ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED RESIDENTIAL APARTMENTS ON L.R. NO: 27253/106 IN SYOKIMAU, MAVOKO SUB-COUNTY, MACHAKOS COUNTY.

GPS COORDINATES: -1.382807, 36.920089; Latitude and Longitude Respectively.

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MARCH 2024

DECLARATION AND SUBMISSION

We **Ecotech Management & Technologies Consultants** (Reg. No 8215), on the behalf of the proponent, **Azure Sky Investment Ltd** of **P.O Box 51303 - 00200, Nairobi**, Kenya, submit the following Environmental Impact Assessment Study Report, for the proposed Residential development in Syokimau, Mavoko Sub-county in Machakos County. The Environmental Impact Assessment Study Report has been carried out according to the Environmental Management and Coordination Amendments) Act, 2015 and Environmental (Impact Assessment and Audit) Regulations, 2003; 2019. To the best of our knowledge; we declare and submit that all information contained in this report is an accurate and a truthful representation of the Environmental Impact Assessment Study Report of the proposed Residential Development Project.

Key Expert:

S/N	Name of Expert	Expertise Area	Signature
1.	Moses Muisyo	**Project EIA Lead Expert**: Environmentalist, Health and Safey	
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3.	Anthony Makau	Lead Expert: Policy and Legal Framework	
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Designation PROJECT MANAGER — Signature .....

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LIST OF ACCRONYMS AND ABBREVIATIONS

CBD	Convention on Biological Diversity
EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMC	Environmental Management and Coordination
EMCA	Environmental Management and Coordination Act
EMMP	Environmental Management and Monitoring Plan
EOHS	Environmental, Occupational Health and Safety
GOK	Government of Kenya
GPS	Global Positioning System
KPLC	Kenya Power and Lighting Company
L.R	Land Reference
MAVWASCO	Mavoko Water and Sewerage Company
ME&NR	Ministry of Environment and Natural Resources
MSDS	Material Safety Data Sheets
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
OHS	Occupational Health and Safety
OHSA	Occupational Safety and Health Act
SDGs	Sustainable Development Goals
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Ecotech Management & Technologies Consultants, a NEMA registered EIA/EA Firm of experts has been contracted by the proponent to carry out an Environmental Impact Assessment Study report for the proposed residential apartments (3 blocks of 3 and 6 bedroom apartments, minimarket, kindergarten, children play area and gym and swimming pool facilities (Block C Building) on No: 27253/106 in Syokimau area, Mavoko Sub-County, Machakos County located off Mombasa Road, in Syokimau area, Mavoko Sub-county, Machakos County. A change of use for the proposed development has been acquired from Mavoko Sub-County, Machakos County.

This document is an EIA Study Report for the proposed residential development project in Syokimau, Mlolongo town, Machakos County. The proponent is committed to ensure that the ecological integrity, healthy and sustainability of the environment is not compromised. This necessitated the undertaking of this EIA process. The proponent through the engagement with the environmental consultants has ensured that this new project undergoes an EIA process in an effort to comply with the legal requirement of the Government of Kenya on the fulfilment of the Environmental (Impact Assessment and Audit) regulations 2003; 2019 and EMCA, 1999 (Amendments, 2015).

The purpose of conducting the EIA process was to predict, assess and analyze all possible positive and negative impacts that the project might have on both the natural and human environment and suggest the appropriate mitigation measures for the significant negative impacts and design an Environmental Management Plan (EMP) to address the negative environmental impacts associated with the proposed residential apartment's project. The scope of this report was to describe the project, document all baseline information, legal and regulatory frameworks associated with the project, analyze the project alternatives, assess both the positive and negative impacts and develop mitigation measures for negative impacts and design an EMP for the project. The EIA reporting exercise, inter alia, constituted the following elements:

- Description of the project location, objectives, scope and justification.
- Evaluation of the project locations, methodologies, procedures and processes to be used in the implementation of the project with other available methodologies and describing any alternatives.
- Conducting a site visit, opportunistic observations, public consultations and personal interviews.
- Evaluation of the products, by-products and wastes likely to be generated by the project.
- Evaluation of the environmental and social effects of the project including socio-cultural effects, direct and indirect effects, short and long term effects on pre-project, project construction and post-project operations.
- Analysis of legal and policy framework relevant to the residential housing sector.
- Drawing up an Environmental Management Plan (EMP) proposing measures for eliminating, minimizing or mitigating any adverse impacts on the environment including their cost, timeframe and the responsibility for implementation.
- Drawing up an action plan for prevention and management of foreseeable accidents and other worker related hazards during the construction and occupation phases of the project and preparing a final EIA Study Report for submission to NEMA.

Project Objectives

The objectives of the proposed project include:

i. To construct one hundred and eight 188 housing units in Syokimau area.
ii. To put the current land into more productive and economic use.
iii. To meet the economic desires of the proponent.

Objectives of the EIA

The objectives of undertaking the EIA were as follows;

i. To identify potential environmental impacts of proposed project and assess the significance of these impacts.
ii. To assess the relative importance of the various project alternatives.
iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
iv. To seek the views and concerns of all the Project Affected Persons (PAPs) in regards to the proposed project.
v. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle.
vi. To develop comprehensive Environmental Management Plan (EMP) for the project cycle with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures.
vii. To present the results of the EIA in such a way that they can guide informed decision making.

Legal and Administrative Frameworks

The proposed project is governed by County and National legal regulatory and policy framework, which, among others, are meant to ensure good environmental practices at all stages of the project life-cycle. The proposed two block residential apartment's project is in line with Kenya Vision 2030, Poverty Reduction Strategy Paper (1999), National Housing Policy, 2004 and the Government of Kenya Agenda Four-National Affordable Housing. The project implementation will be affected by several legislations and subsidiary legislations as outlined in Chapter Four of this report. They include: Public Health Act, Cap 242, Water Act 2016, Factories Act, Cap 515, Local Government Act, Cap 265, Penal Code, Cap 63, Energy Act, 2006, Electric Power Act, 1997, OSHA 2007, The Physical Planning Act of 1996 CAP 286, The County Governments Act 2012/2017, EMCA (Water Quality) Regulations 2006, EMCA (Waste management) Regulation 2006, EMCA (Noise and Excessive Vibration Pollution Control) Regulations 2009, EMCA (Air Quality) Regulations 2014 and The Land Planning Act, Cap 303 among others.

Methodology

The EIA process was carried out using a combination of methods including physical examination; site assessments; literature reviews; and informal interviews/ questionnaires administration with stakeholders' e.g. immediate neighbors and business persons.

The key approach utilized included the following:

i. Environmental screening of the proposed project in line with EMCA Cap 387, The Environmental (Impact Assessment And Audit) Regulations, 2003; Revised 2019. We established that the development falls under High Risk Projects (Urban development including establishment of new housing estate developments exceeding one hundred housing units).
ii. A site reconnaissance and visual survey to determine the baseline information of the project area.
iii. Analysis of the project documents such as the architectural plans with the proponent and project team.
iv. Assessment of occupational health and safety issues during the implementation of the project.
v. Seeking public views through a public meeting, direct interviews and administering of questionnaires.
vi. Proposal of feasible mitigation measures to minimize anticipated negative impacts during the project cycle.
vii. Preparation and submission of the EIA Study Report to the National Environment Management Authority (NEMA).

Environmental Impacts and Mitigation Measures

The potential negative environmental impacts of the proposed project and possible mitigation measures are summarized below:

Table 1: Summary of the Environmental Impacts and Mitigation Measures

Anticipated Impacts	**Mitigation Measures**
Increased Traffic	• Ferry building materials during off-peak hours. • Employ traffic marshals to control traffic in and out of site. • Provide bill boards at the site/entrance to notify motorists and general public about the proposed project. • Enforce speed limits for construction vehicles especially along the roads leading to the site. • Develop a traffic management plan to ensure that the site vehicles do not interfere with the regular traffic along the access roads. • Ensure that the vehicles comply with axle load limits. • Employ well trained and experienced drivers
Solid waste	• Engage the services of registered waste handler to transport the waste at the designated areas. • Covering of trucks when transporting building materials and waste. • Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse. • Provision of waste management room at a strategic place within the apartments for segregation and disposal of the waste. • Efficient use of the materials to reduce waste and recycling/reuse where feasible.

Anticipated Impacts	Mitigation Measures
	• Monitor waste in line with the waste management regulations
Liquid waste	• Channel all liquid waste to the existing MAVWASCO sewer line or install an onsite waste management system. • Conduct routine inspection and monitoring of the internal drains to identify and repair any leakages and blockages. • Provision of sanitary facilities to the workers during the construction and proper decommissioning of the facilities once construction is complete. • All waste pipes will have rodding eyes accessible from outside i.e. free to every part of the system for inspection, cleaning and repair. • Regular inspection and maintenance of the internal sewer system.
Increased water demand	• Drill a borehole to supplement the existing water supply. • Connect to the existing water supply after acquisition of the relevant permits. • The contractor will engage the eservices of water vendors to supplement the water supply. • Use of water efficient appliances and fixtures for plumbing products and white goods. • Provision of adequate underground and roof water tanks for water storage.
Air Pollution	• Use of dust screens/nets around the construction site to contain and arrest dust. Regular sprinkling of water on work areas to prevent fugitive dust violations especially during the dry spell. • Ensure no burning of waste such as paper and bottles on site/non-designated areas. • Covering and regular watering of the exposed stockpiles on site such as the sand and ballast. • Regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases.
Noise Pollution	• Construction works will be carried out during the day between 0800 hrs to 1700 hrs. • The contractor shall use noise shields on noisy equipment such as corrugated iron sheet structures. • All noisy activities shall be scheduled concurrently during the construction to reduce the exposure period. • Operation of the noisy machinery shall be carried out when necessary and switch them off when not in use.

Anticipated Impacts	Mitigation Measures
	• Provide and enforce use Personal Protective Equipment (PPE) by the workers at all times during the construction.
Energy Demand	• Use of solar energy as an alternative source of energy. • Install and routine maintenance of energy efficient fixtures and fittings. • Turn off the machinery and equipment when not in use. • Put off all the lights immediately when not in use. • Regular inspection and repairs of the solar panels
Occupational Health and Safety of workers and public	• Workers shall use properly fitting PPEs to avoid accidents, injuries and illness • The contractor shall adapt a suitable emergence response plans to manage occurrence of anticipated hazards during construction phase. • Provide appropriate signage and warnings in work areas. • Provide first aid facilities and ensure that workers are trained on emergency response such as first aid skills. • Workers shall always be sensitized on social issues such as drugs, alcohol, diseases such as HIV/AIDS and STIs etc. • Provide adequate and functional sanitary facilities for the workers. • Comply with OSHA 2007 and all other relevant regulations governing health and safety of workplaces
Fire risks/incidences	• Place portable fire extinguishers at suitable locations; • Combustible materials used during construction should be stored away from source of ignition; • Smoking on site or burning of waste should be prohibited so as to reduce the source of ignition at the workplace; • Electrical works such as electrical wiring should be done by qualified technicians or engineers to ensure shoddy work which could pose a danger to the development does not occur; • Train and induct workers on the use of fire extinguishers and other fire-fighting equipment; • Designate a fire assembly point;
Storm Water Management	• Ensuring that the speed of the storm water is reduced as it flows downstream; • Using materials that mimic natural percolation of water.

Anticipated Impacts	Mitigation Measures
	• Landscaping to ensure there are areas where water will percolate underground. • Constructing proper drains and monitoring them to ensure there are no blockages;

Conclusion and Recommendations

The proposed project will have numerous benefits to the housing sectors in the area and the country at large. However, the development might cause negative impacts hence the need to mitigate them in order to reduce their adverse effects to the environment. The study evaluated the anticipated impacts and developed an EMMP which should be implemented by the proponent to ensure environmental protection, health and safety of the workers and the general public. It is therefore our recommendation that the proponent be granted an EIA license to implement the proposed project.

CHAPTER ONE: INTRODUCTION

1.1 Project Background

Housing market in Kenya has recently become one of the most lucrative businesses, many development companies and individuals are now putting up modern housing units for rental and sale, this has become possible by the many banks and financial institutions which are now offering loans and mortgages to both developers and home buyers at subsidized rates. The proposed residential development is privately owned and is targeted for rental/ sale purposes. The Architectural and structural drawings for the proposed structure have been approved by the Machakos County Government as well as the change of use. The report gives in detail the project background, its goal and objectives, scope, project justification and cost, baseline information, Policy- legal and institutional framework governing the exercise, identification of impacts and their respective mitigation measures, a clear description of the project's alternatives and a comprehensive environmental management plan to avert or minimize the anticipated impacts.

1.2 Principle of Environmental Impact Assessment

The fundamental principle of the EIA is that every person is entitled to a clean environment and that every person has a duty to enhance and safeguard the environment. EIA is a planning tool which presents methodologies and techniques for identifying, predicting and evaluating potential environmental impacts of the projects, policies, plans and programmes in the project cycle (planning, implementation and decommissioning phases). EIA presents decision with the information necessary to determine whether or not a project should be implemented.

1.3 Project Objectives

The objectives of the proposed project include:

i. To construct One hundred and eighty eight (188) housing units in Syokimau area.
ii. To put the current land into more productive and economic use.
iii. To meet the economic desires of the proponent.

1.4 Objectives of EIA

The overall objective of EIA is to ensure that environmental concerns are integrated in the proposed project in order to contribute to sustainable development. The specific objectives are:

i. To identify potential environmental impacts of proposed project and assess the significance of these impacts.
ii. To assess the relative importance of the various project alternatives.
iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
iv. To seek the views and concerns of the PAPs in regards to the proposed project.
v. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle.

vi. To develop Environmental Management and Monitoring Plan (EMP) for the project cycle.
vii. To present results of the EIA Study Report in such a way that they can guide informed decision making.

1.5 Project Justification

The need to undertake an EIA for the project emanated from the following observations. Under section 58 (1) *of Kenya Government's Environmental Management and Coordination Act (EMCA)*, *Number 8 of 1999 (Amendments, 2015)* and *Environmental Impact Assessment and Audit Regulations of June, 2003; 2019,* an EIA study is necessary and a fully detailed EIA Study Report depending on the nature of the project is to be compiled and submitted to NEMA for approval before commencing any proposed development. The basis for undertaking this EIA Study was that the proposed residential development project constitutes several activities, which would generate considerable changes and significant effects to the environment including land, water, atmospheric resources and biological diversity. The EIA Study was thus designed to establish, in advance, some appropriate level of environmental management measures for synchronization with project activities from the planning, implementation, operation and decommissioning stages. The key driving force under which the proponent is developing the project is through the following:

a) Demand for Housing

Housing has for a long time been recognized as a basic human need, with even recent suggestions that it be made a basic human right.

The population of Kenyans towards Nairobi and its surroundings has been rapidly increasing over the years resulting to the inability of most existing accommodation facilities to fully cater for the accommodation demand.

The proposed development therefore comes as a timely venture to cater for the existing accommodation deficit more specifically in Syokimau area and its environs.

b) Adjacent Land use analysis

Currently there are developments adjacent to the site. The common land uses surrounding the project site are high-rise residential developments

c) Economic Benefits

The proposed development will have various economic benefits. The development will create direct and indirect employment opportunities and the proprietor will be able to generate more income thus enhance their livelihood. The Machakos County Government will raise extra revenue from both the enhanced Land Rates and approval fees. The central government will also get more revenue in the form of enhanced Land Rent.

1.6 Terms of Reference of the E.I.A

The Terms of Reference (TORs) for this Environmental Impact Assessment study report are based on the approved TORs issued by NEMA on 16th February, 2024, under Reference Number: NEMA/TOR/5/2/674.

The general Terms of Reference (ToRs) for this study was to conduct an EIA study for the proposed Residential Apartments project with associated civil works on No: 27253/106 in Syokimau area, Mavoko Sub-County, Machakos County, Syokimau Machakos County. This is in accordance with NEMAs' Environmental (Impact Assessment and Audit) regulations, 2003 under the Environmental Management and Coordination (Amendments) Act, 2015. Specifically this assessment was commissioned under the following Terms of Reference;

- ✓ To carry out assessment and description of location/site, objectives, scope, nature of the proposed project;
- ✓ To carry out analysis of the proposed project activities during the proposed project cycle; construction, operation, decommissioning phases;
- ✓ To establish the suitability of the proposed project in the proposed location;
- ✓ To review baseline information (Physical, Biological and Social Cultural and economic) and identify any information gaps;
- ✓ To describe and analyze relevant policies, legal and institutional framework including but not limited to Kenyan policies, laws, regulation and guidelines; international guidelines, international conventions and treaties to which Kenya is party to, related to the proposed project, which have a bearing on the proposed project and which also serve as benchmarks for monitoring and evaluation, and future environmental audits;
- ✓ To do an in-depth description of the proposed project and associated works together with the requirements for carrying out the works;
- ✓ To analyze the efficacy of the designs, technology, procedures and processes to be used, in the implementation of the works;
- ✓ To carry out Consultation and Public Participation (CPP): Identify key stakeholders and affected persons**;** Securing written submissions from Lead Agencies (including but not limited to; Water Resources Authority. Public health, physic planning, county government, lands) and the public and administration of questionnaires and undertaking informal interview sessions;
- ✓ To identify and analyze proposed project alternatives including but not limited to: scale and extent; project site alternatives, no project alternatives, design alternatives, material, processes and technologies alternatives. Giving reasons for the preferred and proposed alternatives;
- ✓ To formulate a detailed plan on the Waste Management and Disposal in accordance with the Environmental Management and Co-ordination (Waste Management) Regulations 2006 and other relevant legislations and guidelines;
- ✓ To adequately identify, predict and carry out in-depth analysis all actual potential and significant impacts on flora, fauna, soils, air , water, the social, cultural and community settings; the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated to be generated by the proposed project, both positive and negative throughout the project cycle;
- ✓ To recommend sufficient mitigation measures for all the potential negative impacts identified and analyzed in 10 above;
- ✓ To develop an emergency response procedure for the proposed project for the entire project cycle;
- ✓ To identify gaps in knowledge and uncertainties which will be encountered in compiling the information?

- ✓ To analyze materials to be used in the construction and implementation of the project, and wastes to be generated proposing alternative/appropriate options/technologies;
- ✓ Analyze occupational health and safety issue associated with the proposed project activities;
- ✓ To develop an Environmental Management Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, time-frame and responsibility to implement the measures;
- ✓ Give details of the total project implementation costs as they relate to the Project EMP;
- ✓ To design and specify the monitoring and audit requirements necessary to ensure the implementation and the effectiveness of the mitigation measures adopted;
- ✓ To prepare a comprehensive EIA Study Report in accordance with EMCA 1999 legislation for submission to NEMA for approval;
- ✓ Submit and present draft EIA Study report to the Azure Sky Investment Ltd management for review;
- ✓ Incorporate proponent's comments into the EIA Study Report after review;
- ✓ Submit 10 hard copies and one soft copy of the EIA Study report to NEMA for the purposes of seeking a NEMA license that will approve the proposed project;
- ✓ Submit to Azure Sky Investment Ltd One hard copy of NEMA referenced EIA Study Report and the acknowledgment letter from NEMA;

1.7 Responsibilities

- Currently there is no adequate water in the project locality hence the need to drill a borehole on the site.
- There will be provision of solid waste cubicles for temporary storage of waste before disposal to NEMA designated waste dumping site by a contracted NEMA registered and licensed waste handler;
- The Machakos County Government will charge a service fee to the occupants/house owners for waste disposal, security, and general/common area cleaning services;
- Once complete, the project will be managed by the proponent to provide maintenance services to the estate;
- There will be a designated proponent representative in charge of the estate.

1.8 Study Approach and Methods

1.8.1 Literature Review

A desk study was conducted to review available reports, plans and maps in order to compile relevant bio-physical and socio-economic information about the study area. The bio- physical information was compiled on environmental aspects such as topography, climate, drainage, soils, geology/hydrogeology, and vegetation among other aspects. The socio-economic environment study covered information on issues such as population, the dimensions of wellbeing and income levels, water supply and sewerage, sanitation levels, cultural beliefs and practices, infrastructure developments political ramifications and community participation.

1.8.2 Field Reconnaissance Survey

The EIA team conducted a reconnaissance survey of the project site in order to familiarize itself with the site location. The reconnaissance survey established the general environmental site conditions, neighboring features and characteristics. The EIA methodology was therefore underpinned by the field reconnaissance survey and as guided by the TOR developed during this reconnaissance survey.

1.8.3 Interviews aim:

To inform local people and leaders about the proposed project;

Interviews with interested and affected parties were conducted with the following objectives;

- To seek views, concerns and opinions of people in the area concerning the project;
- To establish if the local people foresee any positive or negative environmental effects from the project and if so, how they would wish the perceived impacts to be addressed;

This was achieved through informal interview sessions and structured questions administered to the local community residents. (**See attached household questionnaires**)

1.8.4 Direct Observation

Onsite, the experts carried out in-situ analysis and assessments through direct observations of the prevailing environmental conditions.

1.8.5 Report Writing and Documentation

In addition to constant briefing with the client, the impact assessment report will be presented to the client before submission to the National Environment Management Authority (NEMA) as required by the law**.** The review of the EIA Study Report is anticipated to take 45 working days upon which an approval or otherwise determined and communicated to the proponent.

The TOR for this assessment was based on the NEMA Environmental Impact Assessment and Audit Regulations, dated June 2003; revised 2019. These regulations require that the report should contain descriptions of the following where possible:

- The physical location of the project including the baseline conditions of the project area; **Chapter One and Two**
- A description of the project including: project objectives, project design, activities, technology, procedures and processes, materials to be used, products, by-products and waste generated during the project construction, operation and de-commissioning phases; - **Chapter Two**
- Description of the recipient environment; - **Chapter Three**
- A description of the national environment legislative and regulatory framework, baseline information and any other relevant information related to the project; - **Chapter Four.**
- Alternative locations, technologies or processes available; analysis of alternatives, and reasons for preferring the proposed design options; - **Chapter Five**

- The potential environmental effects of the project, including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;- **Chapter Seven**
- An environmental management and monitoring plan matrix outlaying the activities, associated impacts, mitigation measures, monitoring indicators, implementation timeframes, responsibilities, and cost;- **Chapter Eight**
- Public Consultation and Participation as well as measures to prevent health hazards and to ensure security in the working environment for the employees, the project area community and for the management of emergencies;- **Chapter Six**
- Conclusions, recommendations for the success of the project; - **Chapter Nine** and
- Any other information that NEMA may require.

1.9 The Project Cost

The construction is estimated to cost approximately **Five hundred eighty-eight million, one hundred ninety-nine thousand and five hundred thirty Kenyan shilling (Kshs. 588,199,530).**

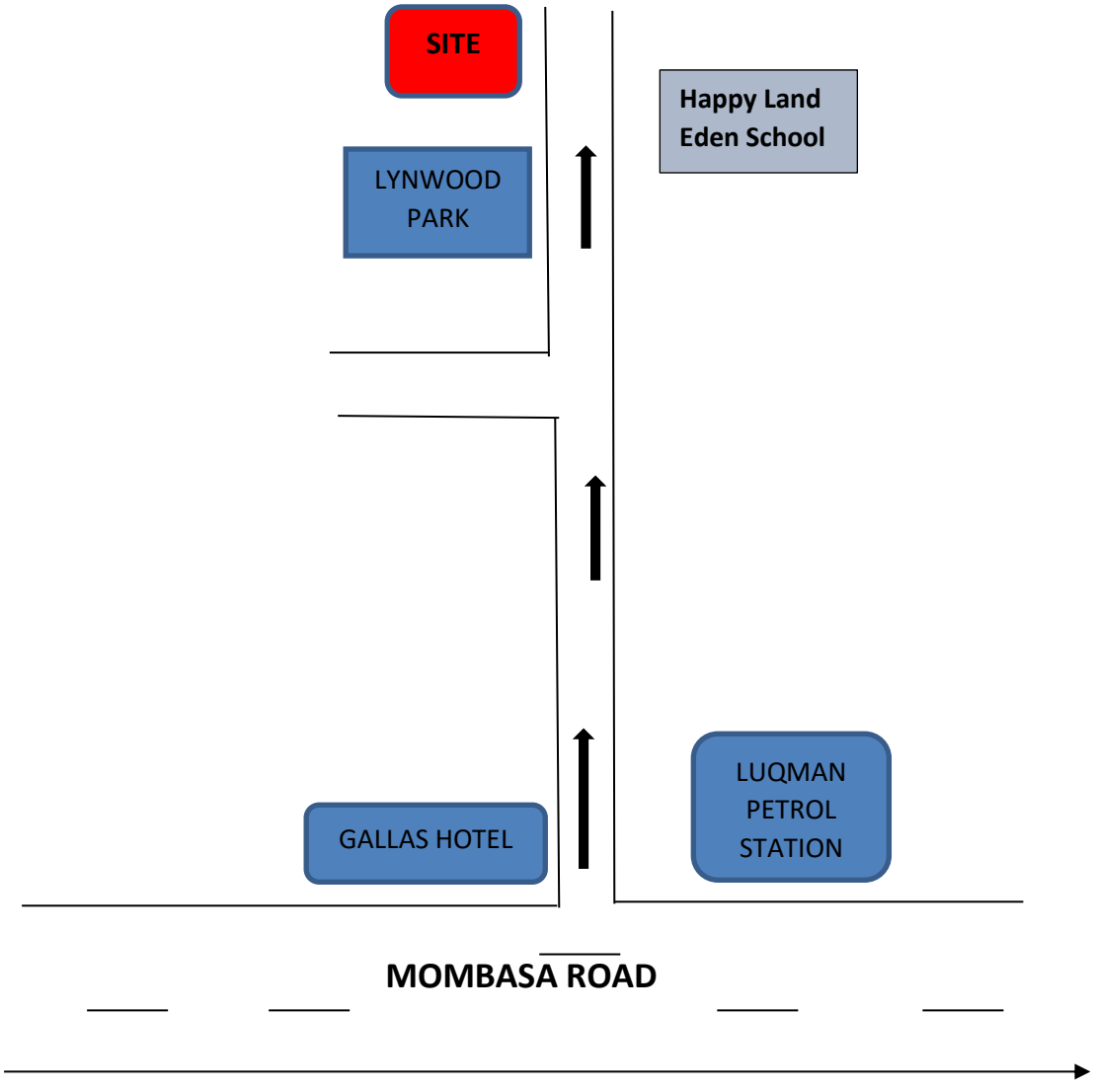
CHAPTER TWO: PROJECT DESCRIPTION

2.1 Location of the Project

The proposed project site is located within Syokimau area in Mavoko Sub-County, Machakos County. The project is located on **Plot L.R. 27253/106** at coordinates - **1.382807** and **36.920089** for Latitude and Longitude Respectively**.** The project location is accessed through an all-weather road breaking from Mombasa Road. The proposed site neighbours several residential apartment's that have come up in the area.

Sketch directions to site

Sketch directions to site



2.2 Project Description

The overall objective of this Project is to develop and avail modern residential apartments in Syokimau area, Machakos County on **Plot L.R. No: 27253/106 in Syokimau, Mavoko Sub-County, Machakos County.** The site falls within a residential area with several upcoming residential developments including a road network, electricity supply and other infrastructure. The main design components of the project include the construction of 2No. Building blocks (Block A and B) of residential apartments with 176 units and 151 parking slots.

2.3 Project components

As mentioned above, the project will have two blocks (Block A and B) with a total of 176 units, residents restaurant at the roof top and 151 parking slots on First and Second floors levels. Specific description are as follows:

Summary of the project description

- **First(1st) and Second (2nd) Floor Levels** will have **151 Parking Slots**
- Third (3rd) Floor Level will have **15 units** in total
- **Forth (4th) to Thirteenth (13th)** will have **typical Floor Plan** and all ten floors will have total of **160 units**
- **Fourteenth (14th)** level floor that is the rooftop will have **1No. Residents restaurant with seating capacity of 64 seats and 1No. 3-bedroom Unit**

Detailed Description for 3rd – 14th floor per block

Third (3rd) Floor level

BLOCK A		**BLOCK B**	
Type of Unit	**No. of Units**	**Type of Unit**	**No. of Units**
1-bedroom Unit	2	1-bedroom Unit	5
2-bedroom Unit	4	2-bedroom Unit	
3-bedroom Unit	2	3-bedroom Unit	1
		Bedsitter	1
Total	8		7

Total Number of units for the 3rd floor level will be 15 Units.

4th -13th Floor Levels (10 floors in total with typical floor plan)

BLOCK A		**BLOCK B**	
Type of Unit	**No. of Units**	**Type of Unit**	**No. of Units**
1-bedroom Unit	2	1-bedroom Unit	6
2-bedroom Unit	4	2-bedroom Unit	
3-bedroom Unit	2	3-bedroom Unit	1
		Bedsitter	1
Total	8		8

Total number of units per floor will be 16 units. The 4th to 13th floors will have a typical floor layout hence each floor having same number of units. The total number for these 10 floors will be 160 Units.

14th Floor level (Roof top)

- Residents restaurant with seating capacity of 64 seats
- 1No. 3-bedroom unit

Details of the Units:

The one, two, and three-bedroom units in the development have common features, such as a lounge, dining area, kitchen, kitchen yard, pantry, balcony, and washrooms. Notably, the two-bedroom units will feature an additional bedroom compared to the one-bedroom units, while the three-bedroom units will include an extra master-ensuite room beyond the two-bedroom units. On the other hand, the bedsitter units will offer a living room, kitchen, and a sanitary facility as their primary features. This diversity in unit configurations provides residents with various options catering to different spatial needs and preferences.

