ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT

PROPOSED RESIDENTIAL DEVELOPMENT PROJECT

ALONG RHAPTA ROAD, NAIROBI COUNTY
PLOT L.R. No. Nairobi/Block 4/113

PROPONENT

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DOCUMENT AUTHENTICATION

This Environmental Impact Assessment Exercise has been carried out according to the Environmental Management and Coordination Act, Cap 387 and Environmental (Impact Assessment and Audit) Regulations, 2003. We the undersigned, certify that the particulars in this report are accurate to the best of our knowledge.

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ACRONYMS

CCTVs	Closed Circuit Televisions
CCVA	Climate Change Vulnerability Assessments
CSR	Corporate Social Responsibility
EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management/Monitoring Plan
EMS	Environmental Management System
GOK	Government of Kenya
ICs	Inspection Chambers
ICT	Information Communication Technology
KBS	Kenya Bureau of Standards
KPLC	Kenya Power
KURA	Kenya Urban Roads Authority
MDGs	Millennium Development Goals
NCG	Nairobi County Government
NEC	National Environment Council
NEMA	National Environment Management Authority
NCWSC	Nairobi City Water and Sewerage Company
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
TOR	Terms of Reference
VOC	Volatile Organic Compounds
WHO	World Health Organization
WIBA	Work Injury Benefic Act
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Introduction

Central Link Property Co. Limited, a Kenyan registered company is proposing to construct an eighteen-storey residential apartment building on plot LR. No Nairobi/ Block 4/113 located along Rhapta Road, Nairobi County. The proposed development will mainly comprise of two hundred and sixteen apartment units and residential amenities such a gym, play area, car park and associated ancillary facilities within the proposed plot. Stalin Environment which is a NEMA registered Firm of Experts was contracted by the proponent to carry out an Environmental Impact Assessment for the proposed residential development project. This is to comply with the Legal requirement stipulated in the Environmental Management and Coordination Act Cap 387.

Environmental Impact Assessment is a tool for environmental planning and is identified as a key component in new project implementation. According to section 58 of the Environmental Management and Coordination Act (EMCA) Cap 387 second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003, new projects must undergo Environmental Impact Assessment. The Report of the same must be submitted to National Environment Authority (NEMA) for approval and issuance of relevant certificates. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

Scope Objective and Criteria of the Environmental Impact Assessment (EIA)

The Kenya Government policy on all new projects, programmes or activities requires that an Environmental Impact Assessment is carried out at the planning stages of the proposed undertaking. The scope of this Environmental Impact Assessment, therefore, covered:

- ✓ The baseline environmental conditions of the area,
- ✓ Description of the proposed project,
- ✓ Provisions of the relevant environmental laws,
- ✓ Identification and discussion of any adverse impacts to the environment anticipated from the proposed project,
- ✓ Appropriate mitigation measures,
- ✓ Provision of an environmental management plan outline.

The main objective of the assignment was to assist the proponent prepare a study report after carrying out an Environmental Impact Assessment (EIA) of the proposed development to ensure that appropriate measures to mitigate any adverse impacts to the environment are taken into consideration. The Environmental Impact Assessment carried out on the project identified existing and potential environmental impacts and possible concerns that interested and/or affected parties have with the development, as well as the associated prevention and mitigation measures for the negative impacts as stipulated in the proposed Environmental Management Plan (EMP).

Impacts and Mitigation Measures

Adequate environmental management systems should be incorporated during the entire planning, construction and operating stages of the project to minimize any adverse environmental impacts and assure sustainable development of the area. A summary of major impacts and proposed mitigation measures is presented in the Table below.

Negative Impacts	Mitigation Measures
Waste generation	✓ Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements; ✓ Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste; ✓ Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time; ✓ Use of construction materials containing recycled content where possible and in accordance with accepted standards; and ✓ Ensure adequate collection and storage of waste on site and safe transportation to licensed disposal sites by Licensed NEMA waste handlers.
Excessive noise and vibrations generation	✓ Prescribe appropriate noise reduction measures e.g. restricted working hours and transport hours and noise buffering; ✓ Install portable barriers to shield compressors and other small stationary equipment where necessary and locate stationary noise sources as far from existing sensitive receptors as possible; ✓ Use quiet equipment (i.e. equipment designed with noise control elements such as mufflers); ✓ Ensure use of well serviced vehicles and equipment.
Air pollution (dust and exhaust emissions)	✓ Provide 2.4-meter-high hoarding along site boundary ✓ Provide effective dust screen, sheeting or netting where a scaffolding is erected around the perimeter of the building under construction, from the ground floor level of the building up to the highest level of the scaffolding; ✓ Water all active construction areas when necessary; ✓ Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard; ✓ Down wash of trucks tyres prior to departure from site
Health and safety risks/hazards	✓ Enhance security by ensuring guards are posted around the project site and the strategic placement of security lights around the site. ✓ A roster of all construction workers shall be kept ✓ Unattended public access to the construction site shall be restricted and only one entry/exit point shall be used ✓ Appropriate health and safety measures shall be implemented. ✓ Warnings and signs should be placed in appropriate places. ✓ Ensure safety education/training of construction workers ✓ Appropriate Personal Protective Equipment shall be worn at all

Negative Impacts	Mitigation Measures
	times by all within the construction site including visitors ✓ Install proper fire management equipment and emergency response systems/strategies.
Increased water demand	✓ Promote awareness on water conservation ✓ Install water meters where applicable ✓ Identify activities and areas that cause high water consumption and reduce where applicable ✓ Install water-saving devices in the appropriate places (flow regulators, water flow sensors, self-closing taps, low-flush toilets, etc.) ✓ Regularly maintain plumbing fixtures and piping in order to avoid losses
Increased energy demand	✓ Identify and use areas/equipment/systems having minimum energy consumption; ✓ Install energy efficient lighting in common areas such as staircases and driveways; ✓ Use alternative energy e.g. solar power for water heating, and security lights; ✓ Install water heating systems as per the Solar Water Heating Regulations, 2012
Traffic and obstruction along access road	✓ Ensure that the Entry/Exit to the project site is located where it will cause minimal traffic along adjacent roads ✓ Ensure all construction vehicles to and from the construction site use the designated Entry/Exit to the project site ✓ All transportation of construction raw materials and excavated materials are to be conducted at traffic off peak hours ✓ Sensitize truck drivers to avoid unnecessary road obstruction ✓ Cover all trucks hauling soil, sand and other loose materials to avoid spillage and dust emissions that may interfere with smooth motoring Other mitigation measures are outlined within the report.

Conclusion

The Environmental Impact Assessment Study indicates that the proposed project will have both positive and negative environmental and social impacts. By putting in place the mitigation measures outlined within the report the negative environmental, safety, health and social impacts associated with the life cycle of the proposed project can be eliminated, minimized and controlled. In this light, it is recommended that the proposed project is granted an EIA License with adequate conditions that the project proponent should adhere to as well as the standards guidelines outlined in this reports Environmental Management Plan.

1. INTRODUCTION

1.1 Background and rationale for an Environmental Impact Assessment (EIA)

The proposed project comprises of the construction of an eighteen-storey residential apartment building (two hundred and sixteen apartment units) on plot LR. No Nairobi/ Block 4/113 located along Rhapta Road, Nairobi County. According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) Cap 387 and Part II and III of the Environmental (Impact Assessment and Audit) Regulations 2003, construction of the proposed development requires an Environmental Impact Assessment Report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences.

The main objective of the EIA study is to predict, assess, and analyze the possible positive and negative environmental and social impacts that are expected during the construction, operation and decommissioning phases of the project. This was done with the aim of proposing the possible mitigation measures for the highlighted negative impacts. This is in line with ensuring that the development does not impact negatively on the environment in terms of social, health, economic and physical (soil, water, plant and animals) state of the project site.

1.2 Content of the EIA Study Report

The contents of the EIA study report is based on the Environmental (Impact Assessment and Audit) Regulations Part IV. According to the Regulations the Study Report should where possible, contain description of the following:-

- ✓ a description of the nature of the proposed project;
- ✓ the proposed location of the project;
- ✓ a concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project;
- ✓ the objectives of the project;
- ✓ the technology, procedures and processes to be used, in the implementation of the project;
- ✓ the materials to be used in the construction and implementation of the project;
- ✓ the products, by products and waste generated by the project;
- ✓ a description of the potentially affected environment;
- ✓ 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;
- ✓ alternative technologies and processes available and reasons for preferring the chosen technology and processes;
- ✓ analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies.
- ✓ 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;
- ✓ provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities of the development project;
- ✓ the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
- ✓ an identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
- ✓ an economic and social analysis of the project;
- ✓ an indication of whether the environment of the surrounding areas is likely to be affected; and the available alternatives and mitigating measures; and

- ✓ any other matters as the NEMA may require.

1.3 Scope of the environmental impact assessment

In order to identify the potential environmental and social impacts, and to come up with the proper mitigation measures for the proposed project the consultant undertook the following:-

- A review of preliminary designs for the proposed project to get acquainted with environmental issues in the project site vicinity.
- The planning and preparing of a time schedule for the activities to be undertaken for the EIA.
- Visiting the project site, and consulting with the local communities and relevant key stakeholders
- Carrying out a comprehensive assessment ensuring all environmental concerns and views of all parties/persons likely to be affected by the project are taken into consideration.
- Developing an environmental and social management plan with mechanisms for monitoring and evaluating the compliance and environmental performance, which include the cost of mitigation measures and the timeframe of implementing the measures.
- Liaising with NEMA for compliance with all mandatory and regulatory requirements relating to the EIA.

1.4 Methodology of the environmental impact assessment

1.4.1 Data collection procedures

Data collection was carried out through administration of questionnaires, use of checklists, observations and photography, site visits and desktop environmental studies, where necessary and in the manner specified the Environmental (Impact Assessment and Audit) Regulations, 2003.

1.4.2 Desktop study

This included documentary review on the nature of the proposed activities, Project documents, Nairobi County Development Plan/Policy, and relevant legislative and regulatory frameworks among others. It also included discussions with the developer, project managers, architects and design engineers.

1.4.3 Site assessment

Field visits were carried out specifically for physical inspection of the proposed Project site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts. It also included taking photographs of the proposed site, access roads that will be used to access the site and other important features within the site and the surrounding areas.

1.4.4 EIA public consultation

To ensure adequate public consultation in the EIA process, the Consultant prepared questionnaires which were administered to the site's neighbours within a two Kilometer radius and the information gathered was subsequently synthesized and incorporated into the EIA Study report. Public meetings were conducted at the proposed project site and in accordance with Section 17 of the Environmental (Impact Assessment and Audit) Regulations, 2003 with the information gathered incorporated into the report. The appendices contain copies of the completed questionnaires administered to the public, public meetings register and public meeting minutes.

1.4.5 Reporting and documentation

A comprehensive EIA Study report containing the findings has been compiled by the Consultant in accordance with NEMA guidelines and submitted to NEMA by the Firm

of Experts on behalf of the proponent for consideration and approval. The Consultant ensured constant briefing of the client during the exercise. Description plans and sketches showing various activities are part of the Appendices.

2. PROJECT DESCRIPTION

2.1 Introduction

This chapter provides a detailed description of the project development assessed within this EIA. The overall objective of this Project is to develop and avail modern residential apartments with associated amenities on plot L.R No. Nairobi/Block 4/113 in Nairobi County. The proposed project will lead to conversion of the current single dwelling residential into a multistorey housing project. The actual design components of the project include: -

- ✓ Construction of an eighteen storey building block with 4 lower ground levels (see drawings attached)
- ✓ Construction of a driveways, sidewalks and parking bays
- ✓ Development utilities (water, drainage, electricity, health and safety systems, IT systems and security
- ✓ Site landscaping/beautification

The project will contribute towards increased availability of housing facilities within the area in general. The project will create several employment and business opportunities in addition to the several positive impacts discussed in this report. The proposed project site falls within an area with several upcoming residential and commercial developments including a good road network, piped water supply, electricity supply and sewer line.

2.2 Location and size of the project site

The proposed project site is located in a Land Parcel identified as L. R. No. Nairobi/Block 4/113 and covers a total area of Nought Decimal Two Nought Nine Two (0.2092) Hectares. The proposed project site is located along Rhapta Road - GPS coordinates are 1°15'53.0"S 36°47'34.7"E (-1.264719, 36.792979) in Nairobi County. Notable neighbours include the Liza Apartments, Kenton Court, Palm Flats, Willowdale Apartments amongst others.

Figure 1: Location of the proposed project on Rhapta Road

2.3 Existing structures on the proposed site

The proposed project site L. R. No. Nairobi/Block 4/113 is currently occupied by one partially demolished single storey residential house with a detached dsq. The project plot is surrounded by an iron sheet fence on the western and eastern borders; a hedge fence on the southern boundary and masonry stone wall on the northern boundary. There are

several mature trees within the plot as well as various flowers and grass lawns. The plots southern border is Rhapta Road while the eastern borders Kenton Court. There is an existing borehole at the project site while the Nairobi Water sewer line runs along Rhapta Road.

