

# **ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT**

**FOR**

## **THE PROPOSED RESIDENTIAL APARTMENTS ON PLOT L.R. NO. 209/8879/7 & 8 LOCATED ALONG OLOITOKTOK ROAD IN KILELESHWA 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,  
P. O. Box 157 – 00600,  
Nairobi.



**Project Proponent:**

Pinecrest Properties Limited,  
P. O. Box 52685 - 00100,  
Nairobi.

**9<sup>th</sup> September 2022**

**Declaration**

This Environmental Impact Assessment (EIA) Study Report for the **Proposed Residential Apartments on Plot L.R. No. 209/8879/7 & 8** located along Oloitoktok Road in Kileleshwa 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).

Signature/Official Stamp: ..... Date: .....

**EIA/EA Firm of Experts:** Space Planners Ltd  
**Registration Number:** 10,492  
**Telephone:** 020 240 9280  
**Email:** info@spaceplanners.co.ke

**For and on behalf of the Project Proponent:**

Pinecrest Properties Limited,  
P. O. BOX 52685 - 00100,  
Nairobi.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Name: .....

Designation: .....

**EIA Study Team**

<b>Name</b>	<b>Position</b>	<b>Roles</b>
Plan. Solomon Kyeni	Team Leader/ Lead Expert, Reg. No.: 3081	<ul style="list-style-type: none"> <li>▪ Stakeholder Engagement</li> <li>▪ Land Use Zoning</li> <li>▪ Site Baseline Survey</li> <li>▪ Impact Analysis and Mitigation Plans</li> </ul>
Aaron Mumo	Associate Expert, Reg. No.: 9047	<ul style="list-style-type: none"> <li>▪ Detailed baseline survey and data collection</li> <li>▪ Review of relevant environmental literature, environmental policy and legislation framework</li> <li>▪ Analysis of the environmental impacts</li> <li>▪ Analysis of the project alternatives</li> <li>▪ Report writing and compilation of the EIA Study Report</li> </ul>
Maureen Diето	Sociologist	<ul style="list-style-type: none"> <li>▪ Stakeholder analysis</li> <li>▪ Holding Public Consultative forums within the project area.</li> <li>▪ Describing the socio-economic and cultural environment within the assignment area.</li> <li>▪ Analysis of socio-economic impacts</li> <li>▪ Report writing</li> </ul>
Arch. Thomas Bowman	Architect	<ul style="list-style-type: none"> <li>▪ Design and detail of the architectural drawings for the project.</li> </ul>
Eng. Nathaniel Matalanga	Structural Engineer	<ul style="list-style-type: none"> <li>▪ Consultant Engineer responsible for Structural Design &amp; Supervision of construction.</li> </ul>
Eng. Gicheru Kimani	Mechanical Engineer	<ul style="list-style-type: none"> <li>▪ Consultant Engineer responsible for mechanical engineering services including design, supervision, contract management and cost control</li> </ul>
Eng. Maina Muriuki	Electrical Engineer	<ul style="list-style-type: none"> <li>▪ Consultant Engineer in charge of electrical engineering services including design, supervision, contract management and cost control</li> </ul>

## **Executive Summary**

### **Introduction**

Article 43 of the Constitution of Kenya 2010 stipulates that every person has a right to accessible and adequate housing and to 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 annual housing demand for the country stands at 250,000 units with an estimated supply of 50,000 units culminating in a housing deficit of 2 million units. The country has made remarkable strides over the years in a bid to address decent housing but more is required for majority of Kenyans to realize this constitutional right.

It is in light of the above, that the proponent, *Pinecrest Properties Limited*, has proposed to construct **two hundred fifty two (252) residential apartments** on Plot L.R. No. 209/8879/7 & 8 located along Oloitoktok Road in Kileleshwa area of Nairobi City County. The proposed project will comprise of two hundred sixteen (216) one-bedroom units and thirty-six (36) two-bedroom units and will contribute to bridging of the housing shortage in the area. The estimated project budget and duration is **KES 1.257 billion** and 2 years respectively.

### **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 **252 residential apartments** in Kileleshwa 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 the Environmental Management and Coordination Act (EMCA), Legal Notice No. 31 of 2019. The EIA team 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, health and safety concerns of the neighbors and the public.
- iii. Documentary review on the nature of the proposed activities, policy and legal framework, environmental setting of the area and other available relevant data/information.
- iv. Consultations and Public Participation (CPP) with PAP through public meeting, the administration of questionnaires, discussions and key informant interviews.
- v. Physical evaluation of the project site and the surrounding areas using a pre-prepared checklist with specific focus on environmental and human safety issues that are likely to be affected,
- vi. A site reconnaissance and visual survey to assess the baseline information of the project area using a prepared checklist.
- vii. Reviewing the proposed project designs and implementation plan/schedules with a view to suggesting suitable alternatives.
- viii. Develop an EMP outlining the responsibilities, schedules, monitorable indicators and time frames.
- ix. Preparation and submission of the EIA Study Report to NEMA.

## Potential Positive Impacts

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

- i. Provision of two hundred fifty two (252) residential apartments in Kileleshwa area.
- ii. Creation of employment opportunities throughout the project cycle i.e. construction workers, security personnel, cleaners among others.
- iii. Revenue generation to the government through taxes such as VAT for goods and services and to the proponent through the sale/lease of the residential apartments.

- iv. Provision of a market for goods such as construction materials and services such as architectural, engineering and environmental professional services among others.
- v. 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
<b>Soil erosion</b>	<ul style="list-style-type: none"> <li>▪ Obtain excavation permit before the excavation works from Nairobi County.</li> <li>▪ Avoid unnecessary excavations and other soil disturbances that can predispose it to the agents of erosion especially during rainy/wet conditions.</li> <li>▪ Use of soil erosion control structures on prone areas within the site.</li> <li>▪ Levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.</li> </ul>
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>▪ Screening of the entire site to control and arrest construction-related dust.</li> <li>▪ Regular sprinkling of water on the work areas to prevent fugitive dust violations.</li> <li>▪ Provision of appropriate PPE to the workers such as gas masks &amp; goggles when working in a dusty environment.</li> <li>▪ Regular maintenance of the machinery to minimize the generation of hazardous gases.</li> <li>▪ Monitor the air quality levels as per the EMCA (Air Quality) regulations.</li> </ul>
<b>Noise and excessive vibrations</b>	<ul style="list-style-type: none"> <li>▪ Construction activities will be carried out only during day at the specified time.</li> <li>▪ Use of noise suppressors or silencers or noise shields on noisy equipment.</li> <li>▪ The contractor shall endeavour to use equipment installed with noise abatement devices as much as practicable.</li> <li>▪ Switch off the construction machinery and vehicles when not in use.</li> <li>▪ Provision of appropriate PPE to the workers such as earmuffs when working in a noisy environment.</li> <li>▪ Monitor the noise and vibration levels at the site as per the EMCA (Noise and Excessive Vibrations) regulations.</li> </ul>
<b>Solid waste</b>	<ul style="list-style-type: none"> <li>▪ Provision of clearly marked dustbins within the project site.</li> <li>▪ Segregation of waste at the source before final disposal.</li> <li>▪ Engage the services of licensed waste transporter to dispose of the waste at designated disposal sites.</li> <li>▪ Manage waste in line with the EMCA (Waste Management) Regulations, 2006.</li> </ul>
<b>Liquid waste</b>	<ul style="list-style-type: none"> <li>▪ Channel all liquid waste to the existing trunk sewer system.</li> <li>▪ All manholes on drive ways and parking areas will be constructed with heavy-duty covers set and double sealed airtight as approved by specialists.</li> <li>▪ Frequent monitoring of the internal reticulation system and ensuring that any blockages and damages are fixed expeditiously.</li> <li>▪ Provision of adequate and appropriate sanitary facilities to the construction workers.</li> </ul>
<b>Water demand</b>	<ul style="list-style-type: none"> <li>▪ Drill a borehole to supplement the existing NCWSC water supply.</li> <li>▪ Provide adequate centralized underground tank for water storage.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Install water efficient fixtures/fittings that turn-off automatically when not in use.</li> <li>▪ Encourage water reuse/recycling during the project cycle.</li> <li>▪ Monitor the consumption of water on monthly basis.</li> </ul>
<b>Energy demand</b>	<ul style="list-style-type: none"> <li>▪ Apply for connection permits from KPLC and EPRA as appropriate.</li> <li>▪ Install a 630 KVA transformer for energy supply within the development.</li> <li>▪ Install a 105 KWp grid tied Solar PV system for the green energy supply within the development.</li> <li>▪ Install a 500KVA generator as an alternative back up for the development.</li> <li>▪ Install energy efficient fixtures/fittings within the development.</li> <li>▪ Turn off machinery and equipment when not in use.</li> <li>▪ Monitor the consumption of energy on monthly basis.</li> </ul>
<b>Traffic congestion</b>	<ul style="list-style-type: none"> <li>▪ Undertake a Traffic Impact Assessment (TIA) and ensure adherence of its recommendations.</li> <li>▪ Engage the traffic marshals to control traffic in and out of the site.</li> <li>▪ Ferry building materials during the off-peak hours.</li> <li>▪ Install warning/ informative signs at strategic point within the project site.</li> <li>▪ A separate entry and exit points will be provided within the development to ease the traffic flow in and out of the project site.</li> </ul>
<b>Health and safety of workers</b>	<ul style="list-style-type: none"> <li>▪ Register the site as a workplace with DOSHS.</li> <li>▪ Provide adequate and appropriate PPE to the workers within the site such as safety boots, overalls, helmets, goggles, earmuffs, masks, gloves etc.</li> <li>▪ Adapt a suitable Emergency Response Plan (ERP) to manage occurrence of anticipated hazards during the construction phase.</li> <li>▪ Establish a Health and Safety committee during the construction phase.</li> <li>▪ Induct and train all construction workers on OHS procedures.</li> <li>▪ Ensure provision of safe drinking water for the workers within the site.</li> <li>▪ Regular monitoring and evaluation of the safety of the site on weekly basis.</li> </ul>
<b>Impact on fauna</b>	<ul style="list-style-type: none"> <li>▪ Ensure that potentially contaminated runoff from storage areas are drained through oil traps.</li> <li>▪ Avoid dumping spoil and waste into the Kirichwa Kubwa River.</li> <li>▪ Limit vegetation clearing to the designated areas and planting of trees after construction works.</li> </ul>

## 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 is granted an EIA license to implement the proposed project.

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## Acronyms

CBD	Central Business District
CCTV	Closed-circuit Television
CPP	Consultations and Public Participation
DOSHS	Directorate of Occupational Safety and Health Services
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EPRA	Energy and Petroleum Regulatory Authority
ERP	Emergency Response Plan
GPS	Global Positioning System
GRS	Grievance Redress System
KEBS	Kenya Bureau of Standards
KIWANA	Kileleshwa Ward Neighbours Association
KPLC	Kenya Power and Lighting Company
LED	Light-Emitting Diode
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
NMS	Nairobi Metropolitan Services
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 annual housing demand for the country stands at 250,000 units with an estimated supply of 50,000 units culminating in a housing deficit of 2 million units. The housing deficit is expected to grow further, fueled by a rapidly growing population at 2.6% per year and a high urbanization rate of 4.4%. The government has been forging partnerships with the private sector and development partners under the *Big Four Agenda* to deliver approximately 500,000 housing units to resolve the existing housing deficit. However, though progress has been made in the delivery and development of related infrastructure, the supply is yet to match the demand. It is in light of the above that the proponent, *Pinecrest Properties Limited*, has proposed to construct **two hundred fifty two (252) residential apartments** on Plot L.R. No. 209/8879/7 & 8 located along Oloitoktok Road in Kileleshwa area of Nairobi City County. The proposed development will contribute to bridging of the housing shortage in the area while adhering to environmental best practices, the area zoning regulations as well as other relevant laws.

The sustainability of developments must be seriously taken into consideration 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 objectives of the proposed development include:

- i. To construct **252 residential apartments** in Kileleshwa area of Nairobi City County.
- ii. To put the current land into more productive and economic use while ensuring minimal environmental degradation.

### **1.4 Terms of Reference (TOR)**

A scoping exercise was undertaken to identify the important issues to be addressed in the study and provide feasible project alternatives. During the exercise, the Terms of Reference (TOR) were developed and submitted to the authority in line with Regulation 11 of the Environmental (Impact Assessment and Audit) Regulations and approved on 26<sup>th</sup> July 2022 (Ref. No.: NEMA/TOR/5/2/457) (*Attached is the TOR Approval Letter*). The following are the TOR developed during the scoping exercise;

- i. The proposed location of the project;
- ii. A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project;
- iii. The objectives of the project;
- iv. The technology, procedures and processes to be used, in the implementation of the project;



- v. The materials to be used in the construction and implementation of the project;
- vi. The products, by-products and waste generated project;
- vii. A description of the potentially affected environment;
- viii. The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short term and long-term effects anticipated;
- ix. Alternative technologies and processes available and reasons for preferring the chosen technology and processes;
- x. Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies;
- xi. 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;
- xii. Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the course of carrying out activities or major industrial and other development projects;
- xiii. The measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
- xiv. An identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
- xv. An economic and social analysis of the project;
- xvi. An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures.