2.4 Raw Materials Inputs

During Alteration/Construction Phase

Raw materials required for the construction of the proposed Azure Sky Investment Ltd residential project will include:

- **Water** for construction, workers' domestic use, dust suppression and material mixing purposes. Water will be obtained from the existing water supply in the project area- MAVWASCO.
- **Cement** for mortar and concrete used in the construction and repairing of walls of the structure walls. Cement will be procured from local suppliers in Mlolongo town.
- **Sand** for building mortar. This will be bought from the neighboring vendors who are selling sand near the project site that include Mlolongo town.
- **Wood** this will be sourced from the nearby sites and vendors within the project site.
- **Concrete stones/blocks/ bricks-**These will be obtained from local hardware suppliers and vendors in Syokimau/ Mlolongo town.
- **Tiles-**Ceramic tiles will be obtained from local hardware and vendors

During Operational Phase

The main raw material inputs required for the operation of the proposed Azure Sky Investment residential project will include:

Water for domestic purposes: This will be obtained from existing water supply in the site project from Mavoko Water and Sewerage Company. The proponent will also install roof gutters for water harvesting as well as drill a borehole on the site.

Electricity for night visibility and security lighting: This will be supplied by the Kenya Power and Lighting Company (KPLC) on a commercial basis. It is expected that the proposed residential apartment's project will exert minimal pressure on the present power supply system in the area.

2.5 By-products of the Project

The main by-products expected from the project during construction will be construction rubbles, rejected concrete blocks and rock rubbles used to construct the foundations and drainage. No by-products are envisaged during the during occupation/ operation phases and by-products during decommissioning phases will include stone debris, iron and steel, wood debris, insulation and electrical wiring, tiles, ceramics and broken glasses.

Waste water management: The proposed project site is located in an area that has a newly constructed sewer line, therefore the proponent need to apply and connect the proposed residential project to this utility for the management of waste water. The manhole for the sewer connection should be heavy duty and the inside face of the wall should be plastered with two courses of 10mm thick cement mortar.
Solid waste management: Solid waste management within the project area is normally an individual responsibility to ensure that all the solid waste generated within their households is properly disposed. It's for this reason that the proponent in partnership with other residents will engage a private service provider who is NEMA compliant (licensed to transport solid waste) to offer his/her services to them at a nominal fee during occupation. In the construction period, the construction waste will be collected by a contracted NEMA registered waste collection company for safe disposal.

Storm water management: The proposed project area is a fairly flat with an undulating topography hence storm water does drain properly when it rains.

A parking space: There are designated personal parking space on the semi basement and Site plan floors. On the semi basement, there are 174 parking spaces while the Site Plan Floor/ Ground floor is having 181 parking spaces. Hence the total parking spaces as per the approved plans is 355.

2.6 Project Activities

2.6.1 Description of the project's construction activities

The implementation of the project's design and construction phase will start with thorough investigation of the site soil chemical and physical properties and water table level determination. Initial activities during this pre-construction phase relating to construction management will in addition, include establishment and agreement on management, inspection and reporting procedures. The construction of the residential project shall be as per the approved designs. The construction will be based on the building standards, code and regulations applicable in Kenya. The proposed works will follow standard environmental guidelines, health and safety measures. The County's general bye-laws on building, water and sewerage bye-laws, and Public Health Act must be adhered to during the construction phase. This phase will be undertaken by a contractor who will be able to handle all the civil works including leveling of the site and clean up. The construction will involve but not be limited to the following activities:

- Procurement of construction materials from approved dealers;
- Excavation and removal of overburden;
- Storage of the construction materials;

- Transportation of construction materials and disposal of the resulting construction wastes/debris using heavy and light machinery;
- Laying of foundations and structural members;
- Erection of water storage tanks, septic tank and other structures on site;
- Installation of electrical and mechanical fittings onto the structure;
- Finishing of the structure; and
- Landscaping works and earth works to be done mostly on completion of the proposed residential development.

In order to alleviate any negative impacts emanating from the construction and operation activities of the proposed residential apartment's project, relevant and cost effective mitigation measures have been proposed in the EMMP which is part of this report.

Key summary descriptions of the construction activities are presented in the following section and they include:

Procurement of building materials

Greater emphasis shall be laid on procurement of building materials which shall strictly be done within the project area and its environs. This makes both economic and environmental sense as it will reduces both the costs and negative impacts of transportation of the materials to the project site through reduced distance of travel. To avoid much wastage of construction materials, the proponent shall order the materials in quotas as at when they are required and the quantities required. The proposed project construction activities shall require concrete blocks, sand, cement, ballast, steel metals, roofing materials among others.

Excavation and foundation works: The proposed project site is located in an area characterized by black cotton soils that are usually not stable for foundation works. The proponents shall carry out extensive excavation activities to ensure a stable foundation to the buildings hence avoiding future calamities such as collapsing of the buildings. Excavation activities shall cause considerable levels of disturbance to the project area and must be limited to day time only. No blasting of stones shall be carried out at the project site. The proponent must ensure that all the excavated soils are properly disposed of away from the construction site preferably areas approved by the Machakos County Government to avoid reducing the aesthetic quality of the areas off site.

The Structural Framework: The foundation and all reinforced concrete structural members e.g. ground beam foundation, columns, beam casting will be carried out in accordance with Ministry of Public works regulations. The best concrete cast must also conform to mixing ration of 1:2:4 reinforced concrete as per the specifications of the structural engineer and be tested in accordance by the material testing section of the Ministry of Public Works.

Masonry and concrete works: Construction of the masonry walls, foundations, floors, pavements, storm water drainage systems, perimeter fence, access road and parking space among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and shall be supplemented by machinery such as concrete mixers.

Roof construction works: The roof construction shall depend on the architectural designs.

Electrical works: Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets among others. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

Door/Window Fixtures: The doors and their frames shall be of standard measurement as per the architectural designs and structural engineers' specifications. The windows shall be of steel casement glass and fabricated as proposed in the design concept but must provide adequate light into the house.

Walling and Floor Finishing: The walls will be built of thick reinforced concrete as per the specifications given and plaster, thick cement, sand mix ratio finished in smooth with steel float for the internal walls. Toilets, washrooms and bathrooms will be fitted with ceramic filing as designated tiles.

Security and services: During peak construction, more workers will be employed on site. The majority of these workers will be sourced from the local population. It is anticipated that no criminal or security threats will be reported from the neighbour-hood. As a control measure the proponent should have a 24 hours security provided.

Landscaping: On completion of the project, massive landscaping shall be carried out across the project area especially open areas of the project site. Different types of trees and flowers shall be planted within the site to help improve the aesthetic quality.

2.6.2 Description of the Project's operational Activities

Residential services: The main activity during operation is residential accommodation. This is expected not to cause any significant environmental impacts due to the nature save for solid waste produced during occupation.

Water supply: The water to be used for both construction and during operational phases of the project will be obtained from water supplies or water vendors as well as the proposed borehole drilling on the site.

Electricity supply: Kenya Power and Lighting Company (KPLC) is a limited liability company responsible for the transmission, distribution and retail of electricity throughout Kenya. The main supply to the facility will be from the existing KPLC line that is in the project area.

Solid waste: Considering that the Machakos County government does not provide solid waste management services as per the law requirements, the proponent in partnership with other residents has proposed to contract a private service provider licensed by both NEMA and the Machakos County Government to help manage all the solid waste generated from the estate.

Waste water management: The project proponent shall cater for waste management in appropriate structures, facilities and operations. These will be provided in such a way as to meet the requirements of the Waste Management Regulations and as stipulated under the EMCA 1999 and as per the relevant EMCA Waste Management (2006) Regulations. In so doing the proponent will pursue waste minimization, recycling and disposal. The

proponent commits to handle liquid wastes through a proposed onsite bio-digester or through connection to a MAVWASCO sewer line that passes in the project area.

Swimming Pool Management

a) Water supplies

- Azure Sky Investment Ltd shall ensure that the water serving the swimming pool and all plumbing fixtures are obtained from legalized water supplier-MAVWASCO.
- Azure Sky Investment Ltd shall ensure that the supply of water is adequate for service to all plumbing fixtures and for furnishing the swimming pool with gallons of the swimming pool volume. A swimming pool owner shall ensure that water at a temperature is kept within the required standards.
- Azure Sky Investment Ltd shall ensure that a potable water supply system that serves a swimming pool and all plumbing fixtures is protected against backflow. This should be introduced into the swimming pool or re-circulation system through permanent piping.

b) Water circulation

Azure Sky Investment Ltd shall equip the swimming pool for continuous, uniform circulation of treated water within the swimming pool tank and for continuous removal, treatment, and reuse of the water. Azure Sky Investment Ltd shall also ensure that the water recirculation and treatment system is adequate for recirculating and treating the entire volume. Azure Sky Investment Ltd shall ensure that swimming pool water piping is all of the following:

(a) Nontoxic material.

(b) A potable water grade.

(c) Durable.

(d) Resistant to corrosion.

c) Swimming pool discharges and wastewater disposal systems

Azure Sky Investment Ltd shall, without the written permission of the Authority, discharge or cause the discharge of any water from a swimming pool either directly or indirectly, onto any public street or public place, or onto any site other than onto the site upon which such swimming pool is situated.

Azure Sky Investment Ltd shall ensure that a swimming pool has a wastewater disposal system that serves the entire swimming pool facility. A swimming pool owner shall ensure that the wastewater disposal system has sufficient capacity to prevent flooding during the swimming pool filter cleaning cycle and during draining of the swimming pool.

Azure Sky Investment Ltd shall ensure that the disposal of wastewater from a swimming pool does not create a threat to public health or safety, a nuisance, or unlawful pollution of the waters of the state

Azure Sky Investment Ltd shall ensure that the swimming pool and its recirculation system is protected against backflow from a wastewater disposal system.

Azure Sky Investment Ltd shall thereof ensure that there is an overflow to lead away excess rainwater, such overflow shall be designed and constructed to discharge:-

a. onto the site upon which the pool is situated; or
b. into an approved surface channel, storm-water drain or natural watercourse.

The swimming pool shall be further designed and constructed that the water from the backwashing of any filter is discharged onto the site upon which such pool is situated or, with approval, into a drain by the relevant authority.

We recommend the proponent to refer to Planning and Building Regulations, 2009, The Public Health Act and relevant authorities to changes or any other activities which may be done on the swimming pool and cause any harm to the public and environment.

Eco-Friendly Design Guidelines for Construction of Kindergarten

Azure Sky Investment Ltd should design an eco-friendly kindergarten/ school in such a manner that the kids are provided with an atmosphere that is environmentally safe, healthy and conducive to learning. The main environmental parameters to be considered during construction of the kindergarten building are: protection, providing insulation and promoting natural ventilation for thermal comfort, health and hygiene, safe water supply/ sanitation and promoting environmental aesthetics to ensure healthy environment to the children's. The incorporation of eco-friendly design does not require any extra costs but may rather reduce the cost of construction if proper designing is carried out as the construction materials will be easily obtained in the project area.

We propose the following environmental guidelines that will be helpful in constructing the Kindergarten school at the proposed Azure Sky Investment residential development project.

Table 2: Proposed Kindergarten Eco-friendly design guidelines

Environmental aspect in design	**Eco-friendly design guidelines**
Structure design of schools	The building should be structurally stable, seismic proof, weatherproof according to the local environmental conditions, climatically comfortable, easily exited in case of emergency and well integrated with the environmental and cultural context of the area. The designs should also factor facilities for special children who might be admitted at the schools (ramps, hand rails, and others).
Drinking water facility	Fresh and safe drinking water should be provided to the kids within the school with proper plumbing infrastructure for distribution of drinking water. If the school is going to use either main water supply or borehole water, water quality assessment should be conducted in every 3 months to ensure that all relevant standards from KEBS and Public Health in Kenya are met.

Toilets and sanitation	Water efficient design of toilets should be designed keeping in view the local topography and cultural context. Privacy, cleanliness and safety aspects need to be considered during designing of toilets building.
Lighting, ventilation, humidity,	Classrooms need good fresh-air circulation to avoid heat and excessive humidity. To ensure adequate daylight and ventilation, sufficient sliding windows must be provided in the building. Classrooms shall need to be sufficiently shaded from direct sunlight and heat to maintain normal room temperature in summer plain areas.
Electricity and fittings	Electricity or solar power is needed to provide light. Azure Sky Investment Ltd should apply electricity supply from Kenya Power Company.
Protection	Security and protection will be provided either security checks at the gate as well as through boundary walls or stone fence to keep children within the school premises and also protect them.
Acoustics	The location of design of school building should be such that the surrounding noise caused by traffic, or any other source of sound have minimum effect on the classrooms to avoid disturbance in concentration and learning.
Access Ramps	Depending upon need basis, it is necessary to design access ramps at the entrance and near toilets for physically handicapped children on wheelchairs, to allow them access to all school facilities.
Health and Safety	Health and safety of school children's should be considered in re-designing of school buildings and the facilities inside the school. During construction, the contractor should ensure that construction materials are free of elements that could be dangerous or hazardous to children health. Appropriate sized municipal wastes bin should be provided outside the school premises for solid waste disposal which will be regularly cleaned to guarantee a clean and healthy environment to the kids.

2.6.3 Description of the project's decommissioning activities

The main objective of decommissioning shall be to make the area occupied by the residential apartment's project equivalent or better than its original condition upon decommissioning. During this phase, a project decommissioning plan will be prepared and a report submitted to NEMA before decommissioning commences. Some of the major activities that will be undertaken during this phase include the following:

Demolition works: Upon decommissioning, the project components including buildings, drainage systems and boundary wall will be demolished. This will produce a lot of solid waste mostly construction debris, which will be reused for other construction works or if not reusable, disposed of appropriately by a licensed waste collection and disposal company.

Dismantling of equipment and fixtures: Project and housing equipment (e.g. electrical installations, furniture, finishing fixtures partitions, pipe-work and sinks) will be dismantled and removed from the site. Priority will be given to reuse of these equipment in other projects. This will be achieved through re-sale of the equipment to other building owners or contractors or donation of this equipment to charitable institutions in Syokimau area.

Site restoration: Once all the waste resulting from demolition and dismantling works will have been removed from the site, the site should be restored through replenishment of the top-soil and re-vegetation using indigenous tree species.

Table 3: Materials Used, By-products and Waste Generated during project life cycle

Project Phase	Materials used	Wastes/Byproducts	Disposal Method
Building Works	• Stone/ bricks • Cement and water • Timber and Nails • Glasses for window panes	• Debris • Used Timber • Broken Tiles and Glasses	• Contractor to dispose of-site
Operational phase/Occupation	• Food staff • Plastic Containers • Water	• Domestic Garbage • Waste Water	• Waste collection contractor • MAVWASCO sewer connection.
Decommissioning phase	• Demolitions	• Stone debris, Steel • Wood debris/ broken glasses • Insulation and Electrical wiring • Tiles and ceramics	• Recycling the recyclable waste • Registered waste handler to dispose off-site

CHAPTER THREE: BASELINE INFORMATION

3.1 Introduction

This chapter provides comprehensive details regarding the location, biophysical characteristics, socio-economic dynamics, and other pertinent aspects of the project area. Its purpose is to thoroughly examine potential areas of impact stemming from project activities. The study encompasses an analysis of the physical location, climatic conditions, geological features, drainage patterns, existing infrastructure, demographic profiles, and socio-economic indicators within the project vicinity.

3.2 Project Location and Land ownership

The project is situated on Plot L.R No: 27253/106 in Syokimau, Mavoko Sub-County, Machakos County. Primarily characterized by residential developments, the proposed project site is privately owned by the proponent.

3.3 Climate

Syokimau-Mlolongo, located in Machakos County, exhibits distinct climate characteristics typical of its geographical region. The area experiences a semi-arid climate, characterized by relatively low and erratic rainfall patterns throughout the year. Here are some key climate characteristics of Syokimau-Mlolongo.

3.3.1 Temperatures

The sunniest and warmest part of the year is from December to March, when temperatures average the mid-twenties during the day. The mean maximum temperature for this period is 27 °C (75 °F).The minimum temperature also remains low during cloudy nights, usually hovering around 11 °C and at times reaching 8°C. Clear skies in January and February also bring colder nights. Temperature range from a minimum of 9.1^0C to a maximum of 26.7 ^{0}C.

3.3.2 Rainfall

There are two rainy seasons but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. Rainfall ranges from 500 mm to 900 mm per annum.

3.3.3 Wind flows

The lower winds throughout the year are of the easterly type. Between October and April they shift to the northeast while as from May to September they move to the southeast .Prior to the "Long Rain" season strong winds prevail with an average speed of 22.5 Miles/hour. The rest of the year has wind speed varying from 10 to 15 Miles/hour. However, during night, the winds are usually calm.

3.4 Topography and Drainage

The landscape of Syokimau-Mlolongo paints a picture of gentle slopes and rolling plains, gradually descending towards the Athi River floodplain. This **relatively flat topography**

with an average elevation of 1,600 meters (5,250 feet) offers ample space for development while presenting distinct drainage characteristics.

During the rainy seasons, the land transforms into a network of temporary streams and channels, carrying rainwater runoff towards the Athi River. These **natural drainage pathways** play a vital role in preventing flooding and ensuring proper water flow. However, as urbanization progresses, concerns arise regarding the potential disruption of these natural drainage patterns.

The construction of buildings and roads can impede natural water flow, leading to localized flooding and putting stress on existing drainage infrastructure. To mitigate these risks, **careful urban planning** that considers and integrates with the existing drainage system is crucial. This could involve incorporating green spaces, swales, and other sustainable strategies to manage stormwater runoff effectively.

3.5 Hydrogeology and Soils

In general groundwater in volcanic rocks is limited to fractures and erosion levels within the volcanic succession. Fresh lavas are usually not water bearing because of their massive and impervious nature. The most significant aquifer system west of the project area is the Upper Athi Series aquifer system. This is the main aquifer for boreholes in Upper Machakos, Nairobi and Kiambu areas and is composed of tuffs, lakebeds and sediments
The rocks in the Upper Machakos regions such as Mavoko, Syokimau and Mlolongo area mainly comprise a succession of lavas and Pyroclastics of the Cainozoic age and overlying the foundation of folded Precambrian schist's and gneisses of the Mozambique basement rock which traverses the entire lower eastern region up to Kilimambogo area .The crystalline rocks are rarely exposed but occasionally fragments are found as agglomerates derived from former Ngong volcano.
The soils of this area are products of weathering of mainly volcanic rocks. Weathering has produced black cotton soils that reach more than 50 feet (15m) in thickness. Metamorphism process is witnessed in the region that has resulted to major deposits of limestone rich mines.

3.6 Biological Environment

This section describes key biological elements, including the identification and distribution of dominant, rare and unique flora and faunal species within the region of concern (proposed project site and other potentially affected areas).

3.6.1 Flora

Syokimau-Mlolongo, situated on the outskirts of Nairobi County, showcases a unique tapestry of **flora**, reflecting its complex interplay between human activity, prevailing climate, and underlying geology. While the natural vegetation has undergone significant modifications due to urbanization, remnants of indigenous flora persist, offering a glimpse into the area's ecological history and contributing to its overall biodiversity.

Dominant Vegetation:

Scattered Savannah Woodland: This vegetation type, once widespread, is now fragmented and confined to pockets within the landscape. These pockets are characterized by drought-resistant trees and shrubs like acacias (Acacia spp.), crotons (Croton spp.), and commiphoras (Commiphora spp.). These plants have adapted to the region's low rainfall and high temperatures through features like deep root systems, water-storing tissues, and small leaves that minimize water loss.

Introduced Ornamental Plants: As urbanization progresses, ornamental plants like bougainvillea (Bougainvillea spp.), crotons (Codiaeum variegatum), and palm trees (Phoenix spp.) are increasingly being cultivated in gardens and public spaces. These non-native species add a touch of color and aesthetic appeal to the urban environment but may require additional watering and maintenance compared to native plants.

3.6.2 Fauna

Due to its proximity to Nairobi National Park and surrounding protected areas, Syokimau-Mlolongo exhibits a unique blend of urban and remnant wildlife. However, the extent and diversity of fauna are significantly influenced by factors like habitat loss due to urbanization, human encroachment, and agricultural activities.

Mammals like small antelopes, zebras, and even occasionally larger predators like hyenas have been known to venture into the fringes of Syokimau-Mlolongo, particularly at night or in search of water. However, these sightings are infrequent and highlight the human-wildlife conflict that can arise in peri-urban areas.

Birdlife is more prevalent, with a variety of indigenous birds like sparrows, eagles, and kites inhabiting the area. Additionally, the presence of green spaces and water bodies can attract a diverse range of migratory birds during specific seasons. Overall, the fauna of Syokimau-Mlolongo reflects a dynamic interplay between remnant wildlife and the growing human presence.

3.7 Land use

Syokimau-Mlolongo's land use reflects a dynamic mix of urban development, rural pockets, and environmental conservation areas. The area is undergoing rapid urbanization, with residential estates and commercial establishments springing up alongside existing agricultural activities. However, remnants of natural spaces like the Nairobi National Park offer a crucial green buffer and highlight the importance of balancing development with environmental preservation. This diverse land use mosaic presents both challenges and opportunities, requiring careful planning and responsible management to ensure sustainable growth and a healthy living environment for the residents of Syokimau-Mlolongo. Here's a breakdown of the key characteristics:

a) **Residential areas:** The most dominant land use is **residential development**, catering to a growing population. This includes various housing types, from single-family homes and apartments to gated communities.

b) **Commercial development:** To support the needs of the residents and serve as a regional hub, **commercial establishments** are increasingly present. These include shopping centers, restaurants, and small businesses.

c) **Industrial areas:** While not as extensive as residential areas, **pockets of industrial activity** exist, catering to various sectors like manufacturing, logistics, and warehousing.

d) **Agricultural pockets:** Remnants of **agricultural land use** are still present, particularly on the outskirts of the area. However, these are gradually giving way to urbanization.

The Azure Sky project is situated adjacent to the renowned Nairobi National Park and the SGR (Standard Gauge Railway). Consistent with other ongoing and completed projects in the vicinity, the client has erected a perimeter wall to demarcate its land from the SGR land and the reserve area. The client is strongly encouraged to uphold and enforce measures to prevent any encroachment onto the adjacent lands designated as part of the national park and the railway reserve.

Plate 1: Completed and ongoing residential projects within the project area.

Plate 2: Occupied residential apartments and Eden School in the project area

3.8 Socio-Economic Environment

3.8.1 Population Size

Syokimau-Mlolongo's combined population is estimated to be around **172,662**, based on the 2019 census figures for Syokimau/Mlolongo ward (136,000) and the Mlolongo town population estimate (36,662).

Syokimau:

According to the 2019 Kenya Population and Housing Census, Syokimau has a population of **36,862**, with **18,777 males** and **18,085 females**. The national population pyramids and demographic trends suggest that roughly **60%** of the population might fall within the **adult (18-64 years old) category**, while the remaining **40%** might be **children (under 18 years old).** It's important to note that this is an estimated distribution based on national trends and may not reflect the exact demographics of Syokimau

3.8.2 Infrastructure roads and accessibility

Syokimau's road network presents a mixed picture of progress and challenges. While some areas boast well-maintained bitumen roads, others struggle with unpaved or poorly maintained infrastructure. Recent efforts by the Kenya Rural Roads Authority (KeRRA) aim to improve the Community Road, potentially leading to better accessibility within the area. However, residents often report issues like flooded roads during the rainy season, potholes, and incomplete construction projects, causing disruptions and hindering smooth traffic flow. This highlights the ongoing need for continued investment in road maintenance and development to ensure reliable and efficient accessibility throughout Syokimau. A road paved with cabros joining from Mombasa –Nairobi Highway serves the project site.

Plate 3: Access road to the proposed project site

3.8.3 Water supply

Syokimau's water supply has historically faced challenges due to its reliance on **limited groundwater resources** and a lack of readily available surface water sources. While the area experiences **bimodal rainfall**, the low permeability of the underlying volcanic rocks restricts infiltration and groundwater recharge. Additionally, the **bimodal rainfall pattern** with distinct wet and dry seasons limits natural recharge opportunities. This has led to **water scarcity** and dependence on alternative sources like **boreholes** and **water bowsers**.

Recent efforts have aimed to improve the situation. A **treated water pipeline project** was completed in 2021, bringing water from General Motors to Syokimau and surrounding areas. This project, coupled with the construction of **groundwater reservoirs and elevated storage tanks**, aims to provide a more **reliable and accessible water supply** for the growing population of Syokimau. Despite these improvements, **water conservation** remains crucial, and exploring **alternative water sources** like rainwater harvesting might be necessary to ensure long-term water security in the region.

3.8.4 Sewer System

Syokimau faces challenges with its sewer system.. While the Mavoko Water and Sewerage Company (MAVWASCO) oversees the area, a significant portion of Syokimau lacks a formal sewer network. While the neighboring Athi River Town and Export Processing Zone (EPZA) have established sewer networks, most of Syokimau lacks a proper sewage infrastructure. This has resulted in sewerage issues, including overflows and potential health risks. Some estate developers and industries have constructed their own sewer lines to connect to existing trunk sewers, but these efforts only cover a limited area, estimated at around 15% of the developed area.

Plate 4: Existing MAVWASCO sewer line manholes in the area

3.8.5 Electricity

The electricity supply in Syokimau, a vibrant residential and commercial area located in Mavoko Sub-County, Machakos County, plays a pivotal role in facilitating daily life and powering economic activities. The region, enjoys relatively good access to electricity. The area is connected to the national grid and served by Kenya Power & Lighting Company (KPLC). This ensures a generally reliable power supply for homes, industiries and businesses. Electricity distribution infrastructure, including power lines, transformers, and substations, is strategically deployed throughout Syokimau to efficiently deliver electricity to homes and establishments. With the growing population and expanding urbanization in the area, efforts have been made to upgrade and expand the electrical infrastructure to meet increasing demands. The availability of electricity has stimulated socio-economic development, supporting various sectors such as commerce, education, healthcare, and entertainment. Additionally, access to electricity has enhanced living standards, enabling residents to utilize modern appliances, lighting, and communication technologies. As Syokimau continues to evolve and grow, the provision of reliable and affordable electricity remains essential for driving progress and improving the quality of life for its inhabitants.

Plate 5: KPLC transformer and Power lines in the project area

3.8.6 Communications

Syokimau boasts a relatively well-developed communications infrastructure, with major network suppliers like Safaricom, Airtel, and Telkom playing significant roles in providing telecommunication services to the area. These providers have established a robust network of cellular towers and base stations across Syokimau, ensuring widespread coverage and connectivity for residents and businesses alike. Safaricom, as one of the leading telecommunications companies in Kenya, offers a range of services including mobile voice, data, and mobile money transfer through its widely utilized M-Pesa platform. Similarly, Airtel and Telkom also maintain a strong presence in the area, offering competitive mobile and data services to consumers. The presence of multiple network suppliers has led to increased competition and improved service quality, with residents benefiting from access to a variety of telecommunications options. Advancements in technology have enabled the expansion of broadband services, facilitating high-speed internet connectivity in homes, offices, and public spaces throughout Syokimau. Additionally, fiber optic internet connections are offered by various service providers, giving residents and businesses access to high-speed internet As a result, the communications infrastructure of Syokimau continues to evolve, providing residents with reliable and efficient means of communication and connectivity in today's digital age.

3.8.7 Education Institutions

The education profile of Syokimau reflects a growing and diverse landscape, catering to the educational needs of its residents. The area is home to a variety of educational institutions ranging from early childhood development centers to primary and secondary schools, as well as vocational training centers. Private Schools: Syokimau boasts a number of well-regarded private schools catering to different age groups, such as Kitengela International School (offering pre-school, primary, and high school), Syokimau Kindergarten, and Midland Preparatory School. These schools often provide additional activities like music, drama, cultural days, and sports, alongside academics. These establishments provide a comprehensive education system designed to equip students with the necessary knowledge and skills for personal and professional growth. Additionally, Syokimau hosts several private and public schools, offering both Kenyan curriculum and international education programs to accommodate different learning preferences and aspirations. The education sector in Syokimau continues to expand, with ongoing investments in infrastructure, technology, and teaching resources aimed at enhancing the quality of education.

3.8.8 Health

According to Machakos County Integrated Development Plan, the county has about 110 health facilities, with a doctor/population ratio of about 1:63,000, which indicate an over-utilization of medical personnel.

The health setup of Syokimau area is characterized by a network of medical facilities and services aimed at addressing the healthcare needs of its residents. The area is home to various healthcare providers, including hospitals, clinics, and dispensaries, offering a range of medical services from primary care to specialized treatment. Here's a glimpse into Syokimau's health setup:

a) **Hospitals:** Meldy Medical Clinic is a popular choice, offering services like pediatrics and baby care. Equity Afia, Syokimau, provides affordable outpatient care with appointments and a pharmacy. For specialized pediatric care, Gertrude's Children's Hospital is another option.
b) **Clinics:** Maayan Medical Centre, located within Gateway Mall, offers basic health services and boasts a convenient location. Additionally, numerous other clinics cater to various medical needs.

3.8.9 Sites of Historical and Cultural significance

There are no structures or sites that are of historical or cultural significance within or near the proposed residential apartment's site.

CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 General Overview

Environmental Impact Assessment (EIA) is a methodology used to identify the actual and probable impacts of projects on the environment and to recommend alternatives and mitigation measures. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. Various National Policies and Acts of parliament are discussed below as they relate to the environment management and the sector into which the proposed project has interest.

4.2 Policies

Any EIA must conform to the policy guidelines under its jurisdiction. Recognizing that Environment and Development issues must promote aspirations for an innovative, progressive, and prosperous Kenya, it is the expectation that any development initiatives are reflective of these policies. Policies are normally translated into actionable 'how to" by implementable action plans or programmes, bearing with them a systematic code of ethics for reward at compliance or sanction and penalties otherwise. The policies outlined below are relevant to the proposed project.

