ENVIRONMENTAL IMPACT ASSESSMENT

STUDY REPORT

FOR

THE PROPOSED SERVICED AND RESIDENTIAL APARTMENTS ON PLOT L. R. NO. 209/4908 ALONG RIVERSIDE GARDENS OFF RIVERSIDE DRIVE IN WESTLANDS SUB COUNTY OF NAIROBI CITY COUNTY.

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

Project Proponent:

Abdul Waheed Sheikh

P. O. Box 56038-00200,

Nairobi.

The following expert(s) conducted the assessment and prepared this Report

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EXECUTIVE SUMMARY

Introduction

Since the inception of the Environmental Management and Coordination Act (EMCA) Cap 387, it has now become a legal requirement for all projects listed in the second schedule to undertake Environmental and Social Impact Assessment (ESIA). Environmental concerns now need to be part of the planning and development process and not an afterthought. To avoid unnecessary conflicts that retard development in the country, the proponent undertook this ESIA and incorporated environmental concerns as advised by the Authority.

This EIA report is designed to inform the proponent and regulatory authority (NEMA) on the predicted environmental impacts (physical, ecological, socio-cultural, health and safety) likely to emanate from the proposed project activities. The report will further guide the proponent on environmental protection. An Environmental Management Plan (EMP) for the project has been proposed for implementation. The report will also assist NEMA in making an informed decision while approving the proposed project.

The proponent, *Abdul Waheed Sheik,* is proposing to develop serviced and residential apartments comprising of two blocks, that is, Block 1 with 50 units and Block 2 with 76 units, on Plot L.R. No. 209/4908 along Riverside Gardens in Riverside Area of Nairobi County. The site is located on GPS coordinates latitude 1°16’6.47’’S and longitude 36°47’21.09’’E approximately five kilometers from Nairobi Central Business District (CBD) and measures approximately 0.3318 Ha.

Scope

The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development (ground preparations, foundation, walling, fixtures and fitting) among other activities.

Objectives of the EIA

The main objectives carrying out the EIA study is to identify potential environmental impacts of proposed project; assess the significance of these impacts; evaluate the relative importance of the impacts of project alternatives and to propose mitigation measures for the significant negative impacts of the project on the environment.

Project Objectives

The objectives of the proposed development include:

i. To construct 126 housing units in riverside area.
ii. To put the current land into more productive and economic use.
iii. To meet the economic desires of the proponent.

Methodology

The methodology of this study included: mobilization and planning; desk review of documents; field data collection; project data synthesis; public consultation and participation. A number of stakeholders were consulted for their inputs through public meeting (baraza) and administration of questionnaires.

Environmental Impacts and Mitigation Measures

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

Possible Impact	**Mitigation Measures**
Increased Traffic	▪ Employ traffic marshals to control traffic in and out of site ▪ Ferry building materials during off-peak hours. ▪ Provide bill boards at the site/entrance to notify motorists and general public about the development. ▪ Enforce speed limits for construction vehicles especially along the roads leading to the site. ▪ Ensure that the vehicles comply with axle load limits. ▪ Employ well trained and experienced drivers.
Increased water demand	▪ The contractor shall use water bowsers and tankers from external sources. ▪ Install water efficient appliances and fittings. ▪ Encourage re-use of water where possible during construction and operation phase. ▪ Drill a borehole to supplement the water supply ▪ Connect to the Nairobi City Water and Sewerage Company supply
Storm water	▪ Semi permeable materials shall be used for construction of pavements. ▪ Comprehensive landscaping on the open areas shall be done after completion of construction.
Air Pollution	▪ Screening of the construction site to contain and arrest construction-related dust. ▪ Dust suppression with water-sprays during the construction phase on dusty areas. ▪ Exposed stockpiles of e.g. sand, shall be covered and watered daily. ▪ Regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases.
Noise and Excessive Vibrations	▪ Construction works shall be carried out between 0800hrs to 1700 hrs. ▪ Provide and enforce use Personal Protective Equipment (PPEs) e.g. earmuffs and helmets during construction.