## 1.5 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 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, health and safety concerns of the neighbors and the public.

- iii. Documentary review on the nature of the proposed activities, policy and legal framework, environmental setting of the area and other available relevant data/information.
- iv. Consultations and Public Participation (CPP) with PAP through public meetings, the administration of questionnaires, discussions and key informant interviews.
- v. Physical evaluation of the project site and the surrounding areas using a pre-prepared checklist with specific focus on environmental and human safety issues that are likely to be affected,
- vi. A site reconnaissance and visual survey to assess the baseline information of the project area using a prepared checklist.
- vii. Reviewing the proposed project designs and implementation plan/schedules with a view to suggesting suitable alternatives.
- viii. Develop an EMP outlining the responsibilities, schedules, monitorable indicators and time frames.
- ix. Preparation and submission of the EIA Study Report to NEMA.

## **1.6 Project Justification**

### **i. Demand for housing**

Article 43 (1) (b) of the Kenya Constitution empowers every citizen with a right to accessible and adequate housing and to reasonable standards of sanitation. According to the State Department for Housing and Urban Development, there is currently a backlog of 1.85 million housing units. The deficit is bound to rise due to the Country's 4.4 percent 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. This, therefore, calls for the development of housing units to meet the current demand.

### **ii. Zoning of the area**

Kileleshwa area is located in Zone 4D according to the Nairobi City Development Ordinances and Zones which allows for **Residential Flats Development** at a minimum area of 0.05ha. Therefore, the proposed project is in conformity with the zoning of the area which allows for residential flats development. At **0.1813 hectares**, the plot is large enough to accommodate the proposed development while adhering to the planning standards and policies provided by the County Government.

### **iii. Socio-Economic Benefits**

There will be numerous socio-economic benefits attributed to the proposed development. These include the provision of quality housing units to the city dwellers and hence improving their living standards, direct and indirect employment opportunities, increased revenue generation to the national and county government through taxes and permits, increased income to the proponent through the sale/rent of the residential apartments and therefore improving their living standards, provision a market for goods and services throughout the project cycle, enhanced overall competitiveness of this area hence more development and growth, and increased security in the area. There shall also be the co-benefit of this project to the area by stimulating other land owners within the vicinity to also improve the value of their properties through re-development.

### **iv. Neighborhood Development Trend**

The area has undergone development regeneration and restructuring in the recent years at a high rate as a result of its strategic location and proximity to the Central Business District (CBD). This has seen the area transforming from the previous Single Dwelling Units to Multiple Dwelling Units (Apartments). The predominant land use in the area is Residential Apartments whereas the other supportive land uses are commercial, educational, health, and religious institutions. The proposed development will, therefore, be in conformity with the current land uses and will ensure better utilization of the property giving it a higher quality urban character. Reference is made to a similar development opposite the site as shown on plate 1.1.

#### **Plate 1. 1: Neighborhood Characteristics**



**Source: Field Survey, 18/07/2022**

## CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

### 2.1 Nature of the Project

The proposed project will entail the construction of **two hundred fifty two (252) residential apartments** in Kileleshwa area. The project aims at providing housing infrastructure as well as maximizing the utilization of the property. The design of the development has set aside 30 percent of the total land area to open green spaces and 70 percent of the plot for the residential development. Currently, the existing residential house has been demolished to pave way for the construction of the proposed development as shown in plate 2.1 below.

**Plate 2. 1: The Site**



*Source: Fieldwork, 18/07/2022*

### 2.2 Site Location

The project site is located along **Oloitoktok Road** adjacent to Scenic Court and opposite Euro Villas. It abuts Kirichwa Kubwa River to its southern end and lies on latitude -1.285277 and longitude 36.783503 in Kileleshwa area of Dagoretti North Sub County, Nairobi City County as shown in figure 2.1 below.

**Figure 2. 1: Location Map**



Source: Google Earth, 2022

### 2.3 Land Tenure, Size, Ownership and Use

The property is registered as **Plot L.R. No. 209/8879/7 and 209/8879/8** under the Registration of Titles Act (Chapter 281) on leasehold interest for a period of ninety-nine (99) years from the 1<sup>st</sup> of August 1977. The plots have been amalgamated and the total area is approximately **0.1813 hectares**. The current registered proprietor is **Pinecrest Properties Limited** of P.O. Box 52685 - 00100, Nairobi who is seeking an EIA License for the proposed project. (*Attached is the copy of the ownership documents*). The current registered use is one private dwelling unit but the proponent applied for a **Change of Use** to Multiple Dwelling Units (Apartments) pending approval from Nairobi Metropolitan Services (NMS).

### 2.4 Project Description

The proponent proposes to construct **one block of eighteen (18) floors comprising a total of 252 housing units (two hundred sixteen (216) one-bedroom units & thirty-six (36) two-bedroom units) and one hundred eighteen (118) parking bays** with the following features:

- i. **Basement 1 level** comprising twenty three (23) parking bays and service room.
- ii. **Basement 2 level** comprising twenty three (23) parking bays and service room.
- iii. **Ground floor** comprising twenty six (26) parking bays, waste management room, two (2) service rooms, store and lobby area.
- iv. **Podium 1 level** comprising twenty three (23) parking bays and service room.
- v. **Podium 2 level** comprising twenty three (23) parking bays and service room.
- vi. **Typical 1<sup>st</sup> to 18<sup>th</sup> floor** comprising two (2) units of two-bedroom apartment and twelve (12) units of one-bedroom apartment with each unit consisting of a lounge, kitchen, washroom and terrace/balcony.
- vii. **Roof level** comprising gym, swimming pool, pool store & changing rooms, lounge, drying area, fire pits and terraces.

**Other salient features** include a staircase, three (3) lift shafts, lift lobby, electrical and mechanical ducts, gatehouse, boundary wall, ramp, passage, and driveway.

**Table 2. 1: Summary of housing units and parking bays**

S/N	Description	1 bedroom units	2 bedroom units	Parking bays
1.	Basement 1	-	-	23
2.	Basement 2	-	-	23
3.	Ground floor	-	-	26
4.	Podium 1	-	-	23
5.	Podium 2	-	-	23
6.	Typical 1 <sup>st</sup> to 18 <sup>th</sup> floor	216	36 units	-
<b>Sub Total</b>		<b>216</b>	<b>36</b>	<b>118</b>
<b>Grand Total</b>		<b>252</b>		

More fine details, specifications, and features of the proposed project can be obtained from the architectural plans annexed in the report.

## 2.5 Construction Inputs

The project inputs will include the following:

- i. The materials that will be used will include stones, cement, sand, crushed rock (gravel/ballast), ceramic fixtures, reinforcement bars, wood/timber, glass, painting materials, plastic, electrical and mechanical fixtures. All these materials shall be sourced from licensed dealers who have complied with the environmental management guidelines and policies and approved by Kenya Bureau of Standards (KEBS).
- ii. Several machines shall be used which will include earth moving equipment (excavators, loaders, wheel loading shovels and backhoes), material handling equipment (cranes and hoists), construction equipment (concrete mixers and vibrators) and engineering vehicles (trailers, tippers and dumpers).
- iii. The project will require a labour force of both skilled and non-skilled workers. The skilled personnel will include the project consultants (architects, engineers, quantity surveyors and environmental experts) and the contractor with a team of foreman, masons, plasterers, carpenters, plumbers, welders, electricians, glaziers, painters and casual labourers.

- iv. Other construction inputs will include water from the borehole and Nairobi City Water and Sewerage Company (NCWSC) water supply and electricity from the main grid or provided by a generator.

## **2.6 Construction Activities**

### **2.6.1 Pre-Construction Phase**

- i. Appraisal of the baseline conditions to determine supply and demand for the required infrastructural services.
- ii. Preparation of Change of Use from Single Dwelling Unit to Multiple Dwelling Units and submission to NMS for approval.
- iii. Preparation of the preliminary architectural designs and submission to NMS for approval.
- iv. Preparation of an EIA Study Report and submission to NEMA for licensing.
- v. Obtaining a Project Compliance Certificate from the National Construction Authority (NCA) before the construction begins.
- vi. Pegging of the riparian reserve by Water Resources Authority (WRA).
- vii. Site preparation through the construction of a hoarding area, site office, material storage area and sanitary facilities.

### **2.6.2 Construction Phase**

#### **i. Excavation and Foundation works**

The excavator, backhoe, and tippers shall be used to aid in the removal of the topsoils and transporting of the soils to the approved designated area. Appropriate excavation works shall be undertaken to ensure that the volumes for the excavation works are clearly defined under the supervision of the project engineer and the county engineers. The excavated red volcanic soils shall be reused for landscaping purposes.

#### **ii. Concrete and Masonry 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 in already constructed formwork. The concreting will be supplemented by concrete mixers and vibrators. The poured concrete will be cured for a specified period approved by the project engineer. The internal and exterior walls shall be built



using machine cut stones sourced from a licensed supplier. The process will be under the supervision of the project consultants.

iii. **Structural Steelworks**

The structural elements which include the strip footings, retaining walls, shear walls, slabs, beams, and columns 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 the already constructed formwork before concreting is carried out. The steelworks shall be carried out in strict supervision from the project engineer.

iv. **Plumbing, Mechanical and Electrical Works**

This phase will involve the installation of water and wastewater piping, electrical fixtures and appliances including lighting fixtures. This will be followed by connection of the electrical and mechanical configuration to the existing power and sewer lines upon acquisition of the relevant permits from Kenya Power and Lighting Company (KPLC) and NCWSC respectively. All the works will be carried out by a licensed electrician and plumber.

v. **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, the painting of the proposed building which will be carried out with cement primer and eco-friendly zero Volatile Organic Compounds (VOC) paints.

vi. **Final Clean Up and Landscaping**

The final cleanup will be carried out once the construction activities are completed. All the solid waste will be reused where feasible and/or transported to designated approved dumpsites. Thereafter, the proponent will undertake apartment gardening to improve the aesthetic value and visual quality of the proposed development.

### **2.6.3 Operational phase**

The project will be used for **residential purposes** and the operational activities will involve the following:

- i. **Residence:** A total of 252 families will reside within the development. Several family activities such as cooking and washing will thus accompany residence.

- ii. **Recreational Activities:** There will be several recreational activities within the proposed development aided by the presence of the gym, swimming pool and outside lounge/kitchen.
- iii. **Property Management:** The proponent shall engage the services of a management company to ensure the following:
  - Obtain an Occupation Certificate from the County Government before operation begins.
  - Collect rent from the tenants and ensure routine maintenance of the development.
  - Ensure monthly monitoring of energy and water consumption within the development.
  - Ensure regular cleaning of the common areas within the development such as corridors and staircases.

#### **2.6.4 Decommissioning Activities**

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 from the site. The following should be undertaken to restore the environment:

- i. Give notices of at least three (3) months of the intention to redevelop the property and/or demolition of the development to the tenants.
- ii. Prepare a decommissioning plan and submit to NEMA for approval at least three (3) months prior to the 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 removal of 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 occur.

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

## **2.7 Construction Products, By Products and Wastes**

- i. **Products:** The final product will be **252 residential apartments.**
- ii. **By-Products:** The by-products will include;
  - The soil generated during excavation will be reused for landscaping purposes.
  - 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-off for use as fuel for cooking and heating.
  - Empty cans and drums will be used to store water whereas the damaged ones will be sold to licensed scrap metal dealers.
- iii. **Wastes:** The solid waste generated during construction will include construction debris, sanitary waste, excavated soil and rocks. The other wastes that are likely to be generated during operation are solid waste such as paper, plastics, cans, glasses, metallic pieces, organic waste and e-wastes. The liquid waste generated throughout the project cycle will be directed to the existing trunk sewer system whereas the solid waste will be segregated, reused and/or recycled where appropriate and disposed of at designated sites by a licensed waste transporter in line with EMCA (Waste Management) Regulations of 2006.

## **2.8 Project Budget and Duration**

The proposed project is estimated to cost **One billion two hundred fifty seven million seven hundred forty five thousand five hundred eighty Kenyan shillings only (Kshs. 1,257,745,580.00)**. The project implementation works is estimated to take 2 years.

## **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 condition that all developers conduct EIAs on the 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 the 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 integration of environmental concerns including EIA into 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. The integration process was to be achieved through a multi-sectorial approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision making. As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process, EIAs were introduced targeting the industrialists, business community and local authorities (now the county governments).

*The proposed project shall be implemented and operated based on these guidelines*

#### **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 promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It therefore

calls for 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 neighborhood and further downstream are not negatively impacted by the emissions.

*All liquid waste generated from the proposed project will be directed into the existing trunk 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 25<sup>th</sup> 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 trunk sewer system; that the solid waste is collected and transported for final disposal at a designated disposal site by a licensed waste transporter and that the proposed development will be connected to the existing NCWSC water supply and borehole water.

### **Goal 6: Clean Water and Sanitation**

The proponent is committed to providing adequate sanitary facilities during the project cycle. All liquid waste will be channeled into the existing trunk 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 a 105 KWp grid tied Solar PV system for the green energy supply 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 the 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 environment, Article 42 of Chapter 4, 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.

