ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT

FOR

THE PROPOSED RESIDENTIAL APARTMENTS ON PLOT NO. NAIROBI/BLOCK 15/121 LOCATED ALONG RIARA ROAD IN THOMPSON AREA OF NAIROBI CITY COUNTY

This Environmental Impact Assessment (EIA) Study Report is submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, Cap 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003

EIA Firm of Experts:

Space Planners Ltd,

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SPACE PLANNERS LTD

Project Proponent:

Riara Oasis Limited,

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Nairobi.

14th November 2024

Declaration

This Environmental Impact Assessment (EIA) Study Report for the **Proposed Residential Apartments Development** on Plot No. Nairobi/Block 15/121 located along Riara Road in Thompson Area of Nairobi City County has been prepared by **Space Planners Limited, EIA/Audit Firm of Experts (NEMA Reg. No. 10,492),** in accordance with the Environmental Management and Coordination Act, Cap 387 and The Environmental (Impact Assessment and Audit) Regulations, 2003 for submission to the National Environment Management Authority (NEMA).

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P.O. Box 100803 - 00101,
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Signed: _____ Date: 14-11-2024

Name: JIANG LIANGKE

Designation: Director

EIA Study Team

Name	Position	Roles
Plan. Solomon Kyeni	Team Leader/ Lead Expert, Reg. No.: 3081	▪ Overall Project Management. ▪ Coordinating the EIA Specialist Studies. ▪ Impact Assessment and Monitoring Plans. ▪ Land Use Assessment and Analysis. ▪ Development of the Environmental Management Plan.
Aaron Mumo	Lead Expert, Reg. No.: 9047	▪ Detailed baseline survey and data collection. ▪ Impact Assessment and Analysis. ▪ Analysis of the project alternatives. ▪ Documentary Review (project designs and implementation schedules). ▪ Review of the applicable legislative framework.
Lilian Mbogo	Associate Expert, Reg. No.: 13273	▪ Baseline data collection. ▪ Documentary Review (project designs and implementation schedules). ▪ Review of the applicable legislative framework. ▪ Stakeholder engagement and consultations. ▪ Compilation of the EIA Study Report.
Maureen Dieto	Sociologist	▪ Development of Stakeholder Engagement Plans (SEPs). ▪ Stakeholder Analysis and Planning. ▪ Analysis of socio-economic impacts. ▪ Social Impact Assessment. ▪ Undertake the Consultations and Public Participation with the PAP. ▪ Coordinate the project meeting. ▪ Holding Public Consultative forums within the project area.

Executive Summary

Introduction

Article 43 of the Constitution of Kenya 2010 stipulates that every person has a right to accessible and adequate housing and reasonable standards of sanitation. Although this is a constitutional right, the housing situation in the country is such that the demand far exceeds supply leaving many people to live in deplorable conditions. The demand for housing in Kenya has been rising in recent years as a result of high urbanization and population growth rates. However, more is required for the majority of Kenyans to realize this constitutional right. According to the National Housing Corporation Strategic Plan of 2023-2027, the annual demand and supply for housing are estimated at 200,000 units and 50,000 units respectively resulting in a 75% deficit. Therefore, there is a need to provide more housing units in order to meet this demand. The Government under the *Bottom-Up Economic Transformation Agenda (BETA)* plans to increase the supply of new housing to 200,000 units per annum to bridge this gap. It also provides an enabling environment for the supply of housing by both the public and private sectors through the lowering cost of inputs, providing incentives to developers and enabling low-cost mortgages.

In light of the above, the proponent, ***Riara Oasis Limited,*** has proposed to construct **548 residential apartments, and associated amenities** on Plot No. Nairobi/Block 15/121 located along Riara Road in Thompson Area of Nairobi City County. At present, the site is characterized by two (2) blocks of residential structures comprising four (4) housing units which were occupied. The proponent will issue adequate notice to vacate to the tenants before the demolition exercise begins and obtain a demolition permit from Nairobi City County (NCC).

Scope

The scope of the report is to describe the nature of the project and the physical extent of the project site and its immediate environs, document all the baseline information, describe the legal and regulatory framework associated with the project, analyze the project alternatives, assess the environmental impacts, and develop feasible mitigation measures for the anticipated negative impacts including designing the Environmental Management Plan (EMP) for the project while maximizing on the anticipated positive impacts.

Project Objectives

The objective of the proposed project is to construct **a 23-storey residential building comprising 548 residential apartments (328 No. one-bedroom units, 132 No. two-bedroom units and 88 No. three-bedroom units), a swimming pool, a gym, parking bays, and associated amenities** in Thompson area of Nairobi City County.

EIA Objectives

The objective of the EIA is to identify, predict and evaluate the economic, environmental, and social impacts of development activities, to provide information on the environmental consequences for decision-making, and to promote environmentally sound and sustainable development through the identification of appropriate alternatives and mitigation measures.

Methodology

The methodology used for preparation of this EIA Study Report is stated below:

i. Environmental Screening of the proposed project in line with the Second Schedule of EMCA, Legal Notice No. 31 of 2019 and established that the proposed development falls under **High-Risk Projects *(Urban development including establishment of new housing estate developments exceeding one hundred housing units)*** which requires submission of the EIA Study Report to NEMA under Section 58 (2) of the act.

ii. A scoping exercise that identified the key issues to be addressed in the assessment including environmental, social, health and safety concerns.

iii. A site reconnaissance and physical evaluation of the project site to assess the baseline information of the project area using a prepared checklist with a specific focus on environmental and human safety issues that are likely to be affected.

iv. Preparation of Terms of Reference (TOR) and submission to the authority for approval in line with Regulation 11 of the Environmental (Impact Assessment and Audit) Regulations, 2003 (*Attached is the copy of TOR Approval (Ref: No. NEMA/TOR/5/2/799)).*

v. Review the proposed project designs, environmental setting of the area, nature of the proposed activities, implementation plan/schedules, and other available relevant data/information.

vi. Review of the policy, legal and institutional framework on the environment and socio-economic matters pertaining to the proposed project.

vii. Consultations and Public Participation (CPP) with the Project Affected Persons (PAP) through the public meeting, administration of questionnaires, discussions and key informant interviews.

viii. Preparation of an EIA Project Report and the development of an EMP outlining the responsibilities, schedules, monitorable indicators and time frames for submission to NEMA.

Potential Positive Impacts

The positive impacts associated with the proposed project include the following among others:

i. Provision of 548 residential apartments in Thompson area.

ii. Enhance convenience to the residents through the provision of recreational facilities such as a gym and swimming pool within the same development.

iii. Creation of employment opportunities throughout the project cycle i.e., construction workers, security personnel, domestic workers, waste transporters, cleaners, property managers, and a caretaker among others

iv. Revenue generation to the National Government through taxes such as Value Added Tax (VAT) for goods and services and Monthly Rental Income (MRI) among others.

v. Revenue generation to the County Government through permits such as building plan fees and enhanced rates among others.

vi. Revenue generation to the proponent through the sale and/or lease of the residential apartments.

vii. Provide a market for goods and services throughout the project cycle such as building materials (cement, sand, ballast, steel etc.) and professional services such as architectural, engineering, and environmental consultancy services.

viii. Increase in the value of land/property in the area by putting the land into a more productive and economic use.

Potential Negative Impacts and Mitigation Measures

The anticipated negative impacts associated with the proposed project and their mitigation measures include the following:

Impact	Mitigation Measures
Soil Erosion	▪ Obtain an excavation permit from NCC before the construction begins. ▪ Excavation will be undertaken using standard equipment and no blasting of the rocks will be carried out to avoid the destruction of neighbouring developments.

	▪ Undertake a comprehensive landscaping exercise after the construction phase by planting indigenous trees within the open spaces.
Air Pollution	▪ Screen the entire site using dust screens/nets to control and arrest construction-related dust. ▪ Sprinkle water in the work areas twice every day to prevent fugitive dust violations. ▪ Provide adequate and appropriate PPE such as masks to the workers in dusty areas within the site. ▪ Ensure the covering of loaded vehicles with clean impervious sheeting to ensure that the dusty materials will not leak from the vehicles.
Noise and Excessive Vibrations	▪ Construction activities are to be undertaken between 0800hrs to 1800hrs on weekdays and 0800hrs to 1300hrs on Saturdays only. ▪ No construction work will be undertaken on Sunday. ▪ Provide adequate and appropriate PPE such as earmuffs to the workers in noisy environments within the site. ▪ Sensitize workers and drivers on minimal permissible noise levels every month. ▪ All noisy activities shall be scheduled concurrently to reduce the exposure period. ▪ Endeavour to use equipment installed with noise abatement devices as much as practicable. ▪ Regular maintenance of the machinery to reduce frictional noise.
Traffic Density	▪ Ferry building materials and construction waste during the off-peak hours. ▪ Engage traffic marshals to control traffic in and out of the site. ▪ Provide temporary car parking spaces for construction vehicles within the site boundary. ▪ Provide a separate pedestrian lane into the property to cater for the NMT traffic movement in and out of the premises. ▪ Install traffic control/warning signs to inform the motorists and public of the potential hazards.
Solid Waste	▪ Design and implement a Waste Management Plan for the entire project cycle. ▪ Provide a centralised Waste Collection Centre (WCC) before final disposal. ▪ Provide properly labelled and colour-coded receptacle bins for solid waste management within the site. ▪ Provide adequate and appropriate PPE such as gloves and masks to all the workers handling the solid waste within the site. ▪ Segregate non-hazardous waste into organic and non-organic fractions before final disposal. ▪ Engage a NEMA-registered waste transporter to collect and dispose of segregated waste to designated disposal sites.
Liquid Waste	▪ Extend the connection of the proposed development to the existing conventional sewer system upon acquisition of a connection permit from NCWSC. ▪ Design and construct an internal reticulation system which can consistently handle the loads even at peak volumes. ▪ Obtain a site toilet from NCC before the construction begins. ▪ Provide sufficient and suitable sanitary conveniences for the workers during

	the construction phase. ▪ Proper decommissioning of the sanitary conveniences once the construction works are completed. ▪ Install hygiene awareness signs at strategic points within the site and hold regular toolbox talks on hygiene with the personnel.
Water Demand	▪ Extend the connection of the main water supply to the proposed development upon acquisition of a connection permit from NCWSC. ▪ Drill a borehole to supplement the existing NCWSC water supply subject to the acquisition of an authorization permit from WRA. ▪ Harvest rainwater for reuse to supplement the existing NCWSC water supply. ▪ Install water-efficient fixtures and fittings within the development such as 6 litres dual flush cisterns, low flow rate taps and showerheads. ▪ Monitor the water consumption within the site every month.
Energy Demand	▪ Install an onsite transformer to supply energy to the proposed development subject to the acquisition of a connection permit from KPLC. ▪ Install solar panels as an alternative source of renewable energy for the proposed development. ▪ Install energy-efficient fixtures and fittings within the development such as LED bulbs. ▪ Monitor the energy consumption within the site every month.
Storm Water Drainage	▪ Construct internal drainage channels covered with gratings for stormwater management. ▪ Install rainwater-harvesting facilities within the site structures to reduce the amount of storm reaching the surface. ▪ Use of semi-permeable materials during the construction of pavements.
Oil Pollution	▪ Fit all internal drainage facilities with adequate functional oil-water separators and silt traps. ▪ Store all oils/grease in a designated area at the contractor's yard away from the site. ▪ Proper disposal of oily materials such as oil drums and cans at designated disposal sites by licensed waste transporters.
Health and Safety of Workers	▪ Register the construction site as a workplace with the DOSHS before the construction begins. ▪ Insure all the workers against the accidents before the construction begins. ▪ Provide adequate and appropriate PPE and ensure that all workers wear them at all times. ▪ Provide first aid facilities and ensure that the workers are trained in emergency response. ▪ Develop an Emergency Response Plan (ERP) to manage the occurrence of anticipated hazards during the construction phase. ▪ All workers shall be sensitized before construction begins on how to control accidents related to construction. ▪ Keep a record of the public emergency service telephone numbers including Police, Fire brigade, and Ambulance at strategic points. ▪ Ensure that the workers are registered with SHIF / NSSF and remit appropriate fees.

Fire Risks	▪ Hire a competent authorized contractor to do the electrical works on site. ▪ Provide adequate firefighting equipment at strategic places within the property. ▪ Train staff on the use of the available firefighting equipment. ▪ Conduct annual fire drills within the site to sensitize the workers and residents.
Insecurity	▪ Engage security personnel to guard the site and monitor the movement of people in and out of the property at all times. ▪ Install security lights around the property and ensure they are switched on only during the night hours. ▪ Hoard the site and construct a gatehouse to enhance security within the site.
Conflict with Neighbours	▪ Establish a Grievance Redress Mechanism that is easily accessible to all the stakeholders. ▪ Ensure continuous communication between the proponent and stakeholders on the progress of the project and its effects.
Loss of Vegetation	▪ Obtain a tree-cutting clearance certificate from NCC before cutting down the trees and adhere to the conditions therein. ▪ Undertake a comprehensive landscaping exercise after construction by planting indigenous trees within the open spaces.

Conclusion and Recommendations

The proposed project will have numerous benefits to the housing sector as outlined above. The negative impacts identified can be mitigated to a level of no significance throughout the project cycle. The implementation of the EMP developed in this report will be instrumental in ensuring 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.

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Acronyms

CBD	Central Business District
CCTV	Closed-circuit Television
CECM	County Executive Committee Member
CPP	Consultations and Public Participation
DOSHS	Directorate of Occupational Safety and Health Services
DSQ	Domestic Service Quarter
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ERP	Emergency Response Plan
GRS	Grievance Redress System
KEBS	Kenya Bureau of Standards
KPLC	Kenya Power and Lighting Company
LED	Light-Emitting Diode
MRI	Monthly Rental Income
NCA	National Construction Authority
NCC	Nairobi City County
NCWSC	Nairobi City Water and Sewerage Company
NEAP	National Environment Action Plan
NEMA	National Environment Management Authority
NET	National Environment Tribunal
OHS	Occupational Health and Safety
PAP	Project Affected Persons
PPE	Personal Protective Equipment
SDGs	Sustainable Development Goals
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
TOR	Terms of Reference
VAT	Value Added Tax
WRA	Water Resources Authority

CHAPTER ONE: INTRODUCTION

1.1 General Overview

The demand for housing in Kenya has been rising in recent years as a result of high urbanization and population growth rates. The demand for housing in Kenya has been rising in recent years as a result of high urbanization and population growth rates. According to the National Housing Corporation Strategic Plan of 2023-2027, the annual demand and supply for housing are estimated at 200,000 units and 50,000 units respectively resulting in a 75% deficit. Therefore, there is a need to provide more housing units in order to meet this demand. The Government under the *Bottom-Up Economic Transformation Agenda (BETA)* plans to increase the supply of new housing to 200,000 units per annum to bridge this gap. It also provides an enabling environment for the supply of housing by both the public and private sectors through the lowering cost of inputs, providing incentives to developers and enabling low-cost mortgages. In light of the above, the proponent ***Riara Oasis Limited*** has proposed to construct **548 residential apartments, 321 parking bays and associated amenities** on Plot No. Nairobi/Block 15/121 located along Riara Road in Thompson Area of Nairobi City County. The proposed development will contribute to bridging the housing shortage in the area while adhering to environmental best practices.

The sustainability of developments should be carefully considered right from the design stage. The proponent recognizes that they have a responsibility to the environment beyond legal and regulatory requirements and are committed to minimizing environmental impacts and continually improving and monitoring the environmental performance of the proposed development and its surroundings and has therefore engaged the environmental experts to carry out the EIA in accordance with the EMCA, CAP 387. The EIA team has evaluated the possible environmental, occupational health and safety impacts of the proposed development during the project cycle and in turn, proposed suitable methods of mitigating the anticipated negative impacts. This will not only achieve a safe and clean environment but also ensure that the proposed project activities are in conformity with the existing environmental legislation.

1.2 Objectives of the 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 all the Project Affected Persons (PAP) 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 an 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.

1.3 Project Objectives

The objective of the proposed development is to construct **a 23-storey residential building comprising 548 residential apartments (328 No. one-bedroom units, 132 No. two-bedroom units and 88 No. three-bedroom units), swimming pool, gym, parking bays, and associated amenities** in Thompson area of Nairobi City County.

1.4 Methodology

The methodology used for preparation of this EIA Study report is stated in the steps below:

i. Environmental Screening of the proposed project in line with the Second Schedule of EMCA, Legal Notice No. 31 of 2019 and established that the proposed development falls under **High-Risk Projects *(Urban development including establishment of new housing estate developments exceeding one hundred housing units)*** which requires submission of the EIA Study Report to NEMA under Section 58 (2) of the act.
ii. A scoping exercise that identified the key issues to be addressed in the assessment including environmental, social, health and safety concerns.

iii. A site reconnaissance and physical evaluation of the project site to assess the baseline information of the project area using a prepared checklist with a specific focus on environmental and human safety issues that are likely to be affected.

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v. Review the proposed project designs, environmental setting of the area, nature of the proposed activities, implementation plan/schedules, and other available relevant data/information.

vi. Review of the policy, legal and institutional framework on the environment and socio-economic matters pertaining to the proposed project.

vii. Consultations and Public Participation (CPP) with the Project Affected Persons (PAP) through the administration of questionnaires, discussions and key informant interviews.

viii. Preparation of an EIA Study Report and the development of an EMP outlining the responsibilities, schedules, monitorable indicators and time frames for submission to NEMA.