4.2.1 National Environmental Action Plan (NEAP)

According to the NEAP-1994 the Government of Kenya recognized the negative impacts on ecosystems emanating from economic and social development programmes that disregard environmental sustainability. Following on this, establishment of appropriate policies and legal guidelines resulted in harmonization of the then 76 existing Statutes into the Environmental Management and Coordination Act (EMCA), cap 387. The NEAP process introduced Environmental Impact Assessment in Kenya culminating in to the development of the Sessional Paper No. 66 on the Environment and Development.

4.2.2 National Environment Action Plan Committee

This Committee is responsible for the development of a 5-year Environment Action Plan among other issues. The National Environment Action Plan shall:

- Contain an analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their quality, distribution and quantity over time.
- Contain an analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.
- Recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.
- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for planning and management of the environment and natural resources.
- Identify actual or likely problems as may affect the natural resources and the broader environmental context in which they exist.

- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment, and strategies for the amelioration of their Negative Impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.
- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritize areas of environmental research and outline methods of using such research findings.
- Without prejudice to the foregoing, be reviewed and modified from time to time to incorporate emerging knowledge and realities.
- To be binding on all persons and all government departments, agencies, States Corporation or other organ of government upon adoption by the National Assembly.

4.2.3 National Policy on Water Resources Management and Development

The National Policy on Water Resources Management and Development (1999) seeks to enhance a systematic development of water facilities in all sectors for the country's socio-economic progress, and therefore calls for development of appropriate sanitation systems to protect people's health and water resources from pollution. It also sets guidelines for the utilization of water resources to prevent overexploitation and depletion of the resource.

Development projects, therefore, should be accompanied by corresponding waste management systems to handle the wastewater and other waste emanating there from. The policy also requires that such projects should undergo comprehensive Environmental Impact Assessments that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighborhoods and further downstream are not adversely affected by any emissions or discharges. (GOK, 1999)

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

The paper presents broad categories of development issues that require sustainable approach. The paper harmonizes environmental and development objectives so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding the environment and development. ***The proposed project will proceed under auspices of these guidelines and strategies that foster environmental values in development projects.***

Among the key objectives of the Policy Paper on Environment and Development (Sessional Paper No. 6 of 1999) are: -

- To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account,
- To ensure that an independent Environmental Impact Assessment (EIA) Study report is prepared before project implementation,
- To come up with effluent treatment standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that require a sustainable approach. Among these issues are waste management and human settlement. The policy recommends a need for enhanced re-use/ recycling of residues

including wastewater, use of low non-waste technologies, increased public awareness and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. On human settlements, the paper advocates for better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

The design of the proposed residential apartment's development project should be such that it adequately addresses the need for a sound waste management system. (GOK, 1999)

4.2.5 National Housing Policy

It is the Act under which National Housing Corporation (NHC) is established and granted its legal mandates. The act make provision for NHC for establishment of a housing fund, power to loan and grant and repayment of loans as provided within the Act, undertake and encourage research and experiment in housing related matters and undertake and encourage the collection and dissemination of information concerning housing and related matters, take part in housing exhibitions and other forms of publicity, undertake and encourage the provision of training in furtherance of the purpose of the and provide training for members of its staff, perform any other duties connected with housing as the ministry may direct, operate a financing institution with powers to borrow fund from the government, overseas agencies, pension and trust funds and any other institution or persons, as well as to collect deposits and saving from the public to be applied to the financing of residential housing development and related matters and to establish, promote or aid in establishing or promoting, constitute, form or organize companies syndicate or partnerships alone or in conjunction with any other person or institutions for the carrying on of any such functions as the corporate is empowered to carry under this act. The proponent should comply with this policy (GOK, 1990).

4.2.6 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. ***The proposed development has been designed by professional engineers and architects and as such will have all amenities/ utilities that are essential for safeguarding public health for all people using the facilities. (GOK, 1986)***

4.2.7 Physical Planning Policy

The local Authorities are empowered under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore allows for the prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area. Section 36 states that, if in connection with a development application, the local Authority is of the opinion that the proposed development activity will have a injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment EIA Study report.

The proposed project is in complete cognizance with the provisions of the Physical Planning Act, as it going to sit on land already approved by the county government of Machakos.

4.2.8 Environment Impact Assessment Guidelines Policy, 2002

The EIA guidelines require that an EIA be conducted in accordance with the issues and general guidelines spelt out in the second and third schedules of the regulations. These

include coverage of the issues on schedule 2 (ecological, social, landscape, land use and water considerations) and general guidelines on schedule 3 (impacts and their sources, project details, national legislation, mitigation measures, a management plan and environmental auditing schedules and procedures. ***This assessment has been conducted according to the EIA guidelines (NEMA, 2003).***

4.2.9 The Kenya Vision 2030

The Kenya Vision 2030 is a policy document outlining Kenya's development programme covering the period between the years 2008 to the year 2030. The objective of Vision 2030 is to help transform Kenya as a newly industrializing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment by 2030. The Kenyan Vision 2030 has a housing and urbanization strategy within its second pillar on investing in the Kenyan society. The Housing and Urbanization sub-strategy talks of Kenya becoming a predominantly urban country by 2030. The strategy additionally outlines the aim of having an adequately and decently housed nation in a sustainable environment. The medium term goal by 2012 was also to increase the annual production of housing units from 35,000 to over 200,000 annually. ***The project proponent will therefore help answer Vision 2030's call for housing development initiative by providing affordable housing to the residents of Syokimau and the Country's citizenry at large.***

Additionally, the Kenya Vision 2030 also has environmental goals outlined under the social pillar. According to the pillar, Kenya aims to be a clean, safe and sustainable environment by 2030. The country aims to achieve this goal by for example improving pollution and waste management strategies. By commissioning an EIA study for the project, the proponent has displayed his desire to support the Kenya Vision 2030.

4.2.10 Sustainable Development Goals, (SDG)

The Sustainable Development Goals (SDGs), otherwise known as the Global Goals, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These 17 Goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are inter-connected – often the key to success on one will involve tackling issues more commonly associated with another. The SDGs work in the spirit of partnership and pragmatism to make the right choices now to improve life, in a sustainable way, for future generations. They provide clear guidelines and targets for all countries to adopt in accordance with their own priorities and the environmental challenges of the world at large. The SDGs are an inclusive agenda. They tackle the root causes of poverty and unite us together to make a positive change for both people and planet.

4.2.11 National Climatic Change Response Strategy (NCCRS)

Climate change is considered one of the most serious threats to sustainable development globally. Studies have shown that about 90% of all natural disasters afflicting the world are related to severe weather and extreme climate change events. Impacts of the projected climate change are expected in many sectors such as environment, human health, food security, economic activities, natural resources and physical infrastructure. Kenya acknowledges that the change in the Earth's climate and its adverse effects are a common concern of humankind. The Ministry of Environment and Mineral Resources (MEMR) has therefore recognized the need to enhance coordination of climate change

activities in the country with a view to ensuring a climate-proof socioeconomic development anchored on a low - carbon path.

The vision of the Strategy is for a prosperous and climate change resilient Kenya. The mission is to strengthen and focus nationwide actions towards climate change adaptation and GHG emission mitigation. This will be achieved by ensuring commitment and engagement of all stakeholders while taking into account the vulnerable nature of Kenya's natural resources and society. The objectives are to:

- enhance understanding of the global climate change regime: the negotiation process, international agreements, policies and processes and most importantly the positions Kenya needs to take in order to maximize beneficial effects of climate change,
- assess the evidence and impacts of climate change in Kenya,
- recommend robust adaptation and mitigation measures needed to minimize risks associated with climate change while maximizing opportunities
- enhance understanding of climate change and its impacts nationally and in local regions,
- recommend vulnerability assessment, impact monitoring and capacity building framework needs as a response to climate change,
- recommend research and technological needs to respond to climate change impacts, and avenues for transferring existing technologies,
- recommend a conducive and enabling policy, legal and institutional framework to combat climate change, and
- Provide a concerted action plan coupled with resource mobilization plan and robust monitoring and evaluation plan to combat climate change.

4.3 Legal Aspects

4.3.1 National.

The Constitution of Kenya (2010)

The constitution of Kenya was promulgated on 27th August 2010. Several articles are relevant to the proposed residential apartment's project in relation to the environment. **Article 42** states that, every person has the right to a clean and healthy environment, which includes the right-

a) To have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69;

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

Article 69: Obligations in respect to the environment

The Article provides that – The State shall-

a) ensure sustainable exploitation, utilization, management, and conservation of the environment and natural resources , and ensure the equitable sharing of the accruing benefits
b) Work to achieve and maintain a tree cover of at least ten percent of the land area of Kenya.
c) protect and enhance intellectual property in, and indigenous knowledge of biodiversity and the genetic resources of the communities

d) Encourage public participation in the management, protection, and conversation of the environment
e) Protect genetic resources and biological diversity
f) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment
g) processes and activities that are likely to endanger the environment; and
h) Utilize the environment and natural resources for the benefit of the people

Section (2) states that; every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Article 70: Enforcement of environmental rights

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

2. on application under clause (1), the court may make any order or give any directions , it considers appropriate –
    a) to prevent, stop or discontinue any act or omission that is harmful to the environment;
    b) to compel any public officer to take measures to prevent or discontinue any act or omission that is harmful to the environment; or to provide for compensation for any victim of a violation of the right to a clean and healthy environment.

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

Housing Act (Cap 117), 1990.

It is the act under which NHC is established and granted its legal mandates. The act make provision for NHC for establishment of a housing fund, power to loan and grant and repayment of loans as provided within the act, undertake and encourage research and experiment in housing related matters and undertake and encourage the collection and dissemination of information concerning housing and related matters, take part in housing exhibitions and other forms of publicity, undertake and encourage the provision of training in furtherance of the purpose of the and provide training for members of its staff, perform any other duties connected with housing as the ministry may direct, operate a financing institution with powers to borrow fund from the government, overseas agencies, pension and trust funds and any other institution or persons, as well as to collect deposits and saving from the public to be applied to the financing of residential housing development and related matters and to establish, promote or aid in establishing or promoting, constitute, form or organize companies syndicate or partnerships alone or in conjunction with any other person or institutions for the carrying on of any such functions as the corporate is empowered to carry under this act. (GOK, 1990).

The Environmental Management and Coordination Act, Cap 387.

It is the policy of the government (NEAP, GoK, 1994) to "integrate environmental conservation with economic development to provide sustainable development for

posterity". Environmental Management and Co-ordination Act, No. 8 of 1999, provides a legal and institutional framework for the management of the environment and development related matters. It is the framework law on the environment, which was enacted on the 14th of January 1999 and commenced in January 2002. Top-most in the administration of the Act is National Environment Council (NEC), which formulates policies, set goals, and promotes environmental protection programmes. The implementing organ is National Environment Management Authority (NEMA).

Part VIII, section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radio-active or any other pollutants into the aquatic environment. Section 73 requires that operators of projects which discharge effluent or other pollutants submit for NEMA accurate information about the quantities and quality of the effluent. Section 74 demands that all effluent generated from point sources are discharged only into the existing sewage system upon issuance of a prescribed permit from the Local Authorities with jurisdiction.

Part VI Section 58 stipulates that before any development or project is undertaken, an Environmental Impact Assessment must be undertaken under the rules governing the nature of the project and type of impacts.

This EIA is in compliance with Section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 Second Schedule Part 3 (a), and the Environment (Impact Assessment and Audit) Regulations 2003. Environmental quality conservation aspects of this project will be realized through the implementation of the Environmental Management and Monitoring Plan aimed at mitigating the potentially negative impacts and enhancing the potentially positive impacts predicted through this EIA.

The Environment (Impact Assessment and Audit) Regulations, 2003

The Regulations supplements EMCA, 1999. In the following Sections, the regulation states that;

10. (1) On determination of the project report, the decision of the Authority, together with the reasons thereof, shall be communicated to the proponent within forty-five days of the submission of the Project Report.

(2) Where the Authority is satisfied that the project will have no significant impact on the environment. or that the Project Report discloses sufficient mitigation measures, the Authority may issue a license in Form 3 set out in the First Schedule to these Regulations.

(3) If the Authority finds that the project will have a significant impact on the environment and the project report discloses insufficient mitigation measures, the Authority shall require that the proponent undertake an environmental impact assessment study in accordance with these Regulations.

(4) A proponent who is dissatisfied with the Authority's decision that an environmental impact assessment study is required may within fourteen days of the Authority's decision appeal against the decision to the Tribunal in accordance with regulation 46.

11. (1) An environmental impact assessment study shall he conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority.

(2) The terms of reference shall include matters required to he considered in the making of an environmental impact assessment as may be contained in the Second Schedule to these Regulations and such other matters as the Director General may in uniting require.

12. (1) An environmental impact assessment study shall be conducted in accordance with the general environmental impact assessment guidelines and sector environmental impact assessment guidelines set out in the Third Schedule to these Regulations. (2) Sector environmental impact assessment guidelines shall be developed by the lead agency in consultation with the Authority.

Environmental Management and Coordination (Water Quality) Regulations, 2006

This Legal Notice on Water Quality provides that anyone who discharges effluent into the environment or public sewer shall be required to apply for Effluent Discharge License. The license for discharge is Ksh. 5,000 while annual license fee for discharge into the environment will be Ksh. 20,000 or 100,000 depending on the facility. Non-compliance with the regulations attracts a fine not exceeding Ksh. 500,000 and the polluter pay principle may apply depending on the court ruling. During the construction phase, the contractor shall obtain the necessary discharge permits into the rivers, if the area water regulatory authority shall so require, depending on the quality of water being discharged. The contractor will abide by the conditions of the discharge license(s), which may include quality trend monitoring and data archiving.

Environmental Management and Co-Ordination (Waste Management) Regulations, 2006

These regulations define the responsibilities of waste generators and define the duties and requirements for transportation and disposal of waste. The regulations provide for mitigation of pollution and handling of hazardous and toxic wastes. The regulations require a waste generator to dispose waste only to a designated waste receptacle. ***The proponent shall adhere to the regulations and proposes to contract a NEMA registered waste transporter (NEMA, 2006)***

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

This regulation prohibits any person to cause unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Part 11 section 6(1) provides that no person shall cause noise from any source which exceeds any sound level as set out in the First Schedule of the regulations. The contractor will prepare a Noise and Ground Vibration Control Plan (NGVCP) to reduce the possibility of adverse noise and vibration impacts to human health.

The Kenya Civil Aviation Act, Cap 394

The Act mandates KCAA to authorize and approve the usage of the flight path for the purpose of ensuring the safety of flying aircraft over a project area. The proponent shall comply if need be and where necessary with the provisions of the Act in seeking authorization from KCAA for the proposed residential development project as the project area might be in a flight path. There is a already completed similar projects in the immediate neighbour-hood, which is thought to have psychologically prepared the general environment. However, if the project location shall be found within the flight path then the proponent will make application and seeks approval from Kenya Airports Authority (KAA) and Kenya Civil Aviation Authority respectively (KCAA).

Having learnt that other projects have been approved in the area, we do believe that the same should be extended to the client Azure Sky Investment Ltd.

The Occupational Health and Safety Act (OSHA), 2007

This legislation provides for protection of workers (employees) during construction and operation phases. It is tailored at implementation of the EHS plan in compliance with the relevant sections of this Act. The following are some of the provisions of the act:

PART VI – HEALTH – GENERAL PROVISIONS

Cleanliness: Section 47

(1) Every workplace shall be kept in a clean state, and free from effluvia arising from any drain, sanitary convenience or nuisance, and, without prejudice to the generality of subsection (1)—

(a) Accumulations of dirt and refuse shall be removed daily by a suitable method from the floors and benches of workrooms, and from the staircases and passages;

(b) The floor of every workroom shall be cleaned at least once in every week by washing or, if it is effective and suitable, by sweeping or by any other method;

(c) All inside walls and partitions, and all ceilings or tops of rooms, and all walls, sides and tops of passages and staircase, shall:

i. Where they have a smooth impervious surface, at least once in every period of twelve months, be washed with hot water and soap or cleaned by other suitable method;
ii. where they are kept painted with oil paint or varnished, be repainted or varnished at least once in every period of five years, or such other period as the director may deem necessary, and at least once in every period of twelve months be washed with hot water and soap or cleaned by other suitable method; and
iii. In other cases, be kept whitewashed or colour washed, and the whitewashing or colour washing shall be repeated at least once in very period of twelve months.

(2) An occupier who contravenes the provisions of this section commits an offence.

Overcrowding: Section 48

1) An occupier shall ensure that his workplace shall not, while work is carried on, be so overcrowded as to cause risk of injury to the health of the persons employed therein.
2) Without prejudice to the generality of subsection (1) a workplace shall be of sufficient size for work to be carried out with ease and shall further have the necessary free space and , having regard to the nature of the work ,an adequate amount of air for each employee , the minimum permissible being ten cubic meters per person:
3) Provided that, in determining, for the purposes of this sub-section the amount of cubic space in any room, no space more than four point five metres from the floor shall be taken into account, and, where a room contains a gallery, the gallery shall be treated for the purposes of this subsection as if it were partitioned off from the remainder of the room and formed a separate room.
4) Every workroom shall be not less than three metres in height, measured from the floor to the lowest point of the ceiling or, where there is no ceiling, to the lowest point of the roofing material:
5) Provided that, if the Director is satisfied that owing to the special conditions under which the work is carried on in any workroom the application of the provisions of

this subsection to that workroom would be inappropriate or unnecessary, he may by certificate in writing except the work room from those provisions subject to any conditions specified in the certificate.

Ventilation: Section 49

(1) An occupier shall ensure that effective and suitable provision is made for securing and maintaining, by the circulation of fresh air in each workroom, the adequate ventilation of the room.

(2) The Minister may by rules, prescribe a standard of adequate ventilation for workplaces or for any class or description of workplaces or part thereof and for any other places of work.

(3) An occupier who contravenes the provisions of this section commits an offence

Lighting: Section 50

(1) An occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing.

(2) All glazed windows and skylights used for the lighting of workrooms shall, so far as practicable be kept clean on both the inner and outer surface and free from obstruction:

Provided that this subsection shall not affect the white-washing or shading or windows and skylights for the purpose of mitigating heat or glare.

(3)Nothing in subsections (2) and (3) or in any rules made there under, shall be considered as enabling direction to be prescribed or otherwise given as to whether any artificial lighting is to be produced by any particular source of light.

50.(1) An occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing.

(2) All glazed windows and skylights used for the lighting of workrooms shall, so far as practicable be kept clean on both the inner and outer surface and free from obstruction.

Provided that this subsection shall not affect the white-washing or shading or windows and skylights for the purpose of mitigating heat or glare.

(3) Nothing in subsections (2) and (3) or in any rules made there under, shall be considered as enabling direction to be prescribed or otherwise given as to whether any artificial lighting is to be produced by any particular source of light.50.(1) An occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing.

Work Injury Benefits Act 2007 (WIBA)

This is an Act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes.

PART II — OBLIGATIONS OF EMPLOYERS

Section 7: Employer to be insured

(1) Every employer shall obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under this Act to any of his employees.

(2) The Minister may exempt from the provisions of subsection (1), an employer who provides and maintains in force a security which complies with the requirements of subsection (3), and any exemption under subsection (3) shall continue in force only so long as the security is maintained.

(3) For the purposes of subsection (2), a security shall consist of an undertaking by a surety approved by the Minister to make good, subject to any conditions specified in the security, any failure by the employer to discharge any liability which the employer may incur under this Act to any of its employees up to an amount approved by the Minister.

(4) Any employer who contravenes the provisions of subsection (1) commits an offence and shall on conviction be liable to a fine not exceeding one hundred thousand shillings or to imprisonment for a term not exceeding three months, or to both. (5) If the contravention in respect of which an employer is convicted is continued after the conviction, the employer is guilty of a further offence and liable in that respect to a fine not exceeding ten thousand shillings for each day on which the contravention continues.

Section 8: Registration of employer.

(1) Every employer carrying on business in Kenya shall within the prescribed period and in the prescribed manner –

(a) Register with the Director;

(b) Furnish the Director with the prescribed particulars of their business; and

(c) Within a period determined by the Director furnish additional particulars as the Director may require.

(2) The particulars referred to in subsection (1) shall be furnished separately in respect of each business carried on by the employer.

(3) An employer shall, within thirty days of any change in the particulars so furnished notify the Director of such change.

PART III — RIGHT TO COMPENSATION

Section 10: Right to compensation

(1) An employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act.

(2) An employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.

(3) An employee is not entitled to compensation if an accident, not resulting in serious disablement or death, is caused by the deliberate and wilful misconduct of the employee.

(4) For the purposes of this Act, an occupational accident or disease resulting in serious disablement or death of an employee is deemed to have arisen out of and in the course of employment if the accident was due to an act done by the employee for the purpose of, in the interests of or in connection with, the business of the employer despite the fact that the employee was, at the time of the accident acting—

(a) In contravention of any law or any instructions by or on behalf of his employer; or

(b) Without any instructions from his employer.

(5) For the purposes of this Act, the conveyance of an employee to or from the employee's place of employment for the purpose of the employee's employment by means of a vehicle provided by the employer for the purpose of conveying employees is deemed to be in the course of the employee's employment.

(6) For the purposes of this section, an injury shall only be deemed to result in serious disablement if the employee suffers a degree of permanent disablement of 40 % or more.

PART VII — MEDICAL AID

First Aid Section 45

(1) An employer shall provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged.

(2) Any employer who fails to comply with the provisions of subsection (1) commits an offence.

(3) The Minister may, after consultation with the Council, by notice in the Gazette exempt an employer or class of employers from application of this section.

Section 46: Conveyance of injured worker

(1) If an employee is injured in an accident, which necessitates the employee's conveyance to a hospital medical facility or from a hospital or medical facility to the employee's residence, the employer shall make the necessary conveyance available.

The Water Act, 2016

The Water Act 2002 vests the rights of all water to the state, and the power for the control of all body of water with the Cabinet Secretary, the powers is exercised through the Cabinet Secretary and the Water Resources Authority in consultation with the regional water resources boards. It provisions aim at the conservation of water, apportionment, and use of water resources.

Part II, section 18, of the Act 2002 provides for national monitoring and information archiving system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRMA) 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.

Section 25 of the Act requires a permit to be obtained for any use of water from a water resource, and the discharge of a pollutant into any water resource. Under Section 29, application for such a permit shall be subject to public consultation as well as an environmental impact assessment in line with the Environmental Management and Coordination Act, Cap 387. The conditions of the permit may also be varied if the Authority is of the opinion that the water so used is causing deterioration of water quality or causing shortage of water for other purposes for which the Authority lays a higher priority. This is provided for under section 35 of the Act.

Section 73 of the Act allows a person, who has been granted a license to supply water (licensee), to make regulations for purposes of protecting against degradation of their

water source(s). Under the Section, the licensee could be a local authority, a private Trust or an individual, and enforcement will under the supervision of the Regulatory Board with jurisdiction.

Section 76 states that no person shall discharge any trade effluent from any trade premises into sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the effluent, maximum quantity anticipated, flow rate of the effluent and any other information deemed necessary. The consent shall be issued on conditions including the payment rates for the discharge as may be provided under section 77 of the same Act.

The proposed project shall require large quantities of water during the construction phase and generation of equally large volumes of surface run-off during construction and operations. The local rivers will not form the sources of water for construction. The same rivers will be receiving bodies for the surfaces run-off, as all the drainage systems shall be designed to discharge into them. The contractor shall seek the necessary permits to obtain water and shall abide by the conditions attached to the permit(s).

The public Health Act (Cap. 242)

The Public Health Act has no environmental protection standards. The Act is primarily concerned with the protection of the quality of water supplies and sources used for human, domestic and animal consumption. It contains provisions against environmental pollution by what it describes as "nuisance" that would result in the pollution of the environment by gaseous emissions, solid wastes and liquid effluent in order to protect public health. The project supervising agency and the contractor are legally bound by this Act to prevent this from happening. Bounding of the perimeter for equipment maintenance spaces, including controlled substances storage areas will be undertaken by the contractor and under the oversight of the project supervising agency.

Energy Act (Cap 314), 2006

This law converts an advisory regulator, the Energy Regulatory Board, into a decision-making regulator, the Energy Regulatory Commission. The law also gives the new commission explicit authority over imports and exports of electricity. It sets out the National Policies and Strategies for short to long-term energy development. ERC is a single sector regulatory agency, with responsibility for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, dispute settlement.

The broad objective of the new Energy Policy is to ensure the provision of adequate, quality, cost-effective, affordable supply of energy while ascertaining environmental conservation.

Energy (Solar Water Heating) Regulations, 2012

Regulation 3, make provision for installation of solar water heating system in all premises within the jurisdiction of a local authority with hot water requirements of a capacity exceeding one hundred litres per day shall install and use solar heating systems.

Responsibility for compliance as per regulation 6 is imposed on:

- Developer of a housing estate, a promoter of the construction, an owner of the premises or an Architect or an Engineer engaged in the design or construction of premises shall comply with these Regulations.

- An owner of premises, architect and an engineer engaged in the design, construction, extension or alteration of premises shall incorporate solar water heating systems in all new premises designs and extensions or alterations to existing premises. An owner or occupier of premises that has a solar water heating system shall use and carry out the necessary operational maintenance and repairs required to keep the installation in good and efficient working condition.
- An owner or occupier of premises that has a solar water heating system shall use and carry out the necessary operational maintenance and repairs required to keep the installation in good and efficient working condition.
- An electric power distributor or supplier shall not provide electricity supply to premises where a solar water heating system has not been installed in accordance with these Regulations.
- An owner or occupier to whom these regulations apply may investigate the inclusion of the relevant solar water heating system into a project to be registered under any carbon finance mechanism that may be established from time to time includes the Clean Development Mechanism (CDM).

A person who contravenes the provisions of this regulation commits an offence and shall be liable, on conviction, to a fine not exceeding one million shillings, or imprisonment for a term not exceeding one year, or to both. (GOK, 2012).

Energy (Energy Management) Regulations, 2012

Require a the owner or occupiers to develop an energy management policy, conduct an energy audit, prepare and submit to the commission an energy investment plan for the next three years, setting out proposals for the conservation of energy during that period, take measures for energy conservation, submit an annual implementation report (GOK, 2012).

Urban 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 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 (GOK, 2011).

Physical Planning Act (Cap 286)

The local Authorities are empowered under section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section, therefore allows for the prohibition or control of the use and development of land and buildings in the interest of proper and orderly development of an area. Section 36 states that, if in connection with a development application, the local Authority is of the opinion that the proposed development activity will have a injurious impact on the environment, the applicant shall be required to submit together with the application an environmental

impact assessment EIA Study report. The proposed project is in complete consonance with the provisions of the Physical Planning Act, as it going to sit on land already approved by the County Government of Machakos.

Local Government Act (Cap 265)

Section 160 helps Local Authorities to ensure effective waste disposal. It states in part that municipal authorities have powers to establish and maintain sanitary services for the removal and destruction of, or otherwise, deal with all kinds of refuse and effluent and where such service is established, compel its use by persons whom the services is available. ***The contractor and the supervising agency shall engage county government for appropriate means of disposal for solid and liquid wastes arising from construction phase activities.***

County Government Act, 2012

Section 109 of the County Government Act (2012) helps counties to ensure effective coordination of spatial developments. Subsection (2) part C states in part; a spatial county plan shall;

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

Building Code By – Laws.

This is a document based on British building standards introduced in Kenya to control building design and control. The adoptive by-laws are divided into Local Government

Adoptive By-laws Grade 1 and Local Government Adoptive Bylaws Grade 2. The Local Government Adoptive By-laws Grade 1 controls high income housing, while Grade 2 Bylaws control buildings for low-income populations. The Building Code, 1968 deals with controls in housing quality, building materials and planning standards. The by-laws rigidly prescribe planning and design standards with respect to minimum plot sizes, maximum coverage, and minimum space around buildings. They also outline room dimensions, including minimum room area, minimum room height, kitchen dimensions, wet cores/ablutions minimum dimensions, access to rooms (minimum width of doors), lighting and ventilation(minimum widths of windows). They also provide for standards on construction materials for foundations, floors, walls, roofs. They are adoptive in the sense that any local authority in Kenya can adopt them for application within their areas of jurisdiction. In recognition of the role of local authorities as lead planning agencies, the adoptive by-law compels any potential developer to submit development application to relevant local authority for approval. The local authority is empowered to disapprove any plan submitted if it is not correctly drawn or do not provide sufficient information that complies with the by-law. Any developer, who intends to erect a building such as a shop/office block, must give the concerned local authority a notice of inspection, before

the erection of the structure. After erecting the building, a notice of completion shall be issued to the local authority to facilitate final inspection/approval. No person shall therefore occupy a building whose certificate of completion has not been issued by the local authority. As a precaution against fire breakout, the by-law states that the walls of any premise shall be non-combustible throughout, similarly, in every building, other than a small house, which comprises more than one storey, shall have firefighting equipment.

By-law 214 indicates that in any public building where floor is more than 20 feet above the ground level, the council may recommend the provision of firefighting equipment that may include one or more of the following: hydrants, hose reels and fire appliances, external conations, portable fire appliances, water storage tanks, dry risers, sprinkler, drencher, and water spray protector system (KEBS, 2009).

The Penal Code (Cap 63)

Section 191 of the Penal Code states that if any person or institution that voluntarily corrupts or foils, water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offense. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to the health of persons/institution, dwelling or business premises in the neighbour-hood or those passing along public way, commits an offense. The vitiation of the atmosphere, corruption of and foiling of the water springs is not an inherent quality of the proposed project's nature. None the less the operational aspects of the project have significantly foreseeable negative impacts. Enforcement of this Act in complimentary with all the aforementioned environmental systems, conserving policies and specific Acts will achieve the desired goals and objectives in this respect. The supervising agency in conjunction of the officers of Machakos County Government with jurisdiction will exercise due diligence.

Occupiers Liability Act (Cap 34)

The Act regulates the duty that an occupier of premises owes to his visitor in respect of dangers due to the state of the premises or to the things done on them. It requires that the occupier warn the visitors of the likelihood of dangers within his premises to enable the visitors to be reasonably safe (GOK, 1980).