Chapter 5 of the new constitution provides the main pillars on which the 77 environmental statutes are hinged and covers "Land and Environment" and includes the aforementioned articles 69 and 70. Part 1 of the Chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. Part 2 of the Chapter directs focus on the environment and natural resources. It provides for a clear outline of the state's obligation with

respect to the environment. The Chapter seeks to eliminate processes & activities likely to endanger the environment.

There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this Chapter. In conformity with the Constitution of Kenya 2010, every activity or project undertaken within the Republic of Kenya must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. The proposed development project is a development activity that will utilize sensitive components of the physical and natural resources hence need for a clearly spelt out environmental management plan to curb probable adverse effects to the environment.

*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.**

Section 3 states that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment and that the entitlement to a clean and healthy environment under subsection (1) includes the access by any person in Kenya to the various public elements or segments of the environment for recreational, educational, health, spiritual and cultural purposes. Section 58 (2) of the Act states the proponent of any project specified in the Second Schedule shall undertake a full environmental impact assessment study and submit an EIA Study Report to the Authority prior to being issued with the EIA license. Section 58 (5) states that EIA studies and reports required under the Act shall be conducted or prepared respectively by individual experts or a firm of experts authorized in that behalf by the Authority. Section 58 (7) further states that EIA shall be conducted in accordance with the EIA regulations, guidelines and procedures issued under this Act.

*The proponent has engaged the services of the 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 (1) 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.

*The environmental experts have undertaken this EIA Study report in line with the provisions set out in these regulations. A public meeting, administration of questionnaires and interviews were conducted to seek 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, 2006**

The Regulations apply to drinking water, water used for industrial purposes, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife, and water used for any other purposes. Regulation 4 (1) states that every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act. Regulation 4 (2) further states that no person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit. Regulation 24 states that no person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses. According to these regulations, every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act.

*All waste water shall be channeled into the existing trunk sewer system so as not to pollute the ground and surface water and if a pollution incidence occurs the contractor/proponent shall notify the authority immediately.*



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

Regulation 4 states that no person shall dispose any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle and that any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these regulations. Regulation 6 (1) stipulates that any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles: improvement of production process through conserving raw materials and energy, eliminating the use of toxic raw materials within such time as may be prescribed by the Authority and reducing toxic emissions and wastes; monitoring the product cycle from beginning to end by identifying and eliminating potential negative impacts of the product, enabling the recovery and re-use of the product where possible and reclamation and recycling and Incorporating environmental concerns in the design, process and disposal of a product. Regulation 9 further states that any person licensed to transport waste shall collect waste from the designated area of operations or storage areas and shall deliver such waste to the designated storage site, disposal site or plant.

*The proponent shall engage the services of a licensed waste transporter to collect, transport and dispose of wastes to the designated disposal sites.*

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

Regulation 3 of the regulations states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment except as otherwise provided in the Regulations. These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Regulation further 4 states that except as otherwise provided in these regulations, no person shall make or cause to be made excessive vibrations annoys, disturbs, injures or endangers the comfort, response, health or safety of others and the environment; or cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source. Regulation 14 relates to noise, excessive vibrations from construction, demolition,

mining or quarrying site, and state that where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work is to be carried out including but not limited to requirements regarding machinery that may be used, and the permitted levels of noise as stipulated in the Second and Third Schedules to these regulations. *The contractor shall ensure that all construction activities are carried out between 0800hrs and 1800hrs on weekdays to ensure that the neighbors are not disturbed. The contractor shall also ensure the construction machinery 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. Regulation 5 states that no person shall act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution; or emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the first Schedule. Further, regulation 6 stipulates that no person shall cause or allow emission of the priority air pollutants prescribed in the second schedule to cause the ambient air quality limits prescribed in the first schedule to be exceeded. Regulation 25 (1) states that no person shall cause or allow the emission of visible air pollutants from a stationary or mobile vehicle in excess of the limits set out under the prescribed Standard. Clause 33 states that no person operating construction equipment or handling construction material shall allow emission of particulate matter so as to adversely affect the limits set out in the First schedule. Regulation 35 states that no person shall cause or allow stockpiling or other storage of material in a manner likely to cause ambient air quality levels set out under the First Schedule to be exceeded. Regulation 38 stipulates that no person shall cause or allow emissions of priority air pollutants set out under the Second Schedule from disposal of medical waste, domestic waste, plastics, tyres, industrial waste or other waste by open burning.

*The proponent shall comply with these regulations and implement all mitigation measures provided in the EMP to prevent air pollution during the project cycle.*

### **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 of this Act states that every person has a right to access water resources, whose administration is the function of the national government. Section 11 states the establishment of the WRA whose functions are stipulated in section 12 and

include but not limited to receiving water permits applications for water abstraction, 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 ensure that the provisions stated in the act are observed and that the water permits shall be obtained before connecting to the NCWSC water supply and drilling of the borehole.*

### **3.3.9 The Water Resources Management Rules, 2007**

Rule 117 (2) states that a riparian landowner may request the Authority to demarcate the riparian boundary on his or her land at the cost of the Authority. Rule 118 (1) further stipulates that unless authorized by the Authority in consultation with other relevant stakeholders, no person shall undertake the activities listed in the Seventh Schedule on riparian land. The activities proscribed on riparian land are: Tillage or cultivation; Clearing of indigenous trees or vegetation; Building of permanent structures; Disposal of any form of waste within the riparian land; Excavation of soil or development of quarries; Planting of exotic species that may have an adverse effect to the water resource and/or any other activity that in the opinion of the Authority and other relevant stakeholders may degrade the water resource;

*The proponent shall observe and conserve the **riparian reserve of 10 meters** that was determined and pegged by WRA officers on 19<sup>th</sup> January 2022.*

### **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 shall ensure that safety measures are implemented in the use of tools and machinery within site and that protection of the workers and general public with any form of interaction with the construction site is given first priority.*

### **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; 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. Section 58 (1) and (2) further states that a person shall obtain development permission from the respective county executive committee member by applying for development permission from that County Executive Committee Member 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 county executive committee member 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 Change of Use and Architectural Plans for the proposed project have been submitted to NMS for approval before the construction begins.*

### **3.3.12 Public Health Act Cap 242**

Section 115 of the Act states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health. 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. Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits 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. Section 138 states 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 contract a licensed waste transporter to collect the solid waste from the site and disposal it of at designated disposal site. Effluent from the proposed development will be channeled into the trunk sewer system.*

### **3.3.13 County Government Act, 2012**

The main purpose of the enactment of this Act was to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Functions which were carried out by local governments were effectively transferred to the county governments. The Act gives 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 proposed project is within the Nairobi City Government and thus there will be need of working in liaison with the County Government. 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 Change of Use and Architectural Plans for the proposed project have been submitted to the NMS for approval 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 energy sector in Kenya. Sections 117-126 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the EMCA Cap 387. Moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

*The proponent will apply and connect to the existing main grid upon acquisition of a permit from the service provider. The proponent will also install a solar 105 KWp grid tied Solar PV system upon acquisition of a permit from the authority.*

### **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 contactors 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 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 registered by the authority and ensure that the construction workers are registered with the authority.*

### **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 has incorporated aspects of climate change adaptation and mitigation such as the installation of solar energy as source of renewable energy, rainwater harvesting, 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**

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.

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

### **4.3.18 The National Land Commission Act, 2012 (No. 5 of 2012)**

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 a 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 ensure the realisation 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 labeled and color coded receptacles, bins, containers and bags and that all waste service providers shall collect, handle and transport segregated waste.

*The proponent shall provide labelled containers for segregation of waste within the site and engage the services of a waste transporter to dispose of the waste at 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 National Environment Tribunal (NET)**

The tribunal is established under section 125 of EMCA and shall upon an appeal made to it in writing by any party or a referral made to it by the Authority on any matter relating to EMCA, inquire into the matter and make an award, give directions, make orders or make decisions thereon, and every award, direction, order or decision made shall be notified by the Tribunal to the parties concerned, the Authority or any relevant committee thereof, as the case may be.

*Any disputes related to the proposed project shall be presented to the tribunal for hearing and determination in accordance with EMCA and related laws.*

### **3.4.3 Water Resources Authority (WRA)**

The WRA will provide necessary water abstraction permits for the drilling of borehole within the site and ensuring the surface water sources (rivers) riparian reserve is observed during the implementation of the project. The authority will also monitor the water usage in the region and provide guidance on water use.

### **3.4.4 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 conducting inspections to ensure conformance to Occupational Health and Safety Act.

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

## CHAPTER FOUR: BASELINE INFORMATION

### 4.1 PHYSICAL ENVIRONMENT

#### 4.1.1 Climate

According to the Nairobi County Integrated Development Plan (CIDP) of 2018-2022, the County has a fairly cool climate resulting from its high altitude. Temperatures range from a low of 10°C to a high of 29°C. It has a bimodal rainfall pattern. The long rains season fall between March and May with a mean rainfall of 899 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 Topography and drainage

The subject plot slopes southwards towards Kirichwa Kubwa River with the highest point at 1748 meters near Oloitoktok Road and lowest point at 1744 meters near the river. Storm water from the site infiltrates naturally and excess flows towards the river. The surface water in the area is normally drained into the open drains located along Oloitoktok Road as shown in plate 4.1 below. Internal drains will be designed and constructed to collect storm water from the site and direct it towards the river.

#### Plate 4. 1: Open drains along the access road



*Source: Fieldwork, 29/07/2022*

### 4.1.3 Geology and soils

The soils in the area are greyey in colour, characteristic of volcanic areas. They owe their origin to weathering and erosion of underlying volcanic rocks and may include clays, laterite and alluvial deposits. The volcanic rocks are represented by the Nairobi Trachytes, Nairobi Phonolites and the Athi series. The thickness of these volcanics varies but generally decreases towards the east, probably due to both deposition and erosion. Below the volcanics are the basement system rocks consisting mainly gneiss and schist. The site majorly lies on Lower Kirichwa Valley Tuffs of tertiary age, which are further underlain by Nairobi trachytes and Athi tuffs. The soils and rocks will be excavated to pave way for the proposed development upon acquisition of an excavation permit from Nairobi City County.

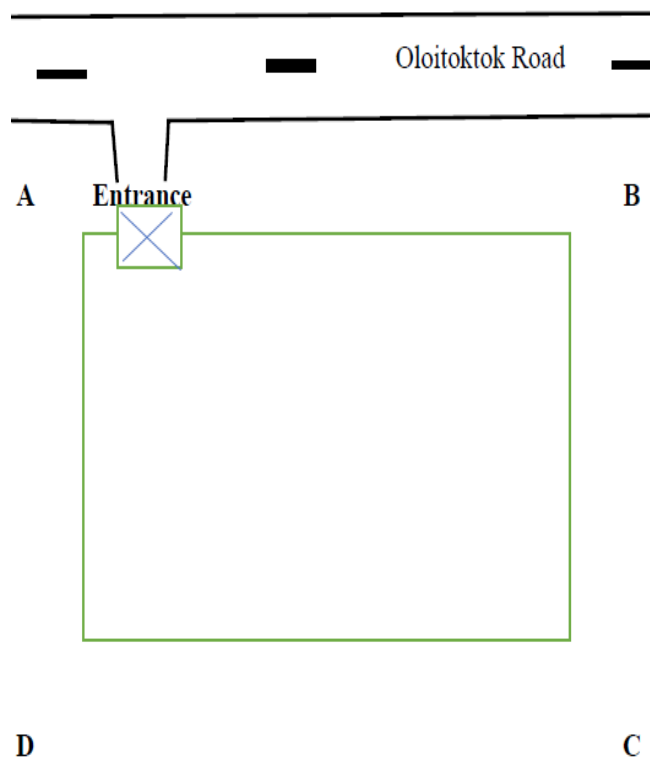
### 4.1.4 Hydrology

The property abuts **Kirichwa Kubwa River** on its southern side. A site visit by WRA officers was conducted on 19<sup>th</sup> January 2022 for riparian reserve marking. **Ten (10) meters on Kirichwa Kubwa River** was marked as riparian reserve. (*Attached is the WRA Pegging Report*). The proponent shall ensure that none of the proscribed activities on the sixth schedule of Water Resources Management Rules 2007 should be carried within the stated riparian reserve and that the masonry boundary fence encroaching on the riparian reserve should be removed.

A hydrogeological survey was conducted in May 2022 to determine the viability of a **borehole, its capacity and quality of water** within the site. The study recommended an 8" borehole to be drilled at a **minimum depth of 320 meters and a maximum of 370 meters** below ground level. The borehole will be cased using machine made mild steel screen casings and installed with a piezometer & a master meter to enable monitoring of the water level and recording the amount of water abstracted respectively. The proponent has commenced the process of drilling a borehole to supplement the existing water supply. The drilling is undertaken in conformity with the laid out laws and regulations governing the underground water.

### 4.1.5 Ambient Air Quality

The site was evaluated for potential sources of air emissions including fugitive dust and exhaust emissions from vehicles and machinery. Baseline air quality measurements were carried out across the four (4) points on 4<sup>th</sup> August 2022 during the day time at about 9:00am as shown in figure 4.1 below.