1.5 Terms of Reference

The following are the TOR developed during the scoping exercise;

i. The proposed location of the project.

ii. A non-technical summary outlining the key findings, conclusions and recommendations of the study shall be signed by the proponent and environmental impact assessment experts involved in its preparation.

iii. The nature of the project.

iv. Methodology of undertaking the study including implementation of stakeholder engagement plan.

v. The proposed location of the project including, proof of land ownership where applicable and the Global Positioning System (GPS) coordinates.

vi. A description of the international, national and county environmental legislative and regulatory frameworks on the environment and socio-economic matters.

vii. Baseline information including environmental and socio-economic and any other relevant information related to the project.

viii. The objectives of the project.

ix. The technology, procedures and processes to be used in the implementation of the project.

x. The materials to be used in the construction and implementation of the project.

xi. The products, by-products and waste generated by the project.

xii. A description of the environment likely to be affected by the project.

xiii. A summary of issues discussed at the public participation forum with supporting documents annexed.

xiv. The environmental impact analysis of the project includes assessments of direct, indirect, cumulative, and irreversible impacts. It also considers both short-term and long-term effects and the analysis of social, economic, and cultural aspects.

xv. Integration of climate change vulnerability assessment, adaptation and mitigation actions.

xvi. Analysis of alternatives including project site, design, technologies and processes and reasons for preferring the proposed site, design, technologies and processes.

xvii. 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.

xviii. Provision of an action plan for the prevention of foreseeable accidents, occupational diseases and management of hazardous activities in the course of carrying out activities of the project.

xix. The measures to prevent health hazards and to ensure safety in the working environment for the employees and for the management of emergencies related to the project.

xx. An identification of knowledge gaps and uncertainties which were encountered in undertaking the Integrated Environmental Impact Assessment Study.

xxi. An indication of whether the project is likely to affect the environment in any other country, the available alternatives and mitigation measures.

1.6 Project Justification

Article 43 (1) (b) of the Constitution of Kenya empowers every citizen with a right to accessible and adequate housing and reasonable standards of sanitation. According to the National Housing Corporation Strategic Plan of 2023-2027, there is currently a backlog of 2 million housing units. The deficit is bound to rise due to the Country's 4.4 per cent urbanization rate that welcomes 0.5 million new city dwellers annually. Nairobi is among the areas affected by the deficit with close to 60 percent of its population living in slums. Therefore, this calls for the development of housing units to accommodate the expanding urban population while supporting the growth of sustainable communities.

1.7 Socio-Economic Benefits

The proposed development will provide the following social economic benefits;

i. Provision of Residential Apartments

The proposed project will provide 548 residential apartments and associated amenities in the area. The provision of recreational facilities (gym and swimming pool) within the same development will enhance convenience to the residents while reducing trip generation to other facilities in the area. This will enhance the overall competitiveness of the area and in turn, encourage more development and growth. This will contribute towards the provision of additional housing units in the area while supporting a sustainable community.

ii. Provision of Employment Opportunities

The proposed project will create employment opportunities for both skilled and semi-skilled workers. During the construction phase, the proposed project will employ construction workers such as masons, plant operators, plumbers, landscapers, steel fixers, tilers, painters, and electricians among others. For the operation phase, the project will employ security personnel, gym & swimming instructors, domestic workers, waste transporters, cleaners, property managers, and a caretaker among others

iii. Provision of Revenue to the National Government

There will be an increase in revenue to the National Government through taxes such as VAT for goods and services (building materials and professional services etc.), and MRI on the rental income among others.

iv. Provision of Revenue to the County Government

There will be an increase in revenue to the County Government through enhanced rates and fees from the permits such as building plans and occupation certificate among others.

v. Provision of Revenue to the Proponent

There will be an increase in revenue for the proponent through the renting/sale of the residential apartments and therefore improving their living standards.

vi. Market for Goods and Services

During the construction phase, the project will require building materials (cement, ballast, sand, tiles, stones etc.) and professional services such as architectural, engineering, and environmental consultancy services among others. This will have a positive impact on the economic status of the suppliers and professionals in the country. The local economy of the neighbourhood will also receive a boost through the purchase of food items, drinks, and other commodities required by the workers and incoming population.

vii. Land use optimization

The proposed development will result in a more economical use of the land without significant environmental degradation. The area has been zoned for *High Rise Residential Apartments* and therefore the proposed development conforms to the zoning regulations.

CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

2.1 Nature of the Project

The proposed project will entail the construction of **548 residential apartments and associated amenities in Thompson area**. The project aims at providing housing infrastructure as well as maximizing the utilization of the property. At present, the site is characterized by two (2) blocks of residential structures comprising four (4) housing units which were occupied as shown in plate 2.1 below. The proponent will issue adequate notice to vacate to the tenants before the demolition exercise begins and obtain a demolition permit from Nairobi City County (NCC).

Plate 2. 1: The Site

Source: Fieldwork, 07/10/2024

2.2 Project Location

The subject plot is located along *Riara Road adjacent to Riara Villas* as shown in figure 2.1 below. It lies on latitude -1.2981 and longitude 36.7670 in Thompson Area of Dagoretti Sub-County, Nairobi City County.

Figure 2. 1: Location Map

Source: Google Earth, 2024

2.3 Land Tenure, Size, and Ownership

The property is registered as **Plot No. Nairobi/Block 15/121** under the Land Registration Act and the Land Registration (General) Regulations of 2017 on **freehold interest**. It measures approximately **0.3339 hectares** and the current registered proprietor is **Riara Oasis Limited** of P.O. Box 100803 - 00101, Nairobi. *(Attached is a copy of the ownership documents).*

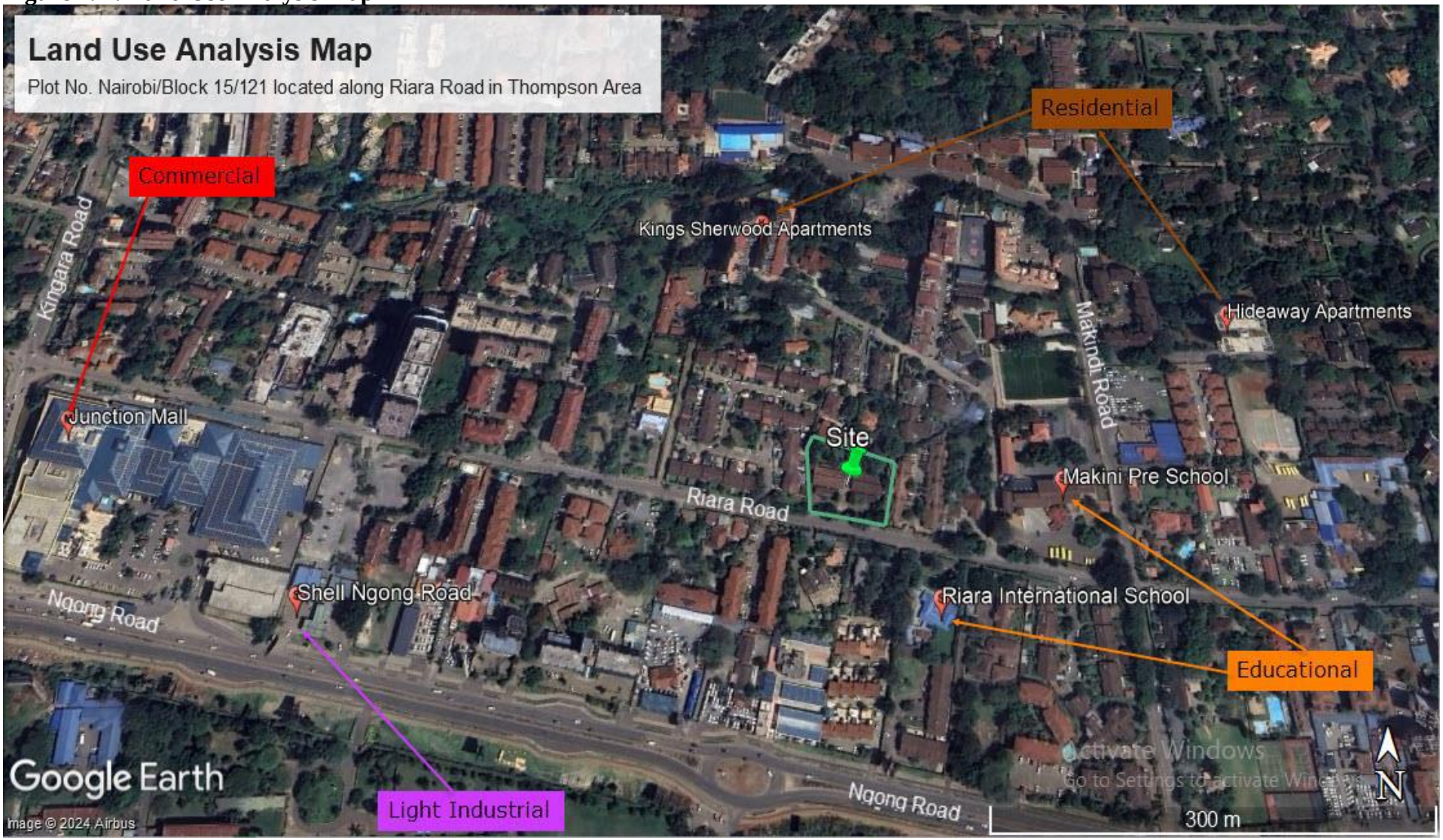
2.4 Zoning of the Area and Land Use

The property is located in **Zone 4** according to *Nairobi City Development Ordinances and Zones, which* allows for **Residential Apartments.** According to *Draft Sessional Paper No. 1 of 2023 on Nairobi City County Development Control Policy*, the property is in **Zone 4D, which** allows for **Mixed Development (Residential, Commercial Offices, Professional Offices and Light Industrial Use) at a skyline of 15 Levels.** The proponent applied for a **Change of Use** from a **Single Dwelling Unit** to **Multiple Dwelling Units (Apartments)** and approval was granted by the Nairobi City County *(Ref. No. PLUPA-COU-002454-N).* Notable high-rise residential developments in the area include *Riara One Residency (18 levels), Hideaway Apartments (14 levels), Urban Oasis (13 levels), and JW Apartments (11 levels)*. Other land uses at a radius of 500 meters from the project site include *Educational, Commercial, Religious Institutions, Administrative, Health Facilities, and Light Industrial.* Therefore, the proposed development will conform to the current land uses and will ensure better utilization of the property, giving it a higher-quality urban character.

Plate 2. 2: Riara One Residency (L) and Hideaway Apartments (R)

Source: Fieldwork, 07/10/2024

Figure 2. 2: Land Use Analysis Map



Source: Google Earth, 2024

2.5 Project Description

The proponent proposes to construct **a 23-storey residential building comprising 548 residential apartments (328 No. one-bedroom units, 132 No. two-bedroom units and 88 No. three-bedroom units), a swimming pool, gym, 321 parking bays, and associated amenities** with the following features:

i. **Basement 1** comprising 81 parking bays and a store.
ii. **Basement 2** comprising 81 parking bays and a store.
iii. **Basement 3** comprising 75 parking bays, a water tank and two (2) stores.
iv. **Ground floor** comprising 84 parking bays, reception, generator room, janitors store, garbage room and, a guardhouse.
v. **First floor** comprising 13 units of one-bedroom apartments, 6 units of two-bedroom apartments, and 4 units of three-bedroom apartments.
vi. **Typical 2nd to 22nd floor** comprising 15 units of one-bedroom apartments, 6 units of two-bedroom apartments, and 4 units of three-bedroom apartments.

Each unit consists of a lounge, kitchen, dining, and washrooms.

Other salient features include 3 staircases, 6 lift shafts, entry and exit gates, a pedestrian entrance, a landscaped garden, electrical and mechanical ducts, a boundary wall, ramps, passages, and driveway. More fine details, specifications, and features of the proposed project can be obtained from the architectural plans annexed in the report.

Table 2. 1: Total Number of Units and Parking Bays

Description	1 Bedroom Units	2 Bedroom Units	3 Bedroom Units	Parking Bays	Total Units
Basement 1	-	-	-	81	-
Basement 2	-	-	-	81	-
Basement 3	-	-	-	75	-
Ground floor	-	-	-	84	-
First floor	13	6	4	-	23
Typical 2nd to 22nd floor	315	126	84	-	525
Total	**328**	**132**	**88**	**321**	**548**

2.6 Existing Infrastructure and Services

2.6.1 Roads and Accessibility

The property is accessed via **Riara Road** in Thompson area of Nairobi City County. The access road is tarmacked, and in good condition, with street lights and walkways. It connects to Ngong Road, Makindi Road, Kingara Road, and Nairobi Express Way which link the area nodes such as the Junction Mall and Central Business District for socio-economic activities. The accessibility of the site will be instrumental during the project cycle.

Plate 2. 3: Riara Road

Source: Field Work, 07/10/2024

2.6.2 Water Supply

The general area as well as the site is served with water by the Nairobi City Water and Sewerage Company (NCWSC). During the construction period, water will be required for *construction activities such as cement mixing, curing of concrete, suppressing dust, and drinking water for workers among others.* On occupation, water will be used for *general use and domestic purposes such as drinking, toilet flushing, and cleaning among others.* The estimated water demand will be approximately *10m³ per day* and *150 m³ per day* during the construction and operation phases respectively. The sources of water for the proposed development will be from the *NCWSC main water supply and an onsite borehole.* The proponent will extend the connection of the main water supply to the proposed development upon the acquisition of a connection permit from NCWSC. The developer will also *drill a borehole* as an alternative source of water upon

acquisition of an authorization permit from Water Resource Authority (WRA) and harvest rainwater for reuse to supplement the existing main water supply. The proponent will further provide water storage tanks with a capacity of 750m³ able *to serve the residents for at least five (5) days*.

2.6.3 Liquid Waste Management

The general area as well as the site is served by the NCWSC conventional sewer system. The estimated liquid waste that will be generated during the operation phase will be approximately *120m³ per day*. The proponent shall extend the connection of the proposed development to the existing conventional sewer system upon acquisition of a connection permit from NCWSC. All sanitary works will be done to the satisfaction of the County Government Health Department.

Plate 2. 4: Sewer Manhole along Riara Road

Source: Field Work, 07/10/2024

2.6.4 Energy

The general area as well as the site is served by electricity from the national grid. During the construction and occupation phases, energy will increase as a result of consumption in the running of construction equipment such as *air compressors*; running of household equipment such as *washing machines, refrigerators, cookers, and air conditioners*; and *lighting purposes* among others. The sources of energy for the proposed development will be from the Kenya Power and Lighting Company (KPLC) main grid, solar energy and generator. The proponent will apply for an *onsite transformer* to supply energy to the development subject to the acquisition of a connection permit from KPLC. The developer will also install solar panels as a renewable source of energy and a generator as a backup source of energy for the development.

Plate 2. 5: Electricity Transformer along the Riara Road

Source: Field Work, 07/10/2024

2.6.5 Solid Waste Management

The solid waste within the area is managed by private waste transporters who collect the waste twice every week. *Construction and demolition waste* is anticipated to be generated during the construction phase and the composition will include *demolition debris, excavated soil, construction debris, pieces of wood and metal, glass, plastic, paper, and food waste* among others. During the operation phase, *municipal solid waste* is anticipated to be generated and will consist of *food waste, paper, bags, plastics, metals, rags, and e-waste* among others. The estimated waste generation will be approximately *750 kilograms per day* during the operation phase. The proponent shall provide a Waste Collection Centre (WCC) for waste management within the property. The waste generated from the proposed project will be segregated, reused where feasible, and transported for final disposal at designated disposal sites by a licensed waste transporter.

2.6.6 Storm Water Management

The stormwater in the general area is managed by the closed and open drains along the access roads that channel the runoff into the *Kirichwa Kubwa River*. The subject property drains its stormwater through natural infiltration while the excess flows into the open drains along the access road as shown in plate 2.6 below. For stormwater management within the property, the proponent will construct internal drains, harvest rainwater for reuse, and plant indigenous trees within the open spaces to increase the infiltration rate.

Plate 2. 6: Open Drains along Riara Road

Source: Field Work, 07/10/2024

2.6.7 Security

The subject plot has been secured with a mix of masonry wall, a live fence, a gate and a guardhouse. There are street lights installed along the access road that are being used to light the area therefore promoting security and also improving the safety of drivers, riders, and pedestrians during the night. The security in the area is also beefed up by the nearby *Kibera Railways Police Station* which is located approximately 1,500 meters north of the project site. During occupation, the proponent shall beef up security by installing CCTV cameras at strategic points within the premises and engaging services of licensed security personnel and to enhance the overall safety of the property and monitor the movement of people in and out of the property of the proposed development.

Plate 2. 7: Street Lights along Riara Road

Source: Field Work, 07/10/2024

2.6.8 Telecommunication

The tech ecosystem in Kenya is rapidly growing with telecommunication services being the core infrastructure. The area is well covered by mobile telecommunication such as *Safaricom, Telkom, and Airtel networks.* Other telecommunication services in the area include fiber optics provided by *Safaricom Home Fiber, Liquid Telecom, and Zuku Fiber*. All these will facilitate communication during the project cycle.