	▪ Monitor Noise and Excessive Vibrations levels especially during excavation as per the regulations
Increased solid waste	▪ Proper disposal of construction waste in the contractor's yard (off the site). ▪ Segregation of waste at the source ▪ Provision of waste management rooms as collection points within the site ▪ Engage the services of NEMA registered waste collector to dispose the waste at designated areas ▪ Covering of trucks when transporting building materials and waste. ▪ Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse.
Increased liquid waste	▪ Conduct routine inspection and monitoring of the internal sewer system to identify leakages and blockages. ▪ All waste pipes shall have rodding eyes accessible from outside i.e. free to every part of the system for inspection, cleaning and repair. ▪ Residents should report any incidence of blockages in their units immediately they occur for prompt maintenance ▪ As provided for by the Building Code, a portable toilet shall be provided on site to be used by construction workers ▪ Proper decommissioning of the sanitary facilities after construction

Conclusion and Recommendations

In conclusion, the proposed project shall have several positive economic benefits during its different phases and does not pose any serious negative environmental impact on the Environment if the set guidelines, laws and building standards are adhered to strictly. Moreover, these impacts are synonymous with development project and can adequately be mitigated through the implementation of the EMP. Our conclusion is that the project is important for economic development and its benefits outweigh its shortcomings. Thus, the proposed development is recommendable for approval by the authority for issuance of an EIA License.

ACRONYMS

AP	Affected Persons
CCTV	Closed-circuit Television
CBD	Central Business District
CPP	Consultations and Public Participation
DRSRS	Department of Resource Surveys and Remote sensing
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EHS	Environmental Health and Safety
ERC	Energy Regulatory Commission
Ha	Hectares
KPC	Kenya Power Company
KFS	Kenya Forest Services
L. R. No.	Land Reference Number
NCA	Nairobi Construction Authority
NCC	Nairobi City County
NCWSC	Nairobi City Water & Sewerage Company
NEAP	National Environment Action Plan
NEMA	National Environmental Management Authority
NET	National Environmental Tribunal
NPEP	National Poverty Eradication Plan
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
SDG	Sustainable Development Goals
TOR	Terms of Reference
WCC	Waste Collection Centre
WRA	Water Resources Authority
WWTP	Waste Water Treatment Plant

CHAPTER ONE: INTRODUCTION

1.1 General Overview

From Kenya's capital Nairobi to other counties, real estate remains an attractive investment to many. The demand for housing is growing with increased urbanization and growth of devolution, yet the government has been unable to meet the annual housing requirements. This has opened up business opportunities for private sector players, who are buying land and developing houses to cater to different types of tastes and budgets. Investment analysts argue that real estate sector remains a central component of the country's immediate and longer-term economic growth agenda, giving the sector a positive outlook. Growth in real estate has been fueled by strong economic growth and infrastructure development.

In light of these prevailing circumstances, the Proponent *Abdul Waheed Sheikh* has **proposed to construct one hundred and twenty six (126) residential units** on plot LR No. 209/4908 located along Riverside Gardens off Riverside Drive on latitude 1°16'6.47''S and longitude 36°47'21.09''E in Riverside Area of Westlands Sub County, Nairobi City County.

1.2 Objectives of the Project

The objectives of the proposed development include:

i. To construct 126 apartments in riverside area.
ii. To put the current land into more productive and economic use with less environmental degradation.
iii. To meet the economic desires of the proponent.

1.3 Objectives of the EIA

The main objective of the ESIA study is to carry out a systematic examination of the present environmental situation within the project area, to determine whether the proposed project will have any adverse environmental impacts to the surrounding area. Specifically, the study set out to achieve the following objectives:

i. To identify potential environmental impacts of proposed project, policies, plans and programmes and assess the significance of these impacts.
ii. To assess the relative importance of the impacts of project alternatives.
iii. To propose mitigation measures for the significant negative impacts of the project on the environment.

iv. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle.

v. To present the result of an EIA in such a way that they can guide decision making.

1.4 Terms of Reference (TOR)

The terms of reference were developed during the screening and scoping exercise and submitted to the authority in accordance to the provisions of the Environmental (Impact Assessment and Audit) regulations, 2003. They were later approved on and attached is the TOR approval later. Below are the TOR as developed;

i. Carry out assessment and description of site/location, objectives, scope, nature of the proposed project,

ii. Carry out analysis of the proposed project activities during the proposed project cycle; construction, operation and decommissioning phases,

iii. Establish the suitability of the proposed project in the proposed location,

iv. Review and establish all relevant baseline information (Physical, Biological, Social Cultural and Economic) and identify any information gaps,

v. Description and analysis of policy, legal and institutional framework including but not limited to policies, laws, regulations and guidelines which have a direct bearing on the proposed project and will also serve as benchmarks for monitoring and evaluation, and future environmental audits,