**Figure 4. 1: Sampling Positions around the Plot**

Air samples were analyzed for Particulate Matter (PM10 and PM2.5). The equipment in use was the Casella CEL-712 Microdust Pro calibrated using ISO 12103-1 Fine Dust Test. The measurement of PM10 and PM2.5 were taken alongside noise level readings under similar weather condition and time. *The results and observations made on site during the sampling exercise shows that the concentrations of PM10 and PM2.5 were within the recommended TLV with no effect/harm to the environment as shown in table 4.1 below.* The low readings are attributed to the mild precipitation at the time of the assessment that held dust to the ground.

**Table 4. 1: Particulate Matter Results**

Points	GPS Coordinates	PM 10 mg/m <sup>3</sup>	PM 2.5 mg/m <sup>3</sup>
A	1 °17' 06''S, 36 °47' 00''E	0.02	0.03
B	1 °17' 06''S, 36 °47' 01''E	0.01	0.02
C	1 °17' 07''S, 36 °47' 02''E	0.01	0.02
D	1 °17' 07''S, 36 °47' 00''E	0.02	0.03
<b>TWA OEL-RL</b>		<b>10</b>	<b>5</b>

#### 4.1.6 Ambient Noise Levels

A precision sound level meter type SL821, Serial Number P20009485 was used to collect noise measurement levels in dB (A) while standing one (1) meter from the boundary wall. The noise levels were carried out across the four (4) plot boundary points on 4<sup>th</sup> August 2022 as shown in figure 4.1 above. 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. The noise level assessment undertaken at the site showed the following;

- i. That the noise levels for the positions along Oloitoktok Road (Points A & B) were slightly above the day's maximum permissible noise levels for **Zone D (Mixed Residential Zone with some commercial and places of entertainment)**.
- ii. That the noise levels for positions away from Oloitoktok Road (Points C & D) were within the day's maximum permissible noise levels for **Zone C (Residential Zone (Outdoor))**.
- iii. That the main source of noise is majorly from vehicular traffic along Oloitoktok Road and therefore the noise levels would vary depending on the traffic along the access road.

The developer has observed a nine (9) meter building line from the access road that will act as buffer from the noise from the vehicular traffic. All trees along the building line will be preserved and more trees planted to act as buffer zones for the proposed development.

**Table 4. 2: Noise Level Results**

Points	GPS Coordinates	Measured Noise Level dB(A)	Sound Level Limits dB(A) for Zone D	Remarks
A	1 °17' 06''S, 36 °47' 00''E	56.7	55	Above limits
B	1 °17' 06''S, 36° 47' 01''E	57.7	55	Above limits
C	1 °17' 07''S, 36° 47' 02''E	47.6	55	Within limits
D	1 °17' 07''S, 36° 47' 00''E	46.7	55	Within limits

## 4.2 BIOLOGICAL ENVIRONMENT

### 4.2.1 Flora

The site is characterized by thirty (30) trees, grass, shrubs, and flowers as shown in plate 4.2 below. There are 22 mature trees and 8 young trees. Trees along the plot boundary will be conserved whereas the rest will be cleared to pave way for the proposed development and

measures will be taken to replant the trees while observing the necessary relevant policies. The floral species observed are not rare or endangered species and no sensitive habitats are within the vicinity of the site. The developer shall seek for a tree cutting permit from the Nairobi County Director of Forestry before carrying out the activity. Landscaping and greening measures will be carried out to improve the aesthetics of the site once the construction works are completed.

**Plate 4. 2: Vegetation within the Site**



*Source: Fieldwork, 18/07/2022*

**4.2.2 Fauna**

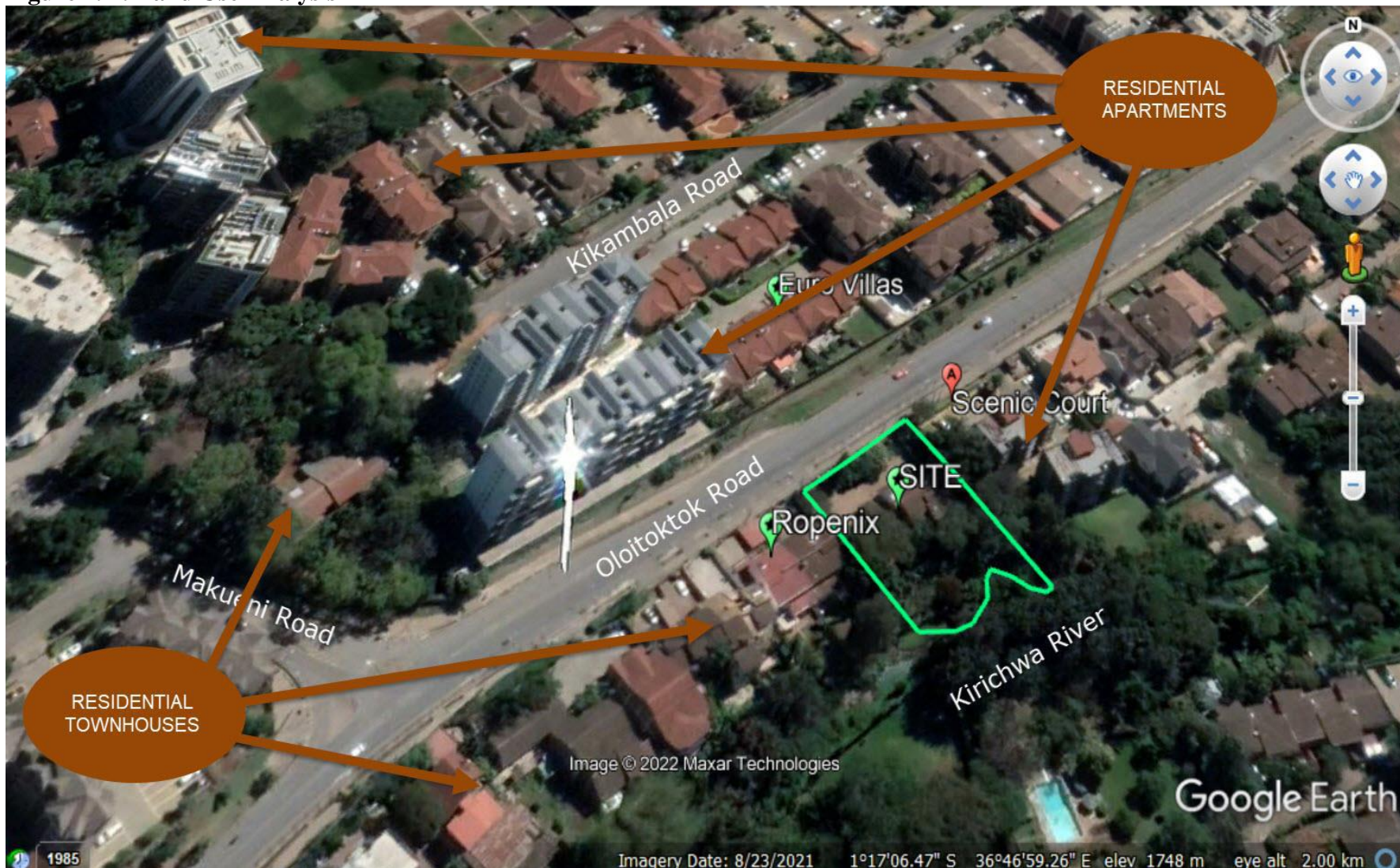
The area is characterized by a few bird species and domestic animals such as cats and dogs. No endangered or endemic faunal species were found in the vicinity of the project site.

**4.3 SOCIO-ECONOMIC ENVIRONMENT**

**4.3.1 Land Use**

The property is located in **Zone 4D according to the Nairobi City Development Ordinances and Zones which allows for Residential Flats Development**. The area is undergoing urban transformation from Single Dwelling Residential Units to Multiple Dwelling Units (Apartments) as shown in figure 4.2 below. Notable similar developments at a radius of 250 meters from the site include Spring Garden Apartments, Exeter Pride and Riana Apartments. Therefore, the proposed project conforms to the general character of the area and will ensure optimum utilization of the land resource and thus urban neighbourhood sustainability.

Figure 4. 2: Land Use Analysis



Source: Google Earth 2022

#### **4.3.2 Project Area Administration**

Nairobi County is divided into seventeen (17) sub-counties/constituencies, namely Starehe, Kamukunji, Kasarani, Roysambu, Ruaraka, Makadara, Embakasi South, Embakasi North, Embakasi Central, Embakasi East, Embakasi West, Dagoretti North, Dagoretti South, Langata, Westlands, Kibra and Mathare. The sub counties are further subdivided into eighty five (85) electoral wards. The project is located in Kileleshwa ward, Kileleshwa location of Dagoretti North Sub County.

#### **4.3.3 Demographic Patterns**

According to the 2019 Kenya Population and Housing Census, Nairobi City County had a population of 4,397,073 distributed between 1,506,888 households. This comprised of 2,192,452 males and 2,204,376 females with a population density of 6,247 km<sup>2</sup>. The county population is projected to rise to 5,958,338 in 2022. The County is growing at the rate of over 4.1 % per annum which is above the national average of approximately 2.3 % per annum. The population has been tremendously increasing on a yearly basis. This calls for development of infrastructure and social amenities to support the population.

#### **4.3.4 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 at a radius of one (1) kilometer from the site include Olenguruone Place Shopping Mall which houses supermarkets, bar & restaurant, leisure and recreation areas, merchandise, services, and financial institutions such as Artcaffe Kileleshwa, Fantasia Grill, Chowpaty Kileleshwa, Fleur Creations, Med Market Pharmacy among others. Other commercial activities include light industries such as TotalEnergies Kileleshwa Petrol Station located along Olenguruone Avenue. These activities will support the incoming population in their day to day demand for goods and services.

#### **4.3.5 Educational Institutions**

Kileleshwa area has seen an increasing number of educational institutions due to the increasing population. The different education facilities found in the area include Kindergarten such as Jabali Kindergarten and Darul Arqam Integrated Kindergarten; Primary Schools such as



Kileleshwa Primary School, Kileleshwa Academy and Angels International School; High schools such as Kenya High School and College such as Kenton College. These institutions will serve the residents of the proposed development.

#### **4.3.6 Religious Institutions**

The religious institutions found in the neighbourhood include mosques such as Darul Arqam Islamic Centre, Masjid Ibrahim Kileleshwa and Kileleshwa Mosque; churches such as Holy Trinity Catholic Church Kileleshwa, Kileleshwa PCEA Church and Kileleshwa Covenant Community Church. These institutions will provide places of worship for the incoming population.

#### **4.3.7 Health Institutions**

The major health institutions serving the residents in the area include Kileleshwa Medical Plaza, Bliss Healthcare Ltd, Gertrude Children's Hospital and AAR Healthcare Lavington clinic. Access to health facilities will enhance the provision of medical care to the incoming population and is part of the *Government Big Four Agenda* on Universal Health Care.

### **4.4 INFRASTRUCTURE AND SERVICES**

#### **4.4.1 Roads and Accessibility**

The property is accessed via **Oloitoktok Road** in Kileleshwa area of Nairobi City County. The access road is tarmacked, in good condition and has Non-Motorized Transport facilities such as the walkways and street lights. Oloitoktok road connects to Likoni Road, Ring Road Kileleshwa and Olenguruone Avenue linking the area to various centers such as Yaya Centre and CBD for socio-economic activities. The accessibility of the site will be instrumental during the project cycle.

#### **4.4.2 Water Supply**

The general area as well as the site is served with water by the NCWSC and the supply line is reliable. Water connection will be extended to the proposed development upon relevant application to the service provider. The proponent has commenced the process of drilling a borehole on site as an alternative source of water. Rainwater harvesting techniques have also been incorporated in the design. The developer will provide rain water harvesting and adequate storage facilities to supplement the supply line.

**Plate 4. 3: Oloitoktok Road**



*Source: Field Survey 29/07/2022*

#### **4.4.3 Liquid Waste Management**

The general area as well as the site is served by NCWSC conventional trunk sewer system. The internal reticulation system has been appropriately designed to collect all effluent/waste water from the proposed development and direct it into the public sewer system. All sanitary works will be done to the satisfaction of the County Government Health Department.

#### **4.4.4 Solid Waste Management**

The solid waste generated in the area is collected and transported for disposal twice a week by private waste collectors licensed by the NEMA. The proposed development will have an onsite waste collection point and will utilize these services. Waste segregation and recycling will be encouraged where feasible.

#### **4.4.5 Energy**

The general area is served by electricity from the KPLC. Relevant applications will be made to the service provider to extend power to the proposed development. During occupation phase, the use of energy conserving appliances (i.e. LED bulbs) and renewable energy sources such as solar energy will be incorporated in the building design.

#### 4.4.6 Security

There are street lights along the access road that light up the road at night and play a major role in enhancing security in the neighborhood. Security in the area is also beefed up by the nearby Kileleshwa Police Station which is located approximately 500m from the site. The site has an existing perimeter wall and a gate which is manned at all times by security guards. During occupation, the proponent shall beef up security by employing security guards and installing CCTV cameras at strategic points within the premises to enhance the overall safety of the proposed development. The security will also be part of the activities undertaken by the management company

**Plate 4. 4: Power lines and Street lights along the access road**



*Source: Field survey, 29/07/2022*

#### 4.4.7 Information Communication Technology

The area is well covered by communication facilities such as Safaricom, Airtel, and Telkom. There exist fiber connections in the neighborhood and the same will be extended to the proposed development. All these will facilitate communication during the project cycle.