Photo 1: Current views of the proposed project site

2.4 Character of surrounding environment

Rhapta Road and the general surrounding area consists of blend of bungalows, modern apartments, hotels and office blocks. There are several similar buildings to the proposed building project which are under construction including Marina Bay Apartment and Malkya Heights along Sports and David Osieli Roads nearby. Other notable multistorey buildings within the neighbourhood include Le Mac (25 storey commercial/residential building), Ibis Styles Hotel and Dusit Princess Hotel. The proposed project shall therefore be consistent with the multi-storey building nature of the surrounding environment.

Photo 2: Marina Bay Apartment and Malkya Heights near the project site

2.5 Design and particulars of the Proposed Project

The surge in the construction of apartment buildings can be attributed to a confluence of demographic, economic, and social factors that are reshaping the housing landscape. Urbanization is a key driver, as an increasing number of people are seeking opportunities in cities, resulting in higher demand for housing in urban areas. Apartments provide a practical solution to accommodate this trend, offering efficient use of limited urban space while providing proximity to employment centers and amenities. Moreover, changing lifestyles and preferences have led to a rise in demand for rental properties. Young professionals and families are increasingly valuing the flexibility and convenience of renting, allowing them to avoid the commitment of homeownership and adapt to changing circumstances more easily. Developers are responding to this demand by constructing more apartment buildings that cater to diverse lifestyles and needs.

Furthermore, economic considerations play a significant role in the construction boom of apartment buildings. The costs associated with single-family homes, such as land prices, construction materials, and labor, have been steadily increasing, making homeownership a less attainable goal for many. In contrast, apartments offer a more cost-effective option for both developers and residents. The economies of scale achieved through apartment construction make it possible to provide housing at relatively lower costs per unit. This affordability factor, coupled with the growing preference for rental living, has led to sustained demand for apartments, prompting developers to capitalize on this market trend by initiating more construction projects.

Specific details of the proposed development are outlined in the proposed projects Architectural Drawings containing the site plan, layouts, sections, elevation and other plans that illustrate the development in more detail attached within the appendices. The proposed buildings design proposes the construction of an eighteen-storey building block with four lower basements. Table 1 below describes the facilities on each of the proposed buildings floors.

Table 1: Apartment units and facilities per floor

Floor	Facilities
Basement 1, 2, 3 and 4	Vehicle parking Utility Rooms – generator/ transformer/ electricity switchboard Underground water tanks/ stores
Ground Floor	Gatehouse Entry/Exit Lobby/Swimming Pool/ Playground
Typical Floor 1-18th	8 No. 2-bedroom apartment units 4 No. 1-bedroom apartment units
TOTAL	144 2-bedroom apartment units 72 1-bedroom apartment units **216 apartment Units**

2.5.1 Parking area and driveway

Four basement floors of the building will be designated mainly as a vehicle car parks as indicated in the table above). The driveways will measure 5 meters while the main entry/exit gate will measure 5.2 meters and will be spacious enough such as to allow easy turning and passage of vehicles. A gate house will also be provided at the building entry/exit for sentries to control and monitor the in and outflow of vehicles and human traffic.

2.5.2 Electrical system

The development will be connected to the electricity main line of the Kenya Power which already exists within the project area and thus will be used in all phases of the

project. A backup generator shall also be installed to be used during the operational phase of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

2.5.3 Water reticulation system

Water from the Nairobi City Water and Sewerage Company and a borehole onsite will be used during the operational phase of the project. Underground water reservoir tanks shall be built on site while overhead (rooftop) water tanks shall also be used to increase water storage capacity within the project. Necessary pumps shall be installed to facilitate water pumping into overhead tanks.

2.5.4 Storm water run-off

All storm water drainage will be channeled into storm water drains which will be constructed within the project compound. The drains will then be channeled to the nearby existing peripheral storm water drainage systems. All inspection chambers in the driveway and parking will have heavy duty covers.

2.5.5 Wastewater/Sewerage

Foul water drainage from the buildings will be connected to the Nairobi City Water and Sewerage Company sewer mains located along the plot boundary on Rhapta Road. All sanitary works will be up to M.O.H standards.

2.5.6 Security

Security within and around the project during construction and during operational phases will be enhanced by security guards posted at the site and installation of security lighting around the project site. During operation, 24 hours security will be incorporated by having security guards on site, CCTV and security lighting around and within the premises.

2.5.7 Fire safety systems

Several health and safety components will be incorporated into the project design so as to boost the emergency response and preparedness index of the building. Emergency staircases shall be incorporated from the topmost floor to the ground floor on both ends of the buildings while hose reels shall be located at several strategic points of each floor. Once complete, hose reels and portable fire extinguishers shall be incorporated at strategic points on all floors. Emergency response and "Emergency Exit" notices will also be posted where applicable and appropriate.

2.6 Description of the project's construction activities

2.6.1 Pre-construction investigations

The implementation of the proposed Project's design and construction phase will start with investigation and studies of the site's biological, physical and socio-economic factors in order to minimize any unforeseen adverse impacts during the project cycle. Infrastructure assessment studies shall also be conducted so as to harmonize the proposed project with existing infrastructure and amenities.

2.6.2 Site set up and management

This involves activities such as screening, fencing the project site, setting up temporary stores, demarcation of temporary roads, car parks, storage areas etc.

2.6.3 Demolition works and site clearance

Site clearance process entails any obstruction on the way of the intended construction activity. This entails demolition of any existing structures on site and clearing of obstructions that may lie within the proposed project path. In this case site clearance will result in substantial generation of solid waste since there is a

partially demolished permanent structure onsite and several trees to be cleared from the site. Any site clearance waste generated should be disposed by using appropriate methods to be identified within this report.

2.6.4 Ground works

Ground works such as excavation and deep trenching, filling, and the construction of earth structures e.g. embankments, bunds and cuttings; will be carried out to prepare the site for construction of foundations and drainage systems. This will involve the use of machinery such as excavators, bulldozers, backhoes and also manual labour.

2.6.5 Construction of foundations and structural works;

The construction of the buildings foundations, walls, floors, pavements, drainage systems and parking area among other components of the proposed project will involve a lot of masonry work and related activities. General masonry and related activities will include concrete mixing, plastering, slab construction, construction of foundations, construction of the envelope of the building, the external facings, cladding, erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplement by machinery such as concrete mixers, tower hoists, pavers, concrete vibrators amongst others.

2.6.6 Structural steel works

The building will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection.

2.6.7 Mechanical and electrical installations and associated trades

Electrical work during construction of the buildings will include installation of electrical gadgets and appliances including transformers, meters, electrical cables, lighting apparatus, sockets etc. In addition, there will be other construction activities involving the use of electricity such as welding, metal cutting, running electrical gadgets etc.

Plumbing will entail the installation of pipework for water supply and distribution will be carried out within the building and associated facilities. In addition, pipework will be done to connect the building into the existing sewer system and for drainage of storm water from the rooftops and driveways into the peripheral storm water drainage system. Other associated trades include as joinery, painting, window placement and plastering. These activities will include metal, wood, glass, plastic and ceramic tiles cutting, the use of adhesives, metal grinding and wall drilling among other activities.

2.6.8 Site reinstatement, removal of site offices and final clear away

This includes site reinstatement, removal of temporary building structures such as tower cranes, scaffolds and props, removal of fittings machinery and equipment and final clear away of surplus spoil.

2.7 Construction Inputs (Materials and Equipment)

Construction inputs/ raw materials shall include but not limited to sand, cement, machine cut stones, crushed rock (gravel/ ballast), steel metal bars, paint/painting materials, ceramic tiles, plastic and metal plumbing, marble counters, wood doors, skirting among others. Construction machines shall include machinery such as tower crane, batch plants, trucks, excavators, concrete mixers, masonry tools, hoists and other relevant construction equipment. Both skilled and non-skilled workers will be required at all phases of the project. The labour force will require services such as energy, water supply and sanitation facilities. Large volumes of water will also be required during the civil works.

3. BASELINE INFORMATION

2.8 Background information

Nairobi County is one of the 47 Counties of Kenya. Nairobi County was founded in 2013 on the same boundaries as Nairobi Province, after Kenya's 8 provinces were subdivided into 47 counties. Nairobi city is located at 1°17′S 36°49′E / 1.283°S 36.817°E / -1.283; 36.817 and occupies 684 square kilometers.

Nairobi is divided into a seventeen constituencies; these are Westlands, Dagoretti North, Dagoretti South, Langata, Kibra, Roysambu, Kasarani, Ruaraka, Embakasi South, Embakasi North, Embakasi Central, Embakasi East, Embakasi West, Makadara, Kamkunji, Starehe and Mathare. Most of the upmarket suburbs are situated to the west of Nairobi; these include Karen, Kitisuru, Lavington and Highridge, although Kangemi and Dagoretti are lower income areas. Most low and lower-middle income estates are located in eastern Nairobi and they include Kariokor, Dandora, Kariobangi, Embakasi and Huruma.

2.9 Project area description

Rhapta Road is a street located in Westlands constituency in Nairobi's Groganville Estate (See Map 1) approximately 3.8 Kilometers away from Nairobi CBD. It is an area that is dominated by mixed use developments including single dwelling to multi storey residential buildings and commercial buildings with several hotels and serviced apartments located along the street. The area being so close to Westlands CBD is thus currently made up of a mixed development blend with a population consisting of individuals from diverse social backgrounds. The real estate in Westlands tends to be on the higher end of the spectrum due to its prime location and modern amenities. Both commercial and residential properties in Westlands are sought after.

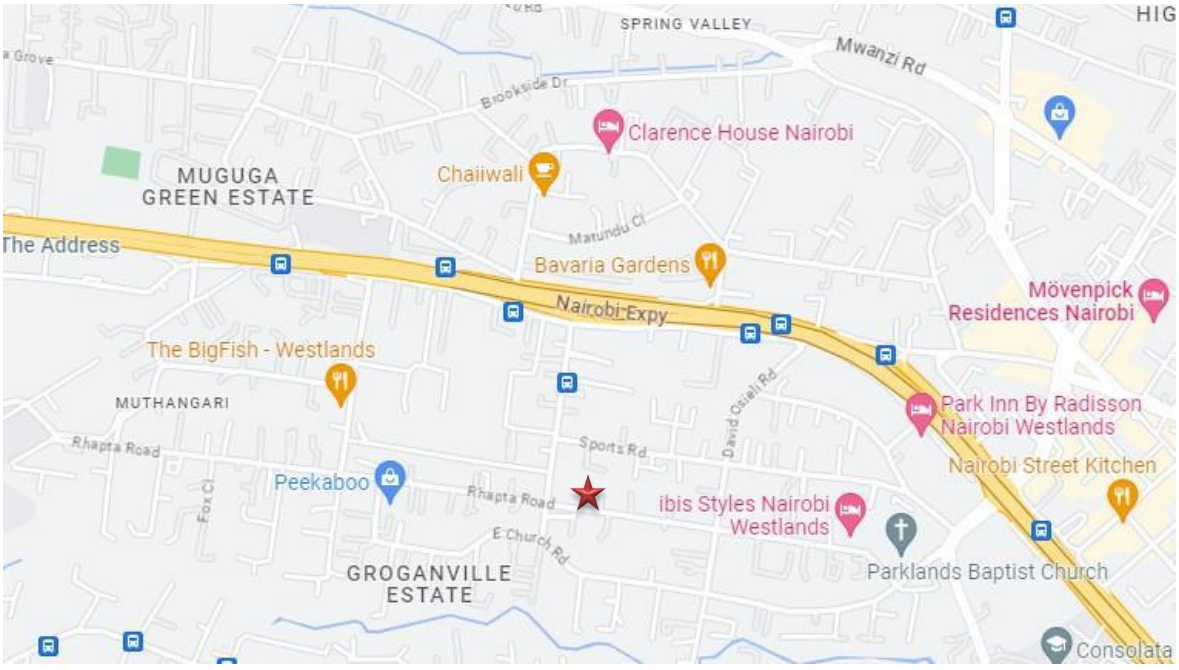

Figure 2: Map of Westlands Area with proposed project location

The proposed project area consists of a blend of single storey residential buildings, multi-storey apartments and commercial buildings with several hotels located within the area such as Ibis Styles Hotel, Pride Inn Azure Hotel and Dusit Princess Hotel Residencies. As the area continues to rapidly develop, investment opportunities for real estate and commercial developments in the area are on the rise with the key pull factors

being proximity to Westlands and Nairobi CBD, good transport network which makes travelling convenient and good security. The area is a mid-population density area.

Westlands is one of Nairobi's major commercial centers, hosting a variety of office buildings, business complexes, and shopping malls. The neighborhood is home to several multinational companies, corporate offices, and local businesses, making it a bustling hub for commerce. The area is renowned for its shopping and entertainment offerings. It features a number of upscale shopping malls such as Sarit Centre, Westgate Shopping Mall, and The Oval. These malls house international and local brands, restaurants, cafes, cinemas, and other recreational facilities.

