in West Pokot.

Duties

- Carrying out preliminary geological field studies of the area using both geological equipment and GIS software.
- Assisting in assessment of rock characteristics and physical interpretation of minerals available.
- Collecting samples and sending them for further geochemical analysis.
- Preparation of a detailed Geological Report on the findings.

2021

Working with Enek-Geo consultants on the COVID-19 emergency boreholes project in Nakuru County as a supervising geologist.

Duties

- Conducting hydro geological surveys using the PQWT-S500 machine and the terameter.
- Preparation of hydro geological survey report.
- Checking on materials used, collecting data, designing the borehole and ensuring all works are done according to the ministry of water code of practice for the supervision and construction of water supply boreholes.
- Borehole site loggings Collection and definition of rock samples/soil formations.
- Borehole development.
- Test pumping and borehole completion report.

May – August 2020

Madini house Attachment (Laboratory Geochemical

Analyst and Technologist)

Duties

- Thin section extraction and geochemical analysis of samples
- Using geochemical analytical methods to determine chemical elements from soil, bedrock and stream samples.
- Subculture and purification of sub colonies
- Oceanography analysis of marine sediments.

Work Experience

October 2021 - Current

Geologist – Enek Geo-Consultants.

Duties

- Conducting hydrogeological surveys
- Preparation of hydrogeological survey report
- Supervision of borehole drilling
- Preparation of borehole quotation and management of database.
- Preliminary documentation for borehole drilling,

Skills and Competence

- Great communication skills with fluency in both written and spoken English and Swahili.
- High proficiency in computer skills with mastery in use and execution of computer, GIS software and applications e.g. QGIS, ArcGIS, MS word, excel and power point.
- Conversant with research proposals writing, literature search, data collection and management.
- Competent in concept note writing and proposal development.
- Excellent capacity to work independently and ability to work proactively in a team.
- Excellent writing, listening and inter-personal skills.
- Highly motivated and enthusiastic individual who thrives in a challenging environment.
- Critical thinking and analytical skills.

Referees

Dr. Lincoln Githenya
Lecturer,
South Eastern Kenya University,
P.O Box 170-90200 Kitui,Mobile
No. 0708442000
Email: githenyalincoln@gmail.com

Habib Suleiman
Geologist
Enek-Geo Consultants
Mobile No. 0799651059
Email: habibsuleiman@gmail.com

Mr. Mark Munialo
Principal St Lawrence Nyabieyo Secondary School
P.O BOX 3799-40200 Kisii, Kenya.
Mobile No.0728093846
Email: markmunialo@yahoo.com

20.1.6 Dr. Anastasia W. Kagunyu

Proposed Position: Sociologist expert

Name of Firm: Geosurveys and Geospatial Information Limited

Name of Staff: Dr. Anastasia W. Kagunyu

Postal Address: 7378-00100, Nairobi Tel: 0729933154.

Email: eia@geosurveysandgeospatialinfo.co.ke

Profession: Sociologist

Date of Birth: 1972

Years with Firm: 6

Nationality: Kenyan

Membership in Professional Societies: Member of the Animal Production Society of Kenya.

Detailed Tasks Assigned: Lead, sociologist. Socio impacts, mitigation measures and Environmental management plan.

Key Qualifications: PhD (Sociologist/Anthropology) University of Nairobi

Dr. Kagunyu is a Senior Research Officer at the Kenya Agriculture and Livestock Research Organization (KALRO). She has Wide experience in diverse areas including Social Protection Rights, assessment of the Status of Dairy cows and Goats among Groups' and Individual Holders in different areas in Kenya. She has conducted several studies on value chains on the products including Value of chains of daily milk, horticulture, and Value chain of beef.

Dr. Kagunyu has carried out studies on effects of climate variability on the agricultural communities coping strategies where Sustainable and long term adaptive strategies were identified and recommended for implementation by policy makers and development agents. She has also worked with UNESCO in their project people and plants which were based in Mt Kenya region.