2.7 Pre-Construction Stage

This stage shall involve:

i. Appraisal of the baseline conditions to determine supply and demand for the required infrastructural services.
ii. Preparation of the architectural and structural designs and submission to NCC for approval.
iii. Preparation of an EIA Study Report and submission to NEMA for licensing.

iv. Obtaining demolition, tree cutting clearance certificate, hoarding and excavation permits from NCC before the construction begins.
v. Obtaining a Compliance Certificate from the National Construction Authority (NCA) before the construction begins.
vi. Site preparation through the demolition of existing structures, tree cutting, construction of a hoarding area, site office, material storage area and sanitary facilities.

2.8 Construction Stage

2.8.1 Construction Inputs

The project inputs will include the following:

i. The materials that shall be used will include stones, cement, sand, ballast, ceramic fixtures, steel, wood, glass, painting materials, roofing materials, plastic, electrical and mechanical fixtures. All these shall be obtained from licensed dealers who have complied with the environmental management guidelines and policies and approved by the Kenya Bureau of Standards (KEBS).
ii. Several machines shall be used which will include earth-moving equipment (excavators and loaders), material handling equipment (cranes and hoists), construction equipment (concrete mixers and vibrators) and Engineering vehicles (tippers).
iii. The project will require a labour force of both skilled and non-skilled workers. The skilled personnel will include the project consultants (architect, engineers, quantity surveyor, health and safety officer and environmental experts) and the contractor with a team of foreman, masons, carpenters, plumbers, electricians and casual labourers among others.
iv. Other construction inputs will include water from NCWSC or borehole and electricity from the main grid (KPLC) or provided by a generator.

2.8.2 Construction Activities

i. Excavation and Foundation Works

The site is generally characterized by reddish-brown fine-grained stiff soil and grey fractured moderately weathered rock. Excavation of soils and the weathered rock will be undertaken to pave way for the construction of the foundation and basements using standard equipment which includes an excavator, auger, and hydraulic hammer. *There will be no blasting of the rocks within the site to avoid direct impact to the existing developments.* Loaders and tippers shall be

used to aid in the removal of the excavated soils and rock materials. Appropriate excavation works shall be undertaken to ensure that the volumes for the excavation works are clearly defined under the supervision of the engineers. The excavated sub-surface materials will be reused for backfilling and landscaping purposes within the site and in other construction sites.

ii. Structural Steelworks

The structural elements which include the strip footings, retaining walls, shear walls, slabs, beams, columns, and column bases will be constructed using reinforced concrete. The structural steel will be used to reinforce the concrete since it is weak in tensile strength. Structural steelworks will involve steel cutting, welding and fixing on an already constructed formwork before concreting is carried out. The steelworks shall be carried out by steel fixers under strict supervision from the project engineer.

iii. Concrete Works

The construction of the proposed development will be carried out in line with the approved architectural & structural plans and comply with the specifications issued and approved by the project team. Concrete works will involve the mixture of cement, sand, and ballast in the specified ratios and poured into already constructed formwork. The poured concrete will be cured for a specified period approved by the project engineer. The concreting will be supplemented by concrete mixers and vibrators.

iv. Masonry Works

The interior and exterior walls shall be built using machine-cut stones sourced from licensed suppliers. The walls will be constructed using cement and sand mortar at specified ratios approved by the project engineer.

v. Mechanical and Electrical Works

This phase will involve the installation of water and wastewater piping, electrical fixtures and appliances including lighting fixtures within the proposed development by licensed electricians and plumbers. This will be followed by an extension of the connection of the electrical and mechanical configuration to the existing power and sewer lines upon acquisition of the relevant permits from KPLC and NCWSC respectively.

vi. Interior and Exterior Finishes

After concrete and masonry works are completed, plastering will be carried out both internally and externally in line with the specifications of the architect. The plastering will ensure the building is structurally strong, protect it from weather effects and give it an attractive look. Thereafter aluminium powder-coated doors and windows will be installed. Painting of the building will be carried out with cement primer and eco-friendly zero Volatile Organic Compounds (VOC) paints. Thereafter, the installation of floor and wall ceramic tiles will be undertaken by a licensed tiler.

vii. Final Clean Up and Landscaping

The final cleanup will be carried out once the construction activities are completed. All the solid waste generated during the construction phase will be reused where feasible and/or disposed of at designated approved sites by licensed waste transporters. Thereafter, the proponent will undertake a comprehensive landscaping exercise by planting indigenous trees within the open spaces. The residents shall be sensitized to practice apartment gardening within their residential units during the operation phase.

2.9 Operational phase

The project will be used for **Residential Purposes** and the operational activities will involve the following:

i. **Residence:** A total of 548 families will reside within the development. Operational activities will include *cooking, laundry, cleaning, and resting activities within the residential apartments*.

ii. **Recreational Activities:** There will be several *recreational and leisure activities* within the development aided by the presence of the gym and swimming pool.

iii. **Property Management:** The proponent shall engage the services of a management company to ensure the following:

   a) Obtain an Occupation Certificate from the Nairobi City County before operation begins.

   b) Collect rent and service charges from the tenants and ensure routine maintenance of the development.

   c) Ensure monthly monitoring of energy and water consumption within the development.

d) Ensure regular cleaning of the common areas within the development such as the parking bays, gym, swimming pool, corridors, & staircases.
e) Ensure regular inspection, maintenance and servicing of the generator, electrical, firefighting and mechanical equipment.
f) Ensure security measures are adhered to within the property by engaging the services of licensed security personnel to safeguard the property and monitor the movement of people and vehicles in and out of the site.

2.10 Decommissioning Phase

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning of the site. The following should be undertaken to restore the environment:

i. Give notices of at least three (3) months to the tenants of the intention to redevelop the property and/or demolition of the development.
ii. Prepare a decommissioning plan and submit it to NEMA for approval at least three (3) months prior to the demolition exercise.
iii. Apply for a demolition permit from the Nairobi City County Government.
iv. Dismantle the equipment including the electrical and mechanical fixtures/fittings.
v. Demolish the existing structures and remove the debris from the site while adhering to all the relevant environmental legislation.
vi. Backfill the surface openings with a suitable material such as pebbles and/or demolition debris.
vii. Undertake soft landscaping by planting indigenous trees, grass, and flowers. The site should be well landscaped by flattening the mounds of soil.
viii. Fence and signpost unsafe areas until natural stabilization occurs.

The major emphasis here will be the restoration of the affected environment, proper disposal of dismantled materials and protection of public health and safety.

2.11 Products, By-Products, and Wastes

i. **Products:** The final product will be **548 residential apartments, a swimming pool and a gym.**

ii. **By-Products:** The by-products will include;

a) The excavated soils and rocks will be reused for backfilling and landscaping purposes within the site and other construction sites.

b) Large pieces of timber/wood generated during the construction phase will be transported back to the contractor's yard for reuse in future while the small pieces of timber/wood will be disposed of for use as fuel for cooking and heating.

c) Empty cans and drums will be used to store water whereas the damaged ones will be sold to licensed scrap metal dealers.

iii. **Wastes:** Solid and liquid waste will be generated during the entire project cycle. The anticipated waste will include construction & demolition waste and municipal solid waste during the construction and operation phases respectively. All liquid waste will be channeled to the existing conventional sewer system whereas the solid waste will be segregated, reused and/or recycled where appropriate and disposed of at designated disposal sites by a licensed waste transporter.

2.12 Project Budget and Duration

The proposed project is estimated to cost **two billion, two hundred ninety-four million, eight hundred thirty-nine thousand eight hundred and twenty-five Kenyan shillings only (KShs. 2,294,839,825)**. The project implementation work is estimated to take 2 years (*Attached is the Bill of Quantities).*

CHAPTER THREE: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 INTRODUCTION

EIA is an instrument for environmental management and development control. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a requirement that all developers conduct EIAs before undertaking any development projects. EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed development with a view of taking advantage of the positive impacts and developing mitigation measures for the negative ones. There are a number of policies, laws and regulations that govern the protection, conservation and exploitation of natural resources coupled with provisions for environmental management. These national policies, laws and regulations cover infrastructure, water, agriculture, forestry and health just to mention a few. The national environment action plan documents cover policy directions regarding the integration of environmental concerns including EIA into the development planning process. Some of the key national laws, policies and regulations that govern the management of environmental resources in the country are discussed herein.

3.2 POLICIES

3.2.1 The National Environmental Action Plan (NEAP)

The NEAP was a deliberate policy effort to integrate environmental considerations into the country's economic and social development initiatives/plans. Section 37 of the EMCA stipulates that NEMA shall formulate the National Environment Action Plan (NEAP) and shall ensure that it has undertaken public participation before the adoption of the plan. The NEAP framework (2009 - 2013) recognizes the intertwined linkages between economic growth and the environment in Kenya. It highlights priority themes and activities for the country towards achieving a sustainable environment. The policy framework among others proposes the integration of environmental concerns into regional and local development plans, promotion of appropriate land uses and enforcement of EMCA and its subsidiary, and other relevant legislation. The policy framework also advocates for efficient water harvesting, storage, and usage. In human settlements and infrastructure, this policy framework recognizes the associated environmental issues. These include waste management, sanitation, diseases, land-use changes in conservation areas, demand for water, energy, construction materials, pollution, land degradation, biodiversity loss, etc. Multiple stakeholders' involvement inclusive of the private

sector is advocated for within the implementation of this framework towards the achievement of sustainable development goals. The framework also advocates for monitoring and evaluation to ensure effective and efficient environmental policy implementation.

The proponent has commissioned the EIA experts to undertake the EIA for the proposed development in adherence to this policy.

3.2.2 National Policy on Water Resources Management and Development (1999)

While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors for the promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It therefore calls for the development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. The same policy also requires that such projects undergo Comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighbourhood and further downstream are not negatively impacted by the emissions.

All liquid waste generated from the proposed project will be disposed of into the existing conventional sewer system.

3.2.3 National Housing Policy for Kenya, 2016

The Sessional Paper No. 3 of 2016 on National Housing Policy is expected to ensure the progressive realization of the right to accessible and adequate housing and reasonable standards of sanitation for every person as per Article 43 of the Constitution. High urbanization and demographic dynamics in the region are driving demand for real estate and infrastructure. Rapid urbanization being experienced worldwide has brought about many challenges, the most critical being a general deterioration of the living standards of an increasing majority of urban dwellers. The problem of urban housing in the country is characterized by an acute shortage in the number of dwellings, overcrowding in the existing housing stock as well as the existence of sub-standard human settlements such as slums and squatter settlements.

The proposed project aims at the provision of residential apartments in the area.

3.2.4 Sustainable Development Goals (SDGs)

On 25th September 2015, countries adopted the United Nations Sustainable Development Goals (SDGs) aimed at contributing towards ending poverty, protecting the planet, and ensuring prosperity for all as part of a new sustainable development agenda. The SDGs have very

significant implications for investment needs and the role of the public sector is fundamental and pivotal. At the same time, the contribution of the private sector is indispensable. The proponent has committed to the SDGs through the proposed development in the following ways:

Goal 3: Good Health and Well Being

The project will contribute to improved health and productivity through the provision of a safe and clean environment by ensuring all liquid waste is channeled to the existing conventional sewer system and that the solid waste is collected and transported for final disposal at designated disposal sites by a licensed waste transporter.

Goal 6: Clean Water and Sanitation

The proponent is committed to providing adequate sanitary facilities during the project cycle. All liquid waste shall be channelled into the existing conventional sewer system. This shall improve water quality and sanitation by ensuring zero proportion of untreated wastewater is not discharged into the environment.

Goal 7: Affordable and Clean Energy

The implementation of an energy management system through the installation of energy-efficient fixtures and fittings shall contribute to increased energy efficiency. The developer shall also install solar panels as a renewable source of energy for the proposed development.

Goal 8: Decent Work and Economic Growth

The creation of employment opportunities during the project cycle shall contribute to reducing the proportion of youth not in employment. The proponent shall ensure an environment that emphasizes the protection of labor rights and promotes a safe and healthy environment for all workers during the project cycle.

3.3 LEGAL FRAMEWORK

3.3.1 The Constitution of Kenya 2010

The Constitution of Kenya is the supreme law of the Republic of Kenya and binds all persons and all State organs at all levels of government. It provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectorial legislative documents are drawn. In relation to the environment, Article 42 of Chapter 4 of the Bill of Rights confers to every person the right to a clean and healthy environment which includes the right to have the environment protected for the benefit of present

and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70.

The proponent will therefore adhere to the provisions of the EMP provided in this report to ensure the residents and general public right to a clean and safe environment is not infringed.

3.3.2 Environment Management and Coordination Act, Cap 387.

This is the framework law on environmental management and conservation. It provides for environmental protection through: Environmental Impact Assessment; Environmental Audit; Environmental Monitoring; and Environmental Restoration Orders, Conservation Orders, & Easements. Section 58 of the Act directs that any proponent for any project listed on the Second Schedule to undertake and submit to the authority an Environment Impact Assessment in the prescribed form while giving the prescribed information which shall be accompanied by the prescribed fee. The act further states that the EIA studies and reports shall be conducted by authorized individual experts or firm of experts in accordance with the EIA regulations, guidelines, and procedures issued thereunder.

The proponent has engaged the services of environmental experts to conduct the EIA Study Report in line with the provisions of this Act. The environmental experts conducted the EIA in line with the regulations, guidelines, and procedures issued under the Act.

3.3.3 The Environmental (Impact Assessment and Audit) Regulations, 2003

These regulations stipulate how an EIA Study Report should be prepared and specifies all the requirements that must be complied with. It highlights the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the EIA Study report-making process. Regulation 4 (1) states that no proponent shall implement a project likely to have a negative environmental impact or for which an EIA is required under the Act or these Regulations unless an EIA has been concluded and approved in accordance with these regulations. Regulation 11 (1) states that an EIA study shall be conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority. Regulation 17 (l) stipulates that during the process of conducting an EIA study under these regulations, the proponent shall in consultation with the Authority, seek the views of persons who may be affected by the project. Regulation 31 states that an environmental audit study shall be undertaken on new projects undertaken after the completion of an environmental impact assessment study report.

The proponent has engaged the services of a licensed firm of experts to undertake this EIA Study Report in line with these regulations and shall undertake an EA within the first year of operation. A public meeting, administration of questionnaires, and interviews were conducted to seek the views of persons who may be affected by the project in line with these regulations.

3.3.4 Environmental Management and Co-ordination (Water Quality) Regulations, 2024

These regulations provide for sustainable management of water resources including prevention of water pollution and protection of water sources. It is an offence under Regulation 4 (2) for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. It further requires proponents to have a valid Effluent Discharge License (EDL) before discharging any effluent from point sources, industry, or sewage treatment works into the aquatic environment. Regulation 14 (1) also requires every licensed person generating and discharging effluent into the environment to carry out effluent discharge quality and quantity monitoring in accordance with methods and procedures of sampling and analysis prescribed by the Authority and to submit records of effluent discharge quality and quantity monitoring to the Authority at least once in every six months or as the Authority may prescribe.

3.3.5 Environmental Management and Co-ordination (Waste Management) Regulations, 2006

These regulations provide details on the management of various waste streams including domestic waste, industrial waste, hazardous and toxic waste, biomedical waste, and radioactive waste. Regulation 4 makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 9 further requires persons licensed to collect waste and transport waste from the designated area of operations or storage areas and deliver to the designated storage site, disposal site or plant.

The proponent shall engage the services of a licensed waste transporter to dispose of the waste at designated disposal sites during the project cycle.

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

These regulations aim to ensure the maintenance of a healthy environment for all people in Kenya, the tranquility of their surroundings, and their psychological well-being by regulating

noise levels and excessive vibration. Regulations 3 and 4 prohibit any person to cause excessive vibrations which exceed 0.5 centimeters per second beyond the property boundary which annoys, disturbs, injures, or endangers the health, or safety of others and the environment. Regulation 13 also requires that the construction equipment shall not perform any work outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the second schedule to these regulations.

The contractor shall ensure that all construction activities are undertaken between 0800hrs to 1800hrs on weekdays and 0800hrs to 1300hrs on Saturdays only and that all machinery used is in good working condition to reduce frictional noise.

3.3.7 The Environmental Management and Co-Ordination (Air Quality) Regulations, 2014

The objective of these regulations is to provide for the prevention, control, and abatement of air pollution to ensure clean and healthy ambient air. These regulations prohibit any person from operating construction equipment or handling construction material causing or allowing the emissions of the priority air pollutants or allowing stockpiling or other storage of material or disposal of waste in a manner likely to exceed the ambient air quality limits prescribed in these regulations.

The proponent has undertaken ambient air quality measurements which were within the recommended limits and shall screen the entire site to control and arrest construction-related dust and sprinkle water in the work areas to prevent fugitive dust violations.

3.3.8 The Water Act, 2016

This Act of Parliament provides for the regulation, management, and development of water resources, water, and sewerage services. Section 9 states that every person has a right to access water resources. Section 11 states the establishment of the Water Resources Authority (WRA) whose functions are stipulated in section 12 and include but are not limited to receiving water permit applications for water abstraction, the collection of water permit fees, and water use charges. Section 63 of the act states that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution. Section 143 states that a person shall not, without authority conferred under this Act willfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion, or abstraction; or throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent,

trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.

The proponent shall extend the connection of the main water supply to the proposed development upon acquisition of a connection permit from NCWSC. The proponent shall conduct a hydrogeological survey and also apply for an authorization permit from WRA before drilling the borehole.