## CHAPTER FIVE: IMPACT ASSESSMENT AND MITIGATION MEASURES

### 5.1 ANTICIPATED IMPACTS

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 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 impact of the proposed project on the physical environment, community and the biological environment:

**Table 5. 1: Assessment criteria for significant impacts**

S/N	Impact	Classification
1.	Impact Type	<b>Direct:</b> The impacts will be generated directly from project activities. <b>Indirect:</b> The impacts are generated from secondary sources.
2.	Impact Nature	<b>Positive:</b> The impacts will affect the environment positively. <b>Negative:</b> The impacts will affect the environment negatively.
3.	Impact Duration	<b>Short Term:</b> The potential impacts only last for a short time during the construction period or less. <b>Medium Term:</b> The potential impacts last for approximately 10 years or half the lifetime of the project. <b>Long Term:</b> Impact will remain after operational life of project but appropriate mitigation measures have been used to reduce the impacts.
4.	Impact Extent	<b>Local:</b> Impacts extend beyond the project site. <b>Regional:</b> Impacts extend beyond the administrative area. <b>National:</b> Impacts are considered nationally.
5.	Impact Magnitude	<b>Low:</b> The magnitude of the impacts have minimal effect on the environment. <b>Medium:</b> The magnitude of impacts is significant and can be reversed with mitigation measures. <b>High:</b> 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 pollution	Direct	Short term	Local	Medium
4.	Traffic Density	Direct	Long term	Regional	High
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	High
9.	Energy demand	Direct	Long term	Regional	High
10.	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.	Devegetation	Direct	Long term	Local	Medium

## 5.2 POSITIVE IMPACTS

Positive impacts that shall be associated with the implementation of the proposed project include and are not limited to the following:

### i. Provision of housing units

The proposed project will provide **252 residential apartments** to the residents living in Kileleshwa area. This will contribute towards meeting the demand for housing in the area and the county at large. The proposed development has given emphasis on the resident's safety and wellbeing.

### ii. Provision of employment opportunities

The proposed project will create employment opportunities for both skilled and semi-skilled workers. During the construction phase, the project will employ a workforce of foremen, masons, plumbers, electricians, casual laborers among others. For the operation phase, the project will employ cleaners, security guards and property manager among others.

**iii. Provision of market for goods and services**

During the construction phase, the project will require building materials sourced both locally and in other parts of the region. This will have a positive impact towards the economic status of the suppliers and to the national economy through the payment of taxes for goods and services. The local economy in the area will also receive a boost through the purchase of food items, drinks, and other commodities required by the workers and incoming population.

**iv. Provision of revenue to the government and proponent**

There will be an increase in revenue to the national and county government through payment of relevant taxes such as VAT, rates, permits and to the proponent through the renting/leasing of the residential apartments.

**v. Improved security**

Security will be ensured around the proposed development through the installation of security lights and engagement of security guards to man the property at all times. CCTV cameras will also be installed at strategic points including near the access road. This will lead to improvement in the general security in the surrounding area.

**vi. Land use optimization**

The proposed development will result to a more economical use of the land without significant environmental degradation. The area has been zoned for high rise residential development and therefore the proposed development is in conformity with the zoning regulations.

**5.3 NEGATIVE IMPACTS**

**5.3.1 Soil Erosion**

The proposed project will have a negative impact on the geology of the site. This will be as a result of clearing of the existing vegetation and excavation of the soils to pave way for the construction of the substructure. The soils will be exposed to weather elements including wind and surface run off causing soil erosion. The traversing of heavy machinery during the construction will lead to compaction, soil erosion and may lead to 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).

*Mitigation Measures*

- i. Control excavation works especially during rainy/wet conditions.

- ii. Avoid unnecessary excavations and other soil disturbances that can predispose it to the agents of erosion.
- iii. The stockpiling of construction materials shall be properly controlled and managed.
- iv. Materials to be delivered on site in installments.
- v. Provide soil erosion control measures i.e. suppressing open surfaces with water or use of soil erosion control structures on prone areas within the site.
- vi. Avoid unnecessary movement of soil materials from the site.
- vii. Re-surface open areas on completion of the project and introduce appropriate vegetation.
- viii. Leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.
- ix. Building of physical barriers to prevent mass movement where necessary.

### **5.3.2 Air Pollution**

The proposed project is located in a residential zone. Air pollutants in the area are from fugitive dust and fumes/exhaust emissions from vehicular traffic on the road adjacent to the site. During the construction phase, air quality is expected to decline as a result of an increase in levels of fugitive dust from the excavation works, construction activities, the stockpiled earth materials, and concrete mixing. Tiny particulates are a public health hazard and may otherwise create considerable nuisances to the immediate neighbors and the public. There may be air pollution due to combustion of fossil fuels expected from construction machinery and vehicles. This is expected to be a short-term, reversible impact lasting only for the duration of the construction activity. The potential receptors of the air pollution will include the immediate neighbours (Scenic Court, neighbouring apartments and bungalows) and the workers within the site.

#### *Mitigation Measures*

- i. Screening of the entire site to control and arrest construction-related dust.
- ii. Regular sprinkling of water on the work areas to prevent fugitive dust violations.
- iii. Ensure no burning of waste on the site.
- iv. Workers will be provided with appropriate PPE such as gas masks & goggles when working in a dusty environment.
- v. Regular maintenance of the machinery to minimize the generation of hazardous gases.
- vi. Ensure the covering of loaded vehicles with clean impervious sheets to ensure that the dusty materials will not leak from the vehicles.

- vii. Use environmentally friendly fuels and minimize the machinery idling time.
- viii. Restrict heights from which materials are to be dropped as far as practicable to minimize the fugitive dust arising from unloading.
- ix. Cover the stockpiles within the site and install windbreaks and/or soil stabilizers to reduce wind-blown dust emissions.
- x. Monitor the air quality levels as per the EMCA (Air Quality) regulations.

### **5.3.3 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. Albeit annoying, this negative impact will be short-term limited to the construction phase. The potential receptors of the noise impact will include the immediate neighbours (Scenic Court, neighbouring apartments and bungalows) and the workers within the site.

#### *Mitigation Measures*

- i. Construction activities will be carried out during the day at specified time from 0800hrs to 1800hrs.
- ii. Use of noise suppressors or silencers or noise shields on noisy equipment.
- iii. The contractor shall endeavor to use equipment installed with noise abatement devices as much as practicable.
- iv. Servicing the construction machinery regularly to reduce frictional noise.
- v. Switch off the construction machinery and vehicles when not in use.
- vi. Workers will be provided with appropriate PPE such as earmuffs when working in a noisy environment.
- vii. Drivers delivering materials shall be advised to avoid unnecessary hooting of the trucks/vehicles.
- viii. Provision of a bill board at the construction site/gate notifying of the construction activity and timings.
- ix. The generator will have acoustic enclosure (sound attenuated-75dB at one meter) thus reducing the noise pollution to the environment.



- x. Safe excavation shall be done using technologies that cause minimal vibrations so as to minimize the effect of excessive vibrations to the immediate buildings. In case of any inevitable damage to property, the proponent will ensure the affected parties are compensated.
- xi. Regular monitoring of noise and vibration levels at the site as per the EMCA (Noise and Excessive Vibrations) regulations.

#### **5.3.4 Traffic Density**

The project site is located in an area that is largely occupied by residential developments. The majority of vehicles using the access road are light vehicles from the different residences; school vans picking and dropping children in the area and few heavy commercial vehicles such as trucks that deliver goods to different commercial premises in the area. The road tends to get 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 increase the traffic volume that may lead to congestion along the access road. This may cause increased potential for accidents since the construction vehicles will be making right turns to leave and enter the project site.

#### *Mitigation Measures*

- i. The proponent will undertake a Traffic Impact Assessment (TIA) and ensure adherence of the recommendations.
- ii. The contractor will prepare a Traffic Management Plan (TMP) to provide safety measures for motorists, workers, road signs and barriers.
- iii. Traffic marshals will be engaged to control traffic in and out of the site.
- iv. Speed limit will be enforced during the construction period.
- v. Building materials will be ferried during the off-peak hours.
- vi. Construction vehicles will comply with axle load limits.
- vii. The contractor will employ well trained and experienced drivers.
- viii. Warning/ informative signs will be erected within the site entrance at strategic point where they are easily viewed by the drivers and motorists in the area.
- ix. A separate entry and exit points will be provided within the development to ease the traffic flow in and out of the project site.

- x. Adequate parking spaces will be provided within the site to ensure no vehicles are parked along the access road or on the existing pedestrian walkways.

### **5.3.5 Solid Waste**

The potential sources of solid waste during the construction phase will include general construction waste such as debris, metal cuttings, cement bags, tree cuttings among others; food waste and rejected materials. During the operation phase, the potential sources will include food waste, paper, e-waste, plastic, glass and organic waste. Such wastes can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on human health. Some of these waste materials especially the plastic/polythene are not biodegradable thus may cause long term injurious effects to the environment. The biodegradable waste such as organic wastes may be injurious to the environment because as they decompose, they produce methane gas, a greenhouse gas known to contribute to global warming. The waste if not well managed may impact on the site soil, fauna, air quality, and the workers' health & safety.

#### *Mitigation Measures*

- i. Provision of clearly marked dustbins within the project site.
- ii. Provision of the waste management area as a collection point within the development before final disposal.
- iii. Segregation of waste at the source before final disposal.
- iv. Engage the services of licensed waste transporter to dispose of the waste at designated disposal sites.
- v. Use of an integrated solid waste management system through a hierarchy of options: source reduction, recycling, and reuse, will facilitate waste handling during occupation phase.
- vi. Efficient use of building material to reduce waste and recycling where possible.
- vii. Manage waste in line with the EMCA (Waste Management) Regulations, 2006.

### **5.3.6 Liquid Waste**

Waste water is anticipated to increase as a result of 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 anticipated daily wastewater volumes from the proposed development will be approximately 64,800 liters. The liquid waste if not well managed may impact on the surface water (Kirichwa Kubwa river), underground water, air quality and the health & safety of the workers.

*Mitigation Measures*

- i. Channel all liquid waste to the existing trunk sewer system.
- ii. The proponent will design an internal reticulation system which will consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it will have the capacity to consistently handle the loads even during peak volumes.
- iii. Frequent monitoring of the internal reticulation system to ensure that any blockages and damages are fixed expeditiously.
- iv. All manholes on drive ways and parking areas shall have heavy-duty covers set and double sealed airtight as approved by specialists.
- v. Ensure regular maintenance of foul water drainage works at the premises to prevent clogging and fore-stall breakdowns.
- vi. Provision of adequate and appropriate sanitary facilities for the construction workers.
- vii. Regular cleaning of the sanitary facilities during the construction phase.
- viii. Proper decommissioning of the sanitary facilities will be carried out once construction is complete.

**5.3.7 Storm Water Drainage**

The clearance of vegetation and excavation works will lead to increased soil erosion at the project site and 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 storm water entering the drainage systems, resulting in overflow and damage to such systems.

*Mitigation Measures*

- i. Undertake comprehensive landscaping through the use of indigenous and local plants & trees within the open areas.
- ii. Use of semi permeable materials during the construction of pavements.
- iii. Construct gently sloping drains to convey water at non-erosive speed.

- iv. Cover the drainage channels with gratings to avoid accidents and entry of dirt.

### 5.3.8 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 the construction activities such as cement mixing, curing of concrete, drinking water for workers, and other construction-related activities. On occupation, water will be required for general use and domestic purposes such as drinking, cleaning, and car washing. The estimated amount of water required during the operation phase will be **48m<sup>3</sup> a day translating to 1,440 m<sup>3</sup> monthly**. 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.

#### *Mitigation Measures*

- i. Drill a borehole to supplement the existing NCWSC water supply.
- ii. Provide adequate centralized underground tank with a capacity of **210 m<sup>3</sup>** and additional holding roof tanks with a capacity of **48 m<sup>3</sup>**. ***The underground tank capacity is able to serve the residents for at least 4 days.***
- iii. Install water efficient fixtures/fittings that turn-off automatically when water is not in use. Six (6) liters dual flush cisterns have been specified for the development together with low flow rate taps and shower heads.
- iv. Encourage water reuse/recycling during the construction and occupation phases. To enhance water conservation in the establishment, all the test and drain water in the fire suppression system will not be treated as waste but rather fed back to the underground tank.
- v. Provide notices and information signs to sensitize the workers and residents on means and needs to conserve water resource i.e. ‘Keep/Leave the Tap Closed’, etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management.
- vi. Monitor the consumption of water on monthly basis.

### 5.3.9 Energy Demand

A significant amount of energy will be required during the project cycle. Energy will be required for the running of construction machinery and other equipment during the construction phase. During operation phase, electricity will be required for internal & external lighting, cooking,

water heating, space cooling and running of appliances such as fridge, television, computers among others. The estimated energy demand required during the operation phase will be **444KVA**. This will place some amount of strain on the existing energy supply in the area.