Dr. Kangunyu is an an expert Social Worker and has counsel women who were highly involved in taking and selling alcohol, has rehabilitated street girls and offered basic business skills. These groups were offered seed money to start businesses such as selling of charcoal, cereals, clothes and hair dressing.

Education:

1. 2011-2014: PhD (Sociology/Anthropology), University of Nairobi
2. 1998 – 2000: Masters in Arts (Sociologist/Anthropology), University of Nairobi
3. 1990-1994: BA (Sociology and Anthropology), University of Nairobi

Employment Record:

2005 – 2016: Senior Research Officer (Socio-economics department), Kenya Agriculture and Livestock Research Organization. Sociologist, Geospatial Solutions Ltd.

1999 – 2001: Community Development worker, UNESCO (United Nations Educational, Scientific and Cultural Organization) Activities

2001: Researcher, Institute for Development Policy and practice

1997: Social Worker, Maria Immaculate Health Project

1990: Research Assistant, University of Nairobi - Sociology Department

Activities

- 2018 – Sociologist, Resilience Context Analysis study for Kenya supported by IGAD
- 2017 – Sociologist, impact study on climate change and coping strategies in Isiolo county by the pastoralists communities.
- 2016 - Sociologist, Mid Term Evaluation of Hunger Safety Net Programme Phase II (2012 – 2017) Social Protection Rights Component Wajir, Mandera, Marsabit, Turkana for HELP Age International.
- 2014 – Sociologist, World Bank Funded projects in Northern Kenya – Vulnerable CBOs including single mothers.
- 2012, Sociologist, Social Worker in Maria Immaculate Community healthy project - counseling women involved in taking and selling alcohol. Rehabilitant of street girls and offering basic business skills to them.
- 2011 – Sociologist, impact study on climate variability on coping strategies of the pastoralists communities of Isiolo County
- 2010, Sociologist, Preliminary Environmental and Social Impact Assessment on irrigation of Kalacha Oasis in Northern Kenya EU/KASAL
- 2008, Sociologist, baseline study to establish the status of hides and skins.
- 2005, Sociologist, baseline on the status of camel milk production in Northern Kenya.

Languages:

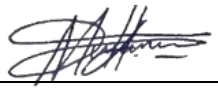
English, Kiswahili

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes

me, my qualifications, and my experience. I understand that any willful misstatement described

herein may lead to my disqualification or dismissal, if engaged.



Date: ***31/10/2022***

[*Signature of staff member*]

Full name and Signature of authorized representative:

LOISE MAKENA MUTURIA Signature: ……

UNIVERSITY OF NAIROBI

This is to certify that

A. Wanjiku Kagunyu

having satisfied the requirements
for the award of the degree of the

BACHELOR OF ARTS
(IN ANTHROPOLOGY)

Second Class Honours (Upper Division)

was admitted to the degree
at a Congregation held at
this University on the

Twenty Second Day of October in the Year
1990

I Certify that this is a true Copy
of the original
MAGDALINE C. NG'ETICH - ADVOCATE
P. O Box 29899-00100, NAIROBI

Philip M. Mbithi
VICE - CHANCELLOR

N. D. Bwibo
DEPUTY VICE - CHANCELLOR (ACADEMIC AFFAIRS)

UNIVERSITY OF NAIROBI

This is to certify that

Anastasia Wanjiku Kagunyu

having satisfied the requirements
for the award of the degree of the

MASTER OF ARTS
(IN ANTHROPOLOGY)

was admitted to the degree
at a Congregation held at
this University on the
Thirtieth Day of September in the Year
1998

VICE CHANCELLOR

DEPUTY VICE CHANCELLOR (ACADEMIC AFFAIRS)

20.1.7 Paul Owino Odak

Proposed Position: Planner

Name of Firm	:	Geosurveys and Geospatial Info Ltd
Name of staff	:	PAUL OWINO ODAK
Profession	:	Geo-Information Expert/Surveyor/Planner
Date of Birth	:	1981
Year with Firm	:	7 Years
Nationality	:	Kenyan