3.3.9 The Water Resources Regulations, 2021

Regulation 14 (1) states that an application for a permit for a proposed water use activity falling within Category B, C or D as specified in Part III of the First Schedule shall be accompanied by a site assessment report, a hydrological assessment report or hydrogeological survey report and an Environmental Impact Assessment Study Report which is compliant with the requirements in the Third Schedule. Regulation 52. (1) states that where any borehole or well is being constructed within five hundred metres of an existing borehole or well, the Authority may by notice require the person constructing the borehole or well to undertake tests, specified in the notice, on the existing well and to supply to the Authority the particulars of the results of such tests including the rate of pumping and rest levels of water. Regulation 75a further states that the Authority shall require an applicant as a condition to the Compliance with the grant of a water resource use permit to provide evidence of compliance with the provisions of the EMCA regarding integrated environmental assessments and any other provisions as the Authority may deem necessary.

The proponent shall undertake a hydrogeological survey and shall ensure that an authorization permit is obtained from WRA before drilling the borehole and shall also extend the connection of the main water supply to the proposed development upon the acquisition of a connection permit from NCWSC.

3.3.10 Occupational Health and Safety Act, 2007

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The key areas addressed by the Act include: General duties including duties of occupiers, self-employed persons and employees. Enforcement of the act including powers of an occupational safety and health officer; Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences;

Machinery safety including safe handling of transmission machinery, hand-held and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver; Safety general provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas; Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials; Welfare general provisions including supply of drinking water, washing facilities, and first aid.

The proponent will ensure that the contractor includes adequate measures to promote the health and safety of the workers and the general public during the construction phase.

3.3.11 The Physical and Land Use Planning Act No. 13 of 2019

The objectives of development control are to ensure orderly physical and land use development; to ensure optimal land use; to protect and conserve the environment; and to promote public safety and health among others. Section 57 (1) states that a person shall not carry out development within a county without development permission granted by the respective County Executive Committee Member (CECM). Section 58 (1) and (2) further state that a person shall obtain development permission from the respective CECM by applying for development permission from that CECM in the prescribed form and after paying the prescribed fees and that an applicant for development permission shall provide documents, plans, and particulars as may be required by the respective CECM to indicate the purposes of the proposed development. Section 58 (3) stipulates that an applicant for development permission shall indicate the proposed uses to which the land shall be put, the population density to which the land shall be subjected, and the portion of the land the applicant shall provide for easements as a consequence of the applicant's proposed development.

The Architectural plans for the proposed project have been submitted for approval by NCC before the construction begins.

3.3.12 Public Health Act Cap 242

This Act concerns the protection of public health in Kenya and lays down rules relative to, among other things, food hygiene and protection of foodstuffs, the keeping of animals, protection of public water supplies, the prevention and destruction of mosquitos, and the abatement of nuisances including nuisances arising from sewerage. Section 116 requires that the local

authorities (county governments) take all lawful, necessary, and reasonably practicable measures for maintaining its district (counties) at all times in clean and sanitary condition, and for preventing the occurrence therein of, or for remedying or causing to be remedied, any nuisance or condition liable to be injurious or dangerous to health, and to take proceedings at law against any person causing or responsible for the continuance of any such nuisance or condition. Sections 136 and 138 state that all collections of water, sewage, rubbish, refuse and fluids that permit or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act and that no person shall within a township permit any premises or lands owned or occupied by him or over which he has control to become overgrown with bush or long grass of such a nature as, in the opinion of the medical officer of health, to be likely to harbour mosquitoes.

The proponent will engage the services of a licensed waste transporter to dispose of the solid waste at designated disposal sites and that all liquid waste shall be discharged into the existing conventional sewer system.

3.3.13 County Government Act, 2012

The Act provides for county governments' powers, functions, and responsibilities to deliver services. The functions which local governments carried out were effectively transferred to the county governments. The Act gives the county the responsibility of planning and co-coordinating all developments within their areas of jurisdiction. Part XI (sections 102-115) of the Act provides for planning principles and responsibilities of the county governments. The land use and building plans provided for in the Act are binding on all public entities and private citizens operating within the particular county. The plans for the proposed project must be approved by the County Government and the County Government may also issue directives and authorizations on various aspects e.g., waste management and fire emergency preparedness among others.

The Architectural Plans for the proposed project have been submitted for approval by NCC before the construction begins.

3.3.14 Energy Act, 2019

The act establishes an Energy and Petroleum Regulatory Authority (EPRA) mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to the energy sector in Kenya. Sections 117-

126 of the Act provide the factors that shall be taken into consideration prior to the issuance of the license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance with the EMCA Cap 387. Moreover, the Act gives provisions for the need to protect the health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

The proponent will extend the connection of the power supply from the main grid to the proposed development upon the acquisition of a connection permit from KPLC.

3.3.15 National Construction Authority Act, 2011

The act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contractors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of a foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they certify they are in Kenya for that specific time. The foreign contractors must also produce a certificate of compliance. Furthermore, they must lodge an affidavit with the NCA that once the project they have been licensed is over, they shall wind up their business. This prevents them from engaging in any other construction in the country.

The proponent shall engage the services of a contractor and construction workers registered by NCA.

3.3.16 Climate Change Act, 2016

This Act of Parliament was formulated to provide for a regulatory framework for enhanced response to climate change and provide mechanisms and measures to achieve low carbon climate development. It has provided for incentives that are geared towards encouraging innovations that are centered on climate change mitigation and enhancing climate change resilience and low carbon development for the sustainable development of Kenya. Climate change is an international agenda and every stakeholder must take an active role in the mitigation of the effects of climate change. Section (2) of this act states that this Act shall be applied in all sectors of the economy by the national and county governments to mainstream climate change responses

into development planning, decision making, and implementation; build resilience and enhance adaptive capacity to the impacts of climate change.

The proponent shall incorporate aspects of climate change adaptation and mitigation; planting of trees along the plot boundary; installation of solar panels as a source of renewable energy for the development; harvesting rainwater to supplement the existing NCWSC water supply; installation of water and energy efficient fixtures/fittings; and waste management through the engagement of a licensed waste transporter to collect and dispose of the solid waste regularly.

3.3.17 Land Registration Act, 2012

This Act aims to rationalize the registration of titles to land and to give effect to the principles and objects of devolved government in land registration. Section 26 (1) of the Act states that the certificate of title issued by the Registrar upon registration, or to a purchaser of land upon a transfer or transmission by the proprietor shall be taken by all courts as prima facie evidence that the person named as proprietor of the land is the absolute and indefeasible owner, subject to the encumbrances, easements, restrictions and conditions contained or endorsed in the certificate, and the title of that proprietor shall not be subject to challenge, except on the ground of fraud or misrepresentation to which the person is proved to be a party; or where the certificate of title has been acquired illegally, unprocedurally or through a corrupt scheme. A certified copy of any registered instrument, signed by the Registrar and sealed with the Seal of the Registrar, shall be received in evidence in the same manner as the original.

A copy of the ownership document is attached to this report.

3.3.18 The National Land Commission Act, 2012 (No. 5 of 2012)

The act provides for the management and administration of land. Section 5 of the Act outlines the functions of the Commission, pursuant to Article 67(2) of the Constitution as follows: to manage public land on behalf of the national and county governments; to recommend a national land policy to the national government; to advise the national government on a comprehensive programme for the registration of title in the land throughout Kenya; to conduct research related to land and the use of natural resources and make recommendations to appropriate authorities; to initiate investigations, on its own initiative or a complaint, into present or historical land injustices, and recommend appropriate redress; to encourage the application of traditional dispute resolution mechanisms in land conflicts; to assess tax on land and premiums on immovable

property in any area designated by law, and to monitor and have oversight responsibilities over land use planning throughout the country.

The subject plot is private property owned by the proponent and does not constitute part of any disputed public utility.

3.3.19 The Sustainable Waste Management Act, 2022

This is an act of Parliament that establishes the legal and institutional framework for the sustainable management of waste and ensures the realization of the constitutional provision on the right to a clean and healthy environment. Section 12 of the act states that all public and private sector entities shall segregate non-hazardous waste into organic and nonorganic fractions; that the segregated waste shall be placed in properly labelled and colour-coded receptacles, bins, containers and bags and that all waste service providers shall collect, handle and transport segregated waste. Section 19 states that private sector entity shall prepare a three-year waste management plan and submit an annual monitoring report to the Authority which shall specify the actual quantities of waste generated by the entity the waste management methods applied by the entity; and any other information that the Authority may require.

The proponent shall prepare a three-year Waste Management Plan for the project cycle; provide waste segregation receptacles at the premises for organic, plastic and general dry waste; employ the waste hierarchy order for efficient use of resources and minimization of pollution; and engage the services of NEMA-registered waste service providers to collect, handle and transport the segregated waste to designated disposal sites.

3.4 INSTITUTIONAL FRAMEWORK

3.4.1 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 the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director General appointed by the president heads NEMA. The Authority is mandated to co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya and identify projects and programmes or types of projects and programmes,

plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA.

The EIA Study Report is submitted to the authority for review and licensing. The proponent shall work in liaison with the authority in complying with the provisions of EMCA and any other subsidiary legislation under the Act.

3.4.2 Water Resources Authority (WRA)

The Water Resources Authority is established under section 11 of the Water Act 2016. It is responsible for the sustainable management of the nation's water resources through:

i. Implementation of policies and strategies relating to the management of water resources;
ii. Development of principles, guidelines and procedures for the allocation of water;
iii. Development of catchments-level management strategies including the appointment of catchments area advisory committees;
iv. Regulate and protect water resources quality from adverse impact; and
v. Classify, monitor and allocate water resources.

The proponent shall ensure that an authorization permit is obtained from WRA before drilling the borehole.

3.4.3 Directorate of Occupational Safety and Health Services (DOSHS)

The directorate will be responsible for the provision of Occupational Health and Safety (OHS) permits for workplaces and for conducting inspections to ensure conformance to the Occupational Health and Safety Act of 2007.

The proponent will register the site as a workplace with DOSHS and obtain the requisite permit before the construction begins.

3.4.4 Nairobi City County Government

The County Government is mandated to control developments within their area of jurisdiction. Part of the development control is the compliance and enforcement department. The developer is required under the building code by-laws to notify the planning authority before commencement of the construction. The county officers from different departments (Public Health, Environment, Fire, and Planning) will visit the site during the construction stage to check compliance with the approved drawings.

The proponent shall notify NCC before the commencement of the construction works and shall adhere to all the laid out by laws.

CHAPTER FOUR: BASELINE INFORMATION

4.1 PHYSICAL ENVIRONMENT

4.1.1 Climate

According to the Nairobi County Integrated Development Plan (CIDP) of 2023-2027, Nairobi area has a fairly cool climate resulting from its high altitude the county lies at an altitude of 1,795 metres above sea level. The sunniest and warmest part of the year is from December to March. Temperatures range from a low of 10°C to a high of 29°C. It has a bi-modal rainfall pattern. The long rains season falls between March and May with a mean rainfall of 899 millimetres (mm) while the short rains season falls between October and December with a mean rainfall of 638 mm. The mean annual rainfall is 786.5 mm.

4.1.2 Ambient Air Quality

The site was evaluated for ambient air pollutants and suspended particulate matter on 5th November 2024. The sky was predominantly covered by clouds but there were occasional breaks in the clouds allowing sunlight to filter through intermittently. Baseline air quality and noise measurements were carried out across five (5) sampling locations as tabulated in table 4.1 and shown in figure 4.1 below.

Table 4. 1: Sampling Locations and Coordinates

Sample Code	Longitude	Latitude	Media
AQ/N1	1°17’54.11’’S	36°46’01.95’’E	Air and Noise
AQ/N2	1°17’53.10’’S	36°46’02.14’’E	Air and Noise
AQ/N3	1°17’53.84’’S	36°46’00.42’’E	Air and Noise
AQ/N4	1°17’52.84’’S	36°46’00.42’’E	Air and Noise

The equipment in use for the Air Quality Measurement was BR-Smart DC5V 500mA which is a real-time hand-held data logging instrument for the detection of airborne dust, fumes, and aerosols. The measurements of particulate matter (PM_{10} and $PM_{2.5}$), Total Volatile Organic Compounds (TVOCs), and Carbon Dioxide (CO_2) were taken alongside noise level readings under similar weather conditions and time. The results of the air sampling are presented in Table 4.2 below.

Figure 4. 1: Air and Noise Sampling Points

Source: Google Earth, 2024

Table 4. 2: Air Quality Measurements

Measuring point/Location	**$PM_{2.5}$ (Mg/m^3)**	**PM_{10} (Mg/m^3)**	**TVOCs (Mg/m^3)**	**CO_2**
AQ/NI	0.007	0.001	0.008	413
AQ/N2	0.009	0.014	0.241	413
AQ/N3	0.007	0.009	0.228	577
AQ/N4	0.007	0.009	0.139	413
TWA OEL: (ASHRAE)	**$5Mg/M^3$**	**$10Mg/M^3$**	**2.444 Mg/M^3**	**5000PPM**

Source: Air Quality Measurement Report

This baseline survey establishes a foundation for providing initial levels for comparison with future monitoring efforts and informs the development of an environmental management plan. The parameters are as discussed below;

i. Particulate Matter ($PM_{2.5}$ and PM_{10})

The concentrations for $PM_{2.5}$ ranged from 0.007 mg/m³ to 0.009 mg/m³ which were within the Occupational Exposure Level (OEL) of 5mg/m³ suggesting that fine particulate matter is also under control. The measured concentrations for PM_{10} were between 0.001mg/m³ to 0.014 mg/m³ across the site. These levels of PM_{10} are well within the OEL of 10mg/m³ indicating that larger particulate matter is adequately controlled within the site and a low risk for respiratory and cardiovascular effects related to particulate inhalation.

ii. Total Volatile Organic Compounds (TVOCs)

The levels of TVOCs ranged from 0.008mg/m³ to 0.241 mg/m³. These levels comply with occupational health guidelines and minimize the risk of headaches, respiratory irritation, and other health issues commonly associated with VOC exposure.

iii. Carbon Dioxide (CO_2)

The levels of CO_2 were found to be between 413PPM to 775PPM which are within the OEL of 5000PPM. Keeping CO_2 levels within this range reduces risks of fatigue, impaired cognitive function, and discomfort among employees.

4.1.3 Ambient Noise Levels

The ambient noise levels were measured using auto range sound level meter with an omni-directional microphone which was calibrated using the Kenya Bureau of Standards laboratory procedure MET/15/CP/02: Sound level meter calibration and in accordance with the requirements of IEC60651 and IEC60804 while standing one (1) meter from the boundary wall. The noise levels were carried out across the four (4) sampling locations as per table 4.1 and figure 4.1 above on 5th November 2024. The noise levels obtained were compared with the guidelines provided by the First Schedule of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, that is, residential outdoor during the day. The results of the noise level measurements within the site are presented in table 4.3 below.

i. The noise levels for Points AQ/N2, AQ/N3, AQ/N4 were 49.9dBA, 47.0dBA, and 42.2dBA respectively and were within the recommended threshold limit levels as per EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

ii. The noise level for Points AQ/N1 one meter from Riara Road was 50.1dBA above the threshold limit recommended by EMCA (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

Table 4. 3 Noise Quality Measurements

Sampling Points	Measured Noise Level Leq dB(A)	TLV dB(A)	Remarks
AQ/N1	50.1	50	Above limits
AQ/N2	49.9	50	Within limits
AQ/N3	47.0	50	Within limits
AQ/N4	42.2	50	Within limits

Source: Noise Quality Measurement Report

The lower noise levels were attributed to their distance from the road and the presence of a boundary wall and vegetation which helped absorb traffic noise. However, the noise level at Point AQ/N1 slightly exceeded the recommended limit, primarily due to its close proximity to Riara Road. It is important to note that these noise levels were not due to activities on the property but were primarily a result of traffic along Riara Road.

4.1.4 Topography

The general area gently slopes northwards towards *Kirichwa Kubwa River* with an elevation ranging from 1796 to 1762 meters above sea level. The site lies at an altitude of approximately 1787 meters and is generally flat.

4.1.5 Geology and Soils

The site is generally characterized by reddish-brown fine-grained stiff soil from the original ground level (OGL) to an average of 2.0 meters and grey fractured moderately weathered rock from an average depth of 3.0 meters to 15.0 meters. The subsurface material will be excavated to pave the way for the construction of the basement and foundation works upon the acquisition of an excavation permit from NCC. The estimated volume of excavation will be approximately *26,000 cubic meters*. The excavated soils will be reused for backfilling and landscaping purposes within the site and in other construction sites.

4.1.6 Hydrology

The site **does not** border any river or stream. The closest surface water body is *Kirichwa Kubwa River* at a distance of approximately 250 meters north of the project site which shall not be directly affected by the activities of the proposed development.

The proponent shall drill a borehole within the subject property to supplement the county main water supply subject to undertaking a hydrogeological survey to determine the viability of a productive borehole and obtaining an authorization permit from the WRA before drilling works begin.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Flora

The site is characterized by 30 mature trees, shrubs, flowers, and grass. The tree species observed include *Guava, Avocado, Mango, Loquat, Jacaranda, and Palm Trees*. The species observed are not rare or endangered and no sensitive habitats are within the vicinity of the site. The trees will be cut down to pave the way for the proposed development upon acquisition of a tree-cutting clearance certificate from the Nairobi County Director of Forestry. The developer will undertake comprehensive soft landscaping by planting indigenous trees within the open spaces upon completion of the construction.

Plate 4. 1: Trees within the Site

Source: Fieldwork, 07/10/2024

4.2.2 Fauna

The area is characterized by a few bird species and domestic animals such as cats and dogs. No endangered or endemic faunal species were found in the vicinity of the project site.