The National Construction Authority Act (NCA), 2011

The National Construction Authority Act, Number 41 of 2011 is set to streamline, overhaul and regulate the construction industry in Kenya. The industry has for many years suffered poor legislative framework and has been dominated by quacks and unqualified persons. The industry has also suffered a lot of competition from foreign contractors who are seen to offer cheaper and more quality work. The new Act is a win for the public as it guarantees public safety. All contractors must be registered with the Authority, meaning that shady contractors and quacks will be locked out of the industry. It is an offence to carry out any construction work without first having been registered with the Authority. The Contractor who will undertake the project will be one who is registered by the NCA. The Act also outlines that every development projects must be registered with and subsequent construction permit secured from the Authority prior to commencement of the project activities. ***The project proponent has so far secured a construction permit from the Authority.***

The Land Planning Act (Cap. 303)

Section 9 of the subsidiary legislation (the development and use of land regulations 1961) requires that before the local authorities submit any plans to the Minister for approval, steps should be taken as may be necessary to acquaint the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should also be submitted. This is intended to reduce conflict with other interests such as settlement and other social and economic activities.

4.3.2 International Conventions and Treaties

United Nations Framework Convention on Climate Change (UNFCCC), 1992

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt 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 interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

African Convention on Conservation of Nature and Natural Resources (1968)

It requires the adoption and implementation of measures necessary to achieve the objectives of this Convention, in particular through preventive measures and the application of the precautionary principle, and with due regard to ethical and traditional values as well as scientific knowledge in the interest of present and future generations. Of particular interest to the housing estate is the requirement to prevent pollution, or any other form of land degradation on land and soil, water; Make provision for prevention of detrimental effects of processes and activities affecting the environment and natural resources and as well as promotion of sustainable development(African Union, 1968).

Kyoto Protocol

The essence of the Kyoto Protocol is that it calls for nations to commit themselves to reducing greenhouse gas emissions.

Some of the principal concepts of the Kyoto Protocol are:

1) The main feature of the Protocol is that it established a legally binding commitments to reduce emissions of greenhouse gases. The commitments were based on the Berlin Mandate, which was a part of UNFCCC negotiations leading up to the Protocol.
2) Implementation. In order to meet the objectives of the Protocol, Annex I Parties are required to prepare policies and measures for the reduction of greenhouse gases in their respective countries. In addition, they are required to increase the absorption of these gases and utilize all mechanisms available, such as joint implementation, the clean development mechanism and emissions trading, in order to be rewarded with credits that would allow more greenhouse gas emissions at home.
3) Minimizing Impacts on developing countries by establishing an adaptation fund for climate change.
4) Accounting, Reporting and Review in order to ensure the integrity of the Protocol.
5) Compliance. Establishing a Compliance Committee to enforce compliance with the commitments under the Protocol.

Paris Agreement

The Paris Agreement establishes the main framework for cooperative action on climate change beyond 2020 and will replace the Kyoto Protocol.

The key elements

1. To keep global increase in temperatures "well below" 2^0C (3.6F) above pre-industrial times and "endeavor to limit" them even more, to 1.5^0C
2. To limit the amount of greenhouse gases emitted by human activity to the same levels that trees, soil and oceans can absorb naturally, beginning at some point between 2050 and 2100
3. To review each country's contribution to cutting emissions every five years so they scale up to the challenge
4. For rich countries to help poorer nations by providing "climate finance" to adapt to climate change and switch to renewable energy.

Safety Provision (Building) Convention 1937

This Convention applies to all construction activities, namely building, civil engineering, and erection and dismantling work, including any process, operation or transport on a construction site, from the preparation of the site to the completion of the project. The Convention describes the term 'construction' as;

1. building, including excavation and the construction, structural alteration, renovation, repair, maintenance (including cleaning and painting) and demolition of all types of buildings or structures ;
2. civil engineering, including excavation and the construction, structural alteration, repair, maintenance and demolition of, for example, airports, docks, harbors, inland waterways, dams, river and avalanche and sea defence works, roads and highways, railways, bridges, tunnels, viaducts and works related to the provision of services such as communications, drainage, sewerage, water and energy supplies;
3. the erection and dismantling of prefabricated buildings and structures, as well as the manufacturing of prefabricated elements on the construction site;

Article 6 states that: Measures shall be taken to ensure that there is co-operation between employers and workers, in accordance with arrangements to be defined by national laws or regulations, in order to promote safety and health at construction sites.

Article 12, Section 1, States that the National laws or regulations shall provide that a worker shall have the right to remove himself from danger when he has good reason to believe that there is an imminent and serious danger to his safety or health, and the duty so to inform his supervisor immediately.

Convention on Biological Diversity (CBD), 1993

Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development. Conceived as a practical tool for translating the principles of Agenda 21 into reality, the Convention recognizes that biological diversity is about more than plants, animals and microorganisms and their ecosystems. It is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. It has three main objectives: 1) the conservation of biological diversity; 2) the sustainable use of its

components; and 3) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

4.4 The National Administrative Framework

4.4.1 The National Environment Council, (NEC)

EMCA 1999 No. 8 part III, section 4 outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for the purposes of EMCA; set national goals and objectives and determines policies and priorities for the protection of the environment and promote co-operation among public departments, local authorities, private sector, non-governmental organizations and such other organizations engaged in environmental protection programs.

4.4.2 The National Environmental tribunal, (NET).

The National Environment Tribunal (NET) is established under section 125 and Part XII of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999. Its principal function is to receive, hear and determine appeals arising from decisions of the National Environment Management Authority (NEMA) on issuance, denial or revocation of environmental impact assessment (EIA) licenses, among other decisions. Such licenses are, in effect, statutory permission to undertake developments of specified nature. The function arises from EMCA's enumeration (in the Third Schedule) of certain kinds of developments that require EIA and thereafter, NEMA's issuance of EIA license, without which the specified developments cannot proceed. The listed developments include, but are not limited to: road construction works, establishment of industries and construction of housing facilities in certain circumstances.

4.4.3 The National Environment Management Authority, (NEMA)

The objective and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. NEMA's mandate is designated to the following committees:

4.4.4 The County Environment Committees (CECs).

According to EMCA, 1999 No. 8, section 40, the following sub-sections states that:

1) Every County Environment Committee shall, within one year of the commencement of this Act and every five years thereafter, prepare a county environment action plan in respect of the county for consideration and adoption by the County Assembly.
2) Every County Environment Committee, in preparing a county environment plan, shall undertake public participation and take into consideration every other county environment action plan already adopted with a view to achieving consistency among such plans.
3) The respective County Executive Committee members of every county shall submit the county environment action plan referred to in subsection (1) to the Cabinet Secretary for incorporation into the national environment action plan referred to in section 37.

4) The Authority shall consider every county environment action plan and either recommend incorporation of such plan into the national environment action plan or specify changes to be incorporated into a respective county environmental plan.

5) The Cabinet Secretary shall, on the recommendation of the Authority, issue guidelines and prescribe measures for the preparation of environmental action plans.

4.4.5 National Environmental Complaints Committee, (NECC)

The Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the Authority in relation to any environmental condition in Kenya and on its own volition, any suspected case of environmental degradation and to report findings together with its recommendations thereon to the Council.
- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3)
- To perform such other functions and exercise e such powers as may be assigned to it by the Council.

Table 4: The Regulatory Agencies Relevant to the Project

	Institution	**Envisioned role in the proposed project**	**Project phase required**
	National Environment Management Authority (NEMA)	Issuance of EIA license and Monitoring for Compliance with conditions and environmental law	Construction, operation and decommissioning
	Machakos County Government/ Mavoko Sub-county	Approval of plans and building inspections, issuance of licenses	Construction, operation and decommissioning
	Physical Planning Department	Building certifications	Construction
	Water Resources Authority (WRA)	Supply of water permits for surface and ground water abstraction.	Construction, operation and decommissioning
	Directorate of Occupational Health and Safety Services (DOSHS)	Ensure safety of workers at construction site	Operation
	National Construction Authority (NCA)	Project Registration and Certification	Construction

CHAPTER FIVE: ANALYSIS OF ALTERNATIVES TO THE PROJECT

This section outlines the main alternatives provided by the applicant, an evaluation of the impacts of each alternative with clear information on the criteria used to assign significance and an indication of the main reasons for choosing the proposed development taking into account the environmental impacts.

- No Project Alternative
- The Alternative Site
- Waste management alternatives
- Project development with mitigation measures

5.1 No Project Alternative

The "no development option" entailed leaving the current status of the site as it is. The environmental effects of the proposed development will be avoided making the option desirable considering the state of the environment. If this is the case, one of the main reasons for developing the site - provision of housing - will not be realized. A significant investment of investment be spent in building material, employment etc including housing opportunities besides the potential of the project stimulating development in the area will not be realized. This option implies economic loss to the proponent, local and national economies. Already a substantial monetary commitment has been made in the procurement of the proposed site, development of building plans as well as designs. In case the project is not implemented, all the participants such as the designers, the local and national authorities, the contractors, materials suppliers and the workers in the development chain will lose economic gains that would have otherwise been realized during project life. Generally, the nil development option will be retrogressive in view of the current economic situation and the Government's efforts to achieve middle income country by year 2030 as envisaged in Vision 2030 and as per the Big Four Agenda where housing is inclusive.

5.2 Alternative Site

Pursuing a change of site alternative on the other hand requires that the project be implemented at an alternative site other than the one already acquired. This would entail purchasing an alternative piece of land. The project proponent however has access to only this property for the stated development. The resultant effect of changing the site would be increase in timeframe and resources required to realize the development. The unpredictability of financial resources and the lag time required in acquiring and designing the development may also mean that the project may be unable to break even once implemented. This will make this alternative more undesirable and more so as there are similar upcoming developments in the vicinity.

5.3 Waste management alternatives

Solid and liquid wastes will be generated from both the project construction and operational phases.

Solid Waste

Solid wastes will be collected from the site for safe disposal by a NEMA licensed waste collector after necessary contractual agreement during both construction and operational

phases. Solid wastes management, an integrated solid waste management system is recommended which is as follows. a) First the proponent should give priority to reduction at source of the materials. This option will demand a solid waste management awareness programme in the individual households. b) The proponent should also consider recycling, reusing and composting of the waste as a second alternative in priority. This shall call for at source separation programme to be put in place. The recyclables may be sold to waste buyers locally or directly to any company that recycles waste such as plastic bags. c) The third priority in the hierarchy of options is combustion of the waste that is not recyclable in order to produce energy. d) Finally, sanitary land filling will be the last option for the proponent to consider. It is to the interest of the proponent and the community that the waste is effectively managed so as to maintain a safe and healthy environment to the worker and the community at large through appropriate disposal mechanism.

Liquid Waste

Liquid wastes in the facility will be managed through connection to MAVWASCO sewer line during operational phase. As an alternative liquid waste management plan option, we advise the proponent to consider installing an onsite waste water management system on the estate in the event that the municipal sewer system would be dysfunctional or out of operations. This will ensure that the proponent manages its liquid waste in a sustainable manner. Having the experience of working with best industry players in wastewater management, we request the proponent to liaise with BioLiff Water Tech to acquire and install a Bioliff Onsite Waste Management System. The parallel dual concept is a green building concept that helps separate liquid waste into grey water and black water. This influences the type of treatment the water is to be subjected to and thus help avoid polluting the grey water with the black water. The concept of a Bioliff is not new and has been used successfully before in several projects in Kenya.

5.4 Selected Site Alternative

Pursuit of this alternative will entail going forward with the development but taking into account all the potential impacts on the biophysical environment by incorporating and integrating the recommended mitigation and enhancement measures into the project designs and implementation.

The proposed site provides a most suitable site for the project as it is currently owned by the proponent and is in harmony with the existing land uses; it is situated next to Mombasa Road hence ease of access as well as the ease to connect to KPLC and MAVWASCO main lines which are in the area. With these advantages, presence of the indicated facilities and from the findings of this impact assessment study, the existing designs provide the optimum alternative for implementing and operating the proposed housing apartment's project subject to the effective implementation of the proposed EMP. The selected alternative will be enhanced through appropriate mitigation measures, including due diligence and best construction management practices that will help protect the physical, ecological and socio-economic environment of the project area. Commitments included in this project report, as well as licenses and other authorizations that would be issued, are all designed or geared to avoid environmental damage in accordance with the Environmental Management and Co-ordination Act, 1999 (Amendments, 2015). The proponent undertakes to incorporate all necessary measures to ensure adverse impacts are mitigated to the maximum extent practicable during the entire project life cycle.

This alternative is more desirable as it will inject a significant amount of money into the economy thereby stimulating economic development and providing affordable middle level housing facility.

CHAPTER SIX: CONSULTATION ANDPUBLIC PARTICIPATION AND OCCUPATIONAL HEALTH AND SAFETY.

6.1 Consultation and Public Participation (CPP)

Public consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting project alternatives and designing viable and sustainable mitigation and compensation plans. The welfare of human societies and the quality of life is directly linked to sustainable use of our natural resources. This has been duly recognized in Agenda 21, where it is stated that:

"Special attention should be paid to the demand for natural resources generated by unsustainable consumption and to the efficient use of those resources consistent with the goal of minimizing depletion and reducing pollution."

The Kenya government has enshrined the need for human societies' involvement in project development in the Constitution. The EMCA, 1999 (Amendments, 2015) requirements read together with the EIA/EA Guidelines of 2003 require that the general public and major stakeholders be consulted on the impacts to the environment that may be occasioned by projects either in the public or private domain. Community consultation and participation ensures that communities and stakeholders are part and parcel of the proposed development projects and in so doing assures the acceptability and sustainability of the project. It has also been demonstrated successfully that projects that go through this process acquires high level of acceptance and accrue benefits to a wider section of the society. Public consultations form a useful component for gathering, understanding and establishing likely impacts of projects determining community and individual preferences and selecting best practicable solutions or alternatives.

Public consultation in the EIA process is undertaken during the project design, implementation and initial operation. The aim is to disseminate information to the public, interested and affected parties (stakeholders), solicit their views and consult on sensitive issues. Inadequate public consultation can result in significant information gaps, which could mislead environmental experts undertaking an environmental assessment. Lack of attention to communication and consultation processes can generate individual, community, or regional opposition to a project. This can ultimately be a cause of substantial delays, increased costs, and unsatisfactory compromise solutions, which could have been avoided through earlier consultation. Participation is therefore a process through which different stakeholders influence and share their views regarding development initiatives and the decisions and resources that affect them. An important element in the process of environmental impact assessment is consulting with stakeholders to gather the information needed to complete the assessment.

In a bid to gather socioeconomic information of the project area, a number of tools were put in place. Public consultations were used to enable understanding of the social and economic characteristics of the local community. The EIA consultants understand that the local community members are major stakeholders in the project, and therefore gathered their views and included them in this report. For purposes of this assessment, the public consultation strategy was designed to involve any and all individuals or groups that would be positively or negatively affected by the proposed development. The strategy involved

face to face discussions with the public to inform and educate the stakeholders and any interested and affected parties (IAPs) on the proposed development as well as its consequences. This process also involved sampling of some members of the community and requesting them to fill in some structured questionnaires. Two(2) public barazas were held on 01st March 2024 at different venues in Wildisde Active living and Gallas Garden Hotel. The third public Baraza was held at 67 Trading Centre were the local were engaged on 5th March 2024. The following organs/ stakeholders members were present; Area's Assistant Chief, Village elder, Area MCA's representative, Ward Administrator, BodaBoda Chairman, and Machakos County Government representative. Due to economic setup of the area that affects 100% residents' turnout in a public meeting, the consultant administered 45 questionnaires that were filled during this exercise, which involved questionnaire administration as well as oral informal interviews. This consultation process dealt more with the project's anticipated impacts on the local environment as well as health and safety of the neighbouring residents. *Public participation questionnaires have been annexed in this report.*

6.2 Objectives of the public consultation program

The overall goal of the consultation process was to disseminate project information and to incorporate the views of the Project Affected Persons (PAPs) in the design of the mitigation measures and environmental management plan.

The specific aims of the consultation process are to:

- Improve project design and, thereby minimise conflicts and delays in implementation;
- Increase long term project sustainability and ownership;
- Reduce problems of institutional coordination; and
- Inform the public and all stakeholders of the details of the proposed residential apartments;

The main objectives of community consultations were to:

- Provide clear and accurate information about the project to the residential neighbours;
- Obtain the main concerns and perceptions of the population and their representatives regarding the project;
- Obtain opinions and suggestions directly from the affected community members and preferred mitigation measures;
- Collect views on the positive and negative impacts anticipated by stakeholders and how these can be overcome; and
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.

6.3 Stakeholder Engagement

The public consultation and disclosure programme was designed and implemented so as to foster community awareness of the proposed project, and to provide opportunities for community input and involvement.

6.4 Stakeholders Analysis

The stakeholder analysis was undertaken to identify all the potential stakeholders of the project. They included: local administration; Government Agencies; Local Community representation and associations; Institutional stakeholders and the general public in the project area. Ecotech Consultants delivered a transmittal and public invitation letters to Mr. David K. Muthuka, the Assistant Chief of Syokimau-Mlolongo Sub-Location, providing details about the project and inviting the public to a meeting. The letters, dated February 26th, 2024, included information about the venue and time for each of the three (3) public meeting. This approach was chosen to ensure fairness and easy distribution of information, as the members of the public were invited through the administration office.

6.5 Overall outcome of consultations

The following is a summary of the key highlighted issues by the respondents;

Positive Impacts

- Avail affordable housing in the area;
- Improve security of the project area once the project is completed;
- Generate employment for the youth both directly and indirectly;
- Boost local business opportunities for the local traders and materials suppliers;
- Skills transfer to the local workforce;
- Generate revenue to the national and county government;
- Improve the general aesthetics of the area.

Negative Impacts

- Generation of solid waste and its management;
- The project will generate noise and vibrations;
- Project will lead to increased crime scenes of insecurity, thefts and immoral behavior;
- Generation of surface run-off and waste water;
- Generation of dust and air pollution;
- Noise pollution; and
- Traffic congestion and accidents.

Table 5: Senior Members present in the Wildside Public Baraza and Stakeholder represented.

Name	**Stakeholder Represented**	**Cell Phone Number**
David K. Muthuka	**Syokimau-Mlolongo Location Sub-Chief**	0713101996
Lawrence Mutuku	**Machakos County Government** (Ministry of Trade, Innovation, Tourism, Culture And Industry)	0724475211

Boniface Mutua	MCA representative – **Syokimau Mlolongo ward**	0712903993
Dominic Nzioka Ndeti	Vice Ward Administrator	0721953412
Florence Akoth Odhiambo	**Village Elder** – Kwa Mbemba 67 Village Elder	0712127752
Alex Mutuku	BodaBoda Chairman	0710177505
Moses Muisyo	Ecotech –EIA/EA Lead Expert	0721171916
Nungari Muraguri	Ecotech Consultants Team	0701964450
Faith Nderitu	Ecotech Consultants Team	0721628951
Mercy Kiume	Ecotech Consultants Team	0701879417
Johnson Ngori	Project Representative	0729847819
Winfred Nduku	Project Representative	0707470381

Plate 6: Syokimau Area Chief and Village Elder making remarks respectively during the Wildside Active Living public meeting.

Plate 7: The MCA office representative and the Vice Ward Administrator making their remarks respectively during the Public meeting at Wildside Active Living.

Plate 8: Pictorial Images of the Public member engaging during the Public meeting at Wildside Active Living Public Meeting

Plate 9: Syokimau Area Ass. Chief making remarks and Public Members actively engaging during meeting at Gallas hotel

Plate 10: Pictorial Image of the Public meeting held at Gallas Garden Hotel

Plate 11: The EIA lead Expert engaging with the public and the Village elder making closing remarks at the Gallas hotel Public Meeting

6.6 Environmental Occupational, Health and Safety impacts

It is a requirement that Azure Sky Investment Ltd must develop adequate and responsive HSE policies and integrate them into the project lifecycle. The construction workers must also ensure that they adhere, at all times, to all national and local health and safety

standards applicable. The contractor should be compliant with the findings of the EIA Study report and the NEMA licensing conditions. All personnel should be issued with necessary personal protection equipment (PPE) and trained by their supervisors to complete their assigned tasks in a safe and secure manner. The key to achieving healthy and safe working conditions is to ensure that health and safety issues are planned, organized, controlled, monitored and reviewed. Everyone controlling site work has health and safety responsibilities. Checking that working conditions are healthy and safe before work begins and ensuring that the proposed work is not going to put others at risk and this requires planning and organization.

Environmental, Occupational Health and Safety (EOHS) is an important aspect of an environmental assessment and evaluation exercise since most of the activities which will be carried out within the project area should comply with specific standards as set by the local authorities, NEMA, DOSHS and other recognized institutions such as the World Health Organization (WHO). Health, safety and environmental protection and responsibility are among the most important aspects of modern construction industry activities. The health and safety of all personnel and the impact of operations on third parties and on the environment are of paramount importance. It is the responsibility of proponent and the contractor to ensure that safety standards are maintained and all members at the construction site adhere to safe working practices. Some of the safety issues include, but are not limited to, the following factors: Risk of personal injury at work, especially during excavation; Noise generation from the machines; Heat / sun exposure; Solid and liquid waste management, including wastewater and effluent discharges; Oil and chemical spills; dust emissions, Fire; and material handling.

The proponent is required to assess risks and take practical measures in advance to protect the health and safety of the workers, keep accident records, provide information and training, consult employees, cooperate as well coordinating mitigation measures with the contractors. Some of the key aspects to be implemented on the site include:

- Standard HSE Management procedures for the site;
- Strategically place safety signage and postage around the facility and in all appropriate areas; and
- Provide fit for use PPE for workers such as, aprons, gloves, hard helmets, safety shoes etc.;

To achieve the above key approaches include planning and organization, documentation, enforcement and good housekeeping.

6.2.1 Planning the work

This will involve gathering as much health and safety information about the project and the proposed site before work begins, this is important. Sources of information include.

- The client;
- The design team;
- Contract documents;
- The main contractors on the site;
- Specialist contractors and consultants;
- Trade and contractor organizations;
- Equipment and material suppliers; and
- HSE relevant laws regulations and guidelines.

The contractor shall identify site hazards as well as see if there are any unusual features which might affect the work, or how the work will affect others in close proximity to the project site.

6.2.2 Organizing the work

- The contractor shall decide who will supervise the work – check that they are adequately trained and experienced.
- The project proponent shall make sure that the Main Contractor and sub-contractors on site provide adequate supervision for their workers.
- The Contractors management on the project will oversee that work methods and safety precautions agreed before work is started are put into practice.
- Make sure that people working for subcontractors also get the information they require and provide training, supervision etc as needed.

6.2.3 Notifying DOSHS

According to the Factories and Other Places of Work (Safety and Health Committees) Rules, 2004, a project site should be registered as a work place with DOSHS if it regularly employs twenty or more employees and hence shall establish a Safety and Health Committee in the manner provided in these Rules.

6.2.3 Setting up the site

Site access

- There should be safe access onto and around the site for people and vehicles. there shall be a plan how vehicles will be kept clear of pedestrians, especially at site entrances
- The plan should include how vehicles can be kept clear of pedestrians at vehicle loading/ unloading areas, parking areas and areas where drivers' vision may be obstructed.

Site boundaries

The construction worksite should be fenced off and suitably signed. This will protect people (especially children) from site dangers and the site from vandalism and theft. For some jobs the workplace will have to be shared. A plan on who has to control each area. Shall be Agreed, what fences, barriers, means of separation or permits to work are required to keep both construction workers away from hazards created by others and other people away from hazards created by the construction work; site rules might be needed to make sure there is a system to ensure necessary precautions are kept in place during working hours and that night-time and weekend protection is put in place as required before the site closes.

Welfare facilities

- Everyone who works on project site must have access to adequate toilet and washing facilities, a place for consuming refreshments and somewhere for storing and drying clothing and personal protective equipment.
- The project contractor and others who have control over construction sites are responsible for providing or making available site welfare facilities. Employers are

also responsible for ensuring that welfare facilities are adequate for their employees.

- The welfare facilities should be sufficient for everybody who is working on the project site. If facilities such as toilets and canteens provided by someone else are to be used, check that they are suitable and properly maintained. They should be kept clean, warm and properly ventilated and lit.
- Welfare facilities shall be easily available to people working on the site. Toilets need to be easily accessible from where the work is being done. Washing facilities should be as close as possible to the toilets. Washing facilities also need to be rest rooms so that people can wash before eating.

Sanitary conveniences

- The numbers of toilets required will depend on the number of people working on the project site.
- Wherever possible toilets should be flushed by water and connected to a mains drainage system. If this is not possible, toilets with a built-in water supply and drainage tank may be provided. If neither option is possible, chemical toilets may be provided.
- Men and women may use the same toilet, provided it is in a separate room with a door that can be locked from the inside.
- A washbasin with water, soap and towels or dryers should be located close to the toilets.

Washing facilities

- On all sites sections, provide basins large enough to allow people to wash their faces, hands and forearms. All basins should have a supply of clean hot and cold, or warm, running water. Because the mains water is not available in the project area, this water will be supplied from a tank.
- Where the work is particularly dirty or workers are exposed to toxic or corrosive substances (e.g. during excavations and demolitions), showers will be provided.
- Men and women can share basins used for washing their faces, hands and arms

Rest facilities

- Facilities should be available for taking breaks and meal breaks facilities should provide shelter from the wind and rain and be heated as necessary.
- It should be possible for non-smokers to use the facilities without suffering discomfort from tobacco smoke. This can be achieved by providing separate facilities for smokers and non-smokers, or by prohibiting smoking in the rest facilities.
- Rest facilities may be provided within the site office or site hut.

Storing and drying clothing and personal protective equipment

1. The contractor shall make sure there are proper arrangements for storing:
   - Clothing not worn on site (e.g. hats and coats);
   - Protective clothing needed for site work (e.g. wellington boots, overalls, gloves etc.);

- Personnel should be issued equipment (e.g. ear defenders, goggles, harnesses etc.).

2. The site office may be a suitable storage area, provided it is kept secure. Where there is a risk of protective site clothing contaminating everyday clothing, store items separately.
3. Where necessary for propriety, men and women should be able to change separately.

Drinking water

1. The proponent shall make sure there is a supply of drinking water.
2. The drinking water tank should be clearly marked if it is possible not to confuse the drinking water supply with other water supplies or other liquids such as:
    a. those not fit for consumption (e.g. water from storage tanks used for wheel washers); or
    b. certain toxic materials
3. Cups or other drinking vessels should be available at the water point, unless the water is supplied as an upward jet that can be drunk from easily (e.g. a drinking fountain).

6.7 Good order, storage areas and waste materials.

1. Plans should be made on how the site will be kept tidy and how housekeeping will be actively managed:
    - Keep walkways and stairways free of tripping hazards such as trailing cables, building materials and waste. This is especially important for emergency routes. Make sure that all flammable waste materials (such as packaging and timber offcuts) are cleared away regularly to reduce fire risks;
    - Keep inside floor areas clean and dry;
    - Outdoor footpaths should be level and firm and should not be used for storing materials
2. Designate storage areas for plant, materials, waste, flammable substances (e.g. foam plastics, flammable liquids and gases such as propane) and hazardous substances (e.g. pesticides and timber treatment chemicals). Flammable materials will usually need to be stored away from other materials and protected from accidental ignition. Care must be taken not to store materials where they obstruct access routes or where they could interfere with emergency escape.
3. If materials are stored at height (e.g. on top of a container or on a scaffold gantry), make sure necessary guard rails are in place if people could fall when stacking or collecting materials or equipment.
4. All storage areas shall be kept tidy, whether in the main compound or on the site itself. Try to plan deliveries to keep the amount of materials on site to a minimum.
5. A decision must be made on how the waste stream will be managed to ensure it is timely and effective. The contractor should consider whether to be responsible for collecting their own waste or whether you will provide someone to do this for the site. Don't forget that waste materials also need storing safely before their removal from the site and make sure that to make allowance for sufficient space for waste skips and bins. If you are collecting waste in skips you will need to decide where the skips can be positioned and how often they will need to be collected. Consider waste generated inside and whether you need to provide wheeled bins to enable it to be brought out of the building safely.