Membership in Professional Societies

- Full member, Institution of Surveyors of Kenya (ISK)-2016
- Graduate Member, Town and County Planners Association of Kenya (TCPAK)-2016
- Graduate Member, Kenya Institute of Planners
- Associate Member – Environmental Institute of Kenya (EIK)
- Associate Expert- Environmental Impact Assessments and Audit
- Certified ISO -2008-2015 QMS Auditor

Detailed Tasks Assigned

The Consultant will be responsible for Collection, Preparation, Analysis and Production of all spatial related data and plans related to the specific assignment.

Key qualifications

Mr. Odak is a Spatial Planner and Geospatial Engineer with interests in the areas of Land Management, Urban Transportation, Geographical Information Systems (GIS) and Environmental Sustainability. He currently works with Kenya Urban Roads Authority as the Assistant Director in Charge of Survey and Mapping Services. He has particular research and Consulting/business interest in the areas of Land management, Environmental Sustainability, Urban Planning and Geographical Information Systems (GIS). He is a Registered Surveyor with the Institution of Surveyors of Kenya with over 10 years' experience in Project management having participated in large scale projects in Kenya and East Africa as Project Surveyor/GIS expert.

Mr. Odak has successfully provided spatial planning services for numerous projects. The most recent ones include the Migori County Spatial Plan, Isibania Town Plan, Lodwar Town Plan, Brookside Dairy Factory expansion in Ruiru, EIA Study for Entarara irrigation Project in Kajiado, Simulator Facilities for Kenya Airways Embakasi, Project for the dualling of Nairobi Eastern and Northern bypasses and several housing projects, banks and retail centres amongst others. He has also carried out Aerial Mappings, Topographical Surveys, Feasibility Studies, Development Appraisals, and Engineering Designs of Several Projects within Kenya.

Mr. Odak has specialized Computing skills in GIS mapping software such as ESRI ArcGIS, QGIS, Remote Sensing technologies such as ERDAS IMAGINE, Global Navigation Satellite Systems (GNSS) Survey systems, Aerial and Terrestrial Mapping Systems, Computer Aided Designs specifically in AutoCAD and AutoCAD Civil 3D.

These attributes equip him to handle large multi-disciplinary projects of any nature.

Education:

2012- 2015 : MA (Planning). The University of Nairobi, Kenya

2002-2007 : BSc (Surveying). The University of Nairobi, Kenya

Other Specialized Trainings:

2019: Regional Center for Mapping of Resources for Development (RCMRD) – Course on GNSS and CORS Survey
2018: Kenya School of Government: Senior Management Course
2017: Oakar Services: Surveying Using Advance GNSS Techniques
2017: Metrysis Systems: Bentley Micro station Connect Edition
2016: Institution of Surveyors of Kenya (ISK) - Diploma for Full Membership
2015: Kenya Bureau of standards; ISO Quality objectives Setting and Process Monitoring
2014: World Bank Institute [WBI]; Integrated Urban Transport Planning
2014: Africa Nazarene University; Environmental Impact Assessment and Environmental Audit [EIA/EA] Course
2013: Esri Eastern Africa; GIS Desktop I, II, III, Work Flow and 3D analysis
2013: Kenya Institute of Administration; Customer Care Etiquette and Protocol
2012: Oarkar Services Ltd: Fundamentals of ERDAS IMAGINE I & II
2012: East African Real Estate training Center (EARRETC): Advanced Surveying Techniques
2012: Land Development and Governance Institute: Seminar on the New Land Laws
2011: Mohemkorp Associates Ltd; ISO 9001:2008 QMS
2011: Gath Management Ltd; AutoCAD Level 2 and AutoCAD Civil 3D
2010: Kenya Institute of Highways and Building Technology (KIHBT); Roads 2000 Roads Maintenance management System (RMMS)
1999: Agape Counseling and Training Services; Peer Counseling