4.3 SOCIO-ECONOMIC ENVIRONMENT

4.3.1 Administrative Units

Nairobi County is divided into eleven (11) administrative unit comprising 31 divisions, 72 locations, and 136 sub-locations as per the National Government Administration offices (NGAO). The administrative units include Dagoretti, Embakasi, Kamukunji, Kasarani, Kibra, Langat, Makadara, Mathare, Njiru, Starehe, and Westlands. *The proposed project is located in Kilimani Location, Maziwa Sub Location of Dagoretti Sub County, Nairobi City County.*

4.3.2 Demographic Patterns

According to the Kenya Population and Housing Census 2019, Kenya had a population of 47,564,296 distributed between 1,506,888 households. Nairobi County's population in 2019 was 397,073 distributed within the seventeen (17) sub-counties whereas Dagoretti Sub County had a population of 434,208. The Sub County's population is projected to rise to 498,655 by 2027 and therefore growing at the rate of over 4.1% per annum which is above the national average of approximately 2.3% per annum. This, therefore calls for the development of infrastructure and social amenities to support the population.

4.3.3 Socio-Economic Activities

The key economic activities undertaken within the county include manufacturing, financial activities, wholesale and retail trade, construction activities, transport and real estate sector. Other economic activities practiced and are not fully utilized with potential for further growth include urban agriculture and ICT. These activities have contributed to the country's Gross Domestic Product (GDP). The social-economic activities in the area within a radius of 500 meters from the site include *Junction Shopping Mall* which houses retail shops, a supermarket, cafe & restaurant, food courts, a movie theatre, health and financial institutions. Some of the commercial facilities located within the mall include *Carrefour Supermarket, Gertrude's Children Hospital, NCBA Bank, Java House, Century Cinemax, Textbook Centre, KFC Junction, Pizza Inn, Maasai Market and* Other social economic facilities include Light Industrial such as *TotalEnergies Dagoretti Corner Service Station and Rubis Dagoretti Service Station*. These

activities will support the incoming population in their day-to-day demand for goods and services.

4.3.4 Educational Institutions

The area has seen an increasing number of educational institutions due to the increasing population. The different education facilities found in the area at a radius of a 1,000 meters from the project site include; *Makini Schools, Riara International Group of Schools, St. Hannah's Preparatory School, Jonlesta School, Primary, Jamhuri Primary School and Steadfast Academy - Nairobi*. These institutions will serve the learners of the proposed development.

4.3.5 Religious Institutions

The religious institutions found in the neighbourhood at a radius of 1,000 meters from the project site include churches and mosques. Some of the institutions include *Adams Masjid and Islamic Centre, Our Lady of Guadalupe Parish, Adams – Nairobi, ACK St Matthew's Dagoretti Corner, AIC Ngong Road, Pneuma Ministries International Church, and ACK St Paul Jamhuri.* These institutions will provide places of worship for the incoming population.

4.3.6 Health Institutions

The major health institutions serving the residents in the area are found at a radius of approximately 1,000 meters from the project site and include; *Gertrude's Children's Hospital - Junction Mall Clinic, Ngong Road Health Centre, Iran Medical Clinic, The Nairobi Women's Hospital-Adams, Maria Immaculata Hospital, and Melchizedek Hospital.* Access to health facilities will enhance the provision of medical care to the incoming population and is part of the Government Agenda on Universal Health Care.

CHAPTER FIVE: IMPACT ASSESSMENT AND MITIGATION MEASURES

The proposed project will affect the environment both positively and negatively during the construction and operation phases. This chapter will assess the impacts that are likely to occur and how the project will interact with the environment. Adequate, cost-effective and feasible measures have been recommended to avoid, minimize, mitigate, or compensate any potential negative impacts. *The potential receptors of the anticipated impacts will include the immediate neighbours such as Riara Villas, Riara Thorns, Riara Group of Schools, Makini Schools, Learn Music Academy, Watford Park and the workers within the site*.

5.1 ANTICIPATED IMPACTS

The anticipated impacts of the proposed project on the environmental elements are categorized into five (5) major parameters: the **type of impact** is described as either direct or indirect; the **nature of the impact** as positive or negative; the **duration** may be short-term, medium-term or long term; the **extent** is evaluated in terms of being local, regional or national and the **magnitude** as being low, medium or high. The following criteria was used to evaluate the significance of the impact of the proposed project on the physical and biological environment:

Table 5. 1: Assessment Criteria for Significant Impacts

S/N	Impact	Classification
1.	Impact Type	**Direct:** The impacts will be generated directly from project activities. **Indirect:** The impacts are generated from secondary sources.
2.	Impact Nature	**Positive:** The impacts will affect the environment positively. **Negative:** The impacts will affect the environment negatively.
3.	Impact Duration	**Short Term:** The potential impacts only last for a short time during the construction period or less. **Medium Term:** The potential impacts last for approximately 10 years or half the lifetime of the project. **Long Term:** Impact will remain after operational life of project but appropriate mitigation measures have been used to reduce the impacts.
4.	Impact Extent	**Local:** Impacts extend beyond the project site. **Regional:** Impacts extend beyond the administrative area.

		National: Impacts are considered nationally.
5.	Impact Magnitude	**Low:** The magnitude of the impacts has minimal effect on the environment. **Medium:** The magnitude of impacts is significant and can be reversed with mitigation measures. **High:** The magnitude of impacts is significant and mitigation measures can only reverse a very small portion.

On the basis of information gathered during both the desktop and field study, the potential environmental impacts for the proposed project are as tabulated below:

Table 5. 2: Anticipated Impacts during the Project Cycle

S/N	Impact	Type	Duration	Extent	Magnitude
1.	Soil Erosion	Direct	Short term	Local	Medium
2.	Air Pollution	Direct	Short term	Local	Medium
3.	Noise and Excessive Vibrations	Direct	Short term	Local	Medium
4.	Traffic Density	Direct	Long term	Regional	Medium
5.	Solid Waste	Direct	Long term	Local	Medium
6.	Liquid Waste	Direct	Long term	Regional	Medium
7.	Storm Water Drainage	Direct	Long term	Regional	Medium
8.	Water Demand	Direct	Long term	Regional	Medium
9.	Energy Demand	Direct	Long term	Regional	Medium
10.	Occupational Health and Safety Risks	Direct	Short term	Local	Medium
11.	Fire Risks	Direct	Short term	Local	Medium
12.	Security Risks	Indirect	Long term	Local	Medium
13.	Oil Pollution	Direct	Short term	Local	Medium
14.	Loss of Vegetation	Direct	Long term	Local	Medium

5.2 NEGATIVE IMPACTS

5.2.1 Soil Erosion and Contamination

The proposed project will have a negative impact on the geology of the site. This will be as a result of the clearing of the existing vegetation and excavation of the soils to pave way for the construction of the substructure. The excavation process will involve using standard equipment with no blasting of rocks. The soils will be exposed to weather elements including wind and surface runoff causing soil erosion. The traversing of heavy machinery during the construction will lead to compaction, soil erosion and contamination of the soil by oil & fuel leaks and hydraulic fluids. Uncontrolled soil erosion can have adverse effects on the local water bodies and lead to air pollution (dust).

Potential Mitigation Measures

i. Obtain an excavation permit from NCC before the excavation works begins.
ii. Use of standard equipment for the excavation works.
iii. Control excavation works especially during rainy/wet conditions
iv. Control the stockpiles within the site.
v. Maintenance of equipment and vehicles away from site to avoid contamination
vi. Connect the sanitary conveniences to the existing conventional sewer line to avoid contamination of soil by untreated effluent.
vii. Landscaping within the open spaces by planting indigenous trees and grass.

5.2.2 Air Pollution

The proposed project is located in a *Residential Zone* where the major air pollutants are fugitive dust and exhaust emissions/fumes from vehicular traffic along the access road. During the construction phase, air quality may decline as a result of an increase in levels of fugitive dust from the excavation works, construction activities, stockpiled earth materials, and concrete mixing. Tiny particulates are a public health hazard and may otherwise create considerable nuisances to the immediate neighbours and the public. There may be air pollution due to the combustion of fossil fuels expected from construction machinery and emissions from the kitchen and vehicles. This is expected to be a short-term, reversible impact lasting only for the duration of the construction activity.

Potential Mitigation Measures

i. Screen the entire site to control and arrest construction-related dust.

ii. Sprinkling of water in work areas to prevent fugitive dust violations.
iii. Provide adequate and appropriate PPE such as nose masks and goggles to the workers.
iv. Regular maintenance of machinery and vehicles used during the construction
v. Use of environmentally friendly fuels.
vi. No burning of waste within the site.
vii. Covering of stockpiles within the site and the loaded vehicles/trucks with clean impervious sheeting
viii. Restrict heights from which materials are to be dropped, as far as practicable to minimize the fugitive dust arising from unloading/loading
ix. Use of low-emission machinery.
x. Training of workers on air quality management.
xi. Regular cleaning of dust-prone areas such as driveways and corridors, WCC and sanitary facilities to arrest fugitive dust and avoid foul smell.
xii. Ambient air quality monitoring within the site.

5.2.3 Noise and Excessive Vibrations

The sources of noise pollution and excessive vibrations will include the construction activities such as site preparation through the cutting of trees and excavation works; operation of earthmoving and excavation equipment; transportation of materials and machinery to the site and operation of the generator and other machinery within the site. The noise and excessive vibrations will be short-term and limited to the construction phase. During the operation phase, noise will be as a result of the outdoor activities in the gym, swimming pool and the generator room.

Potential Mitigation Measures

i. Construction activities will be carried out between 0800hrs to 1800hrs on weekdays and 0800hrs to 1300hrs on Saturdays only. No construction work will be undertaken on Sundays.
ii. No blasting of rocks will be undertaken during the excavation works.
iii. Provide adequate and appropriate PPE such as earmuffs and ear plugs to the workers.
iv. Training of workers on noise management.
v. Noisy activities to be scheduled concurrently to reduce the exposure period.
vi. Install noise shields and barriers and use of noise abatement machinery/devices.

vii. Regular maintenance of machinery and vehicles used during the construction.
viii. Install sound-absorbing materials such as acoustic enclosures within the generator room to reduce noise pollution.
ix. Ambient noise level monitoring within the site.

5.2.4 Traffic Density

The project site is located in an area that is largely occupied by mixed-use developments. The majority of vehicles using the access roads are light vehicles from the different residences; school vans picking up and dropping off children in the neighboring schools; and a few heavy commercial vehicles such as trucks that deliver goods to different commercial premises and construction sites in the area. The roads tend to be congested during the peak hours (early morning and late in the evening) when the residents leave and come back from work respectively. The proposed development will have a significant impact on the existing road network conditions due to increased traffic volume that may lead to traffic disruptions and other construction-related inconveniences to traffic flow and safety. This may cause increased potential for accidents since the construction vehicles will be making right turns to leave and enter the project site. During the operation phase, the traffic volume will increase as a result of an increase in the number of cars and people accessing the property.

Potential Mitigation Measures

i. Engage traffic marshals to control vehicular movement and ensure smooth entry and exit.
ii. Work closely with the traffic police to ensure that any incident on the detours is quickly cleared to ensure continued operation.
iii. Construction of acceleration and deceleration lanes to channel delivery trucks to the site without creating a backlog of traffic behind them as they navigate turns of entry and also prevent congestion and disruptions.
iv. Stagger the deliveries of construction waste and building materials to minimize queuing of vehicles on and off the site especially during the off-peak period.
v. Provide a loading area for construction materials within the site.
vi. Install traffic control signs to inform motorists and the public about the potential hazards and enforce the speed limit
vii. Provide a billboard at the site entrance notifying the public about the project.
viii. Provide temporary parking spaces for construction vehicles within the site.

ix. Provide a separate pedestrian lane into the property to cater for the NMT traffic movement in and out of the premises.
x. Provide separate entrance and exit points within the development.
xi. Provide a billboard at the site entrance to notify the motorists and the public about the project.

5.2.5 Solid Waste

Solid waste will be a negative impact during the project cycle and will include demolition waste, construction waste as well as municipal solid waste. The waste may result in the blockage of drainage systems, choking off water bodies, and have a negative impact on human health if it is not well managed may impact the site soil, fauna, air quality, and the workers' health & safety.

Potential Mitigation Measures

i. Design and implement a three-year Waste Management Plan indicating the actual quantities of waste generated and the waste management methods applied.
ii. Provide a centralized WCC for waste management with appropriate waste receptacles for waste collection before final disposal.
iii. Segregation of non-hazardous waste into organic and non-organic fractions before final disposal.
iv. Engage a NEMA-licensed transporter to collect and dispose of the segregated waste.
v. Provide adequate and appropriate PPE such as gloves and masks to all the workers handling the solid waste within the site.
vi. Monitor the type and volume of waste generated within the site.
vii. Training of workers on solid waste management and on the reuse of materials where feasible during the toolbox meetings.
viii. Use of an integrated solid waste management system through a waste hierarchy of options: avoidance, source reduction, reuse, repair, refurbishment, recycling, recovery and finally treatment for safe disposal during the project cycle.

5.2.6 Liquid Waste

Liquid waste is anticipated to increase as a result of an increase in population during the construction and operation phase. Lack of or inadequate provision of sanitary facilities within the site for use by the workers can lead to ad hoc defecation in secluded areas thus creating unsanitary conditions and sources of fly infestation. This can threaten the health of workers and

compromise the air quality in the area. The liquid waste if not well managed may impact on the groundwater, air quality and the health & safety of the workers.

Potential Mitigation Measures

i. Obtain a site toilet permit from NCC.
ii. Provide adequate sanitary conveniences to the workers and ensure they are kept clean at all times.
iii. Proper decommissioning of the sanitary conveniences once the construction works are completed.
iv. Extend the connection of the proposed development to the existing conventional sewer system upon acquisition of a connection permit from NCWSC.
v. Construct an internal reticulation system which can consistently handle the loads during peak volumes.
vi. Install hygiene awareness signs at strategic points within the site and hold regular toolbox talks on hygiene with the personnel.
vii. Training of workers on hygiene during the toolbox meetings

5.2.7 Water Demand

A considerable quantity of water will be required during the construction and operation phase of the proposed development. During the construction period, water will be required for construction activities and on occupation, water will be required for general use and domestic purposes. This will place some amount of strain on the existing water supply in the area and therefore a steady supply of the commodity is required.

Potential Mitigation Measures

i. Extend the connection of the main water supply to the proposed development upon acquisition of a connection permit from NCWSC.
ii. Drill a borehole to supplement the existing NCWSC water supply subject to the acquisition of an authorization permit from WRA.
iii. Harvest rainwater within the site to supplement the surface and subsurface water sources.
iv. Provide water tanks for water storage within the development with a capacity to serve the residents for at least 5 days.
v. Use of water efficiently within the site.

vi. Install water-efficient fixtures and fittings that turn off automatically such as 6 litres dual flush cisterns, low flow rate taps, and showerheads.
vii. Provide water conservation notices and information signs at strategic points within the site and hold regular toolbox talks on water reuse with the personnel.
viii. Regular maintenance of the water components.
ix. Monitor the water consumption within the site every month.

5.2.8 Energy Demand

There shall be increased use of energy during the construction stage (fuel for running machinery) and during the operation phase. Energy conservation is thus fundamental and shall involve the optimum use of petroleum products (diesel and gasoline), electrical appliances, lighting systems, and other electric machinery as used for different purposes. During the operation phase, increase in energy use will be as a result of running the household machinery and equipment and lighting systems. This will place some amount of strain on the existing energy supply in the area.

Potential Mitigation Measures

i. Install an onsite transformer to supply energy to the proposed development subject to the acquisition of a connection permit from KPLC.
ii. Install solar panels as an alternative renewable source of energy for the proposed development.
iii. Install a generator as a backup source of energy for the development.
iv. Install energy-efficient fixtures and fittings within the development such as energy-saving LED fittings.
v. Switch off machinery/equipment and lights when not in use.
vi. Provide notices and information signs on energy conservation measures.
vii. Routine inspection and maintenance of electrical components by registered personnel.
viii. Monitor the energy consumption within the site every month.

5.2.9 Occupational Health and Safety Risks

The sources of occupational risks within the project site will include the handling of heavy machinery, construction noise, and electromechanical works among others. Fugitive dust from construction activities may affect the respiratory system of the workers and the immediate neighbours. The generation of the waste may pose health and safety risks to the workers. Food for the construction workforce is usually provided by mobile individuals most of which operate

without licenses. This can compromise the health of the workers especially if such foodstuffs are prepared in unhygienic conditions.

Potential Mitigation Measures

i. Register the construction site as a workplace with the DOSHS before the construction begins.
ii. Insure workers against accidents by ensuring that they are registered with SHIF / NSSF and remit appropriate fees.
iii. Provide adequate and appropriate PPE to the workers within the site such as safety boots, overalls, helmets, goggles, earmuffs, masks, gloves etc.
iv. Provide a first aid kit within the site fully equipped at all times and managed by qualified personnel.
v. Install appropriate precautionary signage at strategic places within the site.
vi. Undertake a health and safety audit of the workplace annually by a registered health and safety adviser.
vii. Adapt a suitable Emergency Response Plan (ERP) to manage the occurrence of anticipated hazards during the construction phase.
viii. Engage a qualified full-time health and safety advisor during the construction phase.
ix. Establish a Health and Safety committee during the construction phase.
x. Induct and train all construction workers on OSH procedures.
xi. Hold daily (or as appropriate) toolbox meetings for all workers.
xii. Provide a workmen's compensation cover that complies with the Work Injury and Benefits Act (WIBA) as well as other ordinances, regulations and union agreements.
xiii. Local individuals preparing food for the workers at the site shall be monitored and evaluated to ensure that food is hygienically prepared.
xiv. Provide clean and potable drinking water for the workers within the site.
xv. Monitor and evaluate the safety of the workplace every week by the health and safety officer.
xvi. Sensitize the workers on social issues such as drug and substance abuse, COVID-19, HIV/AIDS etc.
xvii. Keep a record of the public emergency service telephone numbers including Police, Fire brigade, and Ambulance at strategic points within the site.

xviii. Comply with OSHA 2007 and all other relevant regulations governing the health and safety of the workplace.