6.8 Emergency procedures

1. At most sites, the most obvious emergency is fire. The general principles for dealing with fire risks can be applied to planning for other emergencies. Plan emergency procedures before work begins and put general precautions in place from the start of work.
2. Some emergencies may require evacuation of the site or part of the site, while others might involve the rescue of an injured person. For example, it may be necessary to plan how someone injured in a fall can be attended to by first aiders and the emergency services before being taken to a place of safety.

a) Planning for an emergency

1. When planning emergency procedures, routes and exits, the following should be into account:
    - The type of work being done on site (e.g. extra precautions may be required to maintain routes down stairs during demolition);
    - The characteristics and size of the site and the number and location of workplaces on the site. A large site with people working at many locations will probably need bells or sirens at a number of places to raise the alarm. On small sites with only two or three people working, an air horn may be adequate;
    - The plant and equipment being used (e.g. consider tower crane drivers, people working on suspended access equipment or where the exit may be obstructed by equipment);
    - The number of people likely to be present on the site at any one time. On sites where many people work, escape routes need to be wide enough to allow everyone to get through doorways or down stairs easily without them becoming overcrowded; and
    - The physical and chemical properties of substances or materials on or likely to be on the site (e.g. work at petrochemical installations or at sites where flammable paints or glues are in use may require an increased standard of ventilation).
2. Take precautions to ensure:
    - The likelihood of emergencies arising is as low as possible;
    - Everyone on site can be alerted in an emergency;
    - Everyone working on site (including contractors who may only be at the site for a few hours) knows what signal will be given if there is an emergency and knows what to do;
    - Someone who has been trained in what to do is on site while work is in progress and will take responsibility for coordinating procedures;
    - Emergency routes are available, kept clear, signed and adequately lit. When the site is not adequately lit by daylight for all periods when people are at work, provide lighting that will come on automatically in an emergency;
    - There are arrangements for calling the emergency services. It is good practice to let the Fire Brigade know about any work in tunnels, confined spaces or above 18 m (above this height they may require specialist access equipment) and anywhere else where specialized rescue equipment may be needed;
    - There is adequate access to the site for the emergency services and that access does not become blocked by plant or material building up;
    - Arrangements for treating and recovering injured people are available;

- If an emergency does arise, someone is posted at the site entrance, or in another prominent position, so that they can direct the emergency services

b) Precautions to prevent fires

The following precautions should be taken to prevent fires:

- Use less-easily ignited and fewer flammable materials, e.g. use water-based or low-solvent adhesives and paint;
- Keep the quantity of flammables at the workplace to a minimum;
- Always keep and carry flammable liquids in suitable closed containers;
- If work involving the use of flammable materials is being carried out, stop people smoking and don't allow other work activities involving potential ignition sources to take place nearby. For example, if floor coverings are being laid using solvent-based adhesives, don't allow soldering of pipes at the same time;
- Ensure that pipes, barrels, tanks etc. which may have contained flammable gases or liquids are purged or otherwise made safe before using hot cutting equipment, such as a cutting torch or angle grinder. A pipe or container may appear to be empty, but can contain enough material on its sides, or within rust or other sediments, to produce a flammable or explosive atmosphere within it when heated or disturbed. Specialist advice may be required;
- To minimize the risk of gas leaks and fires involving gas-fired plant:
    - Close valves on gas cylinders when not in use;
    - Regularly check hoses for wear and leaks;
    - Prevent oil or grease coming into contact with oxygen cylinder valves;
    - Do not leave bitumen boilers unattended when alight;
- Store flammable solids, liquids and gases safely. Separate them from each other and from oxygen cylinders or oxidizing materials. Keep them in ventilated secure stores or an outdoor storage area. Do not store them in or under occupied work areas or where they could obstruct or endanger escape routes;
- Have an extinguisher to hand when doing hot work such as welding or using a disc cutter that produces sparks;
- Check the site at lunch time and at the end of the day to see that all plant and equipment that could cause a fire is turned off. Stop hot working an hour before people go home, as this will allow more time for smoldering fires to be identified; and
- Provide closed metal containers to collect rubbish and remove them from the site regularly. Collect highly flammable waste such as solvent-soaked rags separately in closed fire-resisting containers.

c) Precautions in case of fire

If a fire should break out, people must be able to escape from it. To achieve this consider the following procedures;

1. Means of giving warning.

Set up a system to alert people on site; this could be a temporary or permanent mains operated fire alarm (which should be tested regularly, e.g. weekly), a klaxon, an air horn or a whistle, depending on the size and complexity of the site. Any warning needs to be distinctive, audible above other noise and recognizable by everyone.

2. Means of escape.

Plan escape routes and ensure they remain available and unobstructed. For work areas above or below ground, provide well separated alternative ways to ground level where possible. Protect routes by installing the permanent fire separation and fire doors as soon as possible. It is important that escape routes give access to a safe place where people can assemble and be accounted for. Signs will be needed if people are not familiar with the escape routes Make sure that adequate lighting is provided for enclosed escape routes – emergency lighting may be required.

3. Means of fighting fire.

a) As well as providing fire extinguishers for hot work, fire extinguishers should be located at identified fire points around the site. The extinguishers should be appropriate to the nature of the potential fire:
   - Wood, paper and cloth – water extinguisher;
   - Flammable liquids – dry powder or foam extinguisher;
   - Electrical – carbon dioxide (CO2) extinguisher.

b) Nominated people should be trained in how to use extinguishers.

d) First Aid

Factories (First-Aid) Order required by section 50(1) of the Act require the occupier to provide The first-aid boxes or cupboards at a work place which are adequate and appropriate equipment, facilities and personnel to enable first aid to be given to your employees if they are injured or become ill at work. The minimum provision for all sites is:

- A first aid box with enough equipment to cope with the number of workers on site as per the order;
- An appointed person to take charge of first-aid arrangements;
- Information telling workers the name of the appointed person or first aider and where to find them. A notice in the site hut is a good way of doing this.

The first-aid arrangements should cover shift working, night and weekend working where this is carried out. This may mean appointing or training several people to ensure adequate cover.

e) Reporting injuries, diseases and dangerous occurrences

Employers have a duty under the law (OSHA, 2007) to report to DOSHS certain types of accidents that happen to their employees. Whoever is in control of the site also has a legal obligation to report certain accidents which involve a self-employed worker or member of the public and certain dangerous occurrences. Generally, you have to report deaths, serious injuries and dangerous occurrences immediately and less serious injuries within seven days. Certain occupational ill-health issues and diseases also have to be reported. Further details of when you must report an accident, disease or dangerous occurrence are given in Factories and other places of work (Safety and health committees) Rules.

f) Site rules

It is recommended to enact certain safety precautions while construction work is in progress. It may assist everyone if site rules are applied. Site rules might cover, for example, the use of personal protective equipment, traffic management systems, pedestrian routes, site tidiness, fire prevention, emergency procedures or permit-to-work

systems. It should be very clear where site rules apply. Make sure everybody knows and follows the rules relevant to them.

6.9 Site management and supervision

This should entail making provision of either all or some of the following.

1. Safety while working at height.
2. Selecting the right means of access and work equipment.
3. Safe working platforms.
4. Inspections and reports.
5. General access scaffolds.
6. Guard rails, toe boards and brick guards.
7. Tower scaffolds.
8. Mobile access equipment.
9. Suspended access equipment.
10. Safety nets and soft landing systems.
11. Rope access techniques.
12. Safety harnesses.
13. Ladders and stepladders.
14. Roof work and fragile surfaces.
15. Roof truss installation.
16. Management of site traffic and mobile plant.
17. Moving goods safely.
18. Hazardous substances and processes.
19. Personal protective equipment.
20. Electricity safety.
21. Prevention of slips and trips.
22. General Public Safety

CHAPTER SEVEN: ASSESSMENT OF POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

7.1 Introduction

This chapter presents the relevant environmental and social issues that may occur (potential impacts) throughout the project cycle. The purpose of the Environmental Impact Assessment (EIA) of the project is to ensure the project progresses in a sustainable approach. The assessment is based on identified potential impacts through fieldwork and public participation. The proposed project is expected to have both positive and negative impacts. Specifically, the chapter covers the main environmental and social impacts that are likely to occur during construction, operation and decommissioning phases of the proposed project. The anticipated impacts are then discussed in three phases namely: construction, operational and decommissioning phases. The initial identification of activities with a potential to have a significant impact on the local physical, human and ecological environment was performed using a screening matrix. In this process several criteria were used to allow the significance of each impact to be assessed, including but not limited to: extent, frequency, duration, reversibility, repairability and scale. The impacts identified during the initial screening were then subjected to an extended evaluation. This evaluation included establishment of a rating, on a scale, for each impact in terms of the level of its significance and the probability of its occurrence. The individual rating of each criterion was then followed by a matrix-based assessment where they were weighed against each other to retrieve a final estimation based on local conditions as per the Leopold's Matrix. The result of this assessment is an individual scoring of each impact allowing for comparability between activities (useful when prioritizing mitigation efforts). The assessment of the impacts from each activity was then followed by initial recommendations on mitigation efforts, adapted to local conditions, which are considered necessary to reduce the estimated impact from each activity to an acceptable level. In order to alleviate negative impacts emanating from the implementation of the project, relevant mitigation measures have also been proposed in this chapter

7.2 Classification of environmental impacts and significance

Impacts may be categorized into the following:

- Positive (beneficial) or negative (adverse);
- Direct or indirect, long-term or short-term in duration;
- Localized or widespread in the extent of their effect;
- Cumulative or non-cumulative.

The aim of this assessment exercise was to identify the significant impacts related to the project. Significant impacts were defined as being those which:

- Are subject to legislative control;
- Are of public concern and importance;
- Are determined as such by technically competent specialists;
- Trigger subsequent secondary impacts;
- Elevate the risk to life threatening circumstances; and
- Affect sensitive environmental factors and parameter in the project area.

Impact significance was described as follows:

High: Where it could have a no-go implication for the project irrespective of any possible mitigation.

Medium: Where the impact could have a moderate influence on the environment, which would require modification of the project design or alternative mitigation.

Low: Where the impact would have little influence on the environment and would not require the project design to be significantly accommodated.

Negligible: Where the impact would have no influence on the environment and would not require the project design to be accommodated at all.

The criterion used in determining the significance of the impact should be was through the following approach:

Nature of Impact: A brief description of how the proposed activity will impact on the environment. This should be stated as: Positive (a benefit); Negative (a cost) or Neutral.

Duration: The period of contact between the impact and the receptors both biophysical and socio-economic. The impact could then be termed as short term, medium term or long term and permanent. Also the impacts could be intermittent or continuous.

Extent: This evaluates the area of occurrence and influence of the impact on the receptor environments. Impacts could occur on site where project activities are taking place, within a limited area thus a radius of 500-1000m, local jurisdiction of 3km radius of the spatial coverage of the project.

Magnitude: The quantifiable effects of impacts. These were measured where possible against the appropriate standards for a given environmental component. Standards included operational guidelines, different environmental standards and schemes drawn based on expert judgment by experienced professionals. Magnitude was then expressed in terms severity thus major, moderate or low.

Irreversibility: Impacts could be reversible or irreversible. Reversible impacts are those for which solutions are available using current knowledge and technology. The changes on the biophysical and socio-economic receptors are not permanent. There is technology available to undo the changes. Irreversible impacts are those for which there is no technology available to restore receptors to their pre-impact state. They are permanent changes in the parameters and functioning of the receptor environment.

Significance: This constitutes the overall impact rating taking into account all the other impact parameters. It was expressed in terms of severe, moderate, minor and negligible. The matrix in the table below presents the criteria for scaling the significance of impacts of the proposed residential apartment's project.

Likelihood: This considered the likelihood of the impact occurring and was described as:

- Unlikely (where the impact is unlikely to occur);

- Likely (where there is a good probability, < 50 % chance that the impact will occur);
- Highly likely (where it is most likely, 50-90 % chance, that the impact will occur); or
- Definite (where the impact will occur, > 90 % chance of occurring, regardless of any prevention measures).

Table 6: Criteria for assessing significance

Environmental and Social Issue/Impact	**Description**
Project Phase	**Pre-construction, Construction, Operation and Decommissioning**
Impact	
Nature	Negative or Positive Direct or Indirect
Extent	Localised or Regional or National
Duration	Long term or Short term
Probability ()	Highly Likely, Likely or Not Likely,
Degree to which impact cannot be reversed	Low or High
Degree to which Impact may cause irreplaceable loss of resources	Low, Medium or High
Significance Pre-Mitigation	Low or High Positive or Negative
Significance Post-Mitigation	Neutral, Positive or Negative
Degree of Mitigation	Easily Mitigated, Not Easily Mitigated

7.3 Impact identification, description and mitigation

An impact matrix is a simple but effective tool for identifying the possible impacts of the project activities on the environment and this was done for the proposed residential apartment's project. The project activities for the construction of the proposed residential project were arrayed against a selection of environmental factors that were deemed to be relevant to the project or which may be affected indirectly as a result of project activities. In order to ensure sound development and effective implementation of the proposed Environmental and Management Plan, it is necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project. The following entities are key for the success of the proposed project and should be involved as adequate in the in the implementation of this EMP: Project Manager, the Project Contractor, Mavoko Sub-county and NEMA. The Project Manager will oversee the construction program and construction activities which shall be compliant with the developed EMP. The contractor is required to comply with all the requirements of the EIA license and other relevant legislations.

The relevant department within the Mavoko Sub-county shall be called upon where necessary during the project implementation to provide the required permits and advisory services to the proponent and Project Manager while NEMA will exercise general

supervision and coordination over all matters relating to the environment and the principal instrument of the government for implementation of all environmental policies.

7.4 Pre-construction phase impacts discussion

This stage involves the design, planning and pre-construction activities of the project. Key activities considered included:

- Vegetation clearing;
- Transportation of materials to project site;
- Public consultations;
- Storm water management;
- Visual intrusion;
- Landscape design;

7.4.1 Positive impacts during the pre-construction phase

Public consultation

Prior to any development, the proponent was required to conduct public consultations and obtain feedback from the community on their views concerning the proposed project as part of the EIA exercise. Through this activity the proponent got to know more on the views of the residents about the proposed development and therefore incorporates appropriate measures in order to be in line with the needs of the community before implementation of the project.

Environmental sound designs

The incorporation of renewable sources of energy and recycling of waste water into the design of the Azure Sky Investment Ltd development would ensure that environmental considerations have been taken into the concept of the development making it environmentally friendly hence we propose the installation of solar panels for use in the proposed apartments.

7.4.2 Negative impact during the pre-construction phase

Vegetation clearing

During site preparation, vegetation consisting of grasses, shrubs and small trees on the site will be cleared and the overburden removed so as to commence construction of the structures. Vegetation clearing is associated with loss of biodiversity, soil erosion, sedimentation and siltation, increased run off and degradation of surface water quality.

Mitigation measures

- Incorporation of natural vegetation into site landscape design;
- Vegetation clearing should be limited during this phase and only where the temporary structures are to be erected;

Restriction of movement

Site handing over to the contractor after signing of civil contract will be the beginning of the site preparation. The contractor will have to fence the site to restrict the movement of people through the site hence increasing the distance and time taken to access certain resources e.g. access to grazing land.

7.5 Construction Phase Impacts Discussion

7.5.1 Positive impacts during construction

Creation of employment opportunities

This project will create job opportunities in the project area. Direct job opportunities are available for high calibre professionals including architects, engineers, civil works contractors and consultants. The project will also offer direct or indirect employment opportunities to semi-skilled and unskilled labourers such as foremen, clerks and drivers.

Table 7: Impacts from creation of employment

Environmental and Social Issue	**Creation of employment opportunities**	
Project Phase	**Construction**	
Impact	**Increased income**	**Improved livelihood**
Nature	Positive (direct and indirect)	Positive (direct and indirect)
Extent	Study area	Study area
Duration	Short term	Long term
Probability	Highly Likely	Highly Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	Low
Significance Pre Enhancement	Positive and High	Positive and High
Significance Post Enhancement	Positive and Very High	Positive and Very High
Degree of Enhancement	Easily Mitigated	Easily Mitigated

Enhancement measures include:

- During employment of semi-skilled and unskilled labour, priority should be given to the local residents and immediate community;
- Gender Equity should be considered when employing labours so as to ensure a balance between the two sexes is almost equal and there should be no bias towards the male;
- Better remuneration for the employees in line with Employment Act 2007 and the Regulation of Wages (General) (Amendment) order, 2009;

- The contractor should inform workers that the employment opportunity is short term so as to prepare them in case employment comes to an end due to reduction in work.

Provision of market for building materials

The project will require supply of large quantities of building materials most of which will be sourced locally within Mlolongo town. This provides ready market for building material suppliers such as quarrying companies and hardware shops hence will be a source of income for owner which enable further investment in their business and create employment opportunities for labourers.

Table 8: Impacts from provision of market for building materials

Environmental and Social Issue	**Provision of market for building materials**	
Project Phase	**Construction**	
Impact	**Increased income**	**Employment opportunities**
Nature	Positive (direct)	Positive (direct)
Extent	Study area and the surrounding region	Study area
Duration	Long term	Short term
Probability	Highly Likely	Highly Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	Low
Significance Pre Enhancement	Positive and High	Positive and High
Significance Post Enhancement	Positive and High	Positive and Very High
Degree of Enhancement	Easily Mitigated	Easily Mitigated

Mitigation measures include:

- Construction contract should stipulate that the Contractor sources materials from an approved site and sources e.g. hard stones for building should be obtained from bonafide commercial quarries;
- Adherence to the NEMA national sand harvesting guidelines by sand harvester supplying sand for building. This is to mitigate the degradation of riverbed and acceleration of erosion;
- Quarry providing aggregates for construction should be licenced and in line with the various regulatory guidelines such as the Mining Act, EIA guidelines and local authority bylaws;
- The Project Manager should ensure that source of timber used during construction should be obtained from approved sources;
- Materials such as steel and cement should be accredited company with Kenya Bureau of Standards marks of highest quality as well as Ministry of

Public Works Material testing section. This is to ensure high building standards are upheld and not compromised by low quality materials;

- The tender documents should specify required standards and certification for procurement of all materials and appliances.

Enhancement of local economic growth

Income generated from employment during construction and from the informal and formal business around the project area is expected to improve the economic status of the local populous. Increased income would lead to increased saving and investment on the household level for example in housing, education and assets.

7.5.2 Negative impacts during construction

Vegetation Clearing

It is anticipated that the entire land surface is going to be cleared to create space for construction of structures and the needed supporting services and facilities. Further, the site will be enhanced through landscaping leading to massive disruption of the existing natural vegetation cover.

Table 9: Impacts of vegetation clearing

Environmental and Social Issue	**Vegetation clearing**		
Project Phase	**Construction**		
Impact	**Top soil loss and Erosion**	**Increased run off causing sedimentation and siltation of surface water features**	**Loss of biodiversity**
Nature	Negative (direct)	Negative (indirect)	Indirect (direct)
Extent	Site	Project area	Site
Duration	Short term	Short term	Long term
Probability	Highly Likely	Highly Likely	Highly Likely
Degree to which impact cannot be reversed	Low	Low	High
Degree to which Impact may cause irreplaceable loss of resources.	Very high	Low	Very High
Significance Pre Mitigation	Negative and Very High	Negative and High	Negative and Very High
Significance Post Mitigation	Positive and High	Positive and Low	Positive and Low
Degree of Mitigation	Easily Mitigated	Easily Mitigated	Moderately Mitigated

Mitigation measures include:

- Minimal clearing of the few tree species on the site. The Project Management should ensure retention and restoration of much of the original vegetation cover;
- Removal of vegetation to take place only within demarcated construction site;
- Non-essential removal of vegetation should be avoided;
- Re-vegetation should incorporate natural vegetation.

Solid wastes management

During the construction phase, three types of solid wastes will be generated: Debris from demolitions, spoils and domestic refuse. At present it is not known the quantities of waste which will be generated from the three sources; however it is believed to be in larger quantities. Such waste materials include excavated soil, stones, construction debris, wood, broken glasses, containers, rods of metal, pieces of iron sheets, extirpated vegetation on the site etc. Other construction waste will be generated while the works are ongoing. This will consist of building materials, concrete, paper and plastic (for example from packaging materials and lagging), timber, scrap metal, etc. Apart from visual impacts, debris can affect water quality and be deterioration to aesthetic beauty of the project area.

Table 10: Impacts from solid waste management

Environmental and Social Issue	**Solid Waste Management**	
Project Phase	**Construction**	
Impact	**Pollution**	**Handling, Collection and Disposal**
Nature	Negative(direct)	Negative (direct)
Extent	Regional	Regional
Duration	Long term	Short term
Probability	Highly Likely	Highly Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	Low
Significance Pre Mitigation	Positive and High	Positive and High
Significance Post Mitigation	Positive and High	Positive and Very High
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures:

- Efficient use, re-use and re-cycling of materials to minimise on solid waste;
- Good housekeeping to ensure no littering from packaging materials;
- Segregation of waste before appropriate disposal;
- The contractor should provide disposal bin around the site for proper disposal of papers and plastics. This to eliminate littering of the construction site and keeping it clean;
- Paper and glass to be sent for reuse/ recycling;
- The contractor should prepare a waste management plan for management of solid waste management. The waste management plan should contain

the waste streams, management procedures, responsibilities and monitoring frequency;

- Disposal of solid waste that accumulate at the construction site should be properly disposed in NEMA licenced landfill in accordance with NEMA solid waste disposal Guidelines and regulations;
- No burning, on-site burying or dumping of waste shall occur;
- Waste minimization by avoiding unsustainable construction practices;
- Provision of waste collection bins and cubicles for collection and temporal holding of the generated waste within the site before disposal;
- Purchase construction materials in quotas to avoid wastage;
- Provide solid waste handling containers within the project site to help in proper collection and management; and
- Ensure separation at source of the solid waste generated on site is done to enhance reusing of any material recovery.

Liquid Wastes

Liquid waste is expected to arise during construction from mixing, rinsing and cleaning activities. These may find its way into surface water features within the drainage system of the site and may equally contribute to underground water polluted.

Table 11: Liquid waste impacts

Environmental and Social Issue	**Liquid waste**	
Project Phase	**Construction**	
Impact	**Pollution of surface and ground water**	**Public health**
Nature	Negative(direct)	Negative (direct)
Extent	Regional	Regional
Duration	Long term	Short term
Probability	Highly Likely	Highly Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	Low
Significance Pre Mitigation	Positive and High	Positive and High
Significance Post Mitigation	Positive and High	Positive and Very High
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures include:

- Concrete batching and mixing should occur at one particular point and the site should be bunded or paved and drains provided to ensure polluted water is drained at a particular suitable point;
- Prudent use of water to reduce liquid waste volumes;

- Contaminated water from construction works should be directed to a containment area where it could be reused at the construction site;
- Portable toilets should be provide onsite so as to mitigate pollution of subsurface water in case where pit latrine are used

Noise pollution and visual intrusion

The proposed development will impact on the environment both visually and through noise pollution. The project site is currently adjacent to low level flats and therefore the construction of the development will disturb the landscape to some extent disrupting the natural landscape. Noise levels are expected to rise during the construction phase of the development. Construction activities that cause noise include vehicle trafficking, generator noise, pressure hammers and construction worker's voices, etc. These noise levels are not assessed to be a nuisance to adjacent residents and communities.

Visual impacts occur during earthworks for the foundation of projects. However, the proposed project will not by far be out of scale with the existing projects or developments (within the area). The visual impact will not be significant and will have very little affects neighbouring activities and the general public. There are already completed similar projects in the immediate neighbour-hood, which is thought to have psychologically prepared the general environment.

Table 12: Noise and visual impacts

Environmental and Social Issue	**Noise and visual**	
Project Phase	**Construction**	
Impact	**Noise**	**Visual impacts**
Nature	Negative (direct)	Negative (direct)
Extent	Local	Site
Duration	Short term	Long term
Probability	Highly Probable	Highly Probable
Degree to which impact cannot be reversed	Medium	Medium
Degree to which Impact may cause irreplaceable loss of resources.	Medium	Medium
Significance Pre Mitigation	Low (-ve)	Medium (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Moderately Mitigated

Mitigation measures for Noise include:

- Schedule noisy activities during the normal working hours of between 8am to 5pm. No work should be undertaken at night or very early in the morning;
- Put off machines and equipment when not in use. Apart from fuel cost saving ;
- Ensure machinery is well maintained to reduce noise emitted;

- The contractor should adhere to the provision in the Environmental Management and Coordination (Noise and Excessive Vibration pollution) (control) regulations,2009;
- Provide worker with appropriate PPEs when working under noisy environment e.g. ear plugs;

Mitigation measures for Visual impacts:
On completing the earthworks, the worked area should be restored through backfilling, levelling and planting of vegetation;

- All solid waste and debris from construction site must be cleared on completion;

- The scheme should be blended in a way to merge with existing environment. It should in fact upgrade the quality of the surroundings. Landscaping and planting of vegetation especially trees shall go a long way in mitigating the visual intrusion.

Air/Dust Pollution

The construction activities on the site will result to increased dust and gas emissions. Construction machinery and trucks (including small vehicles) generate hazardous exhaust fumes such as Carbon Oxides (COx), Sulphur Oxides (SOx) and Nitrogen Oxides (NOx). Dust particles caused by vibrations of machines and vehicle movement suspends in the air mostly during dry spells. Diesel engines emit black carbon, which absorbs sunlight and warms the atmosphere and micro-particles. Unseen and odorless, microscopic particles of air pollution is very harmful. Exhaust from diesel engines and dust swirl into an insidious cocktail of tiny particles that can spend weeks airborne. The most harmful are the smallest, less than 2.5 microns in diameter; when inhaled, the lungs or pass directly into the bloodstream and damage arteries.

The level of air pollution originating from the above mentioned sources are expected to be low, localized and short term. No serious impacts are expected on people and the environment.

Mitigation measures

- Ensure strict enforcement of on-site speed limit regulations;
- Avoid excavation works in extremely dry weather when soil is pulverized;
- Sprinkle water on access routes each day to reduce dust generation during heavy machines usage;
- Provide dust nets to prevent the spread of dust to neighbouring residential houses;
- Ensure all trucks delivering construction materials such as sand are properly covered to prevent the spread of dust;
- Ensure proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done per vehicle or the number of vehicles on the access road;
- Provide adequate personal protective gears to all employees;
- Ensure all transportation trucks are covered while carrying away excavated soils and construction debris for final disposal;
- Minimize dust generation and implement a dust control program; and
- Protect exposed soil and material stockpiles against wind-blown erosion;

- Practice dust management techniques, including watering spraying to suppress dust;
- Move earth and sand in covered vehicles/ transport to avoid it being blown by wind increasing suspend particulate in the atmosphere;

Table 13: Air pollution impacts

Environmental and Social Issue	**Air/dust pollution**	
Project Phase	**Construction**	
Impact	**Atmospheric pollution resulting to poor air quality**	**Public health**
Nature	Negative(direct)	Negative (direct)
Extent	Regional	Local
Duration	Long term	Short term
Probability	Likely	Likely
Degree to which impact cannot be reversed	High	High
Degree to which Impact may cause irreplaceable loss of resources.	Low	Low
Significance Pre Mitigation	Low (-ve)	Medium (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Soil Erosion and pollution

This is loss of the top-most soft material on the earth surface (soil) down - slope or transportation by the use of machinery or other equipment including animals. Soil movement is common in construction activities. This mostly happens during the laying of foundations for the projects and site clearing. The top loose material is excavated and transported elsewhere. This also exposes the underlying material to more dangers of degeneration by erosion agents. In this case soil erosion will not be a major environmental impact especially when the project is over since there will hardly be open areas. However, during site clearing and construction phases, there will be massive movement of soil materials from the site. Most of the vegetation on site will be cleared (and in fact much of it has been extirpated) paving way for soil degradation.

Risk of soil erosion would result from extensive vegetation clearing, excavations for the structures or inadequate measures for storm water management. This would increase the surface run off from the area and lead to siltation of surface water features due to increase load of sediments.

Table 14: Impacts associated with soil erosion and pollution

Environmental and Social Issue	**Soil erosion and Pollution**	
Project Phase	**Construction**	
Impact	**Water quality**	**Increased run off and loss of top soil**
Nature	Negative(direct)	Negative (direct)
Extent	Site	Site
Duration	Short term	Short term
Probability	Likely	Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	High
Significance Pre Mitigation	Medium (-ve)	Medium (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures include:

- Install adequate storm water management measures such as sand filters;
- Schedule earth moving activities during the dry season. This is to reduce acceleration of soil erosion by run off when it rains;
- Avoid unnecessary movement of soil materials from the site;
- Control construction activities during rainy / wet conditions to mitigate erosion effects to the soil;
- Resurface (pavement) open areas after the completion of the project;
- Introduce suitable and well-managed vegetation to generate surface covers on the open areas; to control soil movement by erosion agents i.e. water, animals and wind;
- Provide storm water drainage channel to discharge water to safe areas. Such channels need to be regularly maintained and repaired to avoid point discharges in case of breakages or blockages. Point water discharges usually have pronounced effect to soil erosion.

Land Degradation

Most of the building materials such as stones, aggregates, and sand required for construction of the proposed project will be obtained from nearby quarry sites, concrete block sites and borrow pits. Since substantial quantities of these materials will be required for construction of the development, the availability and sustainability of land resources at the extraction sites will be negatively affected as they are not renewable in the short term. Similarly, during construction of the proposed housing project a lot of construction solid wastes will be generated. These include papers used for packing cement, plastics, timber remains, landscape and land clearing debris, asphalt pavement, gravel and aggregate products, concrete, masonry scrap and rubble (concrete masonry, stone) among others. These will have a negative impact on the receiving environment. It is

expected that the contractor will obtain these materials for construction purposes from licensed suppliers or from authorized areas. Likewise, disposal of construction waste will be on designated sites. The extent of this impact is localized with a low intensity. The impact will be highly reduced/eliminated with mitigation. Therefore, the impact is negative and of low significance.

Table 15: Land degradation and Pollution

Environmental and Social Issue	**Land degradation and Pollution**	
Project Phase	**Construction**	
Impact	**Soil quality**	**Degraded land areas**
Nature	Negative(direct)	Negative (direct)
Extent	Site/Project area	Site/Project area
Duration	Short term	Short term
Probability	Likely	Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	High
Significance Pre Mitigation	Medium (-ve)	Medium (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures

- All wastes should be segregated and appropriately stored on site before final disposal; and
- Backfilling of opened up borrow pits, borrow pits and quarries should be undertaken at the end of the construction process.

Surface drainage and run-off

In this particular project some of the surface water/run-off will mainly be absorbed within the site i.e. open areas. However, these (open) areas are limited since much land will be covered by building structures, driveway, parking and pavements. Therefore as rain falls much water is anticipated to overflow the surface as storm water. In connection to this, the amount of water reaching storm water drain channel will be high.

The aim of a good surface drainage is to prevent land and human settlement from being saturated with water. Poor drainage causes dampness to building structures as well as water stagnation with a myriad of consequences to human health and safety and buildings. Damp (as influenced by poor drainage), in the presence of warmth and darkness, breeds germs and mosquitoes and may cause acute and Chronic Rheumatism. Poor drainage may also lead to property damage due to flooding.