Countries of Experience: Kenya, Somali Land

Languages

	Speaking	Reading	Writing
Kiswahili	Good	Good	Good
English	Excellent	Excellent	Excellent
French	Fair	Fair	Fair

Employment Record:

Assistant Director (Survey and Mapping): Kenya Urban Roads Authority (KURA):

Assisting in developing and reviewing policies, plans and strategies on surveying and mapping; overseeing maintenance of road reserve boundaries; reviewing of engineering and cadastral survey reports; coordinating publication of plans, maps and charts; providing guidance on standardization and

certification of survey equipment; overseeing monitoring and evaluating the survey and mapping activities; overseeing preparation and submission of technical and administrative reports of the section; overseeing angular observation tasks, trigonometric heighting, triangulation, computations using resection solution, twin station problems and reestablishment of lost trig points by the staff; coordinating, supervising, mentoring and training of section staff; providing guidance on standardization and certification of survey equipment used for road projects; and monitoring and evaluation the integrity of survey work done for road works. Overseeing the preparation of road reserve and asset protection work plans; overseeing the cadastral survey and mapping of land assets (camps, quarry sites, children parks and road reserves); supervising the data collection and analysis of the status of the road reserves; organizing and facilitating the opening of road reserves and ensuring the removal of illegal structures/utilities, and preparation of the necessary reports and documentation; liaising with other road Authorities, stakeholders and ensuring harmonious and coordinated operations related to road asset/reserve protection; organizing and facilitating the rehabilitation of road reserves damaged by floods and liaising with the Disaster Management team, where necessary; identifying G I S a n d survey requirements as well as standards for road reserve acquisition and protection.

SENIOR SURVEYOR: Kenya Urban Roads Authority (KURA):

Preparation of survey annual work plans, Undertaking surveys, mapping and GIS functions required in the design, construction and maintenance of road projects, Provision of survey data during feasibility studies and final designs, Identifying survey requirements and standards for specific areas, Overseeing the accurate mapping of roads, road reserves and related functions in digital form, Maintaining inventory of roads records, Organizing and preparing survey specifications and Terms of Reference for survey work, Carrying out evaluation and certifying works submitted by Survey and Mapping Consultants, Supervision of civil works during construction, Liaison with other departments in the Authority, Ministries and Agencies on survey matters, Supervises work of survey consultants engaged by the Authority, Preparation of periodic reports for the section.

GIS SPECIALIST: Kenya National Bureau of Statistics. (KNBS)

General editing of field Manuscripts and collecting spatial and attribute data of facilities and points of interests using GPS, Preparation and data capture of all the field manuscripts for both rural and urban areas, GIS Geo-database development of all the enumeration areas and the administrative Units, Prepare the Enumeration Area Maps according to the set out specifications

CONSULTING TOPOGRAPHER: UNA Somalia. (SWM project under SUDP program).

Conduct a topographical survey of solid waste disposal sites including detailed spot heights and picking all site boundaries and physical features on site.(2.5 hectares average each for eight sites in Hargeisa, Borama, Gabiley and Sheikh towns), Demarcate the site boundaries with ground beacons and Overlay the site boundaries(including contours) on the respective georeferenced satellite image, Produce AutoCAD drawings and shape files of the solid waste disposal sites in both electronic and hard copy format. July 2008:

SURVEYOR: Log Associates Ltd, Nairobi.