While primarily a commercial district, Westlands also offers a range of residential options. There are upscale apartments, condominiums, and residential complexes that cater to both expatriates and local residents. The neighborhood's diverse population contributes to its cosmopolitan atmosphere. You can find a mix of cultures, languages, and cuisines, reflecting Kenya's multicultural society. Being strategically located near the city center it is well-connected by major roads, making it easily accessible from various parts of Nairobi.

2.10 Climate

At 1,795 metres (5,889 ft) above sea level, Nairobi enjoys a moderate climate. The altitude makes for some chilly evenings, especially in the June/July season when the temperature can drop to 10 C. The sunniest and warmest part of the year are from December to March, when temperatures average the mid-twenties during the day. The mean maximum temperature for this period is 24 C. There are two rainy seasons, but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. As Nairobi is situated close to the equator, the differences between the seasons are minimal. The seasons are referred to as the wet season and dry season.

2.11 Physical and topographic features

On the eastern side of the County the terrain gently rolls but is divided by steep valleys towards the city boundaries. To the north, there is the Karura forest which is characterized by steep sided valleys. The Karen - Lang'ata area is characterized by plains surrounded by Nairobi National Park on the east and Ngong Forest on the south. Several streams with steep-sided valleys covered with vegetation are a dominant landscape feature of the County. The main rivers in the County are Nairobi River, Ngong River and Kabuthi River while Nairobi dam, which is along the Ngong River, and Jamhuri dam are the main water reservoirs in the County. The main types of soils are the black cotton and the red soils that form patches in different parts of the County. There are three forests in the County namely Ngong Forest to the south, Karura Forest to the north and the Nairobi Arboretum. The three forests have a total coverage of 23.192 Km^2.

2.12 Ecological conditions

The County is predominantly a terrestrial habitat that supports a diverse web of biodiversity ecosystems. It is home to about 100 species of mammals, 527 bird species and a variety of plant species. Although it is endowed with some permanent rivers, the aquatic ecosystems are largely choked by the effects of pollution from different sources. Currently, efforts are underway to ensure a sustainable clean Nairobi River basin.

2.13 Environment

Nairobi is well endowed with a pleasant environment that preserves much of its pristine natural beauty. Ponds, seasonal springs, rivers, flooded grasslands, and swamps abound. Unlike other major cities, Nairobi is not situated on a large river or near the sea. Nevertheless, several streams criss-cross the city. Streams running from the Ngong Hills to the south and the ridges to the north become the Athi and Nairobi Rivers. Natural springs feed a number of small swamps in secluded hollows. In addition, temporary

wetlands are created with the coming of each rainy season. The planting of eucalyptus trees, however, has drained most of these springs. Nairobi National Park is another preservation of natural environment. It is covered by a highland forest of hardwoods. A spectrum of birds and animals find their home in the park. The Park itself was established in 1948 as an effort by the government to preserve the remaining natural beauty of Nairobi.

2.14 Water resources

Nairobi area is supplied by water by the Nairobi City Water and Sewerage Company a major supplier of water to most business enterprises and household. The water is sourced from rivers flowing from the Mt. Kenya regions in central province. Various Nairobi enterprise owners and residents have however ventured into the sinking of boreholes within their premises or compounds so as to supplement the water supply whenever there is a shortage or for other credible reasons.

Increase in population in the County has resulted to more pressure on the existing water infrastructure leading to serious shortage of the commodity. Over the years, demands for water for domestic and industrial processes have been steadily increasing, while the water catchment areas remain limited. Water catchment areas are increasingly being degraded due to the large volume of industrial and other wastes from human activities being disposed of to the environment without much treatment. Further downstream, there is pollution of water sources in the County. Under these circumstances, water management practices have to be efficient in order to ensure a continued adequate water supply for present and future needs. Maintenance and expansion of the water supply infrastructure will be critical to the continued development of the County.

2.15 Economic activities

The major economic activities in Nairobi include Finance and Banking: Nairobi hosts the Nairobi Securities Exchange (NSE), one of the largest and most advanced stock exchanges in Africa. It serves as a financial center for both local and international businesses, and many major banks and financial institutions have their headquarters or branches in the city. Nairobi has a growing services sector, including IT, software development, business process outsourcing, and digital innovation. The city has been dubbed "Silicon Savannah" due to its emerging tech industry and the presence of numerous tech startups. Tourism: Nairobi is often a gateway for tourists visiting Kenya's famous national parks and wildlife reserves. The city has various attractions such as the Nairobi National Park, Giraffe Centre, Karen Blixen Museum, and the David Sheldrick Wildlife Trust, which contribute to the local economy through tourism-related activities.

Manufacturing and Industry: The city hosts various manufacturing industries, including food and beverage processing, textile production, and light industrial activities. Industrial areas like Industrial Area and Athi River host a range of factories and production facilities. Retail and Wholesale Trade: Nairobi has a vibrant retail sector with numerous shopping malls, markets, and street vendors. It serves as a major distribution point for goods destined for various regions in Kenya and neighboring countries.

Real Estate and Construction: The city has seen significant growth in real estate and construction projects, including residential, commercial, and infrastructure developments. Education and Research: Nairobi is home to several universities, research institutions, and educational centers, contributing to its status as an educational hub in the region. Transport and Logistics: Nairobi's strategic location has made it a key transport and logistics center for both domestic and regional trade. It is well-connected by road, rail, and air to other parts of Kenya and neighboring countries. Healthcare: Nairobi houses some of the best medical facilities in East Africa, attracting patients from across the region seeking specialized healthcare services.

4. LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

According to Sections 58 and 138 of the Environmental Management and Coordination Act Cap 387 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003, new projects require an Environmental Impact Assessment study report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences.

The significance of an Environmental Impact Assessment is to promote a safe environment, and sound, sustainable development, by measuring the environmental impact likely to be caused by projects. EIA shows impact levels on species, land, plants, animals, microorganisms, and non-living organisms. It also identifies safer methods, and proposes appropriate alternative measures to be undertaken before decision making and implementation.

4.2 Environmental Policy Framework

Environmental Impact Assessment (EIA) is a methodology used to identify the actual and probable impacts of the projects and programmes on the environment and to recommend alternatives and mitigating measures. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. The National EIA regulations were issued in accordance with the provisions of Environmental Management and Coordination (Amendment) Act of 2015. The EIA Regulations must be administered, taking into cognizance provisions of EMCA 2015, subsidiary legislation and other relevant national laws. The intention is to approve and license only those projects that take into consideration all aspects of concern to the public as they impact on health and the quality of the environment.

4.3 The Constitution of Kenya

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

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

Part 2 of Chapter 5 of the Constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall;

(i) Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
(ii) Work to achieve and maintain tree cover of at least ten per cent of the land area of Kenya;
(iii) Encourage public participation in the management of, protection and conservation of the environment;
(iv) Protect genetic resources and biological diversity;
(v) Establish systems of environmental impact assessment, environmental audit and monitoring of the environment;

(vi) Eliminate processes and activities that are likely to endanger the environment; and
(vii) Utilize the environment and natural resources for the benefit of the people of Kenya.

Further, Article 70 states that if a person alleges that a right to a clean and healthy environment recognized and protected under Article 42 has been, is being or is likely to be, denied, violated, infringed or threatened, the person may apply to a court for redress.

4.4 Institutional Framework

At present there are several institutions and departments which deal with environmental issues in Kenya. The Ministry of Environment and Forestry in conjunction with several semi-autonomous government agencies are mandated to protect, conserve and manage the environment and natural resources for socio-economic development. These agencies include the National Environment Management Authority (NEMA), Kenya Water Towers Agency (KWTA), Kenya Forest Service (KFS), Kenya Forest Research Institute (KEFRI) and National Environment trust Fund (NETFUND). There are also local and international NGOs involved in environmental issues in the country.

4.4.1 National Environmental Management Authority (NEMA)

The National Environment Management Authority (NEMA) is a government regulatory body formed by an act of parliament, The Environmental Management and Coordination Act (CAP 387). The object 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.

4.5 Environmental Legal Framework

4.5.1 Environmental Management and Co-ordination Cap 387

Environmental Management and Co-ordination Act as the principal act has since been providing a legal and institutional framework for the management of the environmental related matters. It is the framework law on environment, which was enacted on the 14th of January 1999 and commenced in January 2002. The Act has since been amended and replaced by Environmental Management and Co-ordination (Amendment) Act, 2015 which was enacted into a law on 3rd January 2015.

Section 58 of the Second schedule of the Act requires the proponent of a project to submit study reports to NEMA before financing, commencing, proceeding with, carrying out, executing or conducting projects. The Second Schedule to the Act specifies the projects for which an EIA and EA must be carried out. According to Section 68 of the Act, all projects listed in the Second Schedule of the Act must undertake an environmental audit, keep accurate records and make annual reports to NEMA or as NEMA may, in writing, require.

The main objectives of the Act are to:-

- ✓ Provide guidelines for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya;
- ✓ Provide a framework legislation for over 70 statutes in Kenya that contain environmental provisions; and
- ✓ Provide guidelines for environmental impact assessment, environmental audit and monitoring, environmental quality standards and environmental protection orders.

There are several regulations under the Act which include:-

- ✓ Environmental (Impact Assessment and Audit) Regulations, 2003

- ✓ Environmental Management and Co-Ordination (Water Quality) Regulations, 2006
- ✓ Environmental Management and Co-Ordination (Waste Management) Regulations, 2006
- ✓ Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
- ✓ Environmental Management and Co-Ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006
- ✓ Environmental Management and Co-Ordination (Controlled Substances) Regulations, 2007
- ✓ Environmental Management and Co-Ordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulations, 2009
- ✓ Environmental Management and Coordination (Air Quality) Regulations. 2014

4.5.2 Environmental Management and Co-Ordination (Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003 give guidelines to the conduct of Project Reports, Environmental Impact Assessment Study Exercise and Reports as well as Environmental Audit and Monitoring. The regulations Schedules also provide for issues to be considered in EIA, Guidelines for carrying out an EIA and criteria for EIA experts and various environmental fees.

Section 4(1) of the regulations states that:

"…no proponent shall implement a project:

a) likely to have a negative environmental impact; or
b) for which an environmental impact assessment is required under the Act or these Regulations;

unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…"

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

The Environmental Management and Co-Ordination (Waste Management) Regulations, 2006 gives provisions for waste management (solid waste, industrial waste, hazardous waste, pesticides and toxic substances, biomedical waste and radioactive substances) including waste generators responsibilities, categorization of various types of waste, licensing and permitting procedures as well as offences and penalties for violating provisions of the regulations.

Part II of the Waste Management Regulations 4 (1) states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated receptacle. Regulation 4 (3) further states that any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility.

4.5.4 Environmental Management and Co-Ordination (Water Quality) Regulations, 2006

The Environmental Management and Co-Ordination (Water Quality) Regulations, 2006 provide guidelines for the protection of sources of water for domestic, industrial and agricultural use as well as standards for effluent discharge into the aquatic environment, land and public sewers and monitoring procedures. The act also provides for quality standards for sources of domestic water, irrigation and recreational waters.

Part II of the Water Quality Regulations 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 no person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.

Regulation 6 (b) further states that no person shall abstract ground water or carry out any activity near any lakes, rivers, streams, springs and wells that is likely to have any adverse impact on the quantity and quality of the water, without an Environmental Impact Assessment license issued in accordance with the provisions of the Act; or (c) cultivate or undertake any development activity within a minimum of six meters and a maximum of thirty meters from the highest ever recorded flood level, on either side of a river or stream, and as may be determined by the Authority from time to time.

4.5.5 Environmental Management and Co-Ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

The Environmental Management and Co-Ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 provides guidelines to noise and vibration generation by providing standards for permissible noise levels, noise measurement and control methods and licensing procedures for certain activities. Part II of the regulations, 3 (1) states that Except as otherwise provided in these Regulations, 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.

Regulation 4: - states that except as otherwise provided in the Regulations, no person shall- (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source. Regulation 11 on Machinery: - states that any person wishing to (a) operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or (b) Engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to the Regulations.

Regulation 16. License states that (1). Where a sound source is planned, installed or intended to be installed or modified by any person in such a manner that such source shall create or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, such person shall apply for a license to the Authority.

4.5.6 Environmental Management and Co-Ordination (Air Quality) Regulations. 2014

The Environmental Management and Coordination (Air Quality) Regulations. 2014 provides for provides guidelines to air quality standards, air quality levels and permissible levels and occupational air quality limits. The regulations also provide for methods of measurement and analysis of air pollutants, inspection, monitoring and licensing procedures for certain activities. Regulation 5 (1)states that No person shall (a) act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution; or (b) emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the First Schedule of the Regulations.