#### *Mitigation Measures*

- i. Apply for connection permits from KPLC and EPRA as appropriate.
- ii. The proponent will apply for a 630 KVA transformer from KPLC for energy supply within the development.
- iii. Install a 105 KWp grid tied Solar PV system for the green energy supply for the proposed development.
- iv. Install a 500KVA generator as an alternative back up for the development.
- v. Install energy efficient fixtures and fittings within the development. The fittings include energy saving LED fittings that comply with EDGE standards (EEM22) and motion sensors & timer switches that comply with EDGE standards (EEM24) will be used to control powering on and off of the LED fittings hence saving energy.
- vi. Maximum utilization of natural lighting during the day and in turn preserve the amount of energy used for lighting. This will be achieved by provision of adequate setbacks and large windows within the establishment.
- vii. Engage the services of registered personnel to install and maintain the electrical component within the site.
- viii. Turn off machinery and equipment when not in use.
- ix. Put off all lights immediately when not in use or are not needed.
- x. Perimeter wall lighting has been designed using IP65 rated wall mounted fittings facing the development and as a result there is no interference with the neighbors.
- xi. Monitor the consumption of energy on monthly basis.

#### **5.3.10 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 neighbors. The generation of the waste may pose a health and safety risks to the workers. Food for the construction workforce is usually provided by mobile individuals most of which operates without licenses. This can compromise health of the workers especially if such foodstuffs are

prepared in unhygienic conditions. The receptors of occupational safety and health impacts will be the workers and the immediate neighbors (Scenic Court, bungalows and apartments).

*Mitigation Measures*

- i. Register the site as a workplace with the DOSHS.
- ii. Provide adequate and appropriate PPE to the workers within the site such as safety boots, overalls, helmets, goggles, earmuffs, masks, gloves etc.
- iii. Provide first aid kit within the site fully equipped at all times and managed by a qualified personnel.
- iv. Adapt a suitable Emergency Response Plan (ERP) to manage occurrence of anticipated hazards during the construction phase.
- v. The contractor will appoint a qualified full-time health and safety advisor and fire marshal on-site during the construction phase.
- vi. Establish a Health and Safety committee during the construction phase.
- vii. Induct and train all construction workers on OSH procedures.
- viii. Hold daily (or as appropriate) tool box meetings for all workers.
- ix. The contractor will provide workmen's compensation cover that complies with Work Injury and Benefits Act (WIBA) as well as other ordinances, regulations and union agreements.
- x. Local individuals preparing food for the workers at the site should be controlled, monitored and evaluated to ensure that food is hygienically prepared.
- xi. Workers should always be sensitized on social issues such as drugs, alcohol, diseases such as HIV/AIDS and STIs etc.
- xii. Ensure provision of safe drinking water for the workers within the site.
- xiii. Regular monitoring and evaluation of the safety of the site on weekly basis.

**5.3.11 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 the fire risks will vary from one task to another. The receptors of the fire risks include the workers and immediate neighbors.

*Mitigation Measures*

- i. The contractor will hire competent and properly authorized electrical personnel to do the electrical works within the site.
- ii. Provide adequate and appropriate firefighting equipment within development.
- iii. Lightning protection will be installed using active lightning arresters to reduce the risk of property damage by lightning strikes.
- iv. Fire suppression will be installed involving a combination of a sprinkler system for the parking levels, a hydrant, and a fire hose reel system.
- v. Organize for inspection and maintenance of fire equipment at least once in a period of six months.
- vi. Train and induct the workers and residents on the appropriate use of firefighting equipment. At least one person trained on handling firefighting techniques should be available through-out the construction phase of the project.
- vii. Post 'No smoking signs' where flammable materials will be stored.
- viii. Develop and post at the site, fire emergency and evacuation procedures.
- ix. Maintain on site telephone contacts for fire brigade, G4S fire brigade and St. Johns ambulance service provider.
- x. Designate fire assembly point within the project site.
- xi. Provide fire / emergency exits or alternatives routes of escape in cases of emergencies.

### **5.3.12 Security Risks**

The site under consideration is fenced with a masonry wall of approximately 2 meters in height with an electric fence and a gate. The gate is manned by security guards at all times just like most development in the area. There are street lights along the access road leading to the site that light up the area enhancing security in the neighborhood. The building materials and machinery may attract thieves and intruders within the site. Insecurity may arise during the construction phase since intruders may try to steal the building materials and/or machinery within the site.

#### *Mitigation Measures*

- i. Engage services of registered security personnel to man the site at all times.
- ii. The security guards stationed at the gate will document movements of the people and vehicles in and out of the site.

- iii. The proponent/contractor will install CCTV cameras at strategic points to monitor security within the site. CCTV installation will be designed in a manner that captures a good section of the road thus improving security around the development.
- iv. Encourage community policing among the residents by introducing the “*Nyumba Kumi Initiative*” to promote a more secure and vigilant community.
- v. The proponent will prohibit alcohol, drugs, arms, and ammunition within the site.

### **5.3.13 Oil Pollution**

The sources of oil pollution within the project site 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 form of oily containers or oil rags. 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 surface water (Kirichwa Kubwa river), site soil, air quality and the health & safety of the workers.

#### *Mitigation Measures*

- i. Regular inspection and maintenance of all machinery shall be undertaken at designated service bays away from the project site. Maintenance will be carried out in a well-designed and protected area and where oils/grease is completely restrained from reaching the ground. Such areas should be covered to avoid storm from carrying away spilled oils into the soil/water systems.
- ii. All oils/grease and materials will be stored in a paved area with containment within the site.
- iii. Proper disposal of oil handling materials such as oily drums, oily papers/materials and cans will be undertaken by licensed waste transporter.
- iv. All drainage facilities shall be fitted with adequate functional oil-water separators and silt traps.
- v. The contractor should also prepare an ERP for preventing and dealing with emergencies like oil and fuel spills.

### **5.3.14 Devegetation**

The site is characterized by several types of trees, grass and flowers. During the construction, there will be clearing of vegetation and removal of top soil to pave way for the development. The



project site is located in an area where there is high human disturbance. During the study, there were no rare, endemic or threatened species recorded.

#### *Mitigation Measures*

- i. The young trees along the building line and within the riparian reserve will be conserved.
- ii. The proponent will obtain a tree cutting permit before cutting down the trees.
- iii. Comprehensive landscaping exercise will be undertaken using indigenous species after the construction phase.
- iv. Apartment gardening will be encouraged within the development during the operation phase.

## **CHAPTER SIX: OCCUPATIONAL HEALTH AND SAFETY**

### **6.1 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 way:

- i. Risks of slips, trips and falls
- ii. Risks related to instability
- iii. Risks related to traffic
- iv. Risks related to construction machinery
- v. Risks related to electricity
- vi. Risks related to gas
- vii. Fire and explosion risks

After 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.

## 6.2 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, 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.

## 6.3 Construction Safety, Emergency Procedures and Action Plan

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

1. 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.
2. 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
3. Support the role of the supervisor in creating and maintaining a culture that fosters worker participation in identifying and mitigating workplace hazards.

4. 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 site.
5. 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.
6. 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.
7. Place visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.
8. Enclose or isolate hazardous parts of machines or sites within the construction site to minimize exposure.
9. Prepare and maintain emergency response equipment such as fire extinguishers and first aid kits in readiness for use when need be.
10. 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.
11. Comply with the provision of the Occupational Safety and Health Act, 2007

## CHAPTER SEVEN: CONSULTATION AND PUBLIC PARTICIPATION

### 7.1 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 administering of questionnaires, interviews and public meeting as stipulated in the act.

### 7.2 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.
- iii. Generate a good understanding of the project.
- iv. Developing effective mitigation measures and management plans.
- v. Incorporate the information collected in the EIA study.

### 7.3 Stakeholders Identification

The process involves 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 not limited to the following:

- i. The local community that include the immediate neighbours to the site (Scenic Court and neighbouring residential townhouses).
- ii. Residents Associations who include the Kileleshwa Ward Neighbours Association (KIWANA), Kileleshwa Welfare Association and Westlands Association.

- iii. Government agencies who include the National Government Administration Officers (NGAO) (Kileleshwa area chief and assistant chiefs)
- iv. Development agencies who will include NCWSC and KPLC.
- v. Vulnerable Groups (Elderly, youths, women, disabilities)
- vi. Project personnel.

#### **7.4 Consultation Methods and Techniques**

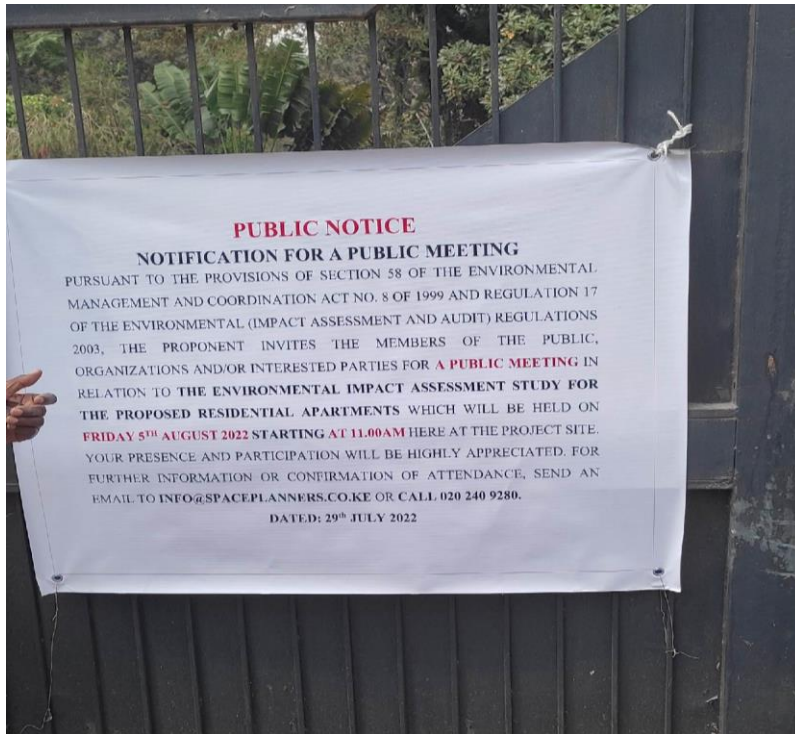
In line with Regulation 17 of the EIA regulations on Public Participation, the following methods and techniques were employed in order to gather information, comments and concerns from the identified PAP;

- i. Public meeting
- ii. Administration of questionnaires to the PAP
- iii. One-on-One Interviews with the PAP
- iv. Field surveys and observations.

#### **7.5 Public Meeting**

The public meeting was held on *Friday 5<sup>th</sup> August 2022* at the project site where the local community, resident associations and relevant stakeholders including the government and private sector representatives participated. The meeting began at 11.25 am and was attended by a total of 24 people. The agenda, minutes of the meeting, list of participants and attendance sheets are annexed in this report. 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 convenient for all concerned parties. Invitation letters were circulated to the stakeholders and an onsite notice erected on the site on 29<sup>th</sup> July 2022. (*Attached is the invitation letter and onsite notice*).

**Plate 7. 1: Onsite notice erected on site**



**Source: Field survey, 29/07/2022**

**Plate 7. 2: Public meeting**



**Source; Field survey, 05/08/2022**

**Plate 7. 3: The architect sharing the design of the project**



**Source; Field survey, 05/08/2022**

**Plate 7. 4: Stakeholders raising their concerns regarding the project**



**Source; Field survey, 05/08/2022**

## 7.6 Analysis of the Public Consultation Findings

The following is a summary of the comments and emerging issues from stakeholder consultations during the public meeting held on Friday 5<sup>th</sup> August 2022:

Name	Position	Key issues/concerns
Mr. David Obuki	KIWANA	<ul style="list-style-type: none"> <li>▪ The adequacy of the parking spaces <i>vis-a-vis</i> the number of units</li> <li>▪ Traffic congestion along the road since there is only one entry and exit from the site</li> <li>▪ The ground coverage in relation to the allowable provision by law</li> <li>▪ The size of the riparian reserve</li> <li>▪ The effect of the proposed development on the existing water and sewer systems in the area</li> </ul>
Ms. Linnet	Scenic Court	<ul style="list-style-type: none"> <li>▪ The trees along the plot boundary should be cut down since the roots are affecting the building</li> <li>▪ How noise and dust from the proposed development will be managed</li> <li>▪ Whether the entrance to the site will be widened to ease traffic congestion along the road</li> </ul>
Mr. Mutheke	Kileleshwa Welfare Association	<ul style="list-style-type: none"> <li>▪ What is the size of the generator, where it will be sited and how the vibrations will be managed</li> <li>▪ What is the allowable zoning of the area</li> <li>▪ Adequacy of the parking spaces for the proposed development</li> <li>▪ How to manage the pressure on the existing infrastructure including the water and sewer systems</li> <li>▪ Whether the developer will expand the size of the pipe supplying water to the site</li> <li>▪ Whether the greening of the riparian reserve will be undertaken</li> </ul>
Ms. Petronila	Westlands Association	<ul style="list-style-type: none"> <li>▪ Whether hydrogeological study has been undertaken before drilling the borehole</li> <li>▪ Whether the delivery of the construction materials will be carried out during the off-peak hours to avoid inconveniences to the neighbors</li> <li>▪ Whether the contractor will adhere to the operational working hours</li> <li>▪ That the density of the proposed development is too high and that the developer should reduce the floors</li> </ul>



		<p>from 18 to about 15</p> <ul style="list-style-type: none"> <li>▪ The equipment that will be used for excavation works and whether blasting will take place</li> <li>▪ Whether there will be commercial shops within the development</li> </ul>
Mr. Collins	Immediate Neighbor	<ul style="list-style-type: none"> <li>▪ What is the size of the setback from the proposed development to their property</li> <li>▪ Whether the development will have alternative sources of energy since the existing power supply is not stable</li> </ul>
Mr. Mwangi	Neighbor along Likoni Road	<ul style="list-style-type: none"> <li>▪ What are the sizes of the housing units for the proposed development</li> </ul>

The issues raised and the foreseen concerns have been adequately addressed in the report and in the detailed EMP. Attached are copies of the questionnaires and minutes of the public meeting indicating the detail record of the stakeholders' consultations and responses from different specialists who include the project architects, engineers, sociologists and environmental experts. CPP process will continue throughout the project cycle to ensure there is harmony with the neighbours of the project.