Field Surveys and data reduction, (Topographical Surveys, Cadastral traverse Surveys, Leveling, GIS data acquisition, processing, quality control, analyses and visualization, Project supervision and Report writing, Writing Proposals and Expression of Interests (EOIs)- September 2007_-july 2008

SELECTED WORKS UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE TASKS ASSIGNED

From	To	Company/Project/Position/Relevant Technical & Management Experience
Dec 2020		Member of the Select Committee for the Preparation of Physical and Land Use Planning Act (PLUPA 2019) regulations.
2015	Geosurveys and Geospatial Info Ltd *Physical Planner*	***Preparation of Awendo Integrated Urban Development Plan for 2015 – 2035*** Preparation of Awendo ISUDP included interpreting regional physical development policies in terms appropriate to the local areas; articulating the aims of the Migori County Government and the Urban Management Authority for the areas together with strategies, policies and general proposals which are intended to achieve those aims; providing a framework for detailed development policies and proposals for subsequent short-term plans for the area; indicating action area for immediate development or re-development; and providing a coordinated basis upon which various implementing agencies can develop their individual programmes of work for which they have executive responsibility, for example, housing, transportation, water supply, electricity supply, sewerage development, etc.; *Roles* • Project reconnaissance survey • Compiling project inception report • Coordinating all-sectors data collection, analysis and presentation • Worked closely with sectoral heads in harmonising the report content to ensure quality • Integrating sectoral reports including transport sector, housing and human settlement, environmental, physiographic characteristics, among others

Sept, 2017	Present	Name of assignment/Job or project: Design Review and construction Supervision of the project for the Upgrading to Bitumen standards of Ngong Road Phase I, II and III Client: Kenya Urban Roads Authority Main Project Features: Control Survey, Topographical Survey, Levelling, Measurements of quantities, horizontal and vertical Designs, Position held: Project Surveyor Activities Performed: Setting up of horizontal and vertical controls, detail picking of features, analysis of data, preparation and presentation of topographical maps/drawings, production of plan and profile for designs, setting out of designs, measurements of construction quantities, general project management.
Sept, 2016	2019	Name of assignment/Job or project: Design Review and construction Supervision of the project for the Upgrading to Bitumen standards of Waiyaki Way-Red Hill Link Road Client: Kenya Urban Roads Authority Main Project Features: Control Survey, Topographical Survey, Levelling, Measurements of quantities, horizontal and vertical Designs, Position held: Project Surveyor Activities Performed: Setting up of horizontal and vertical controls, detail picking of features, analysis of data, preparation and presentation of topographical maps/drawings, production of plan and profile for designs, setting out of designs, measurements of construction quantities, general project management.
Global Geo-systems Ltd *Physical Planner*	Kenya	*Preparation of Isibania Integrated Urban Development Plan for 2015 – 2035.* Preparation of Isibania ISUDP included interpreting regional physical development policies in terms appropriate to the local areas; articulating the aims of the Migori County Government and the Urban Management Authority for the areas together with strategies, policies and general proposals which are intended to achieve those aims; providing a framework for detailed development policies and proposals for subsequent short-term plans for the area; indicating action area for immediate development or re-development; and providing a coordinated basis upon which various implementing agencies can develop their individual programmes of work for which they have executive responsibility, for example, housing, transportation, water and electricity supply, sewerage development, etc.; *Roles* • Project reconnaissance survey • Compiling project inception report • Coordinating all-sectors data collection, analysis and presentation • Worked closely with sectoral heads in harmonising the report content to ensure quality

Global Geo-Systems Ltd *Consultant*	Kenya	Feasibility study for the construction of a Commercial Office Block on LR 209/7753 along Ngong Road for the National Oil Corporation of Kenya (NOCK) to inform the investment decision on among others; design, scale, financing and returns for this project. *Roles:* i. Resource person
July 2012	Sept 2014	Name of assignment/Job or project: Design Review and construction Supervision of the project for the Upgrading of Langata road. Client: Kenya Urban Roads Authority Main Project Features: Control Survey, Topographical Survey, Levelling, Measurements of quantities, horizontal and vertical Designs, Position held: Project Surveyor Activities Performed: Setting up of horizontal and vertical controls, detail picking of features, analysis of data, preparation and presentation of topographical maps/drawings, production of plan and profile for designs, setting out of designs, measurements of construction quantities, general project management.
Jan 2010	March 2010	Name of assignment/Job or project: Solid Waste Management (SWM) project under Somaliland Urban Development Program (SUDP) program.Client: UNA Somalia Main Project Features: Conduct a topographical survey of solid waste disposal sites including detailed spot heights and picking all site boundaries and physical features on site. (2.5 hectares average each for eight sites in Hargeisa, Borama, Gabiley and Sheikh towns), Demarcate the site boundaries with ground beacons and overlay the site boundaries (including contours) on the respective georeferenced satellite image, Produce AutoCAD drawings and shape files of the solid waste disposal sites in both electronic and hard copy format. Position held: Consultant Topographer Activities Performed: Setting up of horizontal and vertical controls, detail picking of features, analysis of data, preparation and presentation of topographical maps/drawings, production of plan and profile for designs, setting out of designs, Placing and marking of sites using beacons.