vi. Do an in-depth description of the proposed project and associated works together with the requirements for carrying out the works,

vii. Analyze the efficacy of the designs, technology, procedures and processes to be used, in the implementation of the works,

viii. Carry out Consultation and Public Participation (CPP): Identify key stakeholders and Project Affected Persons (PAPs); hold a public meeting and collect written evidence, that is, minutes, questionnaires and photographs,

ix. Identify and analyse proposed project alternatives including but not limited to no project option, proposed project option, alternative design and alternative materials and technologies,

x. The Expert to follow up processing and issuance of the EIA License for the proposed project from the authority and submit the original EIA license to client upon issuance.

1.5 Methodology

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

i. Screening of the project in accordance to the requirements of schedule 2 of the EMCA Cap 387 and EMCA (Amendment) 2015, indicate that the project is categorised as high risk projects because the threshold of units is more than 100, hence the need to undergo a full study.
ii. A scoping exercise that identified the key issues to be addressed in the assessment.
iii. Documentary review on the nature of the proposed activities, policy and legal framework, environmental setting of the area and other available relevant data/information.
iv. Public participation and discussions with the local community, proponent and the project team.
v. Physical investigation of the site and the surrounding areas using a pre-prepared checklist identifying possible environmental and human safety issues that are likely to be affected,
vi. Reviewing the proposed project designs and implementation plan/schedules with a view to suggesting suitable alternatives,
vii. Developing an EMP outline with responsibilities, schedules, monitorable indicators and time frames among other aspects,
viii. A comprehensive report including issues as listed in the Environmental (Impact Assessment) Regulations 2003.

1.6 Justification of the project

1.6.1 Demand for Housing

With a steady increase in population, the demand for quality housing has increased tremendously especially in the urban areas. The Government has since recognized housing development as a priority and has addressed the matter by supporting both public and private sector initiatives. The proposed development therefore comes as a timely venture to cater for the existing accommodation deficit more specifically in Westlands Sub-County of Nairobi County.

1.6.2 Adjacent Land use analysis

The current land uses in the immediate neighborhood are residential town houses. However, in the light of development, high-rise residential houses are rapidly taking shape in the area. In addition, commercial developments such as offices, hotels and institutions such as banks and retail shops are in place within a 5km radius from the proposed project.

1.6.3 Size of the plot

At 0.3318 Ha, the plot is large enough to accommodate the proposed development with strict adherence to the parcel development rights as provided by the County Government. *(See attached copy of title*)

1.6.4 Neighbourhood Development Trend

The neighborhood plot is currently undergoing transformation with several mixed use developments coming up, including apartments, offices, hotels and institutions. The proposed development shall therefore be in conformity with this trend which shall ensure better utilization of the land giving it higher value.

Plate 1: A residential development adjacent to the site.

Source: Fieldwork, 2/11/2018

1.6.5 Socio-Economic Analysis of the proposed Development

The proposed development is in line with the government housing policy that aims at facilitating the attainment of adequate shelter and healthy living environment to all socio-economic groups in the country. Further, the proposed project will aid in achieving one of the country big four agenda on affordable housing.

In particular, the proposed development will generate the following positive socio-economic impacts:

i. Provision of houses, hence increase in the national/local housing stock and quality.
ii. The optimal use of land i.e. increased utility of the parcel of land, which is currently used as a single dwelling townhouse.
iii. Boost local investment to both the government and the proponent. The proponent will benefit through renting / sale of the residential units and the government through levies and taxes.
iv. Creation of market for goods and services. Many secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
v. Provision of employment opportunities throughout the project cycle.
vi. The proposed development will indirectly contribute towards enhancement of security in the neighborhood of the area.

CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

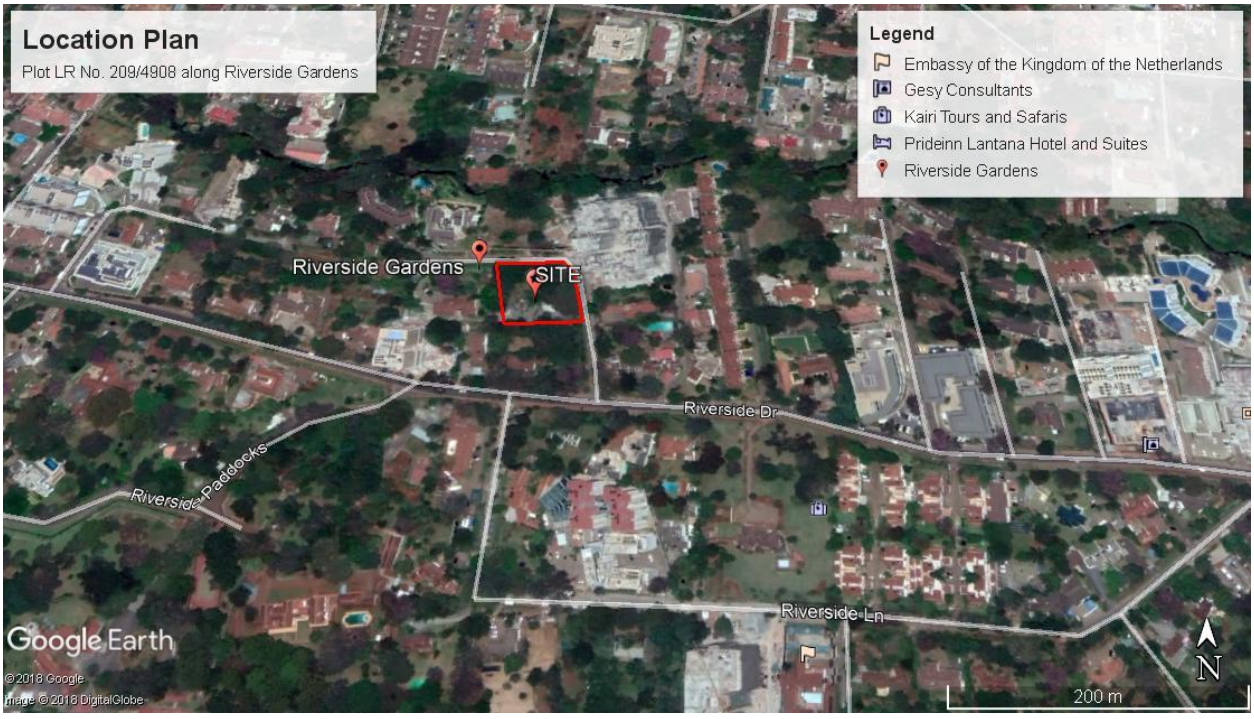
2.1 Nature of the Project

The proposed development will comprise of two blocks (Block 1 with 50 units and Block 2 with 76 units) totaling 126 apartments, 162 parking bays and associated facilities. The development will aim at providing quality housing and will be inconformity with the land use zoning of the area. Currently the proposed project site is used as swing dwelling residential townhouse.

2.2 Project Location and Size

The proposed project site is located **along Riverside Gardens off Riverside Drive** on latitude 1°16'6.47''S and longitude 36°47'21.09''E in Riverside Area of Westlands Sub County, Nairobi County. The parcel of land to be developed measures approximately **0.3318Ha** *(Attached is copy of the ownership documents).*

Plate 2: Site Location



Source: Google Earth, 2018

2.3 Land Tenure, Use, Ownership and Management

The parcel of land on which the subject development is proposed is held on Leasehold interest for 99 years from 11/11/1955. The certificate of Title is drawn under The Registration of Titles Ordinance (Chapter 160) as L.R. No. 209/4908 and the current registered proprietor is *Abdul Waheed Sheikh* (Post Office Box Number 56038-00200) who is hereby seeking the EIA Licence for the proposed development.

According to the zoning ordinances of the county, Riverside Area is in zone 4 which allows for residential apartments and the proposed project is in conformity with the zoning of the area. The proponent has obtained a change of use approval from single dwelling to multi dwelling (Apartments) on 13th September 2018 (**Ref: PPA-CU-AAB359)** *(See attached copy of the ownership document and change of use approval).*

2.4 Project Description

The project proponent proposes to construct residential apartments on the aforementioned piece of land comprising of 126 apartment units, 162 parking bays and other auxiliary facilities as described below:

i. **Basement 1** comprising of 55 parking bays, refuse room, service room, staff changing room, electrical services room and security room

ii. **Basement 2** comprising of 54 parking bays, 2No.service rooms and electrical services room

iii. **Basement 3** comprising of 53 parking bays, pump room, sewer treatment plant and water tank

iv. **Ground floor level**

Block 1

- 4No. two bedroom apartments having a living room, dining, kitchen and washrooms

Block 2

- 4No. two bedroom apartments and 1No. one bedroom apartment having a living room, dining, kitchen and washroom

v. **First floor level**

Block 1

- 2No. two bedroom apartments having a living room, dining, kitchen, washrooms and 2No.admin rooms.