The drainage of the storm water will be greatly compromised especially if it rains, since storm water drain channels will not be present during construction. In addition, it should

be realized that a given area of land can only absorb a certain quantity of rain water/surface water. Therefore in and around the projected area where houses are built close together, the space of land (left open) which is useful in absorbing the surface water will be very small. The drainage of the general apartment's design comes in handy to enhance the flow of the much-anticipated surface run-off emanating from the roof catchments and other areas within the site, into the drains.

Table 16: Surface drainage and run-off

Environmental and Social Issue	**Surface drainage and run-off**	
Project Phase	**Construction**	
Impact	**Water quality**	**Increased run off and loss of top soil**
Nature	Negative(direct)	Negative (direct)
Extent	Site	Site
Duration	Short term	Short term
Probability	Likely	Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Low	High
Significance Pre Mitigation	Medium (-ve)	Medium (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation Measures

- During construction, the designs should ensure that surface flow is drained suitably into the public drains provided and water channels. There should be no flooding within the site at all;
- Drainage channels should be provided within the site and should be covered with gratings or other suitable and approved materials. They must be installed as provided for in the approved plans and designs;
- The channels should be designed with regards to the peak volumes i.e. periods or seasons when there is high intensity of rainfall. They should never at any time be full; say due to the resulting heavy downpours;
- The drainage channels must ensure the safe final disposal of run-off surface water and must be self-cleaning i.e. should have suitable gradient;
- Storm water generated from roof catchments should be harvested, stored and used in various household activities i.e. general cleaning. This will minimize resultant soil erosion and other associated impacts. It will reduce strain on the existing water supply systems. In this connection, it would be better if gutters are incorporated in the designs as well as down pipes to enhance water collection in to the storage tanks say of individual households.

Increased water demand due to construction works

Considerable amount of fresh water will be required during the construction works especially concrete mixing, operation of the concrete batching plant and curing of the constructed structures. This if not well managed will put some strain on the water supply at the construction site. Improper usage of water is anticipated to leads to wastage that can contribute to increase in project cost and poor hygiene and sanitation.

Table 17: Increased water demand due to construction works

Environmental and Social Issue	**Increased water demand**	
Project Phase	**Construction**	
Impact	**Reduction in the amount of water available for industrial purposes**	**Over extraction from water resources**
Nature	Negative(direct)	Negative (direct)
Extent	Regional	Regional
Duration	Long term	Long term
Probability	Likely	Likely
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	High	High
Significance Pre Mitigation	High (-ve)	Medium (-ve)
Significance Post Mitigation	Medium (-ve)	Low (-ve)
Degree of Mitigation	Not Easily Mitigated	Easily Mitigated

Mitigation measures include:

- The contractor should sensitize construction workers on the importance of proper water management through clerks of works by having talks with them when doing their rounds around the site;
- Replace or repair leaking pipes supplying water to the construction sites to minimized wastage from leakages or pipe burst;
- The Contractor should ensure provision of adequate water storage facilities on the construction site to meet project needs during periods of high demand externally and refill of storage tanks during periods of low demand;
- Reuse of waste water from the construction activities for curing of concrete surfaces and cleaning of equipment so as to reduce on the fresh water use;
- Direct construction water runoff to areas where it can soak into the ground or be collected and reused;

- Lock water tank valves to prevent unauthorized use. To discourage wasteful use of water by construction workers, the contractor should lock the water storage facilities to restrict unnecessary access;
- Repair water equipment as needed to prevent unintended discharges.

Occupational Health and Safety

Risks of accidents and incidents will be heightened during the construction activities. Construction workers will be in direct contact with heavy machinery and equipment. Construction work can be particularly hazardous. Personal protective equipment, fire safety, electrical safety, and other precautions are essential for safe construction work.

Table 18: Impacts associated with occupational health and safety

Environmental and Social Issue	**Occupational health and safety**	
Project Phase	**Construction**	
Impact	**Construction workers**	**Public safety**
Nature	Negative (direct)	Negative (direct and indirect)
Extent	Site	Local
Duration	Short term	Short term
Probability	Highly Probable	Probable
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	Medium (-ve)	Low (-ve)
Significance Pre Mitigation	Low (-ve)	Low (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures include:

- Contractor should ensure registration of all construction works by the Director, Directorate of Occupational Safety and Health Services (DOSHS) in compliance with the Buildings and Works of Construction Engineering Rules, 1984;
- Contractor should contract a qualified Health and Safety Advisor to conduct training and monitoring of construction works;
- The contractor should construct a temporary clinic on site to be run by a qualified nurse/ paramedics who will treat opportunistic ailments and injuries such as cold, malaria etc.;
- Contractor should provide a standard First Aid Kit on site;
- The Contractor should train several workers in First Aid depending on the number of workers on site as stipulated in the First Aid Rules 1977 through

DOSHS certified First Training institution e.g. Red Cross, St. John Ambulance;

- Dangerous works should be protected, fenced, demarcated or cordoned off;
- Workers should be inducted with training on health and safety by DOSHS certified Health and Safety Advisor so as to enable or ensure machine safety, construction safety, fire safety and electrical safety as well as workplace inspection technique;
- Provide and enforce the use of Personal Protective Equipment (PPE) to workers as appropriate such as overalls, safety boots, hand gloves;
- The contractor should provide and install fire fighting equipment such as fire extinguishers to fight different classes of fire (Class A, B, C D);
- The Contractor should erect safety and informative signage for hazardous activities taking place such as deep excavations, electrical hazard, signage for fit for use personal protective equipment such as helmets, hand gloves, boots among others and prohibited activities such as smoking;
- The contractor should ensure that all plants to be used during construction such as pressure vessels, lifting machines and cylinders for compressed gas to are examined and inspected by an approved inspector before starting to use them;
- The contractor should develop site Health and Safety guidelines which are to be adhered to by construction workers and visitors to the construction site;
- Maintain an incident/ accident register, in accordance with the Occupational Safety and Health Act, 2007, and report incidences to DOSHS;
- Do not walk, stand, or work under suspended loads. If you raise a load, be sure to crib, block, or otherwise secure the load as soon as possible;
- Be prepared for unexpected hazards. BE ALERT!
- Prior to the start of construction, all areas should be inspected for the presence of potentially hazardous energy in the area should be located and precautions taken care off;
- Great care must be given to excavations and the safety of the machinery, tools and other equipment such as scaffolding, ramp or ladder must be guaranteed. Accident prevention should be the overriding safety precaution. A qualified person should always be on site to oversee the working.

Fire Risks/ Management

Fire risks during construction arise due to hot works, and use of inflammable chemicals. Additionally, with the abundance of grass in the area, the risk of fire is normally high during the dry seasons.

Table 19: Impacts associated with fire risk / management

Environmental and Social Issue	**Fire risk/Management**	
Project Phase	**Construction**	
Impact	**Loss of property**	**Injuries to worker**
Nature	Negative (direct)	Negative (direct and indirect)
Extent	Local	Local

Duration	Long term	Long term
Probability	Probable	Probable
Degree to which impact cannot be reversed	Low	Low
Degree to which Impact may cause irreplaceable loss of resources.	High (-ve)	High(-ve)
Significance Pre Mitigation	High (-ve)	High (-ve)
Significance Post Mitigation	Low (+ve)	Low (+ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures include:

- Place portable fire extinguishers at suitable locations;
- Combustible materials used during construction should be stored away from source of ignition and
- Smoking on site or burning of waste should be prohibited so as to reduce the source of ignition at the workplace;
- Electrical works such as electrical wiring should be done by qualified technicians or engineers to ensure shoddy work which could pose a danger to the development does not occur;
- Train and induct workers on the use of fire extinguishers and other fire fighting equipment;
- Train all staff on fire safety and procedures;
- Allocate a fire assembly point;
- Ensure fire safety warnings are prominently displayed at appropriate locations where fires are likely to occur;
- Provide and enforce the use of Personal Protective Equipment (PPE);
- Develop a Fire Safety Plan through a qualified specialist and implement the provision of the plan at the workplace.

Sexually Transmitted Infections and HIV / AIDS

Increased disease risk can occur due to social interaction between immigrant workers working on the project and the local population as is the case of HIV/AIDS and STI. Therefore necessary measures to make workers and the local population aware of the risk of transmitting and contracting HIV/AIDs and STIs need to be implemented by the contractor.

Table 20: Impacts surrounding STIs and HIV/AIDS

Environmental and Social Issue	**STIs and HIV/AIDS**	
Project Phase	**Construction**	
Impact	**Reduction of workforce**	**Diseases amongst construction workers**

Nature	Negative (direct)	Negative (direct and indirect)
Extent	Local	Local
Duration	Long term	Long term
Probability	Probable	Probable
Degree to which impact cannot be reversed	High	High
Degree to which Impact may cause irreplaceable loss of resources.	High (-ve)	High(-ve)
Significance Pre Mitigation	High (-ve)	High (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures include:

- Voluntary Counselling and Testing to be undertaken monthly for construction workers so as to establish their HIV status;
- Information, Education and Communication materials such as posters (A3) and brochure to be used to sensitize workers. These poster should be pinned at strategic points within the workplace where they can be easily viewed by workers such as at the site office notice board, the ablutions and at the entrance gate;
- Education and sensitisation of workers and the local communities on STIs;
- Formation of peer groups from among the project staff to ensure continuity in training and awareness raising;
- The contractor has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at prominent locations within the construction site, provision of condoms and monthly Educational Video presentation and discussions ;
- The contractor has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases;

Ground and surface water quality

In the short term, surface and ground water may be impacted by construction activities, such as the contamination from fuels, cement, oils and other liquid waste. A potential impact on water quality may also arise from the risk of soil erosion and poor surface drainage management during the construction phase. Any surface water contamination may enter the area drainage water resources and negatively impact on the aquatic ecology of the system. Good environmental management practices must be followed to prevent potential contamination of the water resources.

Table 21: Impacts Associated with ground and surface water quality

Environmental and Social Issue	Ground and surface water quality	
Project Phase	**Construction**	
Impact	**Pollution of ground and surface water**	**Health**
Nature	Negative (direct)	Negative (indirect)
Extent	Local	Local
Duration	Short Term	Medium Term
Probability	Likely	Unlikely
Degree to which impact cannot be reversed	Low	Medium
Degree to which Impact may cause irreplaceable loss of resources.	Low	Low
Significance Pre Mitigation	Low (-ve)	Low (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Easily Mitigated	Moderately Mitigated

Mitigation measures

The following measures should be adhered to in order to limit the impact of the construction phase on the quality of water in the area:

- No mixing of concrete to occur on bare ground. Concrete mixing should be done on bunded surface to avoid soil pollution and contaminating the ground and surface water;
- Appropriate containment structures should be provided to store contaminated water from the construction site. The contractor should ensure these waters are properly disposed and not allowed to be drained on site;
- No concrete batching to occur directly on the ground. Concrete batching area should be bunded to prevent contamination of soils and surface water features;
- All fuel storage to be appropriately bunded and provided with a canopy ;
- Project site should have drip trays to contain any potential leakages of fuels and oils;
- Ablutions for construction workers to enable proper disposal of faecal matter and avoid contamination of surface water features which could be a cause of waterborne diseases.

Loss of biodiversity

The site has already undergone transformation from its perceived natural state. With regards to flora, there are no known red data species or significant indigenous vegetation on-site or within the project area, however when clearing commences these may be revealed. The site is currently green though with human interference as evident by the waste dumped on the site thus very minimal impacts on biodiversity as a result of the current undertaking are envisaged. The only areas of concern with regards to biodiversity

are the shrub and grass vegetation on the site. The vegetation within and around project area is important in anchoring the soils and soil erosion prevention.

Table 22: Impacts surrounding loss of biodiversity

Environmental and Social Issue	**Biodiversity**	
Project Phase	**Construction**	
Impact	**Loss of ecological services/ disturbance to local fauna**	**Loss of ecological benefits**
Nature	Negative (direct)	Negative (direct)
Extent	Site	Site
Duration	Medium Term	Medium Term
Probability	Likely	Likely
Degree to which impact cannot be reversed	Not Replaceable	Not Replaceable
Degree to which Impact may cause irreplaceable loss of resources.	Low (-ve)	Medium (-ve)
Significance Pre Mitigation	Low (-ve)	Medium (-ve)
Significance Post Mitigation	Low (-ve)	Low (-ve)
Degree of Mitigation	Moderately Mitigated	Not Easily Mitigated

Mitigation measures:

- Modifications to the design of the development to ensure spaces are left to allow for regeneration of vegetation;
- Post project restoration of loss habitat through vegetation of affected areas
- Compensation by the relocation of important grassland habitats from the development site to another area identified as suitable.

Extraction of natural resources

Materials for construction such as sand, aggregated material and other natural recourses to be used by the contractor will be transported from the source to site. Movement of this material could have an impact on the environment and settlements. How and where the material is sourced from is also a key determinant on the magnitude of the impact these activity may cause.

Table 23: Impacts associated with natural resource extraction

Environmental and Social Issue	**Natural resources extraction**	
Project Phase	**Construction**	
Impact	**Environmental degradation**	**Economic benefits**

Nature	Negative (direct)	Positive (direct)
Extent	Region	Region
Duration	Short term	Medium Term
Probability	Likely	Likely
Degree to which impact cannot be reversed	High	Low
Degree to which Impact may cause irreplaceable loss of resources.	High (-ve)	Low (-ve)
Significance Pre Mitigation	High (-ve)	High (+ve)
Significance Post Mitigation	High (+ve)	High (+ve)
Degree of Mitigation	Easily Mitigated	Easily Mitigated

Mitigation measures:

To minimise impact of material and waste disposal during the delivery on site the following mitigation measure have been proposed:

- Strictly source material from NEMA authorised dealers of sources
- Avoid overloading trucks and cover trucks to minimize dust and loss of load from trucks during transportation;
- For aggregate and sand, use water sprays or covered chutes to reduce dust emission during loading and unloading of materials from barges;
- Maintain mixing plants in good working condition so as to reduce emission from the plant;
- As far as possible, plan truck trips to material source and to the sites during low traffic hours; and
- Implement safety procedures to reduce the potential for road accidents in village or urban areas.

For the following probable impacts the preliminary analysis was carried out and mitigation measures presented in the sections below.

Security

Security is a prerequisite for any development. During construction, security is very important on the site. This will ensure that materials are in order and minima cases of material loss are reported on the site. It would also control movement within the site especially for the intruders who might be injured by the materials and other hazardous features available within the site.

The project area is well covered with communication facilities, which facilitate security to large extent. After the project is over, security guards and facilities should be provided. The issue has been catered for in the drawings.

Mitigation Measures

- Security guards must always guard the gate to the construction site to keep away the intruders and to control movement within the site;

- Lighting as well as security alarms should be installed in strategic positions all over the site during construction and after the completion of the project;

- The Contractor should provide adequate security during the construction period when there are no works on the site.

- The guards stationed at the gate should document movements in and out of the construction site.

Traffic and pedestrian safety

The project location is likely to result to increased traffic, and changed traffic patterns during construction which might cause localized traffic jams and can potentially cause health and safety impacts, as well as economic impacts. The use of heavy moving construction vehicles and machineries on the project site will however be short lived. The other implications for increased traffic on the access roads will include damage to roads and surface drainage.

General Mitigation measures

Traffic control on the site will include the following:

- Develop and implement a traffic management plan; and adhere to the Traffic Act/ Rules;
- Speed bumps and limit should be set at 5 KMs per hour and signs put up to that effect; and
- Premises should have provisions for first aid facilities.

Traffic Management Plan for Azure Sky Residential Apartment Project

Construction Phase:

1. **Pre-Construction Assessment:**
   Before the commencement of construction, Azure Sky Project will conduct a thorough traffic impact assessment, considering the proximity to residential areas and Happy Land Eden School. This assessment will inform the development of a comprehensive Traffic Management Plan (TMP).

2. **Delivery Schedule:**
   Develop a delivery schedule for construction materials to minimize disruptions during peak traffic hours. Coordinate with suppliers and contractors to ensure a staggered and efficient delivery process.

3. **Traffic Control Personnel:**
   Deploy trained traffic control personnel to manage vehicular movements, especially during material delivery and waste removal. This includes directing traffic, assisting pedestrians, and ensuring safety compliance.

4. **School Hours Restriction:**
   Restrict construction activities during school hours to minimize disturbances to Happy Land Eden School. Ensure that noisy activities are limited during school operational hours.

5. **Alternative Routes Communication:**
   Clearly communicate to residents and stakeholders that no alternative road routes are available during construction. Manage expectations and provide regular updates on traffic conditions.

6. **Speed Limits and Signage:**
   Enforce reduced speed limits within the construction zone and display clear signage to warn drivers of construction activities. Ensure that road signs are visible and adhered to by all vehicles entering and exiting the construction site.

7. **Emergency Access Routes:**
   Establish and maintain clear emergency access routes to ensure the swift passage of emergency vehicles at all times.

8. **Public Awareness Campaign:**
   Conduct a public awareness campaign to inform residents and the school community about the construction timeline, potential traffic disruptions, and safety measures in place.

Operational Phase:

1. **Traffic Monitoring:**
   Implement a continuous traffic monitoring system during the operational phase. Regularly review traffic patterns and adjust the plan as needed to address emerging issues.

2. **Scheduled Maintenance:**
   Together with the other project owners and the community, develop a schedule for road repairs and maintenance in areas damaged by construction vehicles. Azure Sky Project will be responsible for promptly repairing any damage caused during the construction phase.

3. **Community Liaison Officer:**
   Appoint a Community Liaison Officer to serve as a point of contact for residents and the school community. Address concerns promptly and maintain open communication channels.

4. **Regular Safety Audits:**
   Conduct regular safety audits to assess the effectiveness of the Traffic Management Plan. Make necessary adjustments based on feedback, lessons learned, and evolving project needs.

Oil Leaks and Spills

It is important to note that oil/grease spills are prevalent in construction sites and in most areas that make use of petroleum products. Such products contain detrimental elements to the environment. Though this may not be common at the site, it is wise to control and observe the little that could occur especially during maintenance of the involved machinery. During construction phase, some of the site's construction equipment will

require diesel and/or oil. There is therefore the risk of leaks or spills and the potential for contaminating the site's soil.

Mitigation measures

- All machinery must be keenly observed not to leak oils on the ground. This can be affected through regular maintenance of the machinery.
- Maintenance must be carried out in a designated area (protected service bays) and where oils are completely restrained from reaching the ground. Such areas should be covered to avoid storm from carrying away oils into the soil or water systems. Waste water/ wash water from these areas should be properly disposed.
- All oil products and materials should be stored in site stores or in the contractor's yard. They should be handled appropriately to avoid spills and leaks.
- Car wash areas and other places handling oil activities within the site must be well managed and the drains from these areas controlled. Oil interceptors must be installed along the drainage channels leading from such areas.
- Regular maintenance of equipment and machinery should be carried out to ensure any leakages are detected and controlled; and
- Train personnel on the risks of oil spills and leakages.

7.6 Operation Phases Impacts Discussion

To minimize on-going impacts after construction is completed, the Contractor will be responsible for the proper decommissioning of the temporary construction sites.

Suggested mitigation measures to achieve this objective are:

- Rake or loosen all compacted ground surfaces.
- Implement re-vegetation / rehabilitation of the sites involving, where possible, local women's / community groups.

7.6.1 Positive impacts during operation

Employment Opportunities

Operation of the development is expected to provide direct and indirect employment opportunities to the local community, such as security guards, housekeepers, drivers, shopkeepers.

Mitigation measures include:

- Priority should be given to the local community during employment;
- Gender equity to be considered during the recruitment of worker so as achieve a balance and comply with Gender Policy
- Ensure compliance with the Employment Act, 2007 and Regulation of Wages (General) (Amendment)order, 2009

Development of infrastructure social amenities

The proposed Azure Sky Investment residential development will result in development of learning institutions-Kindergarten and other social amenities in the area including the upgrade of the access road, setting up of the KPLC power transformer etc to support the expected population that will be occupying the area.

Increase and improved housing facilities

The housing apartment's development will provide better affordable housing unit. This will aid in reducing the deficit in the number of housing units required as compared to the population and better housing demand. It will therefore provide quality housing which improves the lifestyle of the people who will occupy them.

7.6.2 Negative impacts during operation

Solid Wastes

When all the structures are operational and occupied, it is expected that solid wastes will be generated in large volumes. These will be primarily household waste from the kitchens and sanitary facilities. Removal and disposal of house refuse comes under public cleaning and is very important and costly item on the Sub-county budget. If it is not removed promptly away from the generation points (within the apartments), it accumulates in large heaps harbouring rats, flies and vermin which disseminate germs of disease. A good deal depends upon the mutual cooperation between the local authorities and the public. Proper maintenance and use of dustbins is the key to the satisfactory solution of the problem of sanitary storage and collection of refuse without causing nuisance.
The problem of dealing with house refuse resolves itself into four parts: storage, collection, transportation and disposal. Therefore bins come in handy during storage and collection; both in the house and on foot paths of the streets for the throwing of whatever rubbish such as paper wrappings, cigarette ends etc., into them instead of scattering them all over. Transportation of the collected waste need be simplified and finally, the use of sound method of waste disposal. The proponent shall provide for dustbin cubicle at the project site as given in the project designs yet to be approved by Mavoko Sub-county

Mitigation measures include:

- Prudent use of materials to reduce solid waste volumes;
- Waste separation to encourage reuse and recycling e.g. plastic and glass bottle;
- Domestic refuse should be collected and removed from all facilities at least twice per week and transported to the approved refuse disposal site in covered containers or trucks;
- Provision of waste collecting bins to households which will then be collected for proper disposal by a NEMA licenced waste handler.

Wastewater/ Liquid wastes

The quantity of liquid waste expected as output from the development is enormous. The area where the proposed estate will be developed has MAVWASCO sewer line as waste water disposal infrastructure. The proponent should seek approval and connect to the sewer line.

Sewage is the used water or liquid waste of a community, which includes human and household wastes together with street-washings, industrial wastes such as ground and storm-water as may be mixed with it. Effluent/sewage resulting from sanitary facilities and wastewater from washrooms is of significant importance to the environment. It must never come into contact with the surrounding i.e. water, soil, air etc. It must always drain effectively into the existing sewer systems via well designed and laid pipe networks. Sound sanitation should be ensured to influence prevention of the sporadic outbreak of diseases dangerous for the general health of the community (within the projected area), workers and the general public. Either controlling or eliminating such environmental factors that contribute in some form or the other to the transmission of the diseases can achieve this.

Mitigation Measures

- The proponent must connect the sewerage effluent to the MAVWASCO sewer. The design of the sewer system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it must have the capacity to consistently handle the loads even during peak volumes.

- The system (sewer) line connection should be made of hard, strong, durable, smooth, impervious, and non-corrodible materials. The sewerage lines require to be upgraded in order to adequately service the increased levels of sewage discharge due to rising levels of development;

- Sanitary facilities must be kept clean always;

- The gradient should be sufficient to ensure and maintain maximum depth of flow;

- The trunk sewer must be regularly monitored to avoid overfilling and overflowing. They must be checked regularly to monitor levels of effluent;

- Branches should be streamlined in the direction of flow and there should be no right-angled junctions that would affect the flow of the effluent;

- All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround;

- All manholes on drive ways and parking areas must have heavy-duty covers set and double sealed airtight; as approved by specialists.

Fire safety

Fire risk is expected to occur during operation of the project through electrical fault caused by power upsurges and accidents occurring mainly from the kitchens. The proponent and residents will not burn waste on site. However, electrical faults during electrical installations and due to power brown outs may cause risk of fire. Safety measures should therefore be applied to control and prevent fire risks.

Mitigation measures

- Place portable fire extinguishers at suitable locations where they could be easily accessed and visible from a distance;

- Induct all the occupants on the fire safety procedures and the use of fire fighting equipment such as fire extinguishers;
- Burning of waste within the estate should be prohibited as this could cause fire in cases where the fire is left to burn without monitoring;
- Electrical faulty equipment should be repaired or not put to use. This IS to eliminate the risk of fire caused by electrical fault;
- Electrical wires and socket which are broken or open should be repaired immediately by qualified electrician;
- Allocate a fire assembly point in an open and isolated space within the project area. The fire assembly point should not be obstructed;
- Ensure safety warnings are prominently displayed at appropriate locations;

Increased pressure on existing utilities

The proposed Azure Sky Investment residential development will result to increased pressure on existing utilities such as roads and service lines such as sewerage, water, electricity etc. due to the increased number of people who will be using these facilities.

Mitigation measures include:

- Installation of solar panels on each structure to provide alternative source of power for household use;
- Install water automatic taps that have the capacity to enhance water saving.

7.7 Decommissioning Phases Impacts Discussion

Environmental Emergency and Response

In the event of an environmental emergency during the decommissioning activity, the proponent should establish a procedure for handling the emergency. For example, if a spill of fluid occurred during project decommissioning, the proponent should be able to activate the emergency response protocol, which should include spill response, contingency and urgency communications.

Fire hazards and Management

The proponent should implement the fire procedures, assignment and guidance information on the project site to help in the prevention and management of fire. This will help highlight fire hazards, precautions and suppression facilities necessary to prevent fires from occurring or spreading to prevent loss of life, serious injuries and damage to plant, equipment and structures. The same should also provide the authority and channel of command in the event of fire.

Recycling and Reuse

During decommissioning, there is need to identify the materials that will be of economic value if reused or can be recycled for use gain. In this regard, there is need to identify suitable recycling and disposal options for the equipment and materials that are dismantled, in line with best management principles of the waste hierarchy. Recycling and reuse of materials is to be maximized to the greatest extent possible, subject to safety and pollution considerations. Where practicable, and subject to considerations about safety

and pollution, provide local people with first choice concerning acquisition of recyclables or reusable infrastructure.

Reinstatement and Rehabilitation

After demolition of the building and associated infrastructure, remove access roads with no beneficial re-use potential by deep ripping, shaping and levelling after the removal and disposal of any culverts, drains, ditches and/or other infrastructure. Natural drainage patterns should be reinstated as closely as possible. Also shape, level and de-compact the final landscape, dress with topsoil and, where necessary, vegetate with indigenous species. Ecology specialists to assist in planning re-vegetation and the management of environmental impact as appropriate and when deemed necessary.

7.7.1 Positive impacts during decommissioning

Rehabilitation of the site

Upon decommissioning of the residential development, the site will be rehabilitated and reinstated to its original quality or even better than before. This will include replacement of topsoil and re-vegetation of the site, which will lead to improved visual quality of the area.

Employment opportunities

The decommissioning process will be need of both skilled and semi-skilled labour. The required labour can easily be sourced locally. This will help in reducing social vulnerability and increase household income. However, the job will be short term will the workers soon thereafter being unemployed. It is therefore concluded that the provision of employment opportunities during decommissioning shall therefore provide a positive socio-economic impact but on a short term basis.

Informal Business Growth

During decommissioning period the informal sector will benefit from the operations. This will involve different local entrepreneurs such as local food vending operators who will be selling their food stuffs to the site workers. Such a move for instance, shall promote these local entrepreneurs in the project area.

7.7.2 Negative impacts during decommissioning

Noise and vibration

Demolition of structures and removal of the supporting facilities such as water and electricity lines will involve the use of heavy machinery which will generate noise and excess vibration which will impact on the surrounding activities. The excessive noise and vibrations impact receptors will be general and casual workers on site, adjacent property personnel. The decommissioning process is a temporary nature and it is anticipated that the noise generated will be short lived. However, the proponent is advised to undertake a combination of the following mitigation measures so as to reduce the residual impacts.

Mitigation measure will include:

- Scheduling all the decommissioning works within the normal working hours of between 8am and 5pm;

- Provision of screening around the site when the demotion works is on-going to reduces the impact of noise by cordoning the area;
- Adherence to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Air pollution

Dust generated from the demolition of the concrete structure, excavation works and rehabilitation of the area will pollute the air within and around the project area. Increase in particulates in the air will pose a respiratory health risk to the surrounding community near the project as well as other sensitive receptors located within.

Mitigation measures include:

- Water spraying to suppress dust especially where dust activities are taking place;
- Cordoning the site using meshed cloth to capture particulates during demolition of the structures;
- Providing workers involved with appropriate protective personal equipment such as dust masks or respirators;

Solid Waste

Demolition activities will lead to solid waste generation mainly from building materials used and other materials used in finishing, cement blocks, steel, power and water connection as well as other building materials removed from the foundations. Plastic and metal materials, concrete surfaces and foundations, metal cuttings, reinforcing bars and piping materials all need to be removed. Other waste types will be composed of degradable and non-toxic wastes generated from food wastes, office papers, cardboard and used timber remain. These types of waste need to be adequately separated and appropriate transportation to approved dumping site be undertaken in compliant to EMCA 1999 (Waste Management) Regulation, 2006.

All options will be considered in avoiding or minimizing transporting any unsuitable excavated materials from site, as this is undesirable from both an ecological and economic perspective. Where practicable, materials should be reused or recycled appropriately before being re used. Excess materials generated at the facility are also required to be tested for potential environmental concerns. The test will allow for proper classification and characterization of excess materials. The results of the test help determine if excess materials can be reused onsite or if they are considered waste. If it is deemed acceptable for reuse onsite, the excess materials may be reused during site reclamation landscaping or visual and sound barrier purposes or it will be shipped offsite to an approved facility. If determined to be waste, the excess materials will be managed in accordance with set waste management requirements on site.

In order to minimise the impacts due to the generation of solid wastes during decommissioning process the following measures will be adopted.