4.5.7 Climate Change Act 2016

Climate Change Act 2016 is an Act that is applied for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya. The Act is applied in all sectors of the economy by national and county governments to mainstream climate change responses into development planning, decision making and implementation; enhance adaptive capacity to impacts of climate change formulate programmes to enhance resilience of human and ecological systems to impacts of climate change; mainstream climate change disaster risk reduction into strategies and actions of public and private entities; provide incentives in achieving low carbon climate resilient development and promote low carbon technologies, improve efficiency and reduce emissions amongst other functions.

The Act establishes a Climate Change Council which ensures the mainstreaming of the climate change functions by the national and county governments amongst other functions. It also establishes a Climate Change Directorate which is the lead agency of the government on national climate change plans and actions to deliver operational co-ordination and reports to the Cabinet Secretary. The Act provides for the formulation of a National Climate Change Action Plan in accordance with Article 10 of the Constitution and section 3 of the Climate Change Act 2016. The Act sets out the obligation for public participation when developing strategies, laws and policies relating to climate change by emphasizing that public consultations shall be undertaken in a manner that ensures the public contribution makes an impact on the threshold of decision making.

4.5.8 Sustainable Waste Management Act 2021

The Sustainable Waste Management Act 2021 is an act of Parliament to establish the legal and institutional framework for the sustainable management of waste; to ensure the realization of the constitutional provision on the right to a clean and healthy environment and for connected purposes. The objectives of the act are to promote sustainable waste management; improve the health of all Kenyans by ensuring a clean and healthy environment; reduce air, land, fresh water and marine pollution; promote and ensure the effective delivery of waste services; create an enabling environment for employment in the green economy in waste management, recycling and recovery; establish an environmentally sound infrastructure and system for sustainable waste management; promote circular economy practices for green growth and to mainstream resource efficiency principles in sustainable consumption and production practices

Part 4 of the Act sets the general principles of this Act as (a) promoting the right to a clean and healthy environment; (b) the precautionary principle where the lack of scientific certainty shall not be used to postpone measures to prevent environmental degradation; (c) the polluter pays principle in which the cost of cleaning up any element of the environment that has been damaged by pollution shall be paid by the polluter; (d) payment for ecosystem services or payment for ecological services (e) zero waste principle in which products and processes are designed and managed to reduce the volume and toxicity of waste and materials and (f) achieving sustainable waste management goals.

The Act sets out the functions of the National Environment Management Authority in regard to the Act which includes developing standards and guidelines on sustainable waste management and enforcing waste management legislation in consultation with county governments amongst other functions. The Act also sets out the functions of County Governments in regard to the Act. Other provisions include Waste classification and segregation; Extended producer responsibility; Materials recovery facilities; Waste management plans; Duties of private sector entities and Duties of waste service providers. The Act sets out a general penalty for persons who

contravene provisions of the Act for which a penalty has not been prescribed to a fine of not less than two million shillings and not more than four million shillings or to imprisonment for a term not exceeding four years or to both.

4.5.9 The National Construction Authority Act NO. 41, 2011

The National Construction Authority Act NO. 41, 2011 is an act of Parliament that provides for the establishment, powers and functions of the National Construction Authority and its connected purposes. The Act sets out the functions of the authority which is to oversee the construction industry and coordinate its development. Among its function are to prescribe the qualifications or attributes required for registration of contractors, promote and ensure quality assurance in the construction industry, enforce the prescribed Building Code, accredit and register contractors, certify skilled construction workers and construction site supervisors as well as the appointment of investigating officers amongst others.

Section 22 of the provides for inquiry into conduct of contractors by stating that 'The Board may institute an inquiry into the conduct of a contractor on its own initiative or upon receipt of a complaint addressed to the Board in writing, made by or on behalf of any person alleging unprofessional conduct on the part of a registered person. Section 23 states that 'the Authority shall undertake mandatory inspections at any time on sites under constructions in accordance with the Act'. The Act provides the Board with powers to suspend any contractor if such or (a) is convicted of an offence under this Act; (b) is found guilty of any act or omission amounting to improper, disgraceful conduct or gross professional misconduct, after due inquiry held by the Board; or (c) has breached the regulations or by-laws of the Authority.

4.5.10 The National Construction Authority Regulations, 2014

The National Construction Authority Regulations, 2014 is a subsidiary legislation of the National Construction Authority Act NO. 41, 2011 that sets out the criteria, conduct and evaluation for the registration of contractors and joint ventures; the identification and reporting of construction works contracts or projects by owner; The certification and accreditation of skilled construction workers and construction site supervisors; and collection and payment of construction levy with associated enforcement fees and penalties. The act also spells out the classes of skilled construction workers and the classes of construction site supervisors with criterion for their eligibility for accreditation.

4.5.11 The Water Act, 2016

The Water Act 2016 provides for the regulation, management and development of water resources, water and sewerage services; and for other connected purposes in Kenya. Section 9 (1) of this Act states that every person has the right to access water resources, whose administration is the function of the national government as stipulated in the Fourth Schedule to the Constitution. The Act establishes the Water Resources Authority (WRA) whose functions include formulating and enforcing standards, procedures and Regulations for the management and use of water resources and flood mitigation as well as regulate the management and use of water resources amongst other functions. Section 36 of the Act spells out purposes for which a water permit of required as well as ground water abstraction requirements and the penalties for non-compliance. The Act establishes the Water Tribunal though which water related disputes shall be resolved.

4.5.12 The Occupational Safety and Health Act, 2007

The Act sets minimum standards that are to be maintained in workplaces to safeguard health, safety and welfare of workers. These are all aimed at elimination of hazards from workplaces. Section 13 part 1(a) the employee is expected to ensure his own safety and health and of the other person who may be affected by his acts or omissions at work place, (c)requires the employee at all times to use protective

equipment or clothing provided by the employer for purpose of preventing risks to his safety and health, (f) report to the supervisor any accidents or injury that arise in connection with his work Part 2 states that any employee who fails to follow this section commits an offence and shall on conviction be liable to a fine or imprisonment.

Section 21 provides that the employer or self-employed person to notify the occupational health and Safety Officer of any accidents, dangerous occurrence, or occupational poisoning which has occurred at the workplace. Section 32 gives power to the occupational safety and Health officer to enter inspects examine by day or night, a workplace which he has reasonable cause to believe to be a workplace and any part of any building of which forms a workplace. Section 55 requires all plant, machinery and equipment whether fixed or mobile for use at workplace to be used for designed work and operated by a competent person. Section 97 prohibits employers to employ persons below the age of 18 years at the workplace or perform work by which its nature its likely to harm the persons safety or health.

Relevant subsidiary legislation which are operational under the OSHA Act include:- The Factories and Other Places of Work (Health & Safety Committees) Rules 2004; The Factories and Other Places of Work (Medical Examination) Rules 2005; The Factories and Other Places of Work (Noise Prevention and Control) Rules 2005, The Factories and Other Places of Work (Fire Risk Reduction) Rules 2007 and The Factories and Other Places of Work (Hazardous Substances) Rules 2007.

4.5.13 Public Health Act (Cap. 242)

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health.

Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drainers or refuse pits in such state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health. Any noxious matter or wastewater flowing or discharged from any premises into the public street or into the gutter or side channel or watercourse, irrigation channel, or bed not approved for discharge is also deemed as nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

4.5.14 Physical and Land Use Planning Act, 2019

Section 3 of the Physical and Land Use Planning Act, 2019 gives the objects of the act which include providing (a) the principles, procedures and standards for the preparation and implementation of physical and land use development plans at the national, county, urban, rural and cities level; (b) the administration and management of physical and land use planning in Kenya; (c) the procedures and standards for development control and the regulation of physical planning and land use; (d) a framework for the co-ordination of physical and land use planning by county governments; (e) a mechanism for dispute resolution with respect to physical and land use planning; (f) a framework for equitable and sustainable use, planning and management of land amongst other functions.

4.5.15 Urban and Cities Act, 2011

The Act came into function with regard to Article 184 of the Constitution providing regulations on the classification, governance and management of urban areas and cities and further providing the criteria of establishing urban areas. Part III of the Act gives the regulations and functions of every city or municipality with regard to

integrated development plans, which shall include but not limited to environmental plans and disaster preparedness, within the area of jurisdiction in achieving objects of devolved governments under section 174 of the constitution while maintaining the socio-economic rights of the people. The first schedule of the Act enlists the services the services that the any municipality shall provide to its residents which include but not limited to traffic control and parking, water and sanitation, refuse collection, solid waste management, pollution abatement services among others.

4.5.16 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent landowners seeking permission to construct the respective roads.

4.5.17 Licenses and permits

Ideally, the Proponent should demonstrate compliance to the legislation through acquiring of the appropriate licenses and permits. Further all contractors and consultants who will be engaged during the planning and design, construction, operation and maintenance and decommissioning should demonstrate compliance to the necessary pieces of legislation. Those who will be involved should therefore provide the Proponent with all legal documents that shows that they are legally in the business or services that they intend to deliver to the Proponent. These includes: NEMA registration certificates and licenses, trade licenses, etc.

*A compliance plan matrix for the Legislative and Regulatory Frameworks is hereby attached within the appendices.

5. PUBLIC CONSULTATION

5.1 Sources of Information

One of the key information sources used during the Environmental Impact Assessment exercise was public participation. Views from the would be affected people were sought from the public through the following means:-

1. The administration of pre-designed questionnaires during the project study exercise
2. Public consultation meetings held on:-
   - ✓ 21st July 2023
   - ✓ 28th July 2023
   - ✓ 29th July 2023
3. Direct interviews with stakeholders and members of the public.

The objective of the consultation and public participation was to:-

1. Disseminate and inform the stakeholders about the project with special reference to its key components and location
2. Gather comments, suggestions and concerns of the interested and affected parties
3. Propose and discuss solutions and mitigation measures to the potential negative impacts and various concerns
4. Incorporate the information collected in the EIA study report

In addition, the Environmental Impact Assessment public consultation exercise enabled:-

- ✓ The establishment of a communication channel between the general public and the team of consultants, the project proponents and the Government.
- ✓ The concerns of the stakeholders be known to the decision-making bodies at an early phase of project development

The exercise was conducted by a team of experienced registered environmental experts. The Consultation and Public Participation Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA section 58.

5.2 Issues raised and comments

This Sub-Section covers the views and opinions of the key stake holders (local leaders, surrounding, neighbours/institutions/organizations, interested persons or groups). It highlights both positive and negative socio-economic and environmental impacts anticipated during the construction and operational phases of the project. This is followed by suggested mitigation measures that the developer should incorporate to minimize environmental degradation and promote sustainable development.

5.2.1 Overstretching of infrastructure

It is feared by some of the local community members that the conversion of the project site to a high-rise apartment building may lead to the overstretching of public utilities and infrastructure such as sewer lines, water mains supply and roads. It was reported that water supply within the area is intermittent and the number of proposed apartments may exacerbate the situation.

The Nairobi County Government planning department authorizes projects in accordance with their infrastructure (sewer, water supply) capability as per their own infrastructure assessments/development control policy. The county shall thus make an independent decision and determine the application for approval accordingly.

All necessary approvals shall be sought before commencement of works including building approvals, sewer connection, water connection, power connection amongst others .

5.2.2 Excavation concerns

Immediate neighbours raised concern regarding the potential for soil instability, groundwater infiltration, and structural integrity, all of which can lead to collapses, foundation settlement, and damage to adjacent properties during project excavation activities.

Mitigation measures including effective engineering design, proper shoring and support systems, groundwater control measures, meticulous monitoring, and a well-executed construction sequence shall be practiced in order to mitigate these risks as well as to safeguard worker safety, prevent environmental impacts, and maintain the stability of both the excavation site and the surrounding structures.

Mitigation measures to be incorporated by the proponent are hereby outlined in sections 7.2.6.

5.2.3 Obstruction and traffic

Another concern is that obstruction by construction transport vehicles during the construction phase and increased number of vehicles coming to and from the project during the operational phase will lead to increase in traffic along the access roads.

A traffic management plan has been conducted to ensure proper design of exit /entry points and that traffic is adequately managed during all phases of the project.

Other mitigation measures to be incorporated by the proponent are hereby outlined in sections 7.2.11 and 7.4.1.

5.2.4 Noise, vibration and dust emissions

One of the main concerns was that construction activities may be carried out outside normal working hours causing noise disturbance to the neighbours, these includes early morning from 6AM, late evening past 6PM, on Sundays and on public holidays. Noise, vibrations and dust emissions shall also be generated at the project site during construction which if unmitigated can interfere with neighbours' comfort and health.

All work activities are to be carried out as stipulated within the EIA License conditions

Other Mitigation measures to be incorporated by the proponent are hereby outlined in sections 7.2.3 and 7.2.4.

5.2.5 Dilapidation of existing infrastructure

Heavy trucks transporting excavated materials and raw materials to and from the project site may lead to dilapidation of existing roads and also cause spillage of these materials on roads hence interfering with smooth motoring.

Mitigation measures to be incorporated by the proponent are hereby outlined in sections 7.2.11.