### **7.7 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 the 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 implementation of the continuous stakeholder engagement. This will comprise of the Sociologist (Grievance Officer), EHS officer, Site supervisor and a representative from the Residents Association. 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

### 8.1 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

### 8.2 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 to the construction of the residential apartments such as air, noise and water pollution, pressure on the existing infrastructure, soil erosion among others. However, it means the benefits associated with the proposed development will be foregone and the supply *vis a vis* demand of the housing stock will not be achieved. 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.

### 8.3 Proposed Project Option

The property was previously used for single-dwelling residential purposes but the existing residential structures have been demolished to pave way for the proposed development. The proponent has applied for a **Change of Use** from a Single Dwelling Unit to Multi-Dwelling Units (Apartments) at NMS pending approval. The proponent is proposing to **construct 252 residential apartments** to cater for the rising demand of housing units in the area. The project will have numerous benefits such as provision of housing units, revenue generation to the government, provision of employment opportunities, and the market for goods and services. 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.

#### **8.4 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 increase in expenditure, time, and additional costs to the proponent. Hence, this alternative is not considered viable.

#### **8.5 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 it will reduce the wasting of trees, has a longer lifetime, provides a steady and firm standing, easily assembled and dismantled and it increases the 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 the 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.

#### **8.6 Alternative Sources of Water and Energy**

The estimated demand for water and energy is 48m<sup>3</sup> daily and 444KVA respectively. This will place some amount of strain on the existing infrastructure in the area. The proponent has proposed to drill a borehole as the main source of water for the proposed development. The developer will also apply for a 630 KVA sole transformer from KPLC for energy supply within the development; install a 105 KWp grid tied Solar PV system as an alternative green energy supply for the proposed development and install a 500KVA generator as an alternative back up for the development.

## CHAPTER NINE: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality. The EMP outlined in the table addresses the identified issues of concern (potential negative impacts) and mitigation measures as well as roles, costs and monitorable indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMP have considered for all phases; construction, operational and decommissioning phases.

### 9.1 EMP FOR THE CONSTRUCTION PHASE

**Table 9. 1: EMP during Construction Phase**

Impact	Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (KShs)
<b>Soil erosion</b>	<ul style="list-style-type: none"> <li>▪ Obtain excavation permit before the excavation works.</li> <li>▪ Control excavation works especially during rainy/wet conditions.</li> <li>▪ Avoid unnecessary excavations and other soil disturbances that can predispose it to the agents of erosion.</li> <li>▪ Materials to be delivered on site in instalments.</li> <li>▪ Use of soil erosion control structures on prone areas within the site.</li> <li>▪ Re-surface open areas on completion of the project and introduce appropriate vegetation.</li> <li>▪ Levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.</li> <li>▪ Building of physical barriers to prevent mass movement where necessary.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- NMS/NCC</li> </ul>	Routine inspection	200,000
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>▪ Screening of the entire site to control and arrest construction-related dust.</li> <li>▪ Regular sprinkling of water on the work areas to prevent fugitive dust violations.</li> <li>▪ Ensure no burning of waste on the site.</li> <li>▪ Workers will be provided with appropriate PPE such as gas masks &amp; goggles when working in a dusty environment.</li> <li>▪ Regular maintenance of the machinery to minimize the generation of</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers and Drivers</li> </ul>	Daily inspection  Routine maintenance	300,000

	<p>hazardous gases.</p> <ul style="list-style-type: none"> <li>▪ Ensure the covering of loaded vehicles with clean impervious sheets to ensure that the dusty materials will not leak from the vehicles.</li> <li>▪ Use environmentally friendly fuels and minimize the machinery idling time.</li> <li>▪ Restrict heights from which materials are to be dropped as far as practicable to minimize the fugitive dust arising from unloading.</li> <li>▪ Cover the stockpiles within the site and install windbreaks and/or soil stabilizers to reduce wind-blown dust emissions.</li> <li>▪ Monitor the air quality levels as per the EMCA (Air Quality) regulations.</li> </ul>			
<b>Noise and excessive vibrations</b>	<ul style="list-style-type: none"> <li>▪ Construction activities will be carried out only during day at the specified time from 0800hrs to 1800hrs.</li> <li>▪ Use of noise suppressors or silencers or noise shields on noisy equipment.</li> <li>▪ The contractor shall endeavour to use equipment installed with noise abatement devices as much as practicable.</li> <li>▪ Servicing the construction machinery regularly to reduce frictional noise.</li> <li>▪ Switch off the construction machinery and vehicles when not in use.</li> <li>▪ Workers will be provided with appropriate PPE such as earmuffs when working in a noisy environment.</li> <li>▪ Drivers delivering materials shall be advised to avoid unnecessary hooting of the trucks/vehicles.</li> <li>▪ Provision of a bill board at the construction site/gate notifying of the construction activity and timings.</li> <li>▪ Safe excavation shall be done using technologies that cause minimal vibrations so as to minimize the effect of excessive vibrations to the immediate buildings.</li> <li>▪ Regular monitoring of noise and vibration levels at the site as per the EMCA (Noise and Excessive Vibrations) regulations.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> <li>- Drivers</li> </ul>	<p>Random inspection</p> <p>Routine maintenance</p>	250,000
<b>Oil pollution</b>	<ul style="list-style-type: none"> <li>▪ Regular inspection and maintenance of all machinery shall be undertaken at designated service bays away from the project site.</li> <li>▪ All oils/grease and materials will be stored in a paved area with containment within the site.</li> <li>▪ Proper disposal of oil handling materials will be undertaken by licensed waste transporter.</li> <li>▪ All drainage facilities shall be fitted with adequate functional oil-water</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> </ul>	<p>Routine inspection</p> <p>maintenance</p>	100,000

	<p>separators and silt traps.</p> <ul style="list-style-type: none"> <li>▪ The contractor should also prepare an ERP for preventing and dealing with emergencies like oil and fuel spills.</li> </ul>			
<b>Storm water drainage</b>	<ul style="list-style-type: none"> <li>▪ Undertake comprehensive landscaping through the use of indigenous and local plants &amp; trees within the open areas.</li> <li>▪ Use of semi permeable materials during the construction of pavements.</li> <li>▪ Construct gently sloping drains to convey water at non-erosive speed.</li> <li>▪ Cover the drainage channels with gratings to avoid accidents and entry of dirt.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> </ul>	Routine inspection and maintenance	700,000
<b>Solid waste</b>	<ul style="list-style-type: none"> <li>▪ Provision of clearly marked dustbins within the project site.</li> <li>▪ Provision of the waste management area as a collection point within the development before final disposal.</li> <li>▪ Segregation of waste at the source before final disposal.</li> <li>▪ Engage the services of licensed waste transporter to dispose of the waste at designated disposal sites.</li> <li>▪ Use of an integrated solid waste management system through a hierarchy of options: source reduction, recycling, and reuse, will facilitate waste handling during occupation phase.</li> <li>▪ Efficient use of building material to reduce waste and recycling where possible.</li> <li>▪ Manage waste in line with the EMCA (Waste Management) Regulations, 2006.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> </ul>	Weekly inspection	500,000
<b>Liquid waste</b>	<ul style="list-style-type: none"> <li>▪ Channel all liquid waste to the existing trunk sewer system.</li> <li>▪ Design internal reticulation system will consider the estimate discharges from individual sources and the cumulative discharge of the entire project.</li> <li>▪ All manholes on drive ways and parking areas shall have heavy-duty covers set and double sealed airtight as approved by specialists.</li> <li>▪ Frequent monitoring of the internal reticulation system and ensuring the any blockages and damages is fixed expeditiously.</li> <li>▪ Ensure regular maintenance of foul water drainage works at the premises to prevent clogging and fore-stall breakdowns.</li> <li>▪ Provision of adequate and appropriate sanitary facilities for the construction workers.</li> <li>▪ Regular cleaning of the sanitary facilities during the construction phase.</li> <li>▪ Proper decommissioning of the sanitary facilities will be carried out once construction is complete.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> </ul>	Weekly inspection	500,000

<b>Water demand</b>	<ul style="list-style-type: none"> <li>▪ Drill a borehole to supplement the existing NCWSC water supply.</li> <li>▪ Provide adequate centralized underground tank with a capacity of 210 m<sup>3</sup> and additional holding roof tanks with a capacity of 48 m<sup>3</sup>.</li> <li>▪ Install water efficient fixtures/fittings that turn-off automatically when water is not in use.</li> <li>▪ Encourage water reuse/recycling during the construction and occupation phases.</li> <li>▪ Provide notices and information signs to sensitize the workers and residents on means and needs to conserve water resource.</li> <li>▪ Monitor the consumption of water on monthly basis.</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Workers</li> <li>- NCWSC</li> </ul>	Daily inspection	350,000
<b>Energy demand</b>	<ul style="list-style-type: none"> <li>▪ Apply for connection permits from KPLC and EPRA as appropriate.</li> <li>▪ The proponent will apply for a 630 KVA transformer from KPLC for energy supply within the development.</li> <li>▪ Install a 105 KWp grid tied Solar PV system for the green energy supply for the proposed development.</li> <li>▪ Install a 500KVA generator as an alternative back up for the development.</li> <li>▪ Install energy efficient fixtures and fittings within the development.</li> <li>▪ Maximum utilization of natural lighting during the day and in turn preserve the amount of energy used for lighting.</li> <li>▪ Engage the services of registered personnel to install and maintain the electrical component within the site.</li> <li>▪ Turn off machinery and equipment when not in use.</li> <li>▪ Monitor the consumption of energy on monthly basis.</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Workers</li> <li>- KPLC</li> </ul>	Daily inspection	350,000
<b>Traffic congestion</b>	<ul style="list-style-type: none"> <li>▪ The proponent will undertake a TIA and ensure adherence of the recommendations.</li> <li>▪ The contractor will prepare a TMP to provide safety measures for motorists, workers, road signs and barriers.</li> <li>▪ Traffic marshals will be engaged to control traffic in and out of the site.</li> <li>▪ Speed limit will be enforced during the construction period.</li> <li>▪ Building materials will be ferried during the off-peak hours.</li> <li>▪ Construction vehicles will comply with axle load limits.</li> <li>▪ The contractor will employ well trained and experienced drivers.</li> <li>▪ Warning/ informative signs will be erected within the site entrance.</li> <li>▪ A separate entry and exit points will be provided within the development to ease the traffic flow in and out of the project site.</li> <li>▪ Adequate parking spaces will be provided within the site.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Drivers</li> <li>- KURA</li> </ul>	Daily inspection	200,000



<b>Health and safety of workers</b>	<ul style="list-style-type: none"> <li>▪ Register the site as a workplace with DOSHS.</li> <li>▪ Provide adequate and appropriate PPE to the workers within the site such as safety boots, overalls, helmets, goggles, earmuffs, masks, gloves etc.</li> <li>▪ Provide first aid kit within the site fully equipped at all times and managed by a qualified personnel.</li> <li>▪ Adapt a suitable ERP to manage occurrence of anticipated hazards during the construction phase.</li> <li>▪ The contractor will appoint a qualified full-time health and safety advisor and fire marshal on-site during the construction phase.</li> <li>▪ Establish a Health and Safety committee during the construction phase.</li> <li>▪ Induct and train all construction workers on OHS procedures.</li> <li>▪ Hold daily (or as appropriate) tool box meetings for all workers.</li> <li>▪ The contractor will provide workmen's compensation cover that complies with WIBA as well as other ordinances, regulations and union agreements.</li> <li>▪ Local individuals preparing food for the workers at the site should be controlled, monitored and evaluated to ensure that food is hygienically prepared.</li> <li>▪ Workers should always be sensitized on social issues such as drugs, alcohol, diseases such as HIV/AIDS and STIs etc.</li> <li>▪ Ensure provision of safe drinking water for the workers within the site.</li> <li>▪ Regular monitoring and evaluation of the safety of the site on weekly basis.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> <li>- DOSHS</li> </ul>	Weekly inspection	200,000
<b>Security Risks</b>	<ul style="list-style-type: none"> <li>▪ Engage services of registered security personnel to man the site at all times.</li> <li>▪ The security guards stationed at the gate will document movements of the people and vehicles in and out of the site.</li> <li>▪ The proponent/contractor will install and making use of CCTV cameras at strategic points to monitor security within the site.</li> <li>▪ Encourage community policing among the residents by introducing the "Nyumba Kumi Initiative" to promote a more secure and vigilant community.</li> <li>▪ The proponent will prohibit alcohol, drugs, arms, and ammunition within the site.</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Proponent</li> </ul>	Daily inspection	200,000
<b>Fire Risks</b>	<ul style="list-style-type: none"> <li>▪ The contract will hire competent and properly authorized electrical contractor to do the electrical works within the site.</li> <li>▪ Provide adequate and appropriate firefighting equipment within development.</li> <li>▪ Lightning protection will be installed using active lightning arresters to</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Proponent</li> <li>- Workers</li> </ul>	Routine inspection and maintenance	100,000