5.2.10 Fire Risks

Fire risks and electrocution may occur within the site from poor handling of electrical systems, faulty electrical equipment, and carelessness among others. Electronic equipment may also contain hazardous material harmful to human health. The level of exposure to fire risks will vary from one task to another.

Potential Mitigation Measures

i. Hire a competent authorized contractor to carry out the electrical works within the site.
ii. Provide adequate firefighting equipment at strategic places within the property and organize for inspection and maintenance every 6 months.
iii. Provide and maintain fire detection appliances and ensure they are located in the appropriate places for immediate activation of an alarm or automatic fire extinguishing systems.
iv. Establish a fire-fighting team and ensure every member undertakes the basic fire safety training course within three months from the date of appointment.
v. Train the workers in the safe use of firefighting appliances.
vi. Conduct annual fire drills within the site and ensure records of such drills are kept available for inspection.
vii. An annual fire safety audit shall be carried out by an approved fire safety auditor.
viii. Mark the fire exit routes and the fire assembly point.
ix. Post “No smoking signs” where flammable materials are stored.
x. Develop and post at the site fire emergency and evacuation procedures.
xi. Maintain on-site telephone contacts for the fire brigade, G4S fire brigade, and St. Johns ambulance service provider etc.

5.2.11 Security Risks

The plot under consideration is fenced with a masonry wall, and a live fence with a gate. Insecurity may arise during the construction phase since intruders may try to steal the building materials and/or machinery within the site. During the operation phase, insecurity may arise especially within the development as a result of threats of theft, property damage, vandalism, robbery, and other crime.

Potential Mitigation Measures

i. Engage licensed security personnel to safeguard the property and monitor the movement of people in and out of the site.
ii. Keep records of the movement of people and vehicles in and out of the site.
iii. Install security lights around the property and ensure they are switched on only during the night hours.
iv. Routine inspection and maintenance of the security lights within the site.
v. Hoard the site and construct a gatehouse to enhance the site security.
vi. Install CCTV at strategic points within the site to monitor and enhance the security of the property.
vii. Provide access control measures within the development to keep out unauthorized people such as swipe cards, biometric scans, security tokens, or presenting identification documents.

5.2.12 Storm Water Drainage

The clearance of vegetation and excavation works will lead to increased soil erosion at the project site and the release of sediments into the drainage systems. The construction of the building and pavements will lead to minimal infiltration and increased volume and velocity of the surface run-off. This can lead to increased amounts of stormwater entering the drainage systems, resulting in overflow and damage to such systems.

Potential Mitigation Measures

i. Construct gently sloping drains to convey water at non-erosive speed.
ii. Construct drainage channels within the site covered with gratings to avoid the occurrence of accidents and the entry of dirt.
iii. Use of semi-permeable materials during the construction of pavements.
iv. Install rainwater-harvesting facilities within the site structures to reduce the amount of stormwater reaching the surface.

Undertake a comprehensive landscaping exercise after the construction phase by planting indigenous trees within the open spaces

5.2.13 Oil Pollution

The sources of oil pollution within the project site may include leaks and spills of oil, lubricants or fuel from the use of heavy equipment and vehicles; unused and used oil recovered from

machinery and oil waste in the form of oily containers or oil rugs. This pollution may occur during the project cycle. Oil leaks may also occur from the vehicles at the parking bays during the operation period. Oil pollution if not well managed may impact on the nearby surface waters site soil, air quality and the health & safety of the workers.

Potential Mitigation Measures

i. Fit all drainage facilities with adequate functional oil-water separators and silt traps.
ii. Store all oils/grease in the contractor's yard away from the site.
iii. Routine inspection and maintenance of the machinery away from the site in a well-designed and protected area to avoid oil spillage within the site.
iv. Proper disposal of oily materials such as oil cans at designated disposal sites by licensed waste transporters.
v. Preparation of an ERP for preventing and dealing with emergencies like oil and fuel spills.

5.2.14 Loss of Vegetation

The site is characterized by 30 mature trees, shrubs, flowers, and grass. The tree species observed include *Guava, Avocado, Mango, Loquat, Jacaranda, and Palm*. The species observed are not rare or endangered and no sensitive habitats are within the vicinity of the site. All the mature trees will be cut down to pave the way for the proposed development.

Potential Mitigation Measures

i. Apply for a tree-cutting clearance certificate from the Nairobi County Director of Forestry before cutting down the trees and adhere to the conditions.
ii. Conserve all the trees within the setbacks and building line.
iii. Undertake a comprehensive landscaping exercise after the construction phase by planting indigenous trees within the open spaces.

5.3 CLIMATE CHANGE RISK AND VULNERABILITY ASSESSMENT

Climate Risk Vulnerability Assessment evaluates the climate change threats of projects and explores potential interventions that can help to strengthen climate resilience. The assessment was carried out to determine how the design of the project is vulnerable to climate change and recommends some of the appropriate adaptation and mitigation measures to climate proof the project in line with the provisions of Climate Change Act 2016. Some of the anticipated risks and applicable adaptation and mitigation measures/methods that will be applied by the proponent

to climate-proof the project in line with provisions of the Climate Change Act, 2016 are as tabulated below;

Table 5. 3: Anticipated Risks and Applicable Adaptation and Mitigation Measures

SN	Anticipated Risks	Applicable Adaptation and Mitigation Measures	Relevance
1.	**Water Scarcity**	a) Rainwater Harvesting	▪ Harvesting rainwater for reuse will reduce dependence on the existing county supply thus mitigating the risks associated with water scarcity thus limiting the over-extraction of groundwater sources.
		b) Alternative Sources of Water	▪ The proponent will drill a borehole subject to undertaking a hydrogeological survey and the acquisition of an authorization permit from WRA. This will reduce the overdependence of the existing county water.
		c) Efficient Water Use Technologies	▪ The installation of water-efficient fixtures and fittings within the project such as low-flow fixtures will help conserve water and thus reducing the overall water demand.
2.	**Flooding**	a) Rainwater Harvesting	▪ Installation of rainwater-harvesting facilities will reduce the amount of stormwater reaching the surface thus mitigating flood risks.
		b) Landscaping	▪ Planting indigenous trees within the open spaces will increase soil absorption and stability thus mitigating flood risks.
		c) Stormwater Management Systems	▪ The incorporation of effective stormwater management systems, including permeable pavement, landscaping and harvesting rainwater will help mitigate flooding risks. This will enhance the ability to absorb excess rainwater and reduce runoff within the proposed development.
3.	**Increased Greenhouse Gas Emissions**	a) Use of Green Energy Technologies	▪ The incorporation of technologies such as energy-efficient lighting, solar power, and improved insulation will help reduce the carbon footprint of the project thus promoting climate-smart development to lower emissions.

		b) Waste Management	▪ Proper solid waste management strategies such as recycling and reduction will minimize the generation of greenhouse gas emissions.
		c) Green infrastructure	▪ Comprehensive outdoor and indoor landscaping will help offset carbon emissions by acting as carbon sinks thus reducing greenhouse gas emissions.
4.	**Rising Temperatures**	a) Design Strategies and Technologies for Cooling	▪ Some of the passive cooling designs such as natural ventilation, indoor and outdoor landscaping, and energy-efficient cooling systems will be incorporated to help combat rising temperatures in line with the low-carbon development strategies. ▪ Implementation of energy-efficient building systems, such as LED lighting, high-efficiency HVAC systems, and energy-efficient appliances will help minimize energy consumption and reduce greenhouse gas emissions
		b) Landscaping	▪ Planting indigenous trees will help reduce the urban heat island effect.
		c) Use of Renewable Energy	▪ The use of renewable sources of energy such as solar panels for lighting and heating water will reduce dependence on the main grid power supply thus reducing emissions.

The proposed development will integrate these adaptation and mitigation measures to address climate change risks and vulnerabilities in compliance with the Climate Change Act of 2016.

CHAPTER SIX: OCCUPATIONAL HEALTH AND SAFETY

Introduction

Worldwide, construction workers are three times more likely to be killed and twice as likely to be injured as workers in other occupations. In Kenya, though undocumented, it is reported on our dailies that workers are injured or die on construction sites. It is therefore essential that the proponent and contractor ensure the safety and well-being of the workers, the passersby and any other person who may be directly or indirectly associated with the project.

The main hazards and risks of accidents in the construction site can be categorized and described in the following ways:

i. **Physical Risks** such as falls from heights, slips, trips, and contact with moving machinery or equipment.
ii. **Chemical Risks** such as exposure to harmful substances like asbestos, lead, or hazardous chemicals used in construction processes.
iii. **Electrical Risks** such as electrocution from exposed wiring or working near power lines.
iv. **Ergonomic Risks** such as strains from lifting heavy materials or repetitive motion injuries.
v. **Environmental and Health Risks** such as stress, fatigue, or heatstroke from prolonged physical work in harsh weather conditions.
vi. **Fire and Explosion Risks**: Flammable materials and faulty equipment can lead to fires or explosions.
vii. **Noise and Vibration Risks**: Long-term exposure to high noise levels and vibrations from machinery can cause hearing loss or injury.

After the identification of these major risks and the stages when they are likely to occur, efforts should then be focused on how to alleviate these dangers before they happen.

6.1 Principles of Occupational Health and Safety

The principles of environmental health and safety involve three main actions:

i. **Risk Identification and Assessment**: This shall involve identifying the various hazards and risk at the site that have the potential to occur, all the people who may be at risk such as employees, cleaners, visitors, contractors, and the public, etc. as well as determine whether a control program is required for a particular hazard.

ii. **Risk Communication**: Risk communication refers to the exchange of real-time information, advice and opinions between workers and people facing threats to their health, economic or social well-being. The ultimate purpose of risk communication is to enable people at risk to take informed decisions to protect themselves and their loved ones. Risk communication uses many communications techniques ranging from media and social media communications, mass communications and community engagement. It requires a sound understanding of people's perceptions, concerns and beliefs as well as their knowledge and practices.

iii. **Risk Management**: This involves actions undertaken for the implementation of risk evaluation decisions, monitoring, re-evaluation and prioritizing, and compliance with legal requirements that safeguard health and safety at construction sites The OHS personnel shall be required to determine if existing control measures are adequate or if more should be done.

6.2 Construction Safety, Emergency Procedures and Action Plan

The site will involve construction activities that are dynamic to the workers engaged in the activities resulting in their exposure to a variety of safety hazards such as falling objects, working from rooftops or scaffolding, exposure to heavy construction machinery, and electrocution while operating electrical equipment in moist areas. It is, therefore, a necessity to develop an Environmental Health and Safety Management Plan to regulate environmentally instigated diseases and occupational safety measures during the construction and operation phases of the proposed project. It is the obligation of the proponent and the contractor to ensure a safe and healthy environment at the workplace and within the neighborhood to prevent occupational diseases, avoid injuries, and property damage, control damage to equipment, and enhance environmental sustainability through the developed sound conservation measures.

The following recommendations to ensure the health and safety of the workers and the general public shall be taken into consideration:

i. Develop and Adapt an Emergency Response Plan (ERP) for the proposed project.

ii. Create a culture of safety within construction by planning, creating and supporting ongoing OHS awareness campaigns that promote the importance of workplace occupational health and safety with industry stakeholders as well as consumers.

iii. Increase safety knowledge in the construction site by promoting awareness of the top construction sector hazards (trips and falls from heights, motor vehicle incidents, struck by objects, machinery) and how to control these hazards through new and improved information channels.

iv. Support the role of the supervisor in creating and maintaining a culture that fosters worker participation in identifying and mitigating workplace hazards.

v. Create a strategy for continuous health and safety learning for the construction workers e.g. conducting regular training sessions and drills on how to handle emergencies and accidents at the site.

vi. Identify, review and enhance health and safety content of apprenticeship training standards to keep abreast with any new methods that are effective in promoting site safety.

vii. Provide suitable and well-maintained PPE to all the workers and visitors and ensure they are utilized at all times and in the right manner. These include safety boots, helmets, gas masks, gloves and goggles.

viii. Place visible and readable signs to control the movement of vehicles and notify motorists, pedestrians and workers within and around the site.

ix. 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

x. Enclose or isolate hazardous parts of machines or sites within the construction site to minimize exposure.

xi. Be prepared for unexpected hazards. BE ALERT ALWAYS.

xii. Prepare and maintain emergency response equipment such as fire extinguishers and first aid kits in readiness for use when need be.

xiii. Avoid placing unusual strain on equipment or materials Encourage reporting of safety incidents as soon as they occur at the site, so as to enable a quick action to alleviate the extent of the damage.

xiv. The contractor and his agents shall use barriers and guards as necessary to protect employees from physical hazards.

xv. A well-stocked First Aid kit shall be provided to take care of accidents that may arise during job executions. This shall be placed under the charge of a responsible person who shall readily be available during working hours.

xvi. Employees will be expected to take personal responsibility for their safety, the safety of their colleagues, and the general public plan.

xvii. Comply with the provision of the Occupational Safety and Health Act, 2007.

CHAPTER SEVEN: CONSULTATION AND PUBLIC PARTICIPATION

Introduction

This chapter describes the process of the public consultation conducted to identify the key issues and impacts of the proposed project. The CPP process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by Section 58 of EMCA 1999 on EIA for the purpose of achieving the fundamental principles of sustainable development. Regulation 17 of the Environmental (Impact Assessment and Audit) Regulations 2003 states that during the process of conducting an Environmental Impact Assessment Study, the proponent shall in consultation with the Authority *seek the views of persons who may be affected by the project.* Views from the local residents, stakeholders, surrounding institutions and development partners who in one way or another would be affected or rather interested in the proposed project were sought through the administering of questionnaires, interviews and public meeting as stipulated in the act.

7.1 Objectives of the Consultation and Public Participation

The objective of the consultation and public participation was to:

i. Disseminate and inform the stakeholders about the project with special reference to its key components and location.
ii. Gather comments, suggestions and concerns of the interested and affected parties that may be useful in the decision-making process.
iii. Disclosure and a good understanding of the project to ensure the anticipated impacts are not overlooked and potential benefits are maximized.
iv. To facilitate consideration of alternatives and development of mitigation measures and management plans.
v. Incorporate the information collected in the EIA Study.

7.2 Stakeholders Identification

The process involves the identification of the stakeholders who are directly or indirectly affected by the project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. The different stakeholder groups identified include but are not limited to the following:

i. The local community includes the immediate neighbours at a radius of 250 meters from the site such as *Riara Villas, Riara Thorns, Watford Park, Erro Court, Zahra Villas,*

Sipra Court, Palm Court-Riara Gardens, 39 Riara Road, Riara Valley Gardens Apartments, and Kings Sherwood Apartments.

ii. Institutions within the local area at a radius of 250 meters from the site such as, *Riara Group of Schools, Makini Schools and Learn Music Academy.*

iii. Government agencies include the *National Government Administration Officers (NGAO).*

iv. Development agencies who will include NCWSC and KPLC.

v. Project personnel.

7.3 Consultation Methods and Techniques

In line with Regulation 17 of the Environmental (Impact Assessment and Audit) Regulations, 2003 on Public Participation, the following methods and techniques were employed in order to gather information, comments and concerns from the identified PAP;

i. Public meetings

ii. Administration of questionnaires to the PAP

iii. One-on-one interviews with the PAP

iv. Field surveys and observations

7.4 Public Consultation Forums

Prior to the public meeting, appropriate notices were sent out at least one week prior to the public meeting indicating the venue and times of the meeting. Invitation letters were circulated to the stakeholders and an onsite notice was erected on the site on 22nd October 2024. The public meeting was held on Tuesday 29th October 2024 at the project site where the local community and relevant stakeholders including the government sector representatives participated. The meeting agenda, minutes, and list of participants are annexed to this report. *(Attached is the invitation letter).*

Plate 7. 1: Onsite Notice

Source: Fieldwork, 22/10/2024

7.5 Stakeholders Concerns

The main concerns that were gathered from the CPP exercise are as follows;

i. Strain on infrastructure such as sewer and stormwater systems, water supply, roads, and electricity supply.
ii. Climate change effects.
iii. Flooding.
iv. Environmental effects such as vegetation loss, air pollution, dust and noise & excessive vibrations, blockage of natural sunlight, and increased waste generation.
v. Timelines of the approvals.

Some of the responses were;

i. Construction activities will be undertaken between 0800hrs to 1800hrs on weekdays and 0800hrs to 1300hrs on Saturdays only and No construction work will be undertaken on Sunday.
ii. The proponent has provided adequate parking bays, separate entrance and exit points within the proposed development.
iii. The developer will install an onsite transformer, a generator and solar panels as renewable source of energy.

iv. The developer shall drill a borehole to supplement the NCWSC water supply and harvest rainwater for reuse.

v. The developer has complied with planning/building regulations including the setback and building line thus allowing for natural light and ventilation.

vi. The approval process is estimated to take approximately 3 months while the project implementation will take approximately 2 years.

vii. Appropriate landscaping will be undertaken within the building line and the setbacks.