5.2.6 Interference with privacy and light obstruction

Immediate neighbours raised concern about the proposed height of the building would overlook neighbours properties and impact on their privacy. Of concern was also that the proximity, closeness and shape of the proposed building may lead to the obstruction of natural light.

Mitigation measures against these shall involve careful design, planning, and adherence to privacy considerations. Specific measures shall include

- ✓ *Carefully positioning the apartment building on the site to minimize direct sightlines into neighboring properties.*
- ✓ *Utilizing setbacks and building orientation to create natural barriers between windows and adjacent properties.*
- ✓ *Placing windows in a way that does not directly face neighboring properties and designing balconies and terraces with careful consideration for privacy, ensuring they are not directly overlooking neighboring properties.*
- ✓ *Complying with local zoning regulations and building codes that govern building setbacks, height, and privacy requirements.*

5.2.7 Apartment units numbers

Concern was raised about the number of apartment units proposed within the development. This is in cognizance that the number of units directly impacts on available infrastructure and traffic management.

The proposed number of units are 216 apartment units. The determination of the number of apartment units to build per project involves a careful analysis of factors related to the site, market demand, zoning regulations, financial analysis, utilities, available amenities and the intended target demographic etc.

Balancing all these considerations helps arrive at an appropriate number of apartment units to build per block.

5.2.8 Contact person during construction

Who shall be the contact person during construction to whom grievances can be channeled and appropriately remedied.

During the construction phase of a project, The Project Manager shall act as the emergency contact person who shall handle unforeseen situations, safety concerns, and urgent issues that may arise on the construction site. This contact person shall be available throughout to ensure a quick response to any emergencies.

5.2.9 Positive comments

- ✓ Creation of employment during the various stages of the project
- ✓ Business opportunities during the construction and operational stages of the project
- ✓ Increase in residents in the local area leading to increase in customers for existing businesses
- ✓ Increase in land and property value
- ✓ Improved security
- ✓ An increased number of quality housing units once complete
- ✓ Optimal use of scarce land resources

6. ANALYSIS OF PROJECT ALTERNATIVES

6.1 Project site alternatives

6.1.1 No project alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will, however, involve several losses specifically to the landowner / developer as he will continue to pay land rent/rates on the plot while the property remains underutilized. The No Project Option is the least preferred from the socio-economic perspective.

6.1.2 Relocation option

Relocation option to a different site is an option available for the Project implementation. However, at present the landowner/developer does not have an alternative site. This means that an alternative project site shall have to be sought. Searching for the land to accommodate the scale and size of the project and completing official transaction on it may take up to two years although there is no guarantee that the land would be available. The developer will also have to develop new studies, designs and approvals since design and planning has to be suitable to site conditions. Project design and planning before the stage of implementation will cost the developer a significant sum of money. Whatever has been achieved and paid for to date will be counted as a loss to the developer.

The time wasted on these deliberations would cause delays that the proponent may not be able to afford. This may also lead to a situation like no project alternative option. The other consequence of this is that it would be a discouragement for private investors especially in the commercial development sector. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is an undesirable option for the proponent.

6.1.3 Licensing of the proposed development

Under the proposed Project alternative, the proponents of the proposed project would be issued with an EIA License clearly stating various Licensing conditions that the proponent must adhere to. In issuing the license, NEMA would approve the proponent's proposed development, provided all Licensing conditions are complied with during the construction period and occupation phases. This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in EMCA to the maximum extent practicable. This is the most suitable option.

6.2 Domestic wastewater management alternatives

6.2.1 Connection to the sewer system

Connection to an existing main sewer line will solve the wastewater management issue at a very minimal cost and in an environmental efficient manner. Currently this option is available and considered the best option since there is an existing sewer line within the area.

6.2.2 Use of septic tanks

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is not expensive to construct however regular emptying in large discharge points like the multi-storey residential building development is required. Given the scale of liquid waste emanating from the proposed project this option is not preferred since it will be uneconomical and inefficient.

6.2.3 Construction of a sewage treatment plant

This involves the construction of a treatment plant or the installation of prepackaged treatment plants. Whereas this is a viable option such STPs have proved to be a challenge in such setups as apartment blocks due to various reasons such as: lack of sufficient land (space), nuisance of bad odour to tenants and neighbours; non-compliance with set effluent discharge standards and frequent breakdowns and malfunctions which may also lead to other environmental problems such as emission of raw effluent to the environment. Considering the above cons, this option is not viewed as suitable.

6.3 Solid waste management alternatives

Residential solid waste management typically follows a hierarchy of practices and strategies aimed at minimizing the environmental impact of waste generation and maximizing resource recovery. This hierarchy prioritizes the most environmentally friendly and sustainable approaches.

Standard hierarchy of waste management involves five crucial steps: prevention, reuse, recycling, recovery and disposal. This hierarchy aims for waste generators to extract the maximum practical benefits from products and to generate the minimum amount of waste – emphasizing on reducing, reusing, and recycling as key activities of sustainable materials management.

Recognizing that several of the hierarchy steps are best undertaken by professionals, it is imperative that the waste is collected by a licensed solid waste handler who in turn can sort the waste for energy recovery, treatment, recycling and appropriate disposal.

6.4 Analysis of alternative construction materials and technology

There are several innovative construction technologies and alternatives that can be considered for apartment building construction. These technologies aim to improve efficiency, reduce environmental impact, and enhance the overall quality of the building. Some of the technologies can be used jointly or incorporated into one another for a perfect fit. Some of the alternatives include:-

- ✓ Traditional concrete and steel construction - using modern, locally and internationally accepted materials to achieve environmental, public health, safety and security requirements.
- ✓ Prefabrication and modular construction which involves manufacturing building components off-site and then assembling them on-site. Modular construction takes this concept further by creating entire modules in a factory and then stacking them to form the building. This approach can significantly reduce construction time and waste while maintaining high quality.
- ✓ Green and sustainable construction: Implementing green building practices involves using energy-efficient materials, renewable energy sources, and sustainable construction methods. This can result in lower energy costs and a reduced impact on the environment.
- ✓ Smart building technologies: Incorporating smart technologies into apartment buildings can enhance comfort and energy efficiency. This includes systems for lighting, heating, ventilation, and security that can be controlled remotely.
- ✓ Recycled and reclaimed materials: Using recycled and reclaimed materials, such as reclaimed wood or salvaged bricks and building blocks, can reduce the demand for new resources and give buildings unique character.

When choosing construction technology, factors such as local regulations, building codes, cost considerations, site conditions, and project goals should all be taken into account. It's also important to consider the long-term sustainability and environmental impact of the chosen technology.

7. ASSESSMENT OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

7.1 Introduction

This Section identifies and discusses both positive and negative impacts associated with the proposed project as well as their respective mitigation measures. The potential impacts from the proposed project area are identified and assessed based on the nature, magnitude and merits/or demerits of the various activities associated with the Project. This Chapter therefore describes the anticipated positive and negative impacts of the proposed project due to project location and during construction, operation and decommissioning phases.

7.2 Negative impacts during construction phase

7.2.1 Unsustainable extraction and use of building materials

Building materials such as hard core, ballast, cement, rough stone and sand required for the construction of the proposed project will be obtained from quarries and sand harvesters. Since substantial quantities of these materials will be required for construction of the proposed project, the availability and sustainability of such resources at the extraction sites will be negatively affected-as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health impacts.

Proposed mitigation measures

- ✓ Source building materials such as sand, ballast and hard core from registered quarry and sand mining firms, whose extraction sites have undergone satisfactory environmental impact assessment/audit and received NEMA approval.
- ✓ To reduce the negative impacts on availability and sustainability of the materials, the Proponent should only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities.
- ✓ Consider reuse of building materials and use of recycled building materials where applicable. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.

7.2.2 Destruction of existing vegetation

Vegetation destruction during apartment building construction can have a range of negative effects on the environment, ecosystem, and surrounding community including soil erosion, loss of biodiversity, air quality degradation and loss of green spaces amongst others. Mitigating vegetation destruction is thus crucial for preserving the environment and maintaining a healthy ecosystem.

Proposed mitigation measures

- ✓ Thorough site assessment and planning should be carried out such that planning of the building layout and construction activities avoid disturbing existing vegetation as much as possible.
- ✓ Preservation of existing vegetation by design the building layout around existing trees and vegetation to minimize their removal.
- ✓ Consider transplanting valuable trees to a different location within the site or to another suitable location before construction begins.

- ✓ Incorporate a comprehensive landscaping plan that includes native and adaptive plants after construction is complete.

7.2.3 Noise pollution and vibration

Significant increases in noise and vibration levels may be expected during construction of the proposed project. Such noise and vibrations may be generated by construction machinery and vehicles as well as construction workers. The impact of noise and vibrations on the surrounding community depends upon the characteristics of the noise and vibrations source (instantaneous, intermittent, or continuous in nature); time of day at which noise and vibrations occur; and the location of noise and vibrations source with respect to sensitive receptor.

Though the level of discomfort caused by noise and vibrations is subjective, the most commonly reported impacts of increased noise levels are interference in oral communication, hearing loss, anxiety and disturbance of sleep. Vibration impacts may include the cracking of nearby existing structures such as foundations, walls and water reservoirs. Noise and vibrations may also have health impacts on the workers in the proposed project.

Proposed mitigation measures

- ✓ Apply for a License from NEMA whereby maximum permissible noise levels are to be exceeded.
- ✓ Prescribe noise reduction measures if appropriate e.g. restricted working hours and transport hours and noise buffering.
- ✓ Install portable barriers to shield compressors and other small stationary equipment where necessary and locate stationary noise sources as far from existing sensitive receptors as possible.
- ✓ Use quiet equipment (i.e. equipment designed with noise control elements such as mufflers).
- ✓ Limit trucks and other small equipment to minimize idling time and observe a common-sense approach to vehicle use such as switching off idle engines whenever possible.
- ✓ Ensure use of well serviced and maintained vehicles and equipment.

7.2.4 Air quality degradation

Potential impacts on the air quality during the construction stage will be due to the fugitive dust and the exhaust gases generated in and around the construction site. Fugitive dust (depending on the timing of construction) and vehicular emissions are the major components of air pollution. The following construction related activities are generally associated with these emissions: Site clearance, excavation and use of heavy vehicles and machinery/equipment at construction site; transportation of construction materials such as sand, cement, steel, masonry stone to the construction site; and operating of construction machinery and equipment

During the period of maximum construction activity, the fuel consumption is expected to rise significantly and the background concentrations of suspended particulate matter (SPM), respirable particulate matter (RPM), sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO) are also expected to rise. These emissions if not appropriately mitigated may have significant respiratory and cardio-pulmonary effects on the local population, the health effects may range from subtle biochemical and physiological changes to difficulty in breathing, wheezing, coughing and aggravation of existing respiratory and cardiac conditions.

Proposed mitigation measures

- ✓ Provide 2.4-meter-high hoarding along site boundary.
- ✓ Provide effective dust screen, sheeting or netting where a scaffolding is erected around the perimeter of a building under construction, from the

ground floor level of the building, or if a canopy is provided at the first-floor level, from the first-floor level, up to the highest level of the scaffolding.
- ✓ Any skip hoist for material transport shall be totally enclosed by impervious sheeting.
- ✓ Water active construction areas when necessary.
- ✓ Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- ✓ Down wash of trucks (especially tyres) prior to departure from site.
- ✓ Use of electrically operated construction machinery to avoid externalities produced by diesel engines. This procedural change may reduce problems related to emission, idling and maintenance.
- ✓ Rapid on-site construction so as to reduce duration of traffic interference and therefore reducing emissions from traffic delays.

7.2.5 Solid waste generation

Construction activities create solid wastes that need to be disposed. Such wastes include excavated spoil, concrete, gravel, stones, bricks, plastics, paper, wood, metals, glass, and cleared biomass among others. These wastes if handled inappropriately may have a direct impact on the local community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in wrong places. The off-site effects could be un-aesthetic view, pest breeding, unhygienic conditions, choking of nearby drains and pollution of physical environment. The severity of such impacts will depend upon the magnitude and type of construction waste.

Proposed mitigation measures

- ✓ All construction waste should be disposed in sites approved by the Nairobi City County by NEMA licensed firms.
- ✓ Construction waste should be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses.
- ✓ Measures to ensure that construction materials requirements are carefully budgeted should be put in place and the amount of construction materials left on site after construction is kept minimal.
- ✓ Consider the use of recycled or refurbished construction materials.
- ✓ Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.
- ✓ Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
- ✓ Use of building materials that have minimal packaging to avoid the generation of packaging waste.

7.2.6 Deep excavation risks

Construction excavation involves inherent risks that must be carefully managed to ensure the safety of workers and the stability of surrounding structures. These risks include soil instability leading to collapse, groundwater infiltration causing flooding and erosion, potential damage to neighboring properties, and the need to implement robust shoring and support systems. Additionally, the excavation process can disrupt underground utilities, pose challenges for proper ventilation and lighting, and require effective dewatering techniques to manage groundwater levels.