Mitigation Measures:

- The contractor shall put in place a waste management plan aimed at minimising the production of all wastes and maximize on resource recovery;
- Where possible measures will be put in place to recycle materials such as metal off-cuts, some plastics and clean paper/ cardboard utilising existing specialist recycling firms in Kenya;
- A suitable location within site for placing concrete and foundations removal and washing down equipment will be undertaken with no discernable impact;
- Other non-recyclable materials should be segregated and stored in plastic bins, collected and disposed of through the municipal waste system;
- Disposal bins should be provided at designated areas at the project site to help in waste segregation to encourage recycling;
- Prepare a contaminated land assessment which identifies all areas of contaminated land, the nature of the contamination and the necessary measures to contain and rehabilitate these sites;
- Enforce regular collection and disposal of garbage by the project contractor through licensed NEMA waste handler in the entire decommissioning process;
- Prepare an inventory of all hazardous materials and wastes to be disposed of and specify the method of disposal in accordance with the MSDS and current NEMA's legislation;
- Remove and dispose of all demolition waste at an appropriate authorized waste disposal facility;
- Remove and dispose of all litter, parts and equipment at an approved disposal site;
- Disassemble and remove all machinery from the site.

7.8 Environmental Impacts Analysis: Leopold Matrix (LM) Analysis.

7.8.1 Matrix Rationale

In the matrix, the rows cover the key aspects of the environment and society, while the columns list the project's activities during all stages of the project. Environmental factors must correspond to all those that can be affected by the development of the activity in the project area and the area of influence as shown in the table below. Each box of interaction must determine whether the action in question will have an impact on the environmental factor given. The second step in using the Leopold Matrix was to describe the interaction in terms of its magnitude (M) in the upper section and importance (I) in the lower section of each box. Rate it from 1 to 10, 1 being lowest and 10 being highest, with the number placed in each box identified above to indicate the magnitude of the specific action's impact on the environment. This number is to be placed in the upper left-hand corner. Using the same rating system, rating is made in the lower right hand corner of the defined boxes, representing the importance of the impact to the project.

7.8.2 Matrix Analysis

From the matrix of the environmental impact above it is evident that the envisaged impacts are minimal with a slight increase on their magnitude and significance during the project construction and decommissioning phase. The envisaged impacts magnitude and significance are at the lowest during the project operational phase of the proposed residential development project.

Table 24: The Impact Analysis Leopold Matrix

PROJECT ACTIVITIES.														
Sky Azure Investment Ltd		**Construction Phase.**					**Operation Phase.**			**Decommissioning Phase.**			
	Project Activity. / Resources.	**Site Clearance.**	**Material Transport, Storage,**	**Excavation.**	**Metal & wood works.**	**Construction works.**	**Tenancy.**	**Solid waste management**	**Effluent Waste management**	**Demolition.**	**Debris Clearance.**	**Site Rehabilitation**	***Average Values.***
Physical Components.	**Soil/ Geology**	2 / 2	1 / 2	5 / 7	1 / 2	1 / 3	1 / 7	2 / 2	4 / 3	1 / 3	3 / 2	4 / 3	**2.3 / 3.3**
	Hydrology	3 / .3	4 / ..2	5 / 7	2 / ..3	1 / ..2	5 / ..6	2 / .5	5 / ..7	3 / ..6	1 / ..3	2 / 2	**3 / ..4.2**
	Air	2 / 3	1 / ..1	3 / 3	0 / .. 0	3 / 2	2 / …3	1 / 2	1 / 1	4 / .4	1 / ..2	4 / ..5	**2 / .2.4**
	Noise & Vibrations	3 / 5	4 / 5	3 / 5	3 / 3	4 / 5	2 / 2	0 / 0	0 / 0	3 / 6	1 / 1	1 / 1	**2.2 / 3**
	Visual Impacts	0 / 0	0 / 0	2 / 2	0 / 0	2 / 2	0 / 0	3 / 2	1 / 1	2 / 1	0 / 0	0 / 0	**0.9 / 0.7**
Biological Co	***Diversity of flora***	2 / 1	1 / ….1	1 / 1	0 / 0	1 / 1	0 / 0	0 / 0	0 / 0	1 / 1	1 / 1	0 / 0	**0.6 / 0.5**

	Diversity of fauna	1 2	1 ..1	1 1	0 .0	0 0	0 .0	1 1	1 1	1 1	0 .0	1 .1	**0.6 ….0.7**
	Barriers / Corridors	1 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	**0.1 0.1**
Social Economic Components	**Population**	2 2	1 1	1 1	1 1	1 2	3 4	2 ..2	2 1	2 2	1 1	1 2	**1.4 1.7**
	Site access	0 0	1 ..1	1 1	1 1	1 2	1 1	1 1	0 0	1 2	1 1	2 2	**1.4 1.6**
	Economic Activities.	1 .. 1	0 0	0 0	0 0	0 0	0 0	1 0	1 0	1 1	0 0	0 0	**0.4 0.2**
	Public health	1 1	2 1	1 1	2 1	2 2	1 1	2 3	3 .2	1 1	1 1	0 0	**1.5 3**
	Culture	1 1	1 1	1 1	1 1	2 3	2 2	0 0	0 0	0 0	0 0	0 0	**0.7 0.8**
	Employment	0 0	0 .. 0	0 0	0 ..0	0 0	0 ..0	0 0	0 …0	1 ..1	0 ..0	0 .0	**0.1 ..0.1**

CHAPTER EIGHT: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Auditing the EMMP

The Environmental Management and Monitoring Plan (EMMP) is prepared to show how site specific concerns and mitigation measures are addressed through the project cycle.

To ensure that the negative environmental impacts can be controlled and mitigated effectively, a stringent and scientific management and monitoring plan has been prepared. The proposed EMMP is to be utilized by the contractor together with the local administration and local community to be responsible for ensuring that the overall environmental and social targets are achieved, and that the environmental responsibilities and obligations of the EIA are satisfied during the life of the project. Annual audits should be conducted to ensure that the system for implementation of the EMMP is operating effectively.

The table below sets out the potential impacts associated with construction, along with the location of occurrence, management and mitigation measures and responsibility.

At completion of construction, the client will be responsible for implementation of the environmental management measures associated with operation of the development. This may be through an assigned Project Manager. If necessary, the client will be required to acquire technical assistance and training in environmental management practices, to strengthen its capabilities in this area.

The proponent shall organise to conduct annual audits to ensure that the system for implementation of the EMMP is operating effectively. The audit shall check that a procedure is in place to ensure that:

- The EMMP being used is the up-to-date;
- Variations to the EMMP and non-compliance as well as corrective action are documented;
- Appropriate environmental training of personnel is undertaken;
- Emergency procedures are in place and effectively communicated to personnel;
- A register of major incidents (spills, injuries, complaints, legal transgressions, spot fines and penalties etc..) is in place and other documentation related to the EMMP;
- Ensure that appropriate corrective and preventive action is taken during construction and operation once instructions have been issued.

Table 25: Environmental Management and Monitoring Plan (EMMP)

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
Pre-Construction Phase-1- (Site Office/ Camp)						
1.1	Vegetation clearing	• Incorporation of natural vegetation into site landscape design; • Vegetation clearing should be limited during this phase and only where the temporary structures are to be erected to facilitate the construction phase;	The Contractor	During Site preparation	Weekly	30,000.00
1.2	Fencing of the Site	• The proponent should fence the site before starting the ground breaking and other construction activities.	Contractor	During Site preparation	Weekly	100,000.00
Construction Phase-2						
1.3	Vegetation clearing	• Incorporation of natural vegetation into site landscape design. • Vegetation clearing should be limited during this phase and only where the temporary structures are to be erected.	The Contractor	During site pre-construction activities	Daily Weekly	100,000.00
1.4	Solid waste management	• Efficient use, re-use and re-cycling of materials to minimise on solid waste; • Good housekeeping to ensure no littering from packaging materials;	The Contractor NEMA Mavoko Sub-County	During the construction period	Continuous Continuous	200,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• Segregation of waste before appropriate disposal; • The contractor should provide disposal bin around the site for proper disposal of papers and plastics; • The contractor should prepare a waste management plan for management of solid waste management; • Disposal of solid waste that accumulate at the construction site should be properly disposed in NEMA licenced landfill in accordance with NEMA solid waste disposal regulations.				
1.5	Liquid waste	• Concrete batching and mixing should occur at one particular point and the site should be bunded or paved and drains provided to ensure polluted water is drained at a particular suitable point; • Contaminated water from construction works should be directed to a containment area where it could be reused at the construction site; • Portable toilets should be provide on-site so as to mitigate pollution	The Contractor NEMA MAVWASCO County Government of Machakos	During the construction period	Daily Continuous	100,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		of subsurface water in case where pit latrine are used				
1.6	Provision of market for building materials	• Construction contract should stipulate that the Contractor sources materials from an approved site and sources e.g. hard stones for building should be obtained from bona fide commercial quarries; • Adherence to the NEMA national sand harvesting guidelines by sand harvester supplying sand for building. This is to mitigate the degradation of riverbed and acceleration of erosion; • Quarry providing aggregates for construction should be licenced and in line with the various regulatory guidelines such as the Mining Act, EIA guidelines and local authority bylaws; • The Project Manager/ Contractor should ensure that source of timber used during construction should be obtained from approved sources; • Materials such as steel and cement should be accredited company with Kenya Bureau of Standards marks of highest	The Project Manager The Contractor	During the construction period	Weekly	150,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		quality. This is to ensure high building standards are upheld and not compromised by low quality materials.				
1.7	Creation of employment opportunities	• During employment of semi-skilled and unskilled labour, priority should be given to the local residents; • Gender equity should be considered when employing labours so as to ensure a balance between the two sexes is almost equal and there should be no bias towards the male; • Better remuneration for the employees in line with Employment Act 2007 and the Regulation of Wages (General) (Amendment) order, 2009.	The Contractor The Project Manager	During the construction period	Continuous	200,000.00
1.8	Noise and vibration pollution and visual intrusion	• Schedule noisy activities during the normal working hours of between 8am to 5pm; • Asses the risk of the quarry to the development and liaise with the quarry owner and the authority to ensure that the risk of the quarry are assessed and an informed decision taken.	The Project Proponent, Quarry owner, NEMA and the Contractor.	During the construction period	Daily Weekly	150,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• Put off machines and equipment when not in use as part of fuel cost saving; • Ensure machinery is well maintained to reduce noise emitted; • The contractor should adhere to the provision in the Environmental Management and Coordination (Noise and Excessive Vibration pollution) (control) regulations,2009 • Provide worker with appropriate PPEs when working under noisy environment e.g. ear plugs.				
1.9	Air/Dust pollution	• Practice dust management techniques, including watering spraying to suppress dust; • Move earth and sand in covered vehicles/ transport to avoid it being blown by wind increasing suspended particulate in the atmosphere; • Set up dust barriers/ screens at strategic locations; • Provide and enforce the appropriate use of Personal Protective Equipment (PPE) against dust such as dust masks.	The Contractor Project Manager NEMA County Government of Machakos	During the construction period	Daily Weekly	150,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
1.10	Soil erosion and pollution	• Practice selective vegetation clearing where necessary; • Install adequate storm water management measures such as sand filters, wet ponds; • Replant cleared vegetation as soon as possible and landscape the cleared areas; • Avoid vegetation clearing especially on steep slopes during the rainy season; • Schedule earth moving activities during the dry season. This is to reduce acceleration of soil erosion by run off when it rains.	The Contractor Project Manager County Government of Machakos	During the construction period	Weekly Monthly	150,000.00
1.10	Increased water demand due to construction works	• The contractor should sensitize construction workers on the importance of proper water management through clerks of works by having talks with them when doing their rounds around the site; • Replace or repair leaking pipes supplying water to the construction sites to minimized wastage from leakages or pipe burst; • The Contractor should ensure provision of adequate water storage facilities on the	The Contractor / Project Manager County Government of Machakos	During the construction period	Weekly Monthly	250,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		construction site to meet project needs during periods of high demand externally and refill of storage tanks during periods of low demand; • Reuse of waste water from the construction activities for curing of concrete surfaces and cleaning of equipment so as to reduce on the fresh water use; • Direct construction water runoff to areas where it can soak into the ground or be collected and reused; • Lock water tank valves to prevent unauthorized use. To discourage wasteful use of water by construction workers, the contractor could lock the water storage facilities to restrict unnecessary access; • Repair water equipment as needed to prevent unintended discharges.				
1.12	Occupational health and safety	• Contractor should ensure registration of all construction works by the Director, Directorate of Occupational Health and Safety Services;	The Contractor Project Manager NEMA and DOSHS	During the construction period	Daily Weekly Monthly	300,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• The contractor should contract a qualified Health and Safety Advisor to conduct training and monitoring of construction works; • The contractor should construct a temporary clinic on site to be run by a qualified nurse/ paramedic who will treat opportunistic ailments and injuries such as cold, malaria etc. • The contractor should provide a standard First Aid Kit on site; • The Contractor should train several workers in First Aid depending on the number of workers on site as stipulated in the First Aid Rules; • Dangerous works should be protected, fenced, demarcated or cordoned off; "Permit for work " should be issued; • Workers should be inducted with training on health and safety by DOSHS certified health and safety advisor so as to enable ensure machinery safety, construction safety, fire safety	County Government of Machakos County Government of Machakos			

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		and electrical safety as well as workplace inspection technique; • Provide and enforce the use of Personal Protective Equipment (PPE) to workers as appropriate such as overalls, safety boots, hand gloves; • The contractor should provide and install fire fighting equipment such as fire extinguishers to fight different classes of fire (Class A, B, C D); • The Contractor should erect safety and informative signage for hazardous is taking place such deep excavations, electrical hazard, signage for personal protective equipment such as helmets, hand gloves and boots and prohibited activities such as smoking; • The contractor should develop site Health and Safety guidelines which are to adhered to by construction workers and visitors to the construction site; • Maintain an incident/ accident register, in accordance with the Occupational Safety and Health				

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		Act, 2007, and report incidences to DOSHS				
1.13	Fire risk and management	• Place portable fire extinguishers at suitable locations; • Combustible materials used during construction should be stored away from source of ignition; • Smoking on site or burning of waste should be prohibited so as to reduce the source of ignition at the workplace; • Electrical works such as electrical wiring should be done by qualified technicians or engineers to ensure shoddy work which could pose a danger to the development does not occur; • Train and induct workers on the use of fire extinguishers and other fire fighting equipment; • Train all staff on fire safety and procedures; • Allocate a fire assembly point; • Ensure fire safety warnings are prominently displayed at appropriate locations where fires are likely to occur;	The Contractor Project Manager County Government of Machakos	During the construction period	Daily Weekly Monthly	150,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• Provide and enforce the use of Personal Protective Equipment (PPE); • Develop a Fire Safety Plan through a qualified specialist and implement the provision of the plan at the workplace.				
1.14	Landscaping	• Consider leaving the environment as natural as possible;	The Contractor Project Manager	Construction period	Weekly Monthly	250,000.00
1.15	Sexually Transmitted Infections and HIV/AIDS	• Voluntary Counseling and Testing to be undertaken monthly for construction workers so as to establish their HIV status; • Information, Education and Communication materials such as posters (A3) and brochure to be used to sensitize workers. The Contractor could work in collaboration with local Non-Governmental organization dealing with HIV/AIDS and local hospitals in the project area. The poster should be pinned at strategic points within the workplace where they can be easily viewed by workers such as at the site office notice board,	The Contractor Project Manager	During the construction period	Weekly Monthly	100,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		the ablutions and at the entrance gate; • Education and sensitization of workers and the local communities on STIs including provision of condoms to the project team and the public by installing condom dispensers at different point at the workplace; • Formation of peer groups from among the project staff to ensure continuity in training and awareness raising; • The contractor has to institute HIV/AIDS awareness and prevention campaign amongst workers for the duration of the contract e.g. erect and maintain HIV/AIDS information posters at prominent locations within the construction site, provision of condoms and monthly Educational Video presentation and discussions ; • The contractor has to ensure that staff are made aware of the risks of contracting or spreading sexually transmitted diseases;				

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• The contractor should ensure that the project workers are sensitised on the local culture; • The contractor should ensure the mobilization and sensitization of the general population on reproductive health and STIs;				
1.16	Loss of biodiversity	• Modifications to the design of the development to ensure spaces are left to allow for regeneration of loss biodiversity; • Post project restoration program.	Contractor	During construction	Weekly Monthly Continuous	350,000.00
1.17	Ground and surface water quality	• No mixing of concrete to occur on bare ground. Concrete mixing should be done bonded surface to avoid soil pollution and contaminating the ground and surface water; • Appropriate containment structures to be provided to store contaminated water from the construction site; • No concrete batching to occur directly on the ground. Concrete batching area should be bunded to prevent contamination of soils and surface water features;	Contractor	During construction	Daily Weekly Monthly	100,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• All fuel storage to be appropriately bunded and provided with a canopy ; • Project site to have drip trays to contain any potential leakages of fuels and oils; and • Ablutions for construction workers to enable proper disposal of feacal matter and avoid contamination of surface water features which could be a cause of waterborne diseases.				
1.18	Materials management to minimise the impact of material delivery and waste disposal	• Develop materials delivery and waste disposal handling plan; • Develop site sediment control plan; • Develop safety measures to avoid loss of load from trucks; • Implement methods to reduce dust emission from the loads e.g. covering of trucks; • Develop safety measures to ensure stability of exposed faces or waste material stockpiles	Contractor Project Manager	During construction	Daily Weekly Continuous	80,000.00
1.19	Oil Leaks and Spills	• All machinery must be keenly observed not to leak oils on the ground; • Maintenance must be carried out in a designated area (protected service bays) and where oils are	Contractor Project Manager	During construction	Daily Weekly	50,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		completely restrained from reaching the ground; • All oil products and materials should be stored in site stores or in the contractor's yard. They should be handled appropriately to avoid spills and leaks; • Regular maintenance of equipment and machinery; • Train personnel on the risks of oil spills and leakages.				
1.20	Traffic and pedestrian safety	• Develop and implement a traffic management plan; and adhere to the Traffic Act/ Rules; • Speed bumps and limit should be set at 5 KMs per hour and signs put up to that effect; and • Premises should have provisions for first aid facilities.	Contractor Project Manager	During construction	Daily Weekly Monthly Continuous	50,000.00
1.21	Security	• Security guards must always guard the gate to the construction site to keep away the intruders and to control movement within the site; • Lighting as well as security alarms should be installed in strategic positions all over the site during construction and after the completion of the project;	Contractor Project Manager	During construction	Daily Continuous	100,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• The Contractor should provide adequate security during the construction period when there are no works on the site. • The guards stationed at the gate should document movements in and out of the construction site.				
	Operation Phase					
2.1	Employment Opportunities	• Priority should be given to the local community during employment; • Ensure compliance with the Employment Act, 2007 and Regulation of Wages (General) (Amendment)order, 2009	Project Manager	Occupation	Weekly Monthly Yearly	50,000.00
2.2	Solid waste management	• Prudent use of materials to reduce solid waste volumes; • Waste separation to encourage reuse and recycling; • Provision of waste collecting bins to households which will then be collected for proper disposal by a NEMA licenced waste handler.	Project Manager	Occupation	Daily Weekly Monthly Continuous	80,000.00
2.3	Fire Risk/Management	• Place portable fire extinguishers at suitable locations; • Induct all the occupants on the fire safety procedures and the use of fire fighting equipment such as fire extinguishers; • Allocate a fire assembly point;	Project Manager	Occupation	Weekly Annually	100,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• Ensure safety warnings are prominently displayed at appropriate locations;				
2.3	Increased pressure on existing utilities	• Recycling of waste water from the different houses using a bio digester and the recycled water used for irrigation of lawn and flushing of toilets; • Installation of solar panels on each structure to provide alternative source of power for household use; • Construction of septic tanks to cater for the excess sewage from the development since the existing sewer lines have a lower carrying capacity compared to the increased population.	Project Manager	Occupation	Weekly Monthly	1,550,000.00
2.4	Liquid waste generation	• The proponent must connect the sewerage effluent to the MAVWASCO sewer. The design of the sewer system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it must have the capacity to consistently handle the loads even during peak volumes.	Project Management Tenants	Occupation	Weekly Monthly Semi-annually Annually	1,550,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• The system (sewer) line connection should be made of hard, strong, durable, smooth, impervious, and non-corrodible materials. The sewerage lines require to be upgraded in order to adequately service the increased levels of sewage discharge due to rising levels of development; • Sanitary facilities must be kept clean always; • The gradient should be sufficient to ensure and maintain maximum depth of flow; • The trunk sewer must be regularly monitored to avoid overfilling and overflowing. They must be checked regularly to monitor levels of effluent; • Branches should be streamlined in the direction of flow and there should be no right-angled junctions that would affect the flow of the effluent; • All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround;				

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• All manholes on drive ways and parking areas must have heavy-duty covers set and double sealed airtight; as approved by specialists.				
	Decommissioning					
3.1	Noise and vibrations	• Scheduling all the decommissioning works within the normal working hours of between 8am and 5pm; • Provision of screening around the site when the demotion works is on-going to reduces the impact of noise by cordoning the area; • Adherence to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.	Project Manager / Contractor	During Decommissioning	Daily Weekly Continuous	100,000.00
3.2	Air pollution	• Water spraying to suppress dust especially where dust activities are taking place; • Providing workers involved with appropriate protective personal equipment such as dust masks or respirators.	Project Manager / Contractor	Daily basis during decommissioning	Daily Weekly Continuous	100,000.00
3.3	Solid waste	• The contractor shall put in place a waste management plan aimed at minimising the			Daily Weekly	150,000.00

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		production of all wastes and maximize on resource recovery; • Where possible measures will be put in place to recycle materials such as metal off-cuts, some plastics and clean paper/ cardboard utilising existing specialist recycling firms in Kenya; • A suitable location within site for placing concrete and foundations removal and washing down equipment will be undertaken with no discernable impact; • Other non-recyclable materials should be segregated and stored in plastic bins, collected and disposed of; • Disposal bins should be provided at designated areas at the project site to help in waste segregation to encourage recycling; • Enforce regular collection and disposal of garbage by the project contractor through licensed NEMA waste handler in the entire decommissioning process;			Monthly Continuous	

REF NO.	ENVIRONMENTAL PARAMETER	MANAGEMENT AND MITIGATION OR ENHANCEMENT MEASURES	RESPONSIBILITY	TIME FRAME	Monitoring Frequency	ESTIMATED COST (KES)
		• Prepare an inventory of all hazardous materials and wastes to be disposed of and specify the method of disposal in accordance with the MSDS and current NEMA's legislation; • Remove and dispose of all demolition waste at an appropriate authorized waste disposal facility; • Remove and dispose of all litter, parts and equipment at an approved disposal site				

N:B Continuous means during the entire phase cycle

CHAPTER NINE: CONCLUSIONS AND RECOMMENDATIONS

This EIA Study Report has been prepared to provide sufficient and relevant information on the proposed two residential development project to enable the Authority-NEMA to establish the sustainability and compliant of the project and whether activities of the project are likely to have significant adverse environmental impacts. Mitigation measures have been proposed for the identified impacts in this report and an EMMP for the implementation of the proposed measures presented.

The study has also established a number of negative environmental consequences that the project activities are likely to induce. However, it will be possible to mitigate these negative impacts by strictly implementing the recommended mitigation and enhancement measures provided for in EMMP. There will be no major environmental and social impacts associated with this project should the involved parties comply to the proposed EMMP.

The EMMP presented in this report is a tool to be used by the project team, contractor and project proponent during the entire life cycle of the project. Based on the findings of this study, the EIA study team concludes that the project and subsequent operation activities will generate significant socio-economic benefits to the public, the proponent, local government and the nation at large. This study has also established a number of negative environmental consequences that the project activities are likely to induce if mitigation measures are not implemented effectively. However, there are no significant environmental and social effects that cannot be adequately mitigated by the measures put forward in the proposed EMMP. Hence, we categorically state that there will be no major environmental and social impacts associated with this project should the involved parties comply with the provisions of the EMMP.

We as the study team here by recommends the approval of the project subject to the client commitment to adherence to all the proposed mitigation measures in this report. The Client must confirm adherence in writing to the Director General, National Environment Management Authority (NEMA) on the same.

A summary of the key recommendations for the proposed residential development project are as follows:

- Construction works at the project site should be carried out in accordance with approved designs, regulations, policies and laws;
- The proponent should obtain all the necessary permits and licenses from the relevant authorities and employ qualified and adequate personnel to implement the project as per the best practicable technologies;
- The proponent should adhere to the local authorities-Mavoko Sub-County code of conduct during construction and operational phases of the project;
- The proponent should implement the mitigation measures/ guidelines provided in the EMMP; and
- The operation and maintenance of the proposed project should comply with the best management practices and the principles of good environmental management and occupational health and safety.

REFERENCES

1. Kenya Gazette Supplement Acts 2000, Environmental Management and Coordination Act (EMCA) No. 8 of 1999, Government Printer, Nairobi Republic of Kenya (2005);

2. Kenya Gazette Supplement Acts, Environmental (Impact Assessment and Audit) Regulations 2003, Government Printer, Nairobi Republic of Kenya (2005);

3. Kenya Gazette Supplement Acts, Environmental Management and Coordination (Waste Management) Regulations, 2006, Government Printer, Nairobi Republic of Kenya (2008);

4. Kenya Gazette Supplement Acts, Occupational Health and Safety Act, 2007, Government Printer, Nairobi Republic of Kenya (2005);

5. Kenya Gazette Supplement Acts, Penal Code Act (Cap.63), Government Printer, Nairobi Republic of Kenya (2005);

6. Kenya Gazette Supplement Acts, Physical Planning Act, 1999, Government Printer, Nairobi Republic of Kenya (2005);

7. Kenya Gazette Supplement Acts, Sessional Paper No. 6 of 1999 on Environment and Development, Government Printer, Nairobi Republic of Kenya (2005);

8. www.epa.gov/superfund/programs/recycle/

9. Geology of the Nairobi Area, Geological Survey of Kenya, Report no. 98, Nairobi. SIKES H L (1939); Notes of the geology of the country surrounding Nairobi, Geological Survey of Kenya.

10. http://intranet.croydon.net/Finance/Performance/risk-anagement/default.asp

11. County Integrated Development Plan 2013-2017, Machakos County Government.

Appendices

EAE 2 3060249

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/20431

Application Reference No: NEMA/EIA/EL/27045

M/S **Moses Muisyo**
(individual or firm) of address
P.O. Box 70491 - 00400 Nairobi

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

General

registration number **7688**

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

Issued Date: **1/18/2024** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

EAE 23061502

FORM 7 (r.15(2))

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/20555

Application Reference No: NEMA/EIA/EL/27289

M/S **Anthony Musyoka Makau**
(individual or firm) of address
P.O. Box 635-90131 TALA

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
General
registration number **8902**

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

Issued Date: **1/24/2024** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

EAE 2 3061542

FORM 7 (r.15(2))

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/20525

Application Reference No: NEMA/EIA/EL/27220

M/S **Edward Njuguna Kamau**
(individual or firm) of address
P.O. Box 7413 - 00200 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Associate Expert** registration number **8264**

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

Issued Date: **1/24/2024** Expiry Date: **12/31/2024**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

FORM 7 (r.15(2))

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/19172

Application Reference No: NEMA/EIA/EL/24717

M/S **JULIUS KUYA OKULLO**
(individual or firm) of address
P.O. Box 1244 - 00606 NAIROBI

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
General
registration number **6306**

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

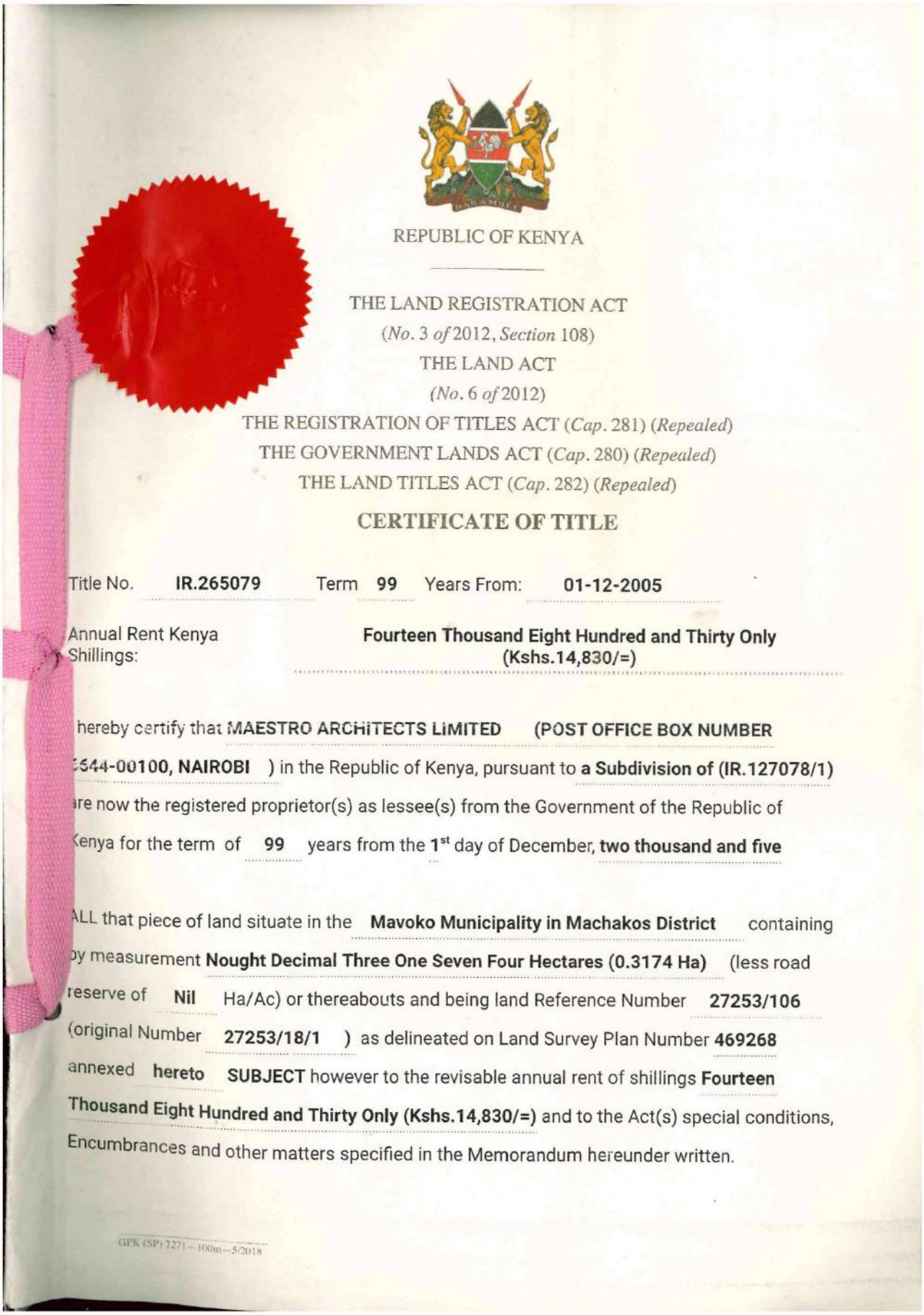
Issued Date: **3/22/2023** Expiry Date: **12/31/2023**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified



REPUBLIC OF KENYA

THE LAND REGISTRATION ACT
(*No.* 3 *of* 2012, *Section* 108)
THE LAND ACT
(*No.* 6 *of* 2012)
THE REGISTRATION OF TITLES ACT (*Cap.* 281) (*Repealed*)
THE GOVERNMENT LANDS ACT (*Cap.* 280) (*Repealed*)
THE LAND TITLES ACT (*Cap.* 282) (*Repealed*)

CERTIFICATE OF TITLE

Title No. **IR.265079** Term **99** Years From: **01-12-2005**

Annual Rent Kenya Shillings: **Fourteen Thousand Eight Hundred and Thirty Only (Kshs.14,830/=)**

I hereby certify that **MAESTRO ARCHITECTS LIMITED (POST OFFICE BOX NUMBER 3544-00100, NAIROBI)** in the Republic of Kenya, pursuant to **a Subdivision of (IR.127078/1)** are now the registered proprietor(s) as lessee(s) from the Government of the Republic of Kenya for the term of **99** years from the **1st** day of December, **two thousand and five**

ALL that piece of land situate in the **Mavoko Municipality in Machakos District** containing by measurement **Nought Decimal Three One Seven Four Hectares (0.3174 Ha)** (less road reserve of **Nil** Ha/Ac) or thereabouts and being land Reference Number **27253/106** (original Number **27253/18/1**) as delineated on Land Survey Plan Number **469268** annexed **hereto** **SUBJECT** however to the revisable annual rent of shillings **Fourteen Thousand Eight Hundred and Thirty Only (Kshs.14,830/=)** and to the Act(s) special conditions, Encumbrances and other matters specified in the Memorandum hereunder written.