Sept, 2008	Dec, 2010	Name of assignment/Job or project: Nationwide Census Mapping Client: Kenya National Bureau of Statistics (KNBS) Main Project Features: GPS/GIS mapping of all enumeration areas in Kenya in preparation for the National population and housing census Position held: GIS technician Activities Performed: Geo-referencing of base Maps, Database creation, digitizing of vector data, preparation and production of maps.
Dec 2007	Sept 2008	Name of assignment/Job or project: Smallholder Irrigation Program Mount Kenya Region (SIPMK). Client: Ministry of Water and Irrigation Main Project Features: Detailed Design and Construction Supervision Services for Kithumbu Irrigation Scheme (Kirinyaga District) and Mbuiru Mwanjati Irrigation scheme (Embu/Meru). Position held: Surveyor/GIS Expert Activities Performed: Geo-referencing of base Maps, Database creation, digitizing of vector data, preparation and production of maps, Control Surveys, detail picking, production of GIS/CAD drawings, designs and construction supervisions

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes

me, my qualifications, and my experience. I understand that any willful misstatement described

herein may lead to my disqualification or dismissal, if engaged.

Date: ***31/10/2022***

[*Signature of staff member*]

Full name and Signature of authorized representative:

LOISE MAKENA MUTURIA Signature: ……

UNIVERSITY OF NAIROBI

This is to certify that

Paul Owino Odak

having satisfied the requirements
for the award of the degree of the

BACHELOR OF SCIENCE
(IN SURVEYING)

Second Class Honours (Upper Division)

was admitted to the degree
at a Congregation held at
this University on the

Seventh Day of September in the Year
2007

I Certify that this is a true Copy
of the original
MAGDALINE C. NG'ETICH - ADVOCATE
P. O Box 29899-00100, NAIROBI

VICE-CHANCELLOR

DEPUTY VICE-CHANCELLOR (ACADEMIC AFFAIRS)

1972

UNIVERSITY OF NAIROBI

This is to certify that

Paul Owino Odak

having satisfied the requirements
for the award of the degree of the

MASTER OF ARTS IN PLANNING

was admitted to the degree
at a Congregation held at
this University on the

Fourth Day of September in the Year
2015

I Certify that this is a true Copy
of the original
MAGDALINE C. NG'ETICH - ADVOCATE
P. O Box 29899-00100, NAIROBI

VICE-CHANCELLOR

DEPUTY VICE-CHANCELLOR (ACADEMIC AFFAIRS)

0217

KUPIMA NA KUKADIRI

This Diploma - Certificate

IS TO CERTIFY THAT

Odak Paul Owino

WAS ON THE 8th DAY OF April 2016

ELECTED A FULL MEMBER OF

The Institution of Surveyors of Kenya

Chapter of Engineering Surveyors

CHAIR, PROFESSIONAL PRACTICE & ETHICS COMMITTEE

CHAIRMAN

I Certify that this is a true Copy of the original

MAGDALINE C. NG'ETICH - ADVOCATE
P. O Box 29899-00100, NAIROBI

This Diploma certificate is held subject to annual notification of its renewal and under conditions of Rule 10 (a) and (b) of the By-laws.

REGISTER NUMBER 1063