Proposed mitigation measures

- ✓ Conduct a thorough geotechnical investigation to assess soil conditions, groundwater levels, and potential risks before excavation begins.
- ✓ Implement appropriate shoring and support systems such as soldier piles, sheet piles, secant piles, or retaining walls to stabilize excavation walls and prevent collapse.

- ✓ Implement effective groundwater control methods, such as wellpoints, dewatering wells, or sumps, to manage water inflow during excavation.
- ✓ Regularly inspect and maintain the stability of the excavation walls and slopes.
- ✓ Utilize a construction sequence that minimizes the duration and extent of open excavation faces to reduce exposure to risk.
- ✓ Develop a detailed emergency response plan that outlines procedures to follow in case of unexpected ground movement, structural instability, or other emergencies.

7.2.7 Soil erosion and water logging

Soil erosion is likely to occur during construction at the site once exposed by excavation works especially during rainy and windy seasons. Considering the land clearing, excavation and other construction processes, soil will be exposed to erosion agents leading to soil/land degradation hence impacting negatively on the environment. Water logging of the proposed site may also occur in the event of heavy rainfall during excavation.

Proposed mitigation measures

- ✓ The stockpiling of construction materials should be properly controlled and managed at the site.
- ✓ Leveling and ripping off compacted areas of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.
- ✓ Channel trenches and cut off drains into peripheral storm water drainages.
- ✓ A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.

7.2.8 Surface and ground water quality degradation

Construction activities for the proposed development can have impacts on hydrology and ground water quality of the area. Changes in surface hydrology can occur due to landscaping; construction of impervious surfaces such as parking lots, roads and buildings (buildings increase the volume and rate of runoff, resulting in habitat destruction, increased pollutant loads, and flooding); blockage of existing drainages can also influence groundwater hydrology (i.e. recharge rates, flow, conditions).

Potential sources of impacts on hydrology and ground water quality during the construction phases are as follows: Soil run-off from the site leading to off-site contamination- particularly during rainy season: The excavated area, if linear, could act as a conduit to extend groundwater contamination to new areas. Improper disposal of construction debris leading to offsite contamination of water resources or blocking of drainages leading to flooding. Spillage of oil and grease from the vehicles and wastewater stream generated from on-site activities can lead to contamination.

Proposed mitigation measures

- ✓ Prepare a hazardous substance control systems and emergency response plans that will include preparations for quick and safe cleanup of accidental spills.
- ✓ Ensure adequate storm water management facilities are put in place

7.2.9 Increased water demand

During the construction phase, both the construction works, and the construction workers will create additional demand for water in addition to the existing local demand. Water will mostly be used in the creation of concrete for construction works and for wetting surfaces or cleaning completed structures. It will also be used by the construction workers for washing and drinking.

Proposed mitigation measures

- ✓ Connect to the existing NCWSC main supply.

- ✓ Harness rainwater for construction activities usage where applicable.
- ✓ Install a discharge meter at all water outlets to determine and monitor total water usage.
- ✓ Promptly detect and repair of water pipes and tank leakages.
- ✓ Ensure taps are not running when not in use.

7.2.10 Increased insecurity

The proposed project may cause an increase in insecurity during the construction phase due to the increased number of transient workers and suppliers within and around the project site. Construction sites are known to attract large numbers of semi-skilled and un-skilled labour searching for job openings. Others may also use such opportunities to scout for potential robbery or burglary targets.

Proposed mitigation measures

- ✓ Unattended public access to the construction site shall be restricted and only one entry/exit point should be used.
- ✓ The project site should be accessed through a designated entry/exit point during the transportation of all raw materials.
- ✓ Security shall be enhanced by ensuring security guards are always posted within and around the project site and strategic placement of security lights around the site.
- ✓ A roster of all construction workers shall be kept while measures shall be put in place to ensure that loitering by itinerant workers is discouraged.

7.2.11 Increased traffic

Obstruction by construction transport vehicles and construction activities adjacent to the nearby roads during the construction phase may lead to the increase traffic along the access road. This may be exacerbated if these activities time/schedule coincide with Peak Traffic hours.

Proposed mitigation measures

- ✓ Ensure that the Entry/Exit to the project site is located where it will cause minimal traffic along adjacent roads.
- ✓ Ensure all construction vehicles to and from the construction site use the designated Entry/Exit to the project site.
- ✓ All transportation of construction raw materials and excavated materials are to be conducted at traffic off peak hours only.
- ✓ Sensitize truck drivers to avoid unnecessary road obstruction.
- ✓ Cover all trucks hauling soil, sand and other loose materials to avoid spillage and dust emissions that may interfere with smooth motoring.
- ✓ Access to driveways will be maintained at all times unless other arrangements are made.

7.2.12 Worker's accidents and public safety

In any civil works, public as well as construction staff safety risks can arise from various construction activities such as falls into deep excavations; accidents due to operation and movement of heavy equipment and vehicles; injuries from falling objects; Injuries from hand tools amongst others. Because of the duration and complexity of the construction phase of the proposed project, such activities need to be controlled and consequently the associated risks will be reduced.

Proposed mitigation measures

- ✓ A risk assessment shall be carried out to ensure that all hazards are identified, and appropriate protective and control measures are put in place.
- ✓ Proper supervision, high workmanship performance, and provision of adequate safety measures shall be in place to ensure enhanced public and occupational safety.

- ✓ The proponent shall adhere to the occupational health and safety rules and regulations stipulated in Occupational, Safety and Health Act, 2007.
- ✓ The contractor shall ensure provision of appropriate personal protective equipment to all staff members, as well as ensuring a safe and healthy environment for construction workers as outlined in the EMP.

7.3 Positive impacts during construction phase

There are a number of positive impacts that shall be associated with the proposed project during construction phase. These are as discussed below.

7.3.1 Employment opportunities

The construction of the proposed project is expected to provide direct and indirect employment to a number of workers. These range from unskilled casual workers, semi-skilled and skilled employees.

7.3.2 Provision of market for supply of building materials

The proposed project will require supply of large quantities of building materials most of which will be sourced locally in the surrounding areas. Producers and suppliers of materials will thus get a ready market for their merchandise.

7.3.3 Improving growth of the economy

Through the use of locally available materials during the construction phase of the project, the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.4 Negative impacts during operation phase

The following negative impacts are associated with the proposed project during its operation phase.

7.4.1 Increased traffic

It is expected that the number of vehicles around the project site shall increase hence leading to the possibility of commensurate increase in traffic around the adjacent access roads. This shall be dependent on the location of the building's car park entry/exit, traffic control measures in place, number of tenants/visitors to the building, the nature of activities within the building amongst other factors.

Proposed mitigation measures

- ✓ Traffic management/parking personnel shall be provided to monitor parking and ensure smooth motoring along the building's adjacent roads.
- ✓ Access to driveways will be maintained at all times.
- ✓ Any work that disturbs normal traffic operations shall be coordinated with the relevant authorities.

7.4.2 Water use

During operation of the proposed Project, a lot of water will be used. Water use is driven by the number of uses and users within the buildings. Water will be sourced from the Nairobi City Water and Sewerage Company mains supply line, a borehole onsite and several rainwater storage tanks.

Proposed mitigation measures

- ✓ Install water meters where applicable.
- ✓ Identify activities and areas that cause high consumption.
- ✓ Install water-saving devices in the appropriate places (flow regulators, water flow sensors, self-closing taps, low-flush toilets).

- ✓ Avoid leaving taps running unnecessarily and cleaning with high pressure hoses.
- ✓ Regularly maintain plumbing fixtures and piping in order to avoid losses.
- ✓ Replace defective seals and repair damage to water pipes.

7.4.3 Electricity consumption

During operation, the building will use a lot of electrical energy mainly for purposes which include lighting, running of electrical gadgets including air conditioning equipment, refrigeration systems, pumping water into tanks/reservoirs. Since electricity generation involves utilization of natural resources, excessive electricity consumption will strain the resources and negatively impact on their sustainability.

Proposed mitigation measures

- ✓ Use energy-saving bulbs, especially in high consumption areas.
- ✓ Install motion detector lighting to reduce lighting time in selected locations such as emergency staircases.
- ✓ Reduce general lighting during daytime and make sure that exterior lighting is switched on only at night.
- ✓ Organize preventive maintenance of the electric network and equipment, including heating and air conditioning systems.

7.4.4 Solid waste generation

During the operation phase, solid waste generation is expected to occur from various sources and activities carried out within the building. Solid waste impacts maybe significant in the absence of a proper waste management plan i.e. improper disposal of waste may have adverse environmental effects.

Proposed mitigation measures

- ✓ Daily sweeping and collection of waste from common areas such as lobbies, staircases, entrances shall be done by management appointed cleaners.
- ✓ Segregate wastes at source; organize the segregation of wastes at source.
- ✓ Dispose of non-reusable and non-recyclable wastes using appropriate methods
- ✓ Do not burn waste outdoors, do not disperse them in nature or bury them
- ✓ Recycle electric and electronic appliances and donate unwanted appliances that are still working to local associations instead of disposing them.
- ✓ Dispose waste responsibly by using NEMA licensed waste handlers.

7.5 Positive impacts during operation phase

Just as in the construction phase, there are positive impacts associated with the proposed project during operation phase. These positive impacts are discussed below.

7.5.1 Employment opportunities

Employment opportunities are one of the long-term major impacts of the proposed Project. A number of people will be employed in various capacities in different professional and non-professional areas at the building.

7.5.2 Increase in revenue to national and local governments

The commissioning of the proposed project will result in positive gains for numerous authorities - Kenya Revenue Authority (KRA), KPLC, and Nairobi City Government through payment of relevant taxes, rates and fees to the respective institutions. Higher property tax revenues can help support local infrastructure, services, and public projects.

7.5.3 Increased Housing Supply

Apartment unit availability will help address housing shortages in urban areas, providing more options for people to find suitable and affordable housing.

7.5.4 Optimal use of land

Change in land use from single use to land on which a modern multiuser building block shall be erected will optimize land use. Apartments allow more efficient use of land, making better use of available space and minimizing the need for extensive suburban development.

7.6 Negative impacts during decommissioning phase

The negative impacts discussed below are associated with the proposed Project during decommissioning phase.

7.6.1 Noise and vibration

The demolition works will lead to significant deterioration of the acoustic environment within the proposed project site and the surrounding areas. This will be as a result of the noise and vibrations that will be experienced during demolition.

Proposed mitigation measures

- ✓ Significant impacts on the acoustic environment will be mitigated as described in Section 7.2.3.

7.6.2 Air quality degradation

Dust will be generated during demolition works of the proposed project from the demolition activities. This will mainly affect demolition workers. In addition, soil will be used in rehabilitation and re-instatement to pre-project status, this will add to the amount of dust that will be generated during rehabilitation. Exhaust emission will also be experienced during decommissioning from the trucks that will be transporting the demolished objects to the disposal sites and storage areas. Large quantities of dust will be generated during demolition works. This will affect both demolition staff as well as the neighbouring establishments.

Proposed mitigation measures

- ✓ Dust and gaseous emissions resulting from demolition or dismantling works will be minimized as described in Section 7.2.4.

7.6.3 Solid waste generation

Demolition of the proposed Project will result in large quantities of solid waste. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

Proposed mitigation measures

- ✓ Solid waste resulting from demolition or dismantling works will be managed as described in Section 7.2.5.

7.6.4 Health and safety

Risk of accidents and ill health as a result of the demolition activities is likely to be experienced. This could be as a result of accidents due to operation and movement of heavy equipment and vehicles; injuries from falling objects; Injuries from hand tools amongst others.

Proposed mitigation measures

- ✓ Risk of accidents and ill health as a result of demolition activities, shall be mitigated by ensuring that appropriate health and safety measures are applied in all activities; fence all unsafe and dangerous areas; and continue to monitor environmental health (air quality, water quality, vegetation, noise) at all main receptor points around the site until site handover.

7.7 Positive impacts during decommissioning phase

In the event that the building is to be relocated, found to be economically unviable or condemned as structurally unstable. It can be abandoned and/or demolished. The following are positive impacts associated with decommissioning of the proposed Project.

7.7.1 Rehabilitation

Decommissioning will involve phasing out the envisaged operations of the building. This may involve conversion of the facility to other uses or rehabilitation of the project site in line with the projected plans. This may involve new landscaping schemes and demolition of some structures within the facility.

7.7.2 Employment opportunities

For demolition to take place properly and in good time, several people will be involved. As a result, large number of jobs will be created in various positions both in supervisory and non-supervisory positions.

8. CLIMATE RISK AND VULNERABILITY ASSESSMENT AND MITIGATION MEASURES

8.1 Introduction

Climate Change Vulnerability Assessments are emerging tools that can be used as an initial step in the adaptation planning process. It is a systematic process that evaluates the potential impacts of climate change on a specific system, region, community, or sector. It aims to identify the extent to which these entities are susceptible to the adverse effects of changing climate conditions, such as rising temperatures, changing precipitation patterns, sea level rise, and increased frequency of extreme weather events. The assessment considers various factors, including social, economic, and environmental aspects, to determine the level of vulnerability and help inform strategies for adaptation and resilience-building.