GPK (SP) 7271—100m—5/2018

IN WITNESS whereof I have hereunto set my hand and seal this 8th day of Novembe

two thousand and twenty-three

Registrar of Titles

S. W. Kirora *3

MEMORANDUM

1. The Land Registration Act, No. 3 of 2012

2. The Land Act No. 6 of 2012

3. The Special conditions contained in a Grant No.IR.127078/1

4. The Government Land Act (Cap 280) (Repealed)

5. The Registration of Titles Act (Cap 281) (Repealed)

This certificate of title is issued under section 70 of the Registration of Title Act (Cap 281) (Repealed and is in Part substitution of a Grant / Certificate of Title registered as IR.127078/1

LAND TITLES REGISTRY – NAIROBI REGISTRY
REGISTRATION OF TITLE ACT

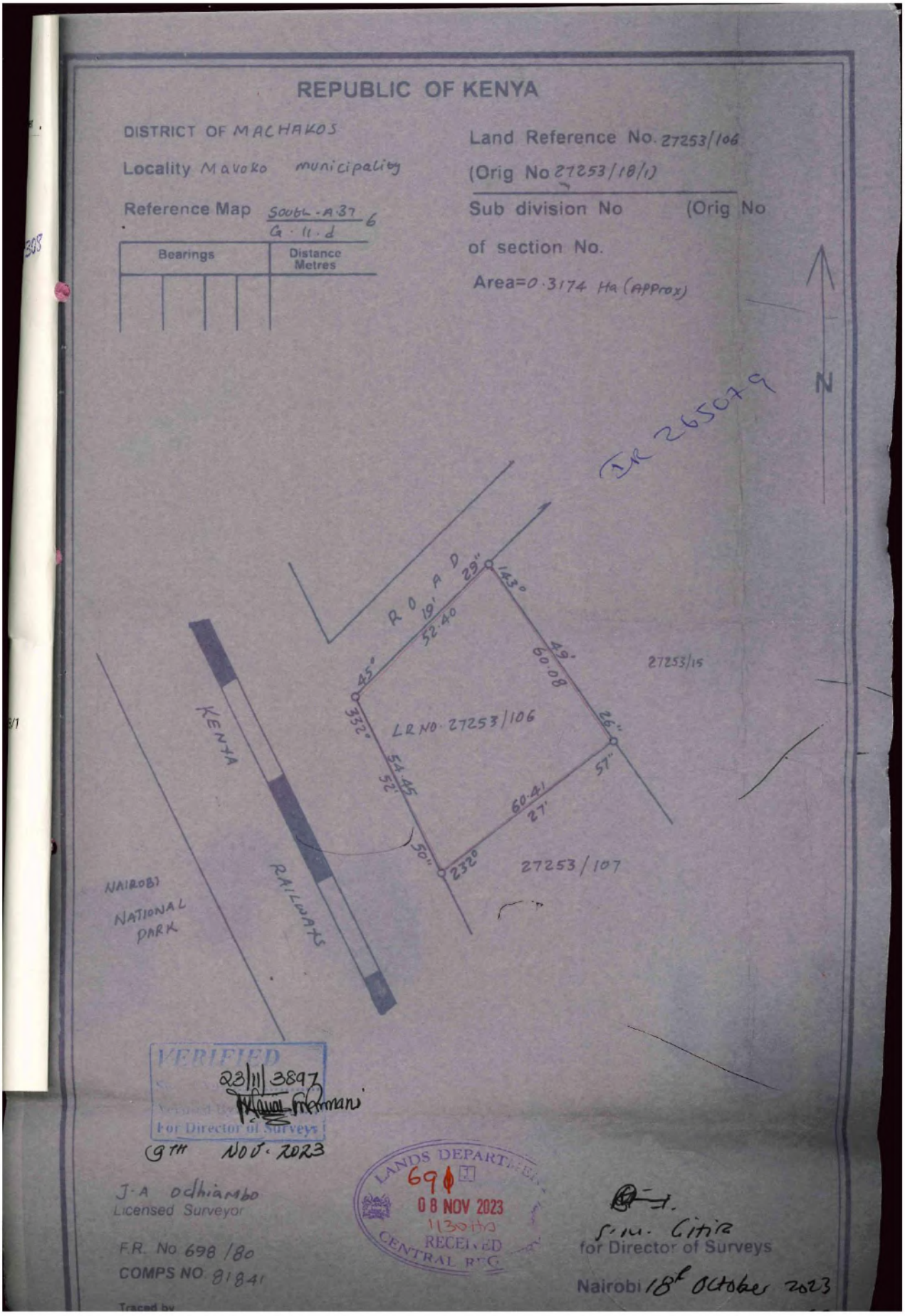
REGISTERED AS No. I.R 265079/1

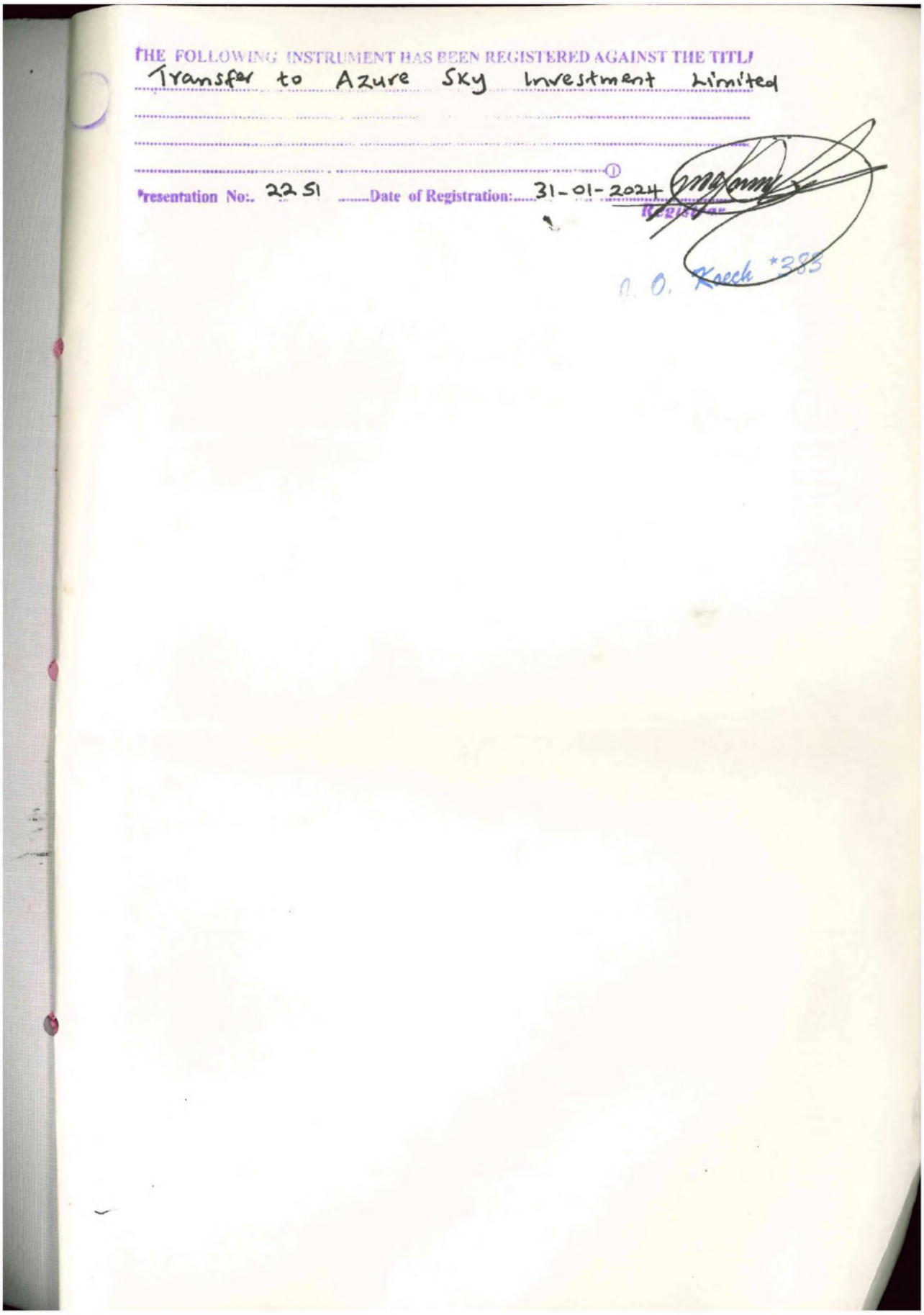
PRESENTED 8th November 2023

TIME 11 30 HRS ③

Registrar of Titles

S. W. Kirora *308


REPUBLIC OF KENYA
DISTRICT OF MACHAKOS
Locality Mavoko municipality
Reference Map South-A-37 / G·11·d 6
Bearings
Distance Metres
Land Reference No. 27253/106
(Orig No 27253/18/1)
Sub division No (Orig No
of section No.
Area=0·3174 Ha (Approx)
N
LR 26507
ROAD
29"
143°
19'
52.40
49'
60.08
45°
27253/15
LR NO. 27253/106
332°
26"
54.45
52'
57"
60.41
27'
50"
232°
27253/107
KENYA
RAILWAYS
NAIROBI
NATIONAL
PARK
VERIFIED
23/11/3897
For Director of Surveys
9TH NOV. 2023
J·A Odhiambo
Licensed Surveyor
F.R. No 698/80
COMPS NO. 81841
LANDS DEPARTMENT
69
08 NOV 2023
RECEIVED
CENTRAL REG.
S.M. Citir
for Director of Surveys
Nairobi 18th October 2023



THE FOLLOWING INSTRUMENT HAS BEEN REGISTERED AGAINST THE TITLE

Transfer to Azure Sky Investment Limited

Presentation No:. 2251 .....Date of Registration:.....31-01-2024

Registrar

P. O. Kocch *385

No. **PVT-7LU5LLK3**

CERTIFICATE OF INCORPORATION

I hereby **CERTIFY** that,

AZURE SKY INVESTMENT LIMITED

is on this date 15 Aug 2023 Incorporated under the Companies Act, 2015 and that the Company is a **PRIVATE LIMITED COMPANY.**

.....

Registrar Of Companies

This is a system generated certificate. To validate this document send the word **BRS** to **21546**

KENYA REVENUE AUTHORITY

PIN Certificate

For General Tax Questions
Contact KRA Call Centre
Tel: +254 (020) 4999 999
Cell: +254(0711)099 999
Email: callcentre@kra.go.ke

www.kra.go.ke

Certificate Date : 16/08/2023

Personal Identification Number
P052247502W

This is to certify that taxpayer shown herein has been registered with Kenya Revenue Authority

Taxpayer Information

Taxpayer Name	AZURE SKY INVESTMENT LIMITED
Email Address	MARTINCUI@FOXMAIL.COM

Registered Address

L.R. Number :	**Building :** CHINA TOWN
Street/Road : RING ROAD	**City/Town :** NAIROBI
County : Nairobi	**District :** Westlands District
Tax Area : Kilimani	**Station :** West of Nairobi
P. O. Box : 51303	**Postal Code :** 00200

Tax Obligation(s) Registration Details

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till Date	Status
1	Income Tax - Company	15/08/2023	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Kenya Revenue Authority. Your accounting end month is December unless a change has been approved by the Commissioner-Domestic Taxes Department. The status of Tax Obligation(s) with 'Dormant' status will automatically change to 'Active' on date mentioned in "Effective Till Date" or any transaction done during the period. This certificate shall remain in force till further updated.

Disclaimer : This is a system generated certificate and does not require signature.

KENYA REVENUE AUTHORITY

Tax Compliance Certificate

For General Tax Questions
Contact KRA Call Centre
Tel: +254 (020) 4999 999
Cell: +254(0711)099 999
Email: callcentre@kra.go.ke

www.kra.go.ke

Taxpayer PIN : P052247502W

Certificate Date: 16/08/2023

Name and Address :

AZURE SKY INVESTMENT LIMITED

CHINA TOWN, NAIROBI, Westlands District,
PO Box:51303,
Postal Code:00200

Certificate Number:

KRAWON1359693123

This is to confirm that AZURE SKY INVESTMENT LIMITED,
Personal Identification Number P052247502W
has filed relevant tax returns and
paid taxes due as provided by Law.

This Certificate will be valid for
twelve (12) months up to 15/08/2024.

Caveat: This certificate is issued on the basis of information available with the authority as at the certificate date mentioned above. The Authority reserves the right to withdraw the certificate if new evidence materially alters the tax compliance status of the recipient.

Disclaimer : This certificate is system Generated and therefore does not require signature.You may confirm validity of this certificate on the iTax Portal by using the TCC Checker.This certificate confirms your compliance status for a period of five years preceding the date of issue. The certificate may however be with withdrawn on grounds of outstanding debt affecting periods prior to this.

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF MACHAKOS
MINISTRY OF LANDS, HOUSING, URBAN DEVELOPMENT AND ENERGY
DEPARTMENT OF LANDS AND PHYSICAL PLANNING

OFFICE OF THE COUNTY DIRECTOR OF PHYSICAL AND LAND USE PLANNING

Telephone: +254-020-2004086
Email: info@machakosgovernment.com
Opp. County Commissioner's office

P.O Box 1364-90100
Mwatu Wa Ngoma Road
MACHAKOS

SUB-COUNTY/MUNICIPALITY MAVOKO

FORM PLUPA/DC/8 **(r.8(3)(i))**

THE PHYSICAL AND LAND USE PLANNING ACT (No. 13 of 2019)

S/No. **A1-0180**

Registered Number of Application MKS/TC/39/7/3/24

NOTIFICATION OF APPROVAL OF APPLICATION

To AZURE SKY INVESTMENT

Your application number as above, submitted on 28/2/2024 For permission to CHANGE USE TO MULTI DWELLINGS L.R./Parcel No. 27253/106 With coordinates -1.3828,36.9201 Situated in MLOLONGO Road OFF MOMBASA ROAD Has been APPROVED by the County Executive Committee Member on 7/3/2024 for the following reasons/subject to the following conditions:

1. Endorsing the new user on the title in within ONE (1) year.
2. Submission of title for new user for recalculation of rates and rent within ONE (1) year.
3. The property in question not being part of public land or disputed private land.
4. Abiding with all other legal requirements of your application.
5. To ensure a copy of this Notification of Approval (FORM PLUPA DC/8) is attached to the original plan on site always.
6. This approval does not confirm ownership of land.

xxx

xxx

xxx

Name DISSENT I AJANGA

Signed ..... Date 8/3/24

County Director of Physical Planning MACHAKOS COUNTY

APPROVED

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF MACHAKOS
MINISTRY OF LANDS, HOUSING, URBAN DEVELOPMENT AND ENERGY
DEPARTMENT OF LANDS AND PHYSICAL PLANNING

OFFICE OF THE COUNTY DIRECTOR OF PHYSICAL AND LAND USE PLANNING

Telephone: +254-020-2004086
Email: info@machakosgovernment.com
Opp. County Commissioner's office

P.O Box 1364-90100
Mwatu Wa Ngoma Road
MACHAKOS

SUB-COUNTY/MUNICIPALITY MAVOKO

FORM PLUPA/DC/8 **(r.8(3)(i))**

THE PHYSICAL AND LAND USE PLANNING ACT (No. 13 of 2019)

S/No. **BP2-0105**

Registered Number of Application MKS/TC/30/7/3/24

NOTIFICATION OF APPROVAL OF APPLICATION

To AZURE SKY INVESTMENT

Your application number as above, submitted on 28/2/2024 For permission to DEVELOP RESIDENTIAL FLATS L.R./Parcel No 27253/106 With coordinates -1.3828,36.9201 Situated in MLOLONGO Road OFF MOMBASA ROAD has been APPROVED by the County Executive Committee Member on 7/3/2024 for the following reasons/subject to the following conditions:

1. Issuing the County with Commencement Notice **(FORM PLUPA/DC/14)** at least 30 hours prior to;
2. To obtain authority for **Excavation** and **Construction of Site House** before commencement of works;
3. Renewing your approval if your construction is not commenced within **THREE (3)** years and completed within **FIVE (5)** years;
4. The land not constituting part of disputed public or private land;
5. Abiding by all details and specifications of your approval;
6. Abiding with all other legal requirements of your application;
7. Observe the recommended setbacks and building lines;
8. Erection of a construction sign board (see overleaf for instructions);
9. Developer to construct a conservancy tank/septic tank at owner's risk and ensure that no spillage of waste water flows along the road or adjacent properties;
10. Approval issued under certificate of workmanship;
11. To ensure a copy of this Notification of Approval **(FORM PLUPA DC/8)** is attached to the original plan on site always;
12. To ensure public utilities along way-leaves are not tampered with during excavation and/or construction;
13. Ensure to observe requirements of public safety in carrying out the exercise;
14. Obtaining **certificate of occupation** from county before the building is occupied;
15. This approval does not confirm ownership of land;

Name DISSENT I AJANGA

Signed ..... Date 8/3/24

County Director of Physical Planning MACHAKOS COUNTY

APPROVED

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Telcom Wireless: 020-2183718, 020-2101370
Mobile Line: 0724 253 398, 0723 363 010, 0735 013 046
Incident Line: 0786 101 100, 0741 101 100

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

NEMA/TOR/5/2/674

16th February, 2024

Managing Director
Azure Sky Investment Limited
P.O. Box 51303-00200
NAIROBI

RE: TERMS OF REFERENCE (TOR) FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) PROJECT REPORT FOR THE PROPOSED RESIDENTIAL APARTMENTS ON PLOT L.R. NO. 27253/106 IN SYOKIMAU, MAVOKO SUB-COUNTY, MACHAKOS COUNTY.

We acknowledge the receipt of your TOR for the above subject.

Pursuant to the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003 and Legal notice 31 & 32 of 2019, your terms of reference for the Environmental Impact Assessment (EIA) for the **PROPOSED RESIDENTIAL APARTMENTS ON PLOT L.R. NO. 27253/106 IN SYOKIMAU, MAVOKO SUB-COUNTY, MACHAKOS COUNTY** has been approved with the following requirements:

You shall submit ten (10) copies of the study report, upon payment of the applicable EIA processing and monitoring fees being 0.1% of the total project cost, a soft copy of the summarised ESMP in **WORD** format for preparation of public notice and one electronic copy of the report prepared by the team of experts to the Authority.

Thank you for your willingness to comply.

Selelah

SELELAH OKOTH
FOR: DIRECTOR GENERAL

BILL OF QUANTITES

CLIENT NAME: AZURE SKY INVESTMENT LTD

PROJECT: PROPOSED AZURE SKY INVESTMENTS LTD RESIDENTIAL DEVELOPMENT.

PLOT: L.R NO. 27253/106

LOCATION: SYOKIMAU, OFF MOMBASA ROAD, MAVOKO SUB-COUNTY, MACHAKOS COUNTY.

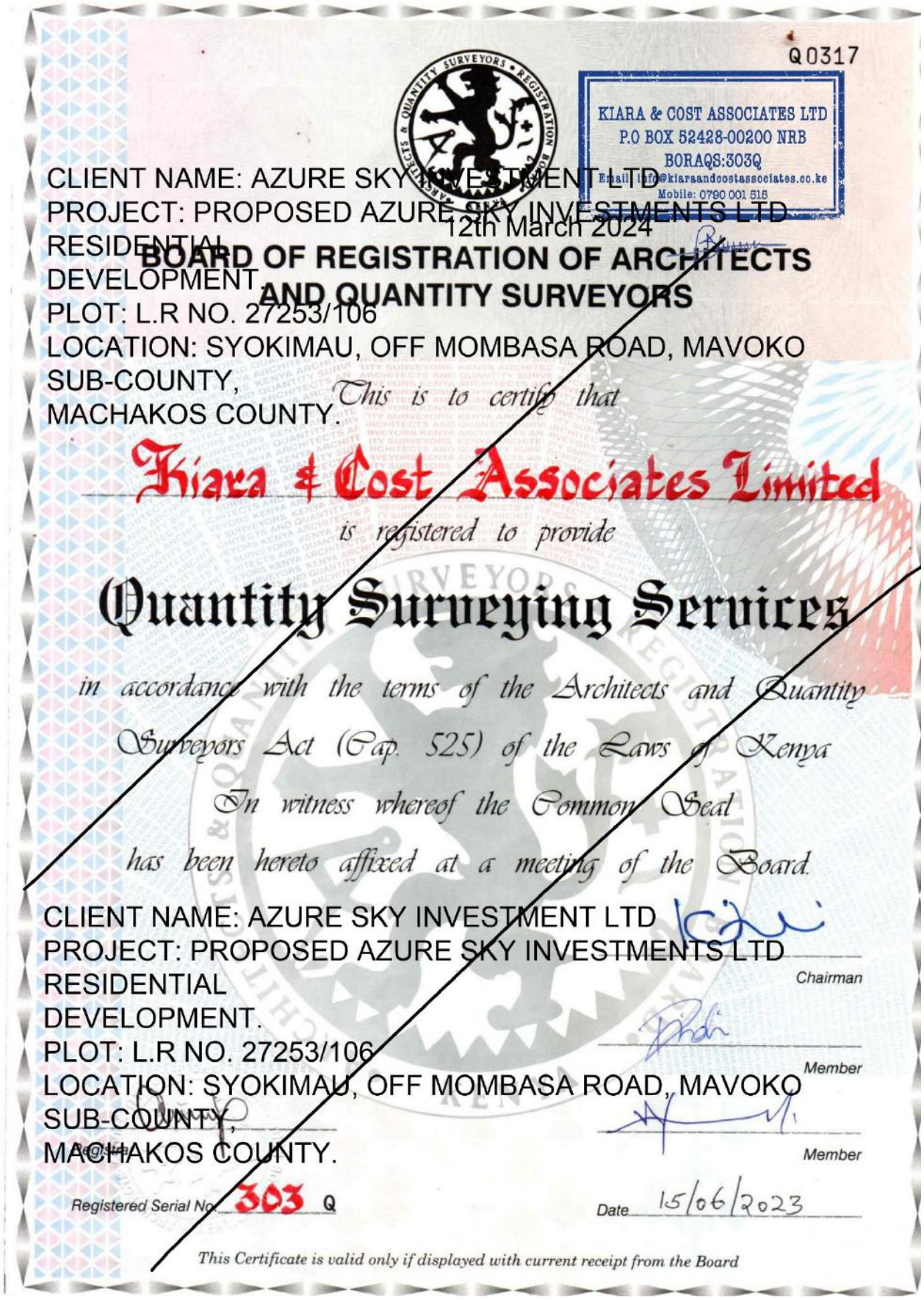
12th March 2024

PROPOSED AZURE SKY INVESTMENTS LTD RESIDENTIAL DEVELOPMENT.

	UNIT	QTY	RATE	AMOUNT
GRAND SUMMARY				
BILL NO 1 – PRERIMINARIES	PG	2/6		18,987,000
BILL NO 2.-GROUND FLOOR	PG	8/17		27,278,987
BILL NO 3 TYPICAL FLOOR (1-3)	PG	19/33		88,989,000
BILL NO 4 TYPICAL FLOOR (4-7)	PG	34/46		93,909,789
BILL NO 5 TYPICAL FLOOR (8-10)	PG	47/54		97,345,987
BILL NO 6 TYPICAL FLOOR (11-13)	PG	55/66		97,890,000
BILL NO 7 TYPICAL FLOOR (14)	PG	67/74		77,900,000
BILL NO 8 EXTERNAL WORKS	PG	75/88		55,898,767
BILL NO 9 PC AND PROVISIONAL SUMS	PG	89/91		30,000,000
GRAND TOTAL				**588,199,530**

KIARA & COST ASSOCIATES LTD
P.O BOX 52428-00200 NRB
BORAQS:303Q
Email: info@kiaraandcostassociates.co.ke
Mobile: 0702744381

12th March 2024



Q 0317

KIARA & COST ASSOCIATES LTD
P.O BOX 52428-00200 NRB
BORAQS:303Q
Email: info@kiaraandcostassociates.co.ke
Mobile: 0790 001 515

CLIENT NAME: AZURE SKY INVESTMENT LTD
PROJECT: PROPOSED AZURE SKY INVESTMENTS LTD RESIDENTIAL DEVELOPMENT.
PLOT: L.R NO. 27253/106
LOCATION: SYOKIMAU, OFF MOMBASA ROAD, MAVOKO SUB-COUNTY,
MACHAKOS COUNTY.

12th March 2024

BOARD OF REGISTRATION OF ARCHITECTS AND QUANTITY SURVEYORS

This is to certify that

Kiara & Cost Associates Limited

is registered to provide

Quantity Surveying Services

in accordance with the terms of the Architects and Quantity Surveyors Act (Cap. 525) of the Laws of Kenya

In witness whereof the Common Seal has been hereto affixed at a meeting of the Board.

CLIENT NAME: AZURE SKY INVESTMENT LTD
PROJECT: PROPOSED AZURE SKY INVESTMENTS LTD RESIDENTIAL DEVELOPMENT.
PLOT: L.R NO. 27253/106
LOCATION: SYOKIMAU, OFF MOMBASA ROAD, MAVOKO SUB-COUNTY,
MACHAKOS COUNTY.

Chairman

Member

Member

Registrar

Registered Serial No. 303 Q

Date 15/06/2023

This Certificate is valid only if displayed with current receipt from the Board

CLIENT NAME: AZURE SKY INVESTMENT LTD
PROJECT: PROPOSED AZURE SKY INVESTMENTS LTD
RESIDENTIAL
DEVELOPMENT.
PLOT: L.R NO. 27253/106
LOCATION: SYOKIMAU, OFF MOMBASA ROAD, MAVOKO
SUB-COUNTY,
MACHAKOS COUNTY.

KIARA & COST ASSOCIATES LTD
P.O BOX 52428-00200 NRB
BORAQS:303Q
Email: info@kiaraandcostassociates.co.ke
Mobile: 0790 001 615

12th March 2024

PRACTISING CERTIFICATE FOR QUANTITY SURVEYING FIRMS

Pursuant to the Architects & Quantity Surveyors Act Cap 525

KIARA & COST ASSOCIATES LIMITED (303Q)

is duly registered to provide Quantity Surveying services

From **1st July 2023** *to* **30th June 2024**

Registrar *Date* **3rd July 2023**

serial no PCQSF/729/23-24

CLIENT NAME: AZURE SKY INVESTMENT LTD
PROJECT: PROPOSED AZURE SKY INVESTMENTS LTD
RESIDENTIAL
DEVELOPMENT.
PLOT: L.R NO. 27253/106
LOCATION: SYOKIMAU, OFF MOMBASA ROAD, MAVOKO
SUB-COUNTY,
MACHAKOS COUNTY.

nema
mazingira yetu | uhai wetu | wajibu wetu

Payment Receipt

Invoice Number:SRA_3164
Invoice Status:PAID
Payment Date:12/03/2024

Applicant Details:
PIN:. P052247502W
Name:AZURE SKY INVESTMENT LIMITED
Phone:0729847819
Email:mosesmuisyo@gmail.com

Service	Description	Amount (KES)
EIA Study Report	Payment for EIA Study Report	588,199
Convenience Fee	Ecitizen Convenience Fee	50.00
	Total Amount Paid	588,249
	Balance	0

Payment Mode eCitizen

Note :This document is computer generated and therefore not signed. Present it during licence or permit collection