Block 2

- 4No. two bedroom apartments and 1No. one bedroom apartment having a living room, dining, kitchen and washroom

vi. Typical 2nd to 12th Floor levels

Block 1

- 4 units of two bedroom apartments having a living room, dining, kitchen and washrooms

Block 2

- 4 units of two bedroom apartments and two units of one bedroom apartment having a living room, dining, kitchen and washroom

Other salient features include 2 staircases, 5 lift lobbies, balconies, lobby areas, swimming pool, gym, changing rooms and gardens. In summary, there are 50 units in Block 1 and 76 units in Block 2 with 102 units of two bedroom and 24 units of one bedroom.

More fine details, specifications and features of the proposed project can be obtained from the drawings (*Attached are architectural drawings*).

2.5 Construction Inputs

The project inputs include the following:

i. Construction raw materials i.e. stones, cement, sand, crushed rock (gravel/ ballast), ceramic tiles and other ceramic fittings, steel and wooden fixtures and fittings, glass, steel metals, timber, roofing materials, painting materials among others. All these should be obtained from licensed dealers, especially those that have complied with the environmental management guidelines and policies.

ii. Construction machines including machinery such as trucks, concrete mixers, tools and other relevant construction equipment. These will be used for the transportation of materials, clearing of the site and construction debris, excavation works and other

construction works. Most of the machinery will use electricity and petroleum products to provide energy.

iii. Skilled and unskilled construction labour force. These will require services such as energy, water supply and sanitation facilities.

iv. Water for construction purposes and power from the mains grid or provided by generators.

2.6 Construction Activities

2.6.1. Pre-construction Investigations

The implementation of the project's design and construction phase will start with thorough investigation of the site's biological and physical resources in order to minimize any unforeseen adverse impacts during the project cycle. Soil feasibility tests will be carried out to determine its ability to withstand the upcoming structure and other aspects such as water absorption capacity. Temporary structures will be put up to act as site office.

2.6.2 Demolition

The project site is currently used as a residential town house and is covered with vegetation that includes grass, shrubs, hedges and trees. In order to pave way for the proposed development, the existing structure shall be demolished, the tree stumps removed and the vegetation cleared. Relevant permits from KFS and NCC should be sought before commencing the demolition and the cutting down of trees. A registered private contractor shall be engaged to carry out the demolition. The exercise shall be limited to day time only and all personnel working on the project shall be provided with PPEs such as helmets and dust masks. The demolition debris shall be disposed off to designated areas by registered NEMA waste handler. The proponent shall ensure as many indigenous trees as possible are used for re-vegetation after project decommissioning.

2.6.3 Sourcing and Transportation of Building Materials

Building materials will be transported to the project site from their extraction, manufacture, or storage sites using trucks. Greater emphasis will be laid on procurement of building materials from within the local area, which will make both economic and environmental sense as it will reduce negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

2.6.4 Storage of Materials

Building materials will be stored on site. Bulky materials such as building stones, ballast, sand and steel will be carefully piled on site and sourced depending on the demand at any particular time. Materials such as cement, paints and glasses among others will be stored in temporary storage structures, which will be constructed within the project site for this purpose.

2.6.5. Excavation and Foundation Works

Excavation will involve the use of heavy earthmoving machinery such as tractors and bulldozers to prepare the site for construction in terms of laying the foundations, basements, pavements and drainage systems.

2.6.6 Masonry, Concrete Works and Related Activities

General masonry and related activities will include construction of foundations, superstructure construction, concrete mixing, stone shaping, plastering and erection of building walls and curing of fresh concrete surfaces. These activities will be supplemented by machinery such as concrete mixers.

2.6.7 Structural Steel Works

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

2.6.8 Electrical and Mechanical works

Electrical work during construction of the premises will include installation of electrical gadgets, devices and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting. Mechanical works for the proposed development will include and not limited the following:

i. Plumbing and drainage
ii. Service ducts accessible from all floor levels
iii. Soil vent pipes (SVP) provided on doors and windows
iv. Storm drains pipes
v. Inspection chamber covers and framing
vi. Underground foul and waste drain pipes

All the electrical and mechanical works will be carried out by licensed experts to the required standards.