When it comes to tackling climate change to prevent the impacts it causes in the different systems of the planet, two types of measures are applied i.e: mitigation and adaptation. Mitigation measures are those actions that are taken to reduce and curb greenhouse gas emissions, while Adaptation measures are based on reducing vulnerability to the effects of climate change. Mitigation, therefore, attends to the causes of climate change, while adaptation addresses its impacts.

Considering the scale of the proposed development several interventions should be implemented to alleviate the causes of climate change. The following mitigation measures should be taken to avoid the increase of pollutant emissions.

8.2 Mitigation measures

8.2.1 Practice Energy efficiency

Energy efficiency is the use of less energy in a building to perform the same operation as buildings that consume energy inefficiently. It should be considered during the design stage, selection of construction materials, construction process, and operation of the building. Adopting passive solar house design strategies at the design stage is the first step toward an energy-efficient structure.

Low-energy building materials and less energy-consuming construction equipment should be used during the construction process. As far as building operation is concerned, utilities for renewable energy systems have to be integrated into the building for water heating, photovoltaic electrification, etc. This involves using energy-efficient equipment in a building that requires the lowest possible energy, such as LED lights, fans, air-conditioners, and refrigerators. Energy star-approved fluorescent bulbs are highly desirable because they are more durable, and their maintenance cost is 75% less than conventional bulbs. Also, using a lighting control mechanism improves energy efficiency because it automatically turns off lights and eliminates waste of energy.

8.2.2 Greater use of renewable energy

Renewable energy and related technologies relevant to the built environment and buildings such as the proposed project include:-

Electricity generation

- ✓ Rooftop photovoltaic (PV) systems, which generate electricity directly from the sun using solar panels usually mounted on the roof
- ✓ Building integrated PV systems, which generate electricity directly from the sun using solar panels that are integrated into building structures, either on the roof, walls or even windows (using transparent panels) in some cases

Hot water systems
- ✓ Solar thermal systems, which heat water directly from the sun
- ✓ Heat pumps, which heat water using warmth from the surrounding air, water or ground

Solar heating and cooling systems
- ✓ Solar thermal cooling, which uses the heat of the sun to drive cooling and/or dehumidification processes
- ✓ Solar heating systems such as heat pumps, which draw and boost heat from the surrounding air, water or ground
- ✓ 'Passive' solar design solutions, which naturally heat or cool buildings without the need for 'active' heating and cooling systems

Energy storage systems such as batteries and thermal storage including hot water storage and storage of warmth and "cool" in building structures. Control systems that manage the flow of energy into and out of properties to increase the total amount of renewable energy used can also be implemented.

8.2.3 Water Conservation:
Install water-efficient fixtures, like low-flow toilets and faucets, and promote responsible water use among residents.

8.2.4 Green Spaces
Plan for and preserve any vegetation within the high-rise development or in close proximity.

8.2.5 Traffic Management
Implement traffic management strategies during construction and operational phases as indicated in chapter 7.

8.2.6 Sustainable Design
Adopt sustainable building practices that focus on energy efficiency, green materials, and reduced environmental impact throughout the building's lifecycle.

8.2.7 Waste Management
Implement efficient waste management systems, including recycling programs and waste reduction strategies, to minimize the environmental impact of high-rise buildings.

8.3 Adaptation measures
In terms of adaptation measures, there are several actions that may help in reducing vulnerability to the consequences of climate change. They include:-

8.3.1 Landscape restoration
Land restoration includes the process of cleaning up and rehabilitating a site that has sustained environmental degradation, such as those by natural cause (desertification) and those caused by human activity. For the proposed project landscaping activities can be used to make the development more attractive by adding ornamental features, and planting indigenous trees, shrubs, flowers and grasses.

8.3.2 Preventive and precautionary measures
Several aspects of a health and safety program should be incorporated into the building and its management operations, designed to control hazards, prevent accidents and health risks at the development. These may include:-
- ✓ A functional Fire Protection System including strategically mounted firefighting equipment (fire hose reels, portable fire extinguishers, fire blankets, kitchen

automatic fire suppression systems, smoke detectors, water sprinklers, fire alarm and intercom system, smoke exhausting system etc)

- ✓ Emergency Response & Evacuation Procedures (written evacuation procedures, emergency exits,)
- ✓ Emergency exit routes (self-closing doors, staircase with handrail, signage, emergency lighting and free from any obstruction)
- ✓ A designated of a Fire Assembly Point
- ✓ Stocked and readily accessible first aid boxes located in several convenient and prominent locations within the building
- ✓ Fire evacuation sign and floor plans showing nearest exits with instructions

8.3.3 Post-Construction Monitoring

Conduct post-construction assessments to evaluate the impact of the high-rise development on the local environment, infrastructure, and community, making necessary adjustments as needed.

9. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

9.1 Introduction

An environmental management and monitoring plan has been developed to assist the Proponent in mitigating and managing environmental impacts associated with the life cycle of the Project. The EMP has been developed to provide a basis for an Environmental Management System (EMS; ISO 14001 principles) for the Project. It is noteworthy that key factors and processes may change through the life of the project and considerable provisions have been made for dynamism and flexibility of the EMP. As such, the EMP will be subject to a regular regime of periodic review.

Tables 2, 3 and 4 form the core of this EMP for the construction, operational and decommissioning phases of the project. In general, the Tables outline the potential safety, health and environmental risks associated with the project and detail all the necessary mitigation measures, their financial costs, as well as the persons responsible for their implementation and monitoring. The EMP will be used as checklist in future environmental audits.

Table 2: Environmental management and monitoring plan for the construction phase of the proposed project

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High demand of raw material/ Unsustainable supply	✓ Source building materials from local suppliers who use environmentally friendly processes in their operations.	Project Manager & Contractor	Lack of waste and damaged material	
	✓ Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.	Project Manager & Contractor		100,000
	✓ Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	Project Manager & Contractor		200,000
	✓ Use recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Project Manager & Contractor		-
Minimize vegetation destruction				
Destruction of existing vegetation	✓ Preserve existing vegetation by designing the building layout around existing trees and vegetation	Project Manager & Contractor	Preservation of some existing vegetation/ Landscaping program	-
	✓ Transplant valuable trees to a different location within the site or to another suitable location before construction begins.	Project Manager & Contractor		100,000
	✓ Incorporate a comprehensive landscaping plan that includes native and adaptive plants after construction	Project Manager & Contractor		700,000
Minimize noise and vibration				
Noise and vibration	✓ Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used	Project Manager & Contractor	No complaints from employees and neighbours/ public	10,000
	✓ Use quiet equipment (i.e. equipment designed with noise control elements such as mufflers)	Project Manager & Contractor		-
	✓ Install portable barriers to shield noisy equipment where necessary and locate stationary noise sources as far from existing sensitive receptors as possible	Project Manager & Contractor		-
	✓ Ensure that construction machinery are kept in good condition to reduce noise generation	Project Manager & Contractor		25,000
	✓ Ensure that all generators and heavy-duty equipment are insulated to minimize noise generation	Project Manager & Contractor		15,000

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
Reduce dust emissions around the project site				
Dust emission	✓ Provide 2.4 m high hoarding along site boundary	Project Manager & Contractor	Presence of hoarding and dust screens No complaints from neighbours/ public	50,000
	✓ Provide effective dust screen, sheeting or netting where a scaffolding is erected around the perimeter of a building			200,000
	✓ Water all active construction areas when necessary	Project Manager & Contractor		30,000
	✓ Cover all trucks hauling soil, sand and other loose materials			5,000
	✓ Down wash of trucks (tyres) prior to departure from site	Project Manager & Contractor		-
	✓ Personal Protective equipment to be worn by all staff members			100,000
Minimize exhaust emissions				
Exhaust emission	✓ Vehicle idling time shall be minimized	Project Manager & Contractor	No complaints from neighbours/ public	0
	✓ Alternatively fueled construction equipment shall be used where feasible equipment shall be properly tuned and maintained			
	✓ Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off vehicle engines at these points	Project Manager & Contractor		0
Reduce stormwater, runoff and soil erosion				
Increased storm water, runoff and soil erosion	✓ A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.	The Civil Engineer, Mechanical Engineer and Project Manager	Presence of storm water management plan and installations Routine site inspection regime	20,000 per unit
	✓ Apply soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.			
	✓ Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site.	Civil Engineer and Project Manager		
	✓ Ensure that any compacted areas are ripped to reduce run-off.			

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
	✓ Site excavation works to be planned such that a section is completed and rehabilitated before another section begins.	Project Manager		5,000 per unit
	✓ Open drains all interconnected will be provided on site.	Civil Engineer		
	✓ Construction of water storage tanks to collect storm water for construction use.	Civil Engineer		5,000 per unit
Minimize deep trenching and excavation hazards				
Trench collapse or cave-in	✓ Conduct a thorough geotechnical investigation to assess soil conditions, groundwater levels, and potential risks before excavation begins.	Civil Engineer and Project Manager	Presence of excavation/trench management facilities Routine site inspection regime	500,000
	✓ Implement appropriate shoring and support systems such as soldier piles, sheet piles, secant piles, or retaining walls to stabilize excavation walls and prevent collapse.	Civil Engineer and Project Manager		20,000 per unit
	✓ Implement effective groundwater control methods to manage water inflow during excavation.	Civil Engineer and Project Manager		5,000 per unit
	✓ Excavated material should not be placed less than 600mm from the edge of a trench to minimize risk of collapse due to the weight of the spoil.	Civil Engineer and Project Manager		-
	✓ Regularly inspect and maintain the stability of the excavation walls and slopes.	Civil Engineer and Project Manager		-
	✓ Develop a detailed emergency response plan that outlines procedures to follow in case of unexpected ground movement, structural instability, or other emergencies.	Civil Engineer and Project Manager		
Persons falling from height	✓ A barricade at least 900mm high must be erected around a trench that is 1 meter or deeper unless it is not possible only workers involved in the trench will be in the area; or another form of barrier exists (such as excavated materials near the trench).	Civil Engineer and Project Manager		100,000
Safe access and exit	✓ Ladders must be provided no more than 9 meters apart in the area where work will be carried out	Civil Engineer and Project Manager		20,000

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
Minimize solid waste generation and ensure efficient solid waste management during construction				
Increased solid waste generation	✓ Use of an integrated solid waste management system i.e. through a hierarchy of options including Source reduction, Recycling, Reuse, Combustion and Sanitary land filling.	Project Manager & Contractor	Presence of construction material storage No waste material at the project site	300,000
	✓ Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed	Project Manager & Contractor		0
	✓ Ensure that damaged or wasted construction materials will be recovered for refurbishing and use in other projects.	Project Manager & Contractor		-
	✓ Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Project Manager & Contractor		100,000
	✓ Use construction materials containing recycled content when possible and in accordance with accepted standards.	Project Manager & Contractor		0
	✓ Dispose waste responsibly by dumping at designated dumping sites or use of licensed waste handlers.	Project Manager & Contractor		500,000
Reduce energy demand				
Increased energy consumption	✓ Ensure electrical equipment, machinery and lights are switched off when not being used	Project Manager & Contractor	Low electric bills	0
	✓ Install energy saving lights at all lighting points to reduce energy consumption	Project Manager & Contractor		5,000
	✓ Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts	Project Manager & Contractor		10,000
	✓ Monitor energy use during construction and set targets for reduction of energy use	Project Manager & Contractor		5,000
Reduce water demand and ensure efficient water use				
High water demand	✓ Connect to the existing NW&SCo main supply	Mechanical Engineer and Project Manager	Water meter available	50,000
	✓ Harness rainwater for construction activities usage			80,000

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
	✓ Install a discharge meter at all water outlets to determine and monitor total water usage	Project Manager & Contractor	Low water bills	2,000 per unit
	✓ Promptly detect and repair of water pipe and tank leaks			1,000 per unit
	✓ Ensure taps are not running when not in use	Site foreman		1,000
Ensure the general safety and security of the construction site and surrounding				
Safety and security	✓ Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site.	Project Manager & Contractor	Presence of security installations	100,000/ month
Minimize hydrology and water quality degradation				
Surface and groundwater contamination	✓ Hazardous substance control and emergency response plan that will include preparations for quick and safe cleanup of accidental spills.	The Mechanical Engineer, Contractor	No indication of contamination	30,000
	✓ Hazardous-materials handling procedures to reduce the potential for a spill during construction to be prescribed	The Mechanical Engineer		2,000
	✓ Identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted	The Mechanical Engineer		-
	✓ Ground water, will be collected during construction contained and disposed of in accordance with all applicable regulations	The Mechanical Engineer		
Minimize traffic around the project site and adjacent roads				
Increased traffic, obstruction	✓ Ensure all construction vehicles to and from the construction site use the designated Entry/Exit to the project site	Project Manager and Site Foreman	No traffic and obstruction Traffic management plan	100,000
	✓ All transportation of construction raw materials and excavated materials are to be conducted at traffic off peak hours only	Project Manager and Contactor		
	✓ Sensitize truck drivers to avoid unnecessary road obstruction	Project Manager, Contactor & site foreman		
	✓ Cover all trucks hauling soil, sand and other loose materials to avoid spillage and dust emissions that may interfere with smooth motoring			