	<p>reduce the risk of property damage by lightning strikes.</p> <ul style="list-style-type: none"> <li>▪ Fire suppression will be installed involving a combination of a sprinkler system for the parking levels, a hydrant, and a fire hose reel system.</li> <li>▪ Organize for inspection and maintenance of fire equipment at least once in a period of six months.</li> <li>▪ Train and induct the workers and residents on the appropriate use of firefighting equipment.</li> <li>▪ Post ‘No smoking signs’ where flammable materials will be stored.</li> <li>▪ Develop and post at the site, fire emergency and evacuation procedures.</li> <li>▪ Maintain on site telephone contacts for fire brigade, G4S fire brigade and St. Johns ambulance service provider.</li> <li>▪ Designate fire assembly point within the project site.</li> <li>▪ Provide fire / emergency exits or alternatives routes of escape in cases of emergencies.</li> </ul>			
<b>Devegetation</b>	<ul style="list-style-type: none"> <li>▪ The young trees along the building line and within the riparian reserve will be conserved.</li> <li>▪ The proponent will obtain a tree cutting permit before cutting down the trees.</li> <li>▪ Comprehensive landscaping exercise will be undertaken using indigenous species after the construction phase.</li> <li>▪ Apartment gardening will be encouraged within the development during the operation phase.</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Proponent</li> <li>- Workers</li> <li>- Director of Forestry</li> </ul>	Routine inspection and maintenance	100,000
<b>Impact on fauna</b>	<ul style="list-style-type: none"> <li>▪ Ensure that potentially contaminated runoff from storage areas are drained through oil traps.</li> <li>▪ Avoid dumping spoil and waste into the Kirichwa Kubwa River.</li> <li>▪ Limit vegetation clearing to the designated areas.</li> <li>▪ Suppress dust during earthworks through continuous watering.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine Inspection	100,000
<b>Conflict with neighbours</b>	<ul style="list-style-type: none"> <li>▪ Establish a grievance redress mechanism that is easy to access for stakeholders to report their concerns as they happen</li> <li>▪ Continuous communication between the developers and the stakeholders on the progress of the project and its effects</li> </ul>	-Proponent	Throughout	100,000

## 9.2 EMP FOR THE OPERATION PHASE

**Table 9. 2: EMP during Operation Phase**

Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
<b>Liquid waste</b>	<ul style="list-style-type: none"> <li>▪ Direct the liquid waste to the existing sewerage system.</li> <li>▪ Regular cleaning of the sanitary facilities within the development.</li> <li>▪ Regular monitoring and maintenance of the plumbing fixtures within the units.</li> <li>▪ Frequent monitoring of the internal reticulation system and ensuring any blockages and damages is fixed expeditiously.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Periodic checks Routine Maintenance	250,000
<b>Solid waste</b>	<ul style="list-style-type: none"> <li>▪ Segregation of waste at the source.</li> <li>▪ Provide for clearly marked dustbins to serve the specified use.</li> <li>▪ Provision of a centralised waste management room within the development.</li> <li>▪ Engage the services of a licensed waste transporter to dispose of the waste at designated disposal sites.</li> <li>▪ Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures.</li> <li>▪ Routine cleaning of the waste collection points/cubicles to avoid foul smell.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Periodic inspection	350,000
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>▪ Regular cleaning of dust prone areas such as driveways and corridors.</li> <li>▪ Regular maintenance of the machinery to minimize the generation of hazardous gases.</li> <li>▪ Regular collection and disposal of the solid waste to avoid exhaust/foul air</li> <li>▪ Comply with EMCA (Air Quality regulations) 2014.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine maintenance	150,000
<b>Noise Pollution</b>	<ul style="list-style-type: none"> <li>▪ Do annual noise monitoring to adhere to acceptable standards</li> <li>▪ Acoustic enclosure of the generator room to minimise the noise pollution into the environment.</li> <li>▪ The generator will have acoustic enclosure (sound attenuated-75dB at one meter) thus reducing the noise pollution to the environment.</li> <li>▪ Sensitize the residents on minimal permissible noise levels</li> <li>▪ Comply with EMCA (Noise and excessive vibration pollution</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Periodic inspection	200,000

	control) Regulations 2009			
<b>Health and Safety Risks</b>	<ul style="list-style-type: none"> <li>▪ Provision of adequate PPE to the workers.</li> <li>▪ Routine maintenance of the lift shafts and electrical equipment by accredited personnel.</li> <li>▪ Monitor any accidents/incidents within the development and keep the records.</li> <li>▪ Formulate an Internal Environmental Policy to guide on the best environmental practices within the development.</li> <li>▪ Regular inspection of the guard rails within the developments.</li> </ul>	<ul style="list-style-type: none"> <li>- Management Company</li> <li>- Residents</li> </ul>	Monthly inspection	150,000
<b>Storm water drainage</b>	<ul style="list-style-type: none"> <li>▪ Proper maintenance of the drainage structures within the site.</li> <li>▪ Inspection and maintenance of water harvesting facilities.</li> <li>▪ Comprehensive landscaping along the riparian reserve to increase the infiltration rate within the site.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine inspection and maintenance	150,000
<b>Increased water demand</b>	<ul style="list-style-type: none"> <li>▪ Provide adequate centralized underground and roof tanks.</li> <li>▪ Use water efficient appliances and fittings.</li> <li>▪ Regular maintenance of all water components including the borehole.</li> <li>▪ Monitoring of the water consumption on monthly basis.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Periodic Inspection Routine maintenance	250,000
<b>Increased energy demand</b>	<ul style="list-style-type: none"> <li>▪ Regular servicing of the generator and Grid Tied Solar PV system.</li> <li>▪ Put off all lights immediately when not in use or are not needed.</li> <li>▪ Switch off electrical appliances when not in use.</li> <li>▪ Regular monitoring and maintenance of the electrical components.</li> <li>▪ Use energy efficient electrical appliances and fixtures such as LED bulbs.</li> <li>▪ Monitoring of the energy consumption on monthly basis.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine maintenance	250,000
<b>Fire Risks</b>	<ul style="list-style-type: none"> <li>▪ Install firefighting equipment within the development which include a combination of a sprinkler system for the parking levels, a hydrant, and a fire hose reel system.</li> <li>▪ Sensitize the residents on fire risks i.e. conduct regular fire drills.</li> <li>▪ Provide escape routes/emergency exits within the development.</li> <li>▪ Adapt an effective emergency response plan.</li> <li>▪ Regular inspect and maintenance of the firefighting equipment.</li> <li>▪ Provide emergency numbers at strategic points within the development.</li> <li>▪ Install lightning protection using active lightning arresters to reduce the risk of property damage by lightning strikes.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine inspection	100,000

<b>Security Risks</b>	<ul style="list-style-type: none"> <li>▪ Engage services of security guards to man the premises day and night.</li> <li>▪ Installation of CCTV cameras at strategic points for monitoring and enhancing the security of the property during operation phase.</li> <li>▪ Placing alarms around the project and establishing emergency preparedness and response procedures.</li> <li>▪ Place hotline numbers on strategic places.</li> <li>▪ Sensitize occupants on security precautions.</li> <li>▪ Encourage community policing and formation of Nyumba Kumi communities.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	<p>Periodic inspection</p> <p>Routine maintenance</p>	150,000
<b>Traffic Density</b>	<ul style="list-style-type: none"> <li>▪ Provide traffic signs to reduce risk of accidents.</li> <li>▪ Provision of adequate on-site parking bays.</li> <li>▪ Regular maintenance of the parking bays.</li> <li>▪ Provide separate entry and exit points for motorized and non-motorized traffic to ease traffic flow and avoid collisions.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine maintenance	100,000
<b>Impact on fauna</b>	<ul style="list-style-type: none"> <li>▪ Ensure that potentially contaminated runoff from storage areas are drained through silt traps.</li> <li>▪ Avoid dumping spoil and waste into the Kirichwa Kubwa River.</li> <li>▪ Ensure replanting of trees and management within the riparian reserve.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine Inspection	-

### 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: EMP during Decommissioning Phase**

<b>Environmental/ Social Impact</b>	<b>Proposed Mitigation Measures</b>	<b>Responsibility for mitigation</b>	<b>Recommended frequency of monitoring</b>	<b>Estimated Cost (KShs)</b>
<b>Demolition of existing structures</b>	<ul style="list-style-type: none"> <li>▪ Apply for demolition permit from relevant authorities before commencing the demolition</li> <li>▪ Engage a registered private contractor to carry out the demolition</li> <li>▪ Provide workers with PPE</li> <li>▪ The demolition exercise to be limited to day time only</li> <li>▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009</li> </ul>	<ul style="list-style-type: none"> <li>-Project proponent</li> <li>-Contractor</li> <li>-NEMA inspectors</li> </ul>	Daily inspection	500,000
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>▪ Dust suppression with water sprays on dusty areas</li> <li>▪ Careful screening of construction site to contain and arrest construction related dust</li> <li>▪ Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent</li> <li>-Contractor</li> <li>-NEMA inspectors</li> </ul>	Daily inspection  Routine maintenance	300,000
<b>Noise and excessive vibrations</b>	<ul style="list-style-type: none"> <li>▪ Demolition activities to be restricted to daytime (8am to 5pm)</li> <li>▪ Use of Suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures</li> <li>▪ Workers in the vicinity or involved in high level noise to wear respective safety &amp; protective gear.</li> <li>▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent</li> <li>-Contractor</li> <li>-Workers</li> <li>-NEMA inspectors</li> </ul>	Routine inspection and maintenance	250,000
<b>Health and safety of workers</b>	<ul style="list-style-type: none"> <li>▪ All workers to wear PPEs e.g. helmets, safety boots and ear muffs</li> <li>▪ All workers will be sensitized before demolition begins, on how to control accidents related to construction.</li> <li>▪ Accordingly, adherence to safety procedures will be enforced.</li> <li>▪ All workers will be adequately insured against accidents.</li> </ul>	<ul style="list-style-type: none"> <li>-Contractor</li> <li>-Workers</li> <li>-Proponent</li> <li>-NEMA inspectors</li> </ul>	Daily monitoring	200,000

<b>Solid and liquid waste</b>	<ul style="list-style-type: none"> <li>▪ Ensure proper solid waste disposal and collection facilities</li> <li>▪ Refuse collection vehicles will be covered to prevent scatter of wastes by wind.</li> <li>▪ Demolition wastes to be collected by a licensed operator to avoid illegal final dumping at unauthorized sites.</li> <li>▪ All persons involved in refuse collection shall be in full protective attire.</li> <li>▪ Dismantling all fixtures and equipment of the internal sewer system</li> </ul>	<ul style="list-style-type: none"> <li>-Contractor</li> <li>-Proponent</li> <li>-NEMA inspectors</li> </ul>	Daily monitoring	500,000
<b>Re-vegetation and comprehensive landscaping</b>	<ul style="list-style-type: none"> <li>▪ Put in place an appropriate re-vegetation programme to restore the site to its original status</li> <li>▪ During the re-vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion;</li> <li>▪ Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences;</li> <li>▪ Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;</li> </ul>	<ul style="list-style-type: none"> <li>-Contractor</li> <li>-Proponent</li> </ul>	Random inspection and monitoring	350,000

## 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 provision of housing units in the area, creation of employment opportunities, improved businesses in the project area especially for various suppliers and increase in revenue to both the county and national governments among others as outlined in the report. However, the proposed project will also have negative impacts which include increased traffic along the access road, air and noise pollution, increased 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 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 approval by NEMA subject to the following conditions:

- i. That the construction activities shall be undertaken during the day at stipulated time.
- ii. That the proponent shall ensure strict implementation of the EMP developed in this report.
- 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 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.
- v. That the proponent shall adhere to all other conditions that the authority may find necessary.



## REFERENCES

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## **APPENDICES**

1. Copy of ownership documents
2. Copy of proponent KRA PIN Certificate
3. Copy of architectural plans
4. Copy of amalgamation approval
5. Copy of TOR Approval letter
6. Copy of expert practicing licenses
7. Copy of the WRA pegging report
8. Copy of Noise and Air measurements
9. Copy of the invitation letter for the public meeting
10. Copy of minutes of the public meeting
11. Copy of the attendance sheet
12. Copy of the Questionnaires
13. Copy of the Bill of Quantities Summary Page
14. Copy of the NEMA Invoice and Payment Receipt