2.6.9 Landscaping

In order to improve the aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping through establishment of a theme garden to replenishment the topsoil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

2.7. Description of the Project's Operational Activities

2.7.1 Residence

Upon completion of the project, the proposed development will provide an urban housing environment to a total of 126 families with high quality infrastructure, amenities and services.

2.7.2 Recreational Activities

There will be several recreational activities within the proposed development which will include a swimming and exercising.

2.7.3 Cleaning

The proponent will be responsible for regular washing and cleaning of the pavements and communal areas. The tenants/occupants of the apartment units will be responsible for washing and cleaning their own residences. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

2.7.4 General Repairs and Maintenance

The housing units and auxiliary facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, repairs of refrigeration equipment, painting, maintenance of flower gardens and grass lawns, and replacement of worn out materials among others.

2.8 Description of the Project's Decommissioning Activities

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

i. Remove all underground facilities from the site
ii. The site should be well landscaped by flattening the mounds of soil

iii. Planting vegetation which may include indigenous trees and flowers
iv. All the equipment should be removed from the site
v. Fence and signpost unsafe areas until natural stabilization occurs
vi. Backfill surface openings

2.9 Construction Products, By Products and Wastes

2.9.1 Products

The final product will be **126 housing units, 162 parking bays** and other auxiliary facilities.

2.9.2 By-Products

The by-products will be disposed-off as follows:

Soil generated during excavation will be reused in the proposed gardens. The surplus soil will be transported for disposal at designated dumping sites by NEMA licensed waste handlers. Pieces of timber/wood generated during the construction phase will be transported back to the contractor's yard for reuse in future or they can be sold to be use as fuel for cooking and heating. Solid waste such as plastic cans will be used to store water during construction while steel metals will be disposed-off to registered scrap metal and plastic waste dealers.

Excess sand, ballast and stock piles will be moved by the contractor to a suitable yard.

2.9.3 Wastes

The waste generated during construction will include construction debris, sanitary waste, excavated soil and rocks. The other wastes that may likely to be generated during operation are solid waste such as paper, plastics, cans, glasses, metallic pieces, and organic waste. The proponent will engage the services of licensed waste handlers. Liquid waste will be treated in the Waste Water Treatment Plant (WWTP) before releasing into the sewer line. These wastes will be disposed by the proponent in accordance with the standards and documented procedures stipulated in the EMCA Waste Management Regulations of 2006.

2.10 Project Budget and Duration

The proposed project is estimated to cost **one billion seventy five million Kenyan shillings** (KShs 1, 075, 000, 000). The project implementation works is estimated to take 2 years to completion.

CHAPTER THREE: BASELINE INFORMATION

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate

Riverside Area just like many parts in Nairobi experiences a bimodal rainfall pattern. Short rains fall between October and December while the long rains fall between mid-March and May. Annual rainfall is influenced by altitude with a mean annual rainfall of 800 mm. The climate is humid highland subtropical in character with seasonal dry and wet periods. Temperatures vary with altitude rising from the lowest 10°C in to the highest are 27°C. The warmest period occurs from January to March with coolest period falling between months of May to August.

3.1.2 Topography

The site lies at an altitude of approximately 1700 meters above sea-level and is gently sloping towards the northern part of the property. It drains its storm water in the open drains constructed within the compound that eventually lead to the public drains.

3.1.3 Geology and Soils

The geology history of Nairobi has been dominated by volcanic activity whereby a thick succession of alkaline lavas and associated tuffs began accumulating in mid- miocene time and continued into the upper Pleistocene. The soil type in the project area is primarily red volcanic in nature which is well drained and easy to work on during construction.

3.1.4 Water Resources and Wetlands

The closest wetland to the project site is the Nairobi River which is at a distance of approximately 200 meters southwards from the project site. Nonetheless, the proposed site **does not** border any river or stream.

3.2 BIOLOGICAL ENVIRONMENT

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

3.2.1 Flora

Increased population within Nairobi has seen natural vegetation within Nairobi and its environs greatly cleared to pave way for upcoming commercial developments such residential, banks, hotels and other social amenities. The site is generally characterized by hedges, grass, thickets

and trees within and along the plot boundaries. The trees will be cut to pave way for the proposed development and measures will be taken to replant observing the necessary relevant policies. The developer will seek tree cutting permit from relevant authorities before carrying out the exercise.