The EIA Study Report has assessed the concerns and adequately provided mitigation measures and safeguards that if implemented, the proposed project will marry with the surrounding developments.

7.6 Grievance Redress System

The proponent will develop a Grievance Redress System (GRS) and make it accessible to all stakeholders internally and externally. The GRS will always seek to address grievances through legally acceptable methods and as fast as possible whilst not preventing any complainants from seeking other legally acceptable methods to justice. Such a GRS should be made available to staff on recruitment and to members of the public either through government agencies/offices through grievance application forms, and internally by establishing procedures for investigation and quick redress that will be recorded and tracked. The GRS shall be monitored through indicators of its efficiency and effectiveness of solving the grievance and producing lessons learnt through which corrective actions can be undertaken to improve the project's health and safety strategies. Additionally, as part of monitoring and review all grievances should be reported to the relevant authorities and corrective actions taken, to ensure the system is credible and transparent. The process should also be culturally appropriate, transparent, and non-coercive.

The developer will set up a team that will oversee the implementation of continuous stakeholder engagement. This will comprise of the Sociologist (Grievance Officer), EHS officer, Site supervisor, and a community representative. All information relating to the project will be posted on the information board at the site office as well as posters erected at the gate to inform the neighbors. Any issues arising from the stakeholders in the area will be received by the grievance officer, recorded and addressed accordingly in the shortest possible time. All relevant stakeholders will be informed in advance of the planned project activities. The development of the project will be based on the EIA procedures and EMP provided in this EIA Study Report.

CHAPTER EIGHT: ANALYSIS OF PROJECT ALTERNATIVES

Introduction

In order to enable the proposed project to seek different ways of minimizing its impacts on the environment and at the same time achieve its objectives several alternatives were assessed through its architectural and engineering designs and environmental planning through this ESIA to come up with the most suitable options in implementing this project

8.1 No Project Alternative

This alternative implies that the status quo is maintained with no development of the proposed development. This alternative will ensure there is no interference with the existing conditions and would prevent the realization of any negative impacts resulting from the construction of the residential apartments. However, it means the benefits associated with the proposed development will be foregone and the supply of the residential apartments will not be achieved resulting in pressure on the existing housing units. The neighborhood character and trends show that the area continues to grow with the predominant land uses now being high-rise residential developments as well as other land uses to support these developments such as schools, hospitals and religious institutions. In addition, the site is situated in an area that is not environmentally sensitive hence implementing the project would not pose adverse impacts on the environment.

The "No Option alternative" is therefore the least preferred and is deemed inappropriate based on economic and environmental considerations.

8.2 Proposed Project Option

The proposed project complies with the areas development policy which allows for **High-rise Residential Development (15 levels).** The proponent is proposing to construct **548 residential apartments** to cater for the rising demand for housing units in the area. The proponent applied for a *Change of Use* from a *Single Dwelling Unit to Multiple Dwelling Units (Apartments)* and approval was granted by NCC. The proposed project will have numerous benefits such as the provision of housing units, revenue generation to the government, provision of employment opportunities, and the market for goods and services among others. The EIA has proposed mitigation measures for the anticipated negative impacts and developed an EMP to ensure that the impacts are mitigated to a level of no significance. The proponent will comply with the

environmental management practices throughout the project cycle in order to maintain harmonious co-existence with the neighboring developments.

Therefore, this is the best option and should be supported by the authority through the issuance of the EIA License.

8.3 Alternative Site

An alternative site could be considered for the proposed development if the project presents serious environmental challenges that cannot be managed effectively. However, the proposed mitigation measures considered are adequate to minimize the anticipated negative impacts to levels that do not warrant significant environmental damage. The proposed project complies with the area's development policy *(zoning of the area)* and is compatible with the existing land uses. Additionally, the search for an alternative site would imply an increase in expenditure, time, and additional costs to the proponent. Hence, this alternative is not considered viable.

8.4 Alternative Construction Materials and Technologies

The proposed project will be constructed using reinforced concrete, natural stones for the walling, cement for mortar and plaster works, structural steel, metal scaffolds and formwork. The concrete structure will be built using locally sourced materials that meet the KEBS requirements. The metal scaffolds will be advantageous than timber because they will reduce the wasting of trees, have a longer lifetime, provide a steady and firm standing, are easily assembled and dismantled and increases work efficiency. The technologies available include timber construction, prefabricated concrete panels, concrete frame construction, conventional brick and mortar style, steel and an aluminum frame, and Expanded Polystyrene Technology. The proponent has preferred the use of reinforced concrete construction as the technology is durable, offers outstanding resistance to explosion and/or impact, and performs well during both natural and manmade disasters. Reinforced concrete can also endure very high temperatures from fire for a long time without loss of structural integrity and the materials are locally available.

8.5 Alternative Sources of Water and Energy

The increase water and energy demand will place some amount of strain on the existing infrastructure in the area. The proponent has proposed to *drill a borehole* as a source of water for the proposed development. The developer will also apply for an onsite transformer from KPLC for energy supply within the development and install *solar panels* as a renewable source of energy for the proposed development.

CHAPTER NINE: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Environmental monitoring involves the measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims to determine the effectiveness of actions to improve environmental quality. The EMP outlined in the tables 9.1, 9.2, and 9.3 below addresses the identified issues of concern (potential negative impacts) and mitigation measures as well as roles, estimated annual costs and monitorable indicators that can help to determine the effectiveness of actions to upgrade the quality of the environment. The key responsible parties to ensure strict implementation of this EMP will be the proponent, contractor, and authorities such NEMA, NCC, NCA and WRA. The proponent will employ a Project Manager who will oversee the implementation of this EMP to ensure adequate monitoring and evaluation by the contractor for no non-conformances. The contractor will also employ a full time Health and Safety officer to be responsible for the monitoring and implementation of this EMP for the pre-construction and construction phases. Some of the estimated annual costs for the environmental management have been billed in the Bill of Quantities (BQ) and are indicated as BQ cost while other costs will be part of the Operations and Maintenance (O&M) costs during the operation phase of the project.

9.1 EMP FOR THE CONSTRUCTION PHASE

Table 9. 1: Environmental Management Plan during Construction Phase

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
Soil	Soil Erosion and Contamination	▪ Obtain an excavation permit from NCC before the excavation works begins	▪ Excavation permit	Before excavation	Proponent NCC	75,000
		▪ Use of standard equipment for the excavation work	▪ Type of machinery used	Excavation period	Proponent Contactor	0
		▪ Control excavation works especially during rainy/wet conditions	▪ Excavation records	Excavation period	Contactor	0
		▪ Control the stockpiles within the site	▪ Well-managed stockpiles	Continuous	Contractor	0
		▪ Maintenance of equipment and vehicles away from site to avoid contamination	▪ Soil analysis tests	Continuous	Proponent Contractor	20,000
		▪ Connect the sanitary conveniences to the existing conventional sewer line to avoid contamination of soil by untreated effluent	▪ Monitoring records	Continuous	Proponent Contractor	0

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
		▪ Landscaping within the open spaces by planting indigenous trees and grass	▪ Number of Indigenous trees planted	Before operation	Proponent Contractor	BQ cost
Air Quality	Nuisance and adverse health due to fugitive dust and emissions from vehicle and machinery	▪ Screen the construction site to control and arrest construction-related dust	▪ Presence of dust screens	Continuous	Proponent Contractor	BQ Cost
		▪ Sprinkling of water in work areas to prevent fugitive dust violations	▪ Water use records	Continuous	Proponent Contractor	BQ cost
		▪ Provide adequate and appropriate PPE such as nose masks and goggles to the workers	▪ Presence and usage of PPE	Continuous	Contractor Workers	50,000
		▪ Regular maintenance of machinery and vehicles	▪ Service records	Continuous	Contractor	BQ cost
		▪ Use of environmentally friendly fuels	▪ Fuel records	Continuous	Contractor	BQ cost
		▪ No burning of waste within the site	▪ Records of complaints	Continuous	Contractor Workers	0
		▪ Covering of stockpiles within the site	▪ Covered stockpiles	Continuous	Contractor	0
		▪ Covering the loaded vehicles/trucks with clean impervious sheeting	▪ Covered trucks	Continuous	Contractor	0
		▪ Use of low-emission machinery	▪ Type of machinery used	Continuous	Contractor	0
		▪ Training of workers on air quality management	▪ Training records	Continuous	Contractor Workers	20,000
		▪ Ambient air quality monitoring within the site	▪ Air quality measurements	Annually	Contractor	40,000
Noise and Excessive Vibrations	Nuisance and adverse health impacts from high noise and vibration levels from machinery and vehicles	▪ Construction activities will be carried out between 0800hrs to 1800hrs on weekdays and 0800hrs to 1300hrs on Saturdays only.	▪ Work schedule records	Continuous	Proponent Contractor	0
		▪ No construction work will be undertaken on Sundays	▪ Work schedule records	Continuous	Proponent Contractor	0
		▪ No blasting of rocks during the excavation period	▪ Records of complaints	Excavation period	Proponent Contactor	0
		▪ Provide adequate and appropriate PPE such as earmuffs and ear plugs to the workers	▪ Presence and usage of PPE	Continuous	Contractor Workers	20,000
		▪ Training of workers on noise management	▪ Training records	Continuous	Contractor Workers	20,000
		▪ Noisy activities to be scheduled concurrently to reduce the exposure period	▪ Work schedule records	Continuous	Contractor	0
		▪ Install noise shields and barriers on noisy areas	▪ Noise shields/barriers	Continuous	Contractor	BQ cost
		▪ Use of noise abatement machinery/devices	▪ Type of machinery used	Continuous	Contractor	0
		▪ Post warning signs on high noise areas	▪ Availability of warning signs	Continuous	Contractor	5,000
		▪ Regular maintenance of the machinery and vehicles	▪ Service records	Continuous	Contractor	BQ cost

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
		▪ Install sound-absorbing materials such as acoustic enclosure within the generator room to reduce noise pollution	▪ Acoustic enclosure	Before operation	Proponent Contractor	BQ cost
		▪ Ambient noise level monitoring within the site	▪ Noise level measurements	Annually	Proponent Contractor	40,000
Liquid Waste	Health and safety hazards and environmental pollution from poor management of wastes	▪ Obtain a site toilet permit from NCC	▪ Site toilet permit	Before construction	Proponent NCC	10,000
		▪ Extend the connection of the proposed development to the existing conventional sewer system	▪ Sewer connection permit	During Construction	Proponent Contractor NCWSC	BQ cost
		▪ Provide adequate sanitary conveniences to the workers	▪ Number of sanitary conveniences	Before construction	Proponent Contractor	BQ cost
		▪ Ensure the sanitary conveniences are kept clean at all times	▪ Cleaning records	Continuous	Proponent Contactor	BQ cost
		▪ Proper decommissioning of the sanitary conveniences	▪ Decommissioning plan	Before operation	Contractor	BQ cost
		▪ Install hygiene awareness signs within the site	▪ Presence of hygiene signs	Continuous	Contractor	10,000
		▪ Training of workers on hygiene during the toolbox meetings	▪ Training records	Continuous	Contractor Workers	20,000
		▪ Construct an internal reticulation system which can consistently handle the loads during peak volumes	▪ Monitoring records	During Construction	Contractor	BQ cost
Solid Waste	Health and safety hazards and environmental pollution from poor management of wastes	▪ Develop and implement a Waste Management Plan	▪ Waste Management Plan	Before construction	Proponent, Contractor	10,000
		▪ Provide a centralized Waste Collection Centre (WCC for waste management with appropriate waste receptacles	▪ Waste collection center ▪ Colour-coded waste receptacles	Continuous	Contractor	20,000
		▪ Segregation of non-hazardous waste into organic and non-organic fractions	▪ Waste management records	Continuous	Contractor	0
		▪ Engage a NEMA-licensed transporter to collect and dispose of the segregated waste	▪ Contract with licensed waste transporter	Continuous	Contractor	50,000
		▪ Provide adequate and appropriate PPE such as gloves to the workers	▪ Presence and usage of PPE	Continuous	Contractor Workers	20,000
		▪ Monitor the type and volume of waste generated within the site	▪ Waste management records	Continuous	Contractor	0
		▪ Training of workers on solid waste management within the site	▪ Training records	Continuous	Contractor Workers	20,000

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
Water Use	Increased demand on local water resources	▪ Extend the connection of the main water supply to the proposed development	▪ Water Connection Permit	During Construction	Proponent Contractor NCWSC	BQ Cost
		▪ Drill a borehole as an alternative source of water for the development	▪ Authorization Permit ▪ Completion certificate	During Construction	Proponent Contractor WRA	BQ Cost
		▪ Install rainwater harvesting facilities to supplement the existing water supply	▪ Rainwater harvesting facilities	During Construction	Contractor	0
		▪ Use of water efficiently within the site	▪ Water use records	Continuous	Contractor	BQ cost
		▪ Provide adequate tanks for water storage	▪ Presence of water tanks	During Construction	Contractor	BQ cost
		▪ Use of water-efficient fixtures and fittings	▪ Type of water components used	During Construction	Contractor	BQ cost
		▪ Regular maintenance of the water components	▪ Service records	Continuous	Contractor	10,000
		▪ Install notices and information signs on water conversation measures	▪ Presence of notices and signs	Continuous	Contractor	10,000
		▪ Training of workers on water conservation measures	▪ Training records	Continuous	Contractor Workers	10,000
		▪ Monitoring of water consumption within the site	▪ Water use records	Monthly	Contractor	0
Energy Use	Increased demand on local energy resources	▪ Extend the connection of the power supply from the main grid to the development	▪ Electricity connection permit	Before construction	Proponent Contractor KPLC	BQ cost
		▪ Install solar panels as an alternative source of energy	▪ Presence of solar panels	Before Operation	Contractor	BQ cost
		▪ Install a generator as a backup source of energy	▪ Presence of a generator	Before Operation	Contractor	BQ cost
		▪ Install energy-efficient fixtures and fittings	▪ Type of energy components used	Before Operation	Contractor	BQ cost
		▪ Switch off machinery/equipment and lights when not in use	▪ Monitoring records	Continuous	Contractor	0
		▪ Provide notices and information signs on energy conservation measures	▪ Presence of notices and signs	Continuous	Contractor	10,000
		▪ Routine inspection and maintenance of electrical components by registered personnel	▪ Maintenance records	Continuous	Contractor	BQ cost
		▪ Monitoring of energy consumption within the site	▪ Energy use records	Continuous	Contractor	0

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
Traffic	Increased traffic causing snarl-up along the access roads	▪ Develop and implement a Traffic Management Plan	▪ Traffic Management Plan	Before Construction	Contractor	BQ cost
		▪ Engage traffic marshals to control vehicular movement and ensure smooth entry and exit	▪ Presence of traffic marshals	Continuous	Contractor	BQ cost
		▪ Ferry building materials and construction waste during the off-peak period	▪ Delivery records	Continuous	Contractor	0
		▪ Provide a loading/offloading area for construction materials within the site	▪ Presence of a designated loading/offloading zone	Continuous	Contractor	0
		▪ Install traffic control signs to inform motorists and public about the potential hazards and enforce speed limit	▪ Presence of signage	Continuous	Contractor	10,000
		▪ Provide a billboard at the site entrance notifying the public about the project	▪ Presence of a billboard	Before construction	Contractor	10,000
		▪ Provide temporary parking spaces for construction vehicles within the site	▪ Presence of parking spaces	During Construction	Contractor	BQ cost
Occupational Safety and Health	Safety and health hazards	▪ Register the site as a workplace with DOSHS	▪ Certificate of Registration	Before construction	Proponent DOSHS	10,000
		▪ Insure workers against accidents	▪ Insurance cover	Annually	Contractor	BQ cost
		▪ Provide adequate PPE to the workers	▪ Presence and usage of PPE	Continuous	Proponent	20,000
		▪ Provide first aid facilities within the site	▪ Presence of a well-equipped first aid box	Continuous	Contractor	10,000
		▪ Undertake first aid audit for the development	▪ First aid audit report	Annually	Contractor	50,000
		▪ Sensitize the workers on social issues such as drug and substance abuse	▪ Sensitization records	Continuous	Contractor Workers	10,000
		▪ Post hazard warning signs at strategic points within the site	▪ Warning signs displayed	Continuous	Contractor	10,000
		▪ Develop an Emergency Response Plan to manage the occurrence of hazards	▪ Emergency Response Plan	Continuous	Contractor	10,000
		▪ Establish a safety and health committee within the site	▪ Presence of a safety and health committee	Before Construction	Contractor	0
		▪ Training the workers on safety and health best practices	▪ Training records	Continuous	Contractor Workers	20,000
		▪ Undertake safety and health audit for the development	▪ Safety and health audit report	Annually	Contractor	50,000
		▪ Undertake a risk assessment of the workplace	▪ Risk assessment report	Annually	Contractor	50,000
		▪ Ensure that the workers are registered with SHIF / NSSF and remit appropriate fees	▪ SHIF/NSSF Covers	Continuous	Contractor Workers	0