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
Minimize occupational health and safety risks				
Approval of building plans	✓ Ensure that all building plans are approved by the Local Authority and the Local Occupational Health and Safety Office	Developer	Approved plans	50,000
Incidents, accidents and dangerous occurrences.	✓ Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Project Manager, Developer & Contractor	Presence of safety officer General register	500/month
	✓ Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.	The Site Safety Officer		10,000
Site organization	✓ Develop a clear site organization plan and construction schedule	The Contractor, Project Manager& Site Safety Officer	Site plan available	5,000
	✓ Deliver and store materials at appropriate locations			10,000
	✓ Hire the right number of workers with clear work schedule and appropriate dress gear			2,000
Sanitary conveniences	✓ Suitable, efficient, clean, well-lit and adequate sanitary conveniences should be provided for construction workers	Project Manager	Sanitary facilities available	20,000
	✓ Mobile toilets, changed regularly, to be provided on site or latrines	Project Manager	No raw effluent spillage	10,000-30,000 per unit
Machinery/ equipment safety	✓ Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Project Manager, Developer & Contractor	Routine inspections	-
	✓ Ensure that equipment and work tasks are adapted to fit workers and their ability including protection against mental strain	Project Manager & Contractor		0
	✓ All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Project Manager		0

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
	✓ Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Project Manager		5,000 per training
	✓ Equipment such as fire extinguishers must be examined by an authorized agency. The equipment may only be used if a certificate of examination has been issued	Project Manager		5,000 per examination
	✓ Reports of such examinations must be presented in prescribed forms, signed by the examiner and attached to the general register	Project Manager		5,000 per examination
Storage of materials	✓ Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Project Manager	Routine inspections	15,000
	✓ Ensure that items are not stored/stacked against weak walls and partitions	Project Manager		0
Safe means of access and safe place of employment	✓ All floors, steps, stairs and passages of must be of sound construction and properly maintained	Project Manager & Contractor	Routine inspections	-
	✓ Securely fence or cover all openings in floors		Routine inspections Accident and Incident records	300,000
	✓ Provide all staircases within the building with suitable handrails on both sides			
	✓ Ensure that construction workers are not locked up such that they would not escape in case of an emergency			
	✓ All ladders used in construction works must be of good construction and sound material of adequate strength and be properly maintained			
	✓ All of scaffolds and work platforms shall be erected, altered and dismantled by competent persons			
	✓ All uprights must be provided with base plates (and, where necessary, timber sole plates) or prevented in some other way from slipping or sinking			
	✓ All scaffolds must be secured to the building in enough places to prevent collapse			

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
	✓ Guard rails or equivalent protection to be in place to stop falls from open edges on scaffolds, mobile elevating work platforms, buildings, gangways, excavations, etc.			
	✓ Enough barriers must be erected at rooftop edges to protect workers or materials falling from roofs			
Emergency preparedness and evacuation procedures	✓ Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency	Project Manager & Contractor	Routine inspections Accident and Incident records	10,000
	✓ Such procedures must be tested at regular intervals			5,000
	✓ Ensure that adequate provisions are in place to immediately stop any operations where there in an imminent and serious danger to health and safety and to evacuate workers			10,000
	✓ Provide measures to deal with emergencies and accidents including adequate first aid arrangements			5,000
First Aid	✓ Well stocked first aid box which is easily available and accessible should be provided within the construction site	Project Manager & Contractor	Presence of First Aid Box	5,000
	✓ Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Project Manager & Contractor	Presence of Trained First Aiders	10,000
Fire protection	✓ Firefighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.	Project Manager & Contractor	Routine inspections	50,000
	✓ Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained			
	✓ Signs such as "NO SMOKING" must be prominently displayed within the construction site, especially in parts where flammable materials are stored			
Ventilation	✓ Enough space must be provided within the premises to allow for adequate natural ventilation through circulation of fresh air	Project Manager & Contractor	Routine inspections	0

Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
Lighting	✓ There must be adequate provision for artificial or natural lighting in all parts the super structure in which persons are working or passing	Project Manager & Contractor	Routine inspections	0
Electrical Safety	✓ Circuits must not be overloaded	Project Manager & Contractor	Routine inspections	20,000
	✓ Distribution board switches must be clearly marked to indicate respective circuits and pumps			
	✓ There should be no live exposed connections			
	✓ Electrical fittings near all potential sources of ignition should be flame proof			
	✓ All electrical equipment must be earthed			
Supply of clean drinking water	✓ Ensure that construction workers are provided with an adequate supply of wholesome drinking water which should be maintained at suitable and accessible points.	Project Manager & Contractor	Potable water available	5,000/month
Washing facilities	✓ Ensure that conveniently accessible, clean, orderly, adequate and suitable washing facilities are provided and maintained within the site	Project Manager & Contractor	Washing facilities available	5,000

Table 3: Environmental management and monitoring plan for the operation phase of the proposed Project

Negative impact	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
Minimize solid waste generation and ensuring efficient solid waste management				
Solid waste generation	✓ Provide solid waste handling facilities such as waste bins and skips	Proponent/Building management	Presence of collection waste facilities	30,000
	✓ Ensure that solid waste generated at the building is regularly disposed of appropriately at authorized dumping sites by licensed waste handlers	Proponent/Building management	Absence of waste & presence of NEMA Licensed Waste handler	100,000/month
Minimize risks of sewage release into environment				
Raw effluent discharge	✓ Provide adequate and safe means of handling sewage generated (i.e. NW&SCo sewer mains)	Property management	Connection to existing sewer main	-
	✓ Conduct regular inspections for sewage pipe blockages or damages and fix appropriately	Building management	Absence of effluent	3000 per inspection
Minimize energy consumption				
Energy resource utilization	✓ Switch off electrical equipment, appliances and lights when not being used	Staffs/ Building management	Low energy bills Presence of energy saving devices	–
	✓ Install occupation sensing lighting at various locations such as storage areas which are not in use all the time	Building management		10-40 % higher than ordinary lighting
	✓ Install energy saving lights at all lighting points within the building instead of bulbs which consume higher electric energy	Building management		10-40 % higher than ordinary lighting
	✓ Sensitize tenants & employees to use energy efficiently	Management/ Tenants		500/month
Minimize water consumption and ensure efficient and safe water use				
Water consumption	✓ Promptly detect and repair water pipe and tank leaks	Building management	Low water bills Presence of water conservation devices	2,000/month
	✓ Encourage tenants and staffs to conserve water	Building management		500/month
	✓ Ensure taps are not running when not in use			500/month

Negative impact	Recommended Mitigation Measures	Responsible Party	Monitoring Indicators	Cost (Ksh)
	✓ Install water conserving taps that turn-off automatically when water is not being used	Building management		10-40 % higher than ordinary
	✓ Install a discharge meter at water outlets to determine and monitor total water usage	Building management	Presence of water meters	3,000 per meter
Minimize Traffic around adjacent road				
Traffic generation	✓ "NO PARKING" signs will be posted around the building where Parking is prohibited and likely to cause obstruction as well as other necessary traffic signs	Building Management & Traffic/Parking Attendant	No traffic	-
	✓ Access to driveways will be maintained at all times	Security personnel	Presence of traffic management plan and measures in place	-
	✓ Any work that disturbs normal traffic signal operations shall be coordinated with the relevant authorities	Security personnel		-
Ensure the general safety and security of the premises and surrounding areas				
✓ Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.		Proponent	No crime/ Presence of security installations	50,000-100,000/month
Environmental monitoring of the project				
✓ The Firm of Experts (Stalin Environment) will undertake continuous environmental monitoring of the project in liaison to the National Environment Management Authority and the Proponent. This will ensure that environmental concerns are integrated into the project at every stage of implementation. ✓ An Initial Environmental Audit will be conducted in the first year of operation/occupation to confirm the efficacy and adequacy of the EMP and to propose a comprehensive operational Phase EMP in harmony with the building's custom fittings		Proponent, Firm of Experts and NEMA	Adherence to EIA License conditions Initial Environmental Audit conducted	-

Table 4: Environmental management plan for the decommissioning phase of the proposed project

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Monitoring Measures	Cost (Ksh)
Generation of large amounts of waste	✓ Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3. Composting and reuse 4. Combustion 5. Sanitary land filling.	Project Manager & Contractor	Absence of complaints from neighbours Absence of Debris Safety Measures in place	5,000,000
	✓ All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible	Project Manager & Contractor		
	✓ All foundations must be removed and recycled, reused or disposed of at a licensed disposal site	Project Manager & Contractor		
	✓ Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site	Project Manager & Contractor		
	✓ Donate reusable demolition waste to charitable organizations, individuals and institutions	Project Manager & Contractor		
	✓ Rehabilitate accordingly	Architect, Project Manager		
Noise generation	✓ Use appropriate noise management techniques as indicated in section 7.6.3	Project Manager & Contractor	No complaints from neighbours	
Air quality degradation	✓ Use appropriate dust management measures as indicated in section 7.6.4	Project Manager & Contractor	No complaints from neighbours	

10. CONCLUSION AND RECOMMENDATION

Conclusion

In conclusion, the Environmental and Social Impact Assessment conducted for the proposed residential development underscores the commitment to responsible and sustainable urban development. The assessment has provided a holistic understanding of the potential environmental implications associated with the project, allowing for informed decision-making and the implementation of necessary mitigation measures. By addressing key concerns related to air and water quality, noise levels, waste management, health and safety and sustainable resource utilization, this EIA has paved the way for the integration of environmentally sound practices into the construction and operation of the proposed project.

As the process moves forward, it is crucial to remain steadfast in the execution of the recommended mitigation strategies outlined in this report. Regular monitoring and adaptive management will be essential to ensure that any unforeseen environmental impacts are promptly identified and effectively managed. By adhering to the principles of sustainable development and embracing innovative technologies where applicable, the proposed project can serve as a model for responsible urban growth that harmonizes the needs of the community with the protection of the natural environment.

Recommendations

- Consult all relevant service providers and authorities (i.e. NEMA, NCG, KPLC, NCWSC, KURA amongst others) to harmonize the projects infrastructural and socio-economic developments with existing facilities
- Adhere to all conditions within the NEMA License once it is obtained.
- Ensure Water and Energy Management Systems are put in place as outlined within the report and incorporate rainwater harvesting facilities
- Solid waste management during construction and operational phases of the project must adhere to the Environmental Management and Coordination (Waste Management) Regulations, 2006
- Ensure adherence to provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) Regulations, 2009
- Ensure that air pollution control measures are implemented according to the provisions of Environmental Management and Coordination (Air Quality) Regulations, 2014
- Ensure wastewater is disposed of as per standards set in the Environmental Management and Coordination (Water Quality) Regulations, 2006
- Ensure adherence to Occupational Health and Safety Act, 2007
- Adhere to all relevant construction, occupational, health and safety regulations and any other relevant law.
- Ensure an elaborate landscaping program is put in place as the construction phase is being concluded so as to replenish vegetation around the project site by planting trees, flowers and lawns where applicable.

- Provide supervision, information and training of employees on safety procedures including how to operate equipment safely, how to handle any hazardous materials, how to respond to emergencies and proper use of PPE.
- Use compliance standards guidelines outlined in Tables 2 and 3: Environmental Management Plan to mitigate against any negative environmental, safety, health and social impacts associated with the construction and operational impacts of the project.

REFERENCES

- ✓ Climate Change Act 2016
- ✓ Environmental Management and Coordination Act (Cap 387).
- ✓ Environmental Management and Coordination (Impact Assessment and Audit) Regulations 2003.
- ✓ Environmental Management and Coordination (Water Quality) Regulations, 2006.
- ✓ Environmental Management and Coordination (Waste Management) Regulations, 2006.
- ✓ Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) Regulations, 2009.
- ✓ Environmental Management and Co-Ordination (Air Quality) Regulations. 2014
- ✓ National Construction Authority Act NO. 41, 2011
- ✓ National Construction Authority Regulations, 2014
- ✓ Occupational Safety and Health Act, 2007. Government Printer, Nairobi.
- ✓ Physical and Land Use Planning Act, 2019 Government printer, Nairobi
- ✓ Public Health Act (Cap. 242). Government printer, Nairobi
- ✓ Public Roads and Roads of Access Act (Cap. 399)
- ✓ Sustainable Waste Management Act 2021
- ✓ Urban and Cities Act, 2011
- ✓ Water Act, 2016. Government printer, Nairobi

APPENDICES

- Firm of Experts Practicing License
- Lead Expert Practicing License
- Proponent Company Certificate of Registration
- Proponent KRA PIN Certificate
- Proposed Site Land Title Deed
- Notification of Approval of Application
- Approved Project Architectural Drawings
- Public Meetings Notice
- Public Meetings Attendance Registers
- Public Consultation Questionnaires