Plate 3: Vegetation within the proposed site

Source: Field Survey 30/10/2018

3.2.2 Fauna

The project site is situated within the leafy suburbs of Nairobi where the natural habitat harbors animals such as bird, mice, rats, moles and other members of the rodent family. During the project implementation, it's expected that the natural habitat of these animals would be tampered with thus creating an imbalance in the ecosystem.

3.3 SOCIO-ECONOMIC ENVIRONMENT

3.3.1 Land Use

The neighborhood is generally characterized by a mix of different uses. The housing typology consists of mainly townhouses. However the trend is slowly changing because high-rise buildings as rapidly taking shape. This can be justified with the upcoming Rumasia Apartment adjacent to the proposed site.

Commercial activities in the area include shopping complex such as the Diamond Plaza and Sky mall with restaurant, supermarkets and recreation areas. Other commercial activities include financial institutions such SBM Bank and Prime Bank and light industries such as Oilibya Petrol Station.

Plate 4: Upcoming residential apartments in the neighborhood

Source; Field Survey 30/10/2018

3.3.2 Educational

The different education facilities found in the area include; Nursery Schools (Riverside Farm Nursery School); Primary Schools include Nairobi International School, Marion Schools, Riverside Academy) and Secondary Schools (Strathmore School and the Kenya High School).

3.3.3 Public Purpose (Church)

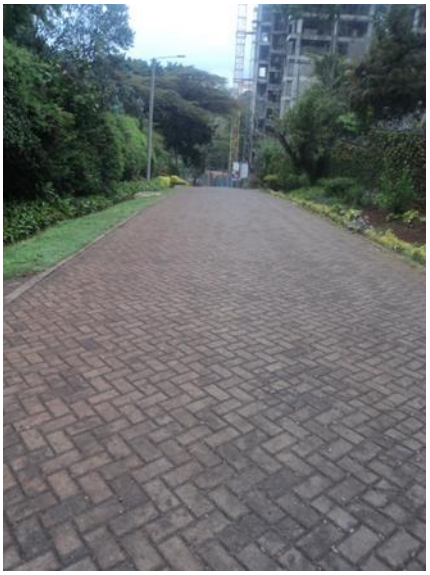
Religious institutions in the neighborhood include churches and mosques such as Riverside PAG church, St. Jude Catholic Church, Masjid Ibrahim Kileleshwa Mosque and Westlands Mosque.

3.4 INFRASTRUCTURE

3.4.1 Roads and accessibility

The property is accessed along Riverside Gardens off Riverside Drive in Riverside Area of Nairobi City County. The main (Riverside Drive) Road is tarmacked but the road leading to the proposed site (Riverside Gardens) is cabro-paved.

Plate 5: Cabro Paved road leading to the site



Source: field survey 30/10/2018

3.4.2 Water supply

The area is served with water supplied by the Nairobi City Water and Sewerage Company (NCWSC). The developer intends to connect to the main water supplier. However, due to the noted inconsistencies in the delivery of the resource from the supply company, the developer intends to:

i. Make arrangements with registered water vendors to supply the commodity (water) to the site in case of short fall in the normal supply.
ii. Drill a borehole to supplement water supply. The proponent will apply for a permit from the Water Resources Authority and conduct a separate EIA before drilling begins.

3.4.3 Sewer System

The general area is served with public sewerage system of NCWSC. The proponent therefore intends to connect to the trunk sewer for sewerage disposal. The internal sewer system of the proposed project will be suitably designed to collect all effluent/waste water from the

development. All sanitary installations, fixtures and fittings will be done to the entire satisfaction of County government Public Health Office and Ministry of Health. In order to reduce overload on the sewer system, the proponent intends to set up a waste water treatment plant to treat sewer before release into the main system.

Plate 6: Sewer Manhole and open drains

Source: Fieldwork, 2/11/2018

3.4.4 Storm water Drainage

Increased surface run-off is anticipated from roof catchments of building structure; drive way and parking. In connection to this, the volume of water reaching the drain system will greatly reduce by installing rain water harvesting facilities in the development

The surface water/run-off will mainly be directed to the open drains constructed within the compound that will eventually drain to the public open drains.

3.4.5 Solid Waste Management

Increased solid waste generation (from the project) is anticipated mainly arising from the construction activities (wooden, debris, metals, glass, plastics, and sanitary litter etc.). The sources include the following:

i. Debris resulting