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
		▪ Keep records of public emergency service telephone numbers	▪ Presence of the emergency telephone numbers	Continuous	Contractor	0
		▪ Provide adequate supply of wholesome drinking water to the workers	▪ Availability of drinking water	Continuous	Contractor Workers	BQ cost
	Fire risks within the site and neighbouring developments	▪ Provide firefighting equipment within the site	▪ Presence of firefighting equipment	Continuous	Contractor	30,000
		▪ Establish a firefighting team within the site	▪ Availability of firefighting team	Continuous	Contractor	0
		▪ Training the workers on fire safety measures	▪ Training records	Continuous	Contractor Workers	20,000
		▪ Undertake a fire safety audit for the development	▪ Fire safety audit report	Annually	Contractor	50,000
		▪ Conduct fire drills within the site	▪ Fire drill records	Annually	Contractor	0
		▪ Post fire prevention signs and notices at strategic points within the site	▪ Presences of signs and notices	Continuous	Contractor	10,000
		▪ Post fire exit routes and fire assembly point within the site	▪ Availability of fire signs and assembly point	Continuous	Contractor	10,000
		▪ Post fire emergency and evacuation procedures at strategic points within the site	▪ Emergency and Evacuation Procedure	Continuous	Contractor	10,000
	Insecurity	▪ Engage licensed security personnel to guard the property and monitor the access points	▪ Presence of licensed security guards	Continuous	Contractor	BQ cost
		▪ Obtain a hoarding permit from NCC	▪ Hoarding permit	Annually	Proponent NCC	BQ cost
		▪ Hoard the site to enhance its security	▪ Availability of hoarding	Continuous	Contractor	BQ cost
		▪ Keep records of movement of people and vehicles in and out of the site	▪ Entry/Exit records available	Continuous	Contractor	0
		▪ Install access control measures within the development	▪ Availability of access control measures	Continuous	Proponent Contractor	0
		▪ Install security lights and CCTV at strategic points within the site	▪ Presence of security lights and CCTV	Continuous	Contractor	BQ cost
Storm water	Flooding	▪ Construct gently sloping drainage channels covered with gratings for stormwater management	▪ Presence of drainage channels with gratings	During Construction	Contractor	BQ cost
		▪ Harvest rainwater to reduce the amount of runoff	▪ Presence of rainwater harvesting facilities	Continuous	Contractor	BQ cost
		▪ Use of semi-permeable materials during the construction of pavements	▪ Presence of semi-permeable pavements	After Construction	Contractor	BQ cost

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
		▪ Undertake comprehensive soft landscaping by planting indigenous trees and grass	▪ Number of trees planted	After Construction	Contractor	BQ cost
Loss of Vegetation	Vegetation loss which may cause soil erosion and air pollution	▪ Apply for a tree-cutting clearance certificate from the Nairobi County Director of Forestry before cutting down the trees and adhere to the conditions.	▪ Tree-cutting clearance certificate	Before construction	Proponent	BQ Cost
		▪ Conserve all the trees within the setbacks and building line.	▪ Number of Conserved trees	Before construction	Proponent Contractor	0
		▪ Undertake a comprehensive landscaping exercise after the construction phase by planting indigenous trees within the open spaces	▪ Number of trees planted	After Construction	Proponent Contractor	BQ cost
Oil	Oil pollution	▪ Fit all drainage facilities with adequate functional oil-water separators and silt traps	▪ Presence of oil-water separators and silt traps	During Construction	Contractor	BQ cost
		▪ Store oil or grease in a container at the designated place before final disposal	▪ Monitoring records	Continuous	Contractor	BQ cost
		▪ Routine maintenance of machinery away from the site to avoid oil pollution	▪ Maintenance records	Continuous	Contractor	BQ cost
		▪ Engage licensed waste transporters to dispose of oily containers at designated disposal sites	▪ Contract with licensed waste transporter	Continuous	Contractor	BQ cost

9.2 EMP FOR THE OPERATION PHASE

Table 9. 2: Environmental Management Plan during Operation Phase

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
Storm Water Management	Flooding	▪ Routine inspection and maintenance of the landscaped area	▪ Maintenance records	Continuous	Proponent Workers	20,000
		▪ Regular maintenance of drainage channels and rainwater harvesting facilities	▪ Maintenance Records	Continuous	Proponent	O&M Costs
Air Quality	Nuisance and adverse health due to dust emission and vehicle fumes	▪ Routine cleaning of the WCC, sanitary facilities and common areas	▪ Cleaning records	Continuous	Proponent Workers	O&M Costs
		▪ Regular maintenance of the machinery such as the generator to minimize the generation of hazardous gases.	▪ Maintenance records	Continuous	Proponent	O&M Costs
		▪ Provide adequate and appropriate PPE such as masks to the workers	▪ Presence and usage of PPE	Continuous	Proponent Workers	10,000
		▪ No burning of waste within the site	▪ Record of Complaints	Continuous	Proponent	0
		▪ Regular collection and disposal of solid waste to avoid foul smell	▪ Waste management records	Continuous	Management	0
		▪ Ambient air quality monitoring within the site	▪ Air quality measurements	Annually	Proponent	20,000
Noise and Vibration	Nuisance and adverse health impacts from high noise and vibration levels	▪ Sensitize the residents on minimal permissible noise levels within the development.	▪ Sensitization Records	Continuous	Proponent Residents	10,000
		▪ Regular maintenance of generator to minimize frictional noise	▪ Maintenance Records	Continuous	Proponent Management	5,000
		▪ Undertake ambient noise level measurements and adhere to the recommendations therein.	▪ Noise level measurements	Annually	Proponent	20,000
Liquid Waste	Health and safety hazards and environmental pollution from poor management of wastes	▪ Regular inspection and maintenance of foul water drainage system at the premises to prevent clogging and forestall breakdowns.	▪ Maintenance records	Continuous	Proponent Management	O&M Costs
		▪ Fix any damages to the foul water drainage system expeditiously.	▪ Record of complaints	Continuous	Proponent Management	O&M Costs
		▪ Provide adequate and appropriate PPEs such as gloves to the cleaners	▪ Presence and usage of PPES	Continuous	Proponent Management	10,000
		▪ Regular cleaning of the sanitary conveniences	▪ Cleaning records	Daily	Proponent	0
Solid Waste	Health and safety hazards and environmental	▪ Develop and implement a Waste Management Plan	▪ Availability of WMP	Before Operation	Proponent Management	10,000
		▪ Engage a NEMA-licensed transporter to collect and dispose of the segregated waste	▪ Contract with licensed waste transporter	Continuous	Proponent Management	O&M Costs

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
	pollution from poor management of wastes	▪ Provide appropriate waste receptacles for segregation of waste	▪ Color-coded waste receptacles	Before operation	Proponent	50,000
		▪ Segregation of non-hazardous waste into organic and non-organic fractions	▪ Waste management records	Continuous	Proponent Management	0
		▪ Monitor the type and volume of waste generated within the site	▪ Waste management records	Continuous	Proponent Management	0
		▪ Provide adequate and appropriate PPE such as gloves and masks to all the workers handling the solid waste within the site	▪ Presence and usage of PPE	Continuous	Proponent Management	10,000
		▪ Sensitize the residents on solid waste management within the site	▪ Sensitization records	Continuous	Proponent Residents	0
Water Use	Increased demand on local water resources	▪ Use of water efficiently within the development	▪ Water Use records	Continuous	Residents	0
		▪ Regular inspection and maintenance of all water components.	▪ Maintenance Records	Continuous	Management	O&M Costs
		▪ Use of water-efficient fixtures and fittings	▪ Types of fittings used	Continuous	Proponent	O&M Costs
		▪ Monitor the water consumption within the development	▪ Water Use records	Monthly	Proponent	0
		▪ Use borehole water or harvested rainwater to supplement the existing water supply	▪ Extraction records ▪ Quantity of water harvested	Continuous	Proponent Management	0
Energy Use	Increased use of energy and indoor air pollution	▪ Switch off machinery/equipment and lights when not in use	▪ Monitoring records	Continuous	Management	0
		▪ Use of energy-efficient fixtures and fittings	▪ Type of energy fittings	Continuous	Proponent	0
		▪ Routine inspection and maintenance of electrical components by registered personnel	▪ Maintenance records	Continuous	Proponent	O&M Costs
		▪ Monitor energy consumption within the site	▪ Energy use records	Continuous	Proponent	0
Occupational Safety and Health	Safety and health hazards	▪ Formulate an Internal Environmental Policy to guide the best practices within the development	▪ Internal environmental policy	Before Operation	Proponent	10,000
		▪ Adapt a suitable ERP to manage the occurrence of anticipated hazards	▪ Availability of ERP	Before Operation	Proponent	30,000
		▪ Post hazard warning signs at strategic points within the site	▪ Availability of warning signs	Continuous	Management	5,000
		▪ Sensitize the residents on occupational Health and safety.	▪ Sensitization records	Continuous	Proponent Residents	0
		▪ Undertake a health and safety audit of the premises by a registered health and safety adviser.	▪ Health and safety audit	Annually	Proponent	50,000

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
		▪ Monitor any accidents/incidents within the development and keep records	▪ Availability of accident register	Continuous	Proponent	20,000
		▪ Provide adequate and appropriate PPE to the workers within the development such as safety boots and overalls.	▪ Presence and usage of PPE	Continuous	Management Workers	10,000
		▪ Keep a record of the public emergency service telephone numbers including Police, Fire brigade, and Ambulance at strategic points within the site	▪ Presence of service telephone numbers	Continuous	Proponent	0
	Fire risks within the site and neighbouring developments	▪ Provide firefighting equipment within the development.	▪ Firefighting equipment	Before operation	Proponent	50,000
		▪ Regular inspection and maintenance of firefighting equipment by licensed personnel	▪ Maintenance records	Bi-annually	Proponent Management	O&M Costs
		▪ Post-fire exit routes and fire assembly point within the site	▪ Availability of fire exit route signs and assembly points	Before Operation	Proponent Management	20,000
		▪ Conduct fire drills within the development to sensitize the residents.	▪ Fire drill records	Annually	Proponent Residents	O&M Costs
	Insecurity	▪ Engage licensed security personnel to guard the property and monitor the access points	▪ Contract with licensed security guards	Continuous	Proponent	O&M Costs
		▪ Keep records of visitors accessing the development	▪ Entry/Exit Records	Continuous	Proponent Security personnel	0
		▪ Routine inspection and maintenance of access control measures, security lights and CCTV	▪ Maintenance records	Continuous	Proponent	O&M Costs

9.3 EMP FOR THE DECOMMISSIONING PHASE

Note: A due diligence environmental audit will be undertaken and submitted to NEMA at least three months prior to decommissioning and in line with the Environmental Management and Coordination Act No. 8 of 1999.

Table 9. 3: Environmental Management Plan during Decommissioning Phase

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
Air Quality	Nuisance and adverse health due to dust emission and vehicle fumes	▪ Prepare a decommissioning Plan before the demolition exercise	▪ Decommissioning Plan	Before Demolition	Proponent NEMA	50,000
		▪ Obtain a demolition permit from NCC	▪ Demolition permit	Before Demolition	Proponent NCC	30,000
		▪ Use of low-emission demolition machinery	▪ Type of machinery used	Continuous	Proponent Contractor	0
		▪ Provide adequate and appropriate PPE such as nose masks and goggles to the workers	▪ Presence and usage of PPE	Continuous	Proponent Contractor	20,000
		▪ Screen the construction site to control and arrest dust	▪ Dust screens	Before demolition	Proponent Contractor	300,000
		▪ Sprinkling of water in work areas to prevent fugitive dust violations	▪ Water use records	Continuous	Proponent Contractor	100,000
		▪ Ambient air quality monitoring within the site	▪ Air quality measurements report	Annually	Proponent Contractor	20,000
Noise and Vibration	Nuisance and adverse health impacts from high noise and vibration levels	▪ Provide adequate and appropriate PPE such as earmuffs and ear plugs to the workers	▪ Presence and usage of PPE	Continuous	Proponent Contractor	20,000
		▪ Demolition activities to be undertaken between 8 am to 6 pm on weekday and 8 am to 1 pm on Saturday	▪ Record of Complaints	Continuous	Proponent Contractor	0
		▪ No demolition work will be undertaken on Sundays	▪ Record of Complaints	Continuous	Proponent Contractor	0
		▪ Use of noise shields/suppressors on the demolition machinery	▪ Availability of Noise shields	Continuous	Proponent Contractor	20,000
		▪ Ambient noise level monitoring within the set	▪ Noise level measurements report	Continuous	Proponent Contractor	20,000
Solid and Liquid Waste Management	Health and safety hazards and environmental pollution from poor	▪ Proper decommissioning of the sanitary facilities	▪ Decommissioning plan	Continuous	Proponent Contractor	0
		▪ Reuse of all the mechanical fittings (WC, WHB) in other projects	▪ Number of fittings reused	Continuous	Proponent Contractor	0
		▪ Engage a NEMA-licensed transporter to collect and dispose of the segregated waste	▪ Contract with licensed waste transporter	Continuous	Proponent Contractor	100,000

Aspect	Potential Impact	Mitigation Measure(s)	Monitoring Indicators	Timeframe	Responsibility	Estimated Cost (KShs)
	management of wastes	▪ Segregate hazardous and non-hazardous waste before final disposal	▪ Colour-coded receptacle bins	Continuous	Proponent Contractor	0
		▪ Provide adequate and appropriate PPE to the refuse collection workers	▪ Presence and usage of PPE	Continuous	Proponent Contractor	20,000
		▪ Ensure refuse collection vehicles are covered to prevent scattering of waste	▪ Covered vehicles	Continuous	Proponent Contractor	0
		▪ Reuse of demolition debris in other construction projects	▪ Transport Records	Continuous	Proponent Contractor	0
Energy Use	Increased use of energy and indoor/outdoor air pollution	▪ Switch off machinery/equipment when not in use	▪ Energy use records	Continuous	Proponent Contractor	0
		▪ Monitor energy consumption within the site	▪ Energy use records	Continuous	Proponent Contractor	0
Occupational Safety and Health	Safety and health hazards	▪ Insure demolition workers against accidents	▪ Insurance available	Continuous	Proponent Contractor	200,000
		▪ Provide adequate and appropriate PPE to the workers	▪ Presence and usage of PPE	Continuous	Proponent Contractor	50,000
		▪ Provide first aid facilities	▪ Well-stocked first aid box	Continuous	Proponent Contractor	10,000
		▪ Training the workers on safety and health best practices before demolition exercise	▪ Training records	Continuous	Proponent Contractor	30,000
		▪ Ensure that the workers are registered with SHIF / NSSF and remit appropriate fees	▪ SHIF/NSSF Covers	Continuous	Contractor	BQ Cost
		▪ Provide adequate supply of wholesome drinking water	▪ Available of Drinking water	Continuous	Proponent Contractor	100,000
	Insecurity	▪ Engage licensed security personnel to guard the property and monitor the access points	▪ Contract with licensed security guards	Continuous	Proponent Contractor	BQ costs
Vegetation	Disturbance of fauna and flora species during the demolition exercise	▪ Implement an appropriate re-vegetation program to restore the site	▪ Re-vegetation program	Continuous	Proponent Contractor	10,000
		▪ Undertake comprehensive soft landscaping by planting indigenous trees	▪ Landscaped area ▪ Vegetation Cover	After demolition	Proponent Contractor	100,000
		▪ Fence the site to minimize disturbance of the newly vegetated area	▪ Fence available	After demolition	Proponent Contractor	50,000

CHAPTER TEN: CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

The proposed development will provide numerous benefits to the housing sector and the country at large. Some of the benefits include the provision of residential apartments, creation of employment opportunities, revenue generation to the National Government through taxes, revenue generation to the County Government through permits, revenue generation to the proponent through the sale and/or lease of the residential apartments, and market for goods and services. However, the proposed project will also have negative impacts, which include increased traffic along the access road, air and noise pollution, increased solid and liquid waste generation, increased energy and water demand, oil pollution, and increased health and safety hazards during the project cycle among others can be sufficiently mitigated.

The proponent has committed to putting in place various mitigation measures to mitigate the negative environmental, safety, health, and social impacts associated with the proposed project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the EMP as well as adhering to all relevant environmental, health and safety standards, policies and regulations that govern the establishment and operation of such projects. It is also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards.

10.2 Recommendations

The proposed development is hereby recommended for licensing by NEMA subject to the following conditions:

i. That the proponent shall obtain all the requisite permits/certificates and licenses before the construction begins and adhere to the conditions therein.
ii. That the proponent shall carry out annual environmental audit in the first year of operation to confirm the efficacy and adequacy of the EMP developed to improve the environmental performance of the development.
iii. That the proponent shall adhere to all relevant environmental, health, and safety standards, policies, and regulations that govern the establishment of the proposed project.

iv. That the proponent shall ensure strict implementation of the EMP developed in this report.

v. That the proponent shall adhere to all other conditions that the Authority may find necessary.

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APPENDICES

1. Copy of ownership documents
2. Copy of KRA PIN Certificate
3. Copy of TOR Approval letter
4. Copy of expert practicing licenses
5. Copy of the Change of Use approval
6. Copy of architectural plans
7. Copy of Traffic Impact Assessment
8. Copy of Geotechnical Investigation Report
9. Copy of Ambient Air Quality Report
10. Copy of the Environmental Noise Level Measurement Report
11. Copy of minutes of the public meeting
12. Copy of Attendance Sheet
13. Copy of the invitation letter for the public meeting
14. Copy of the onsite notice for the public meeting
15. Copy of NEMA Payment Receipt
16. Copy of the NEMA Invoice
17. Copy of the Bill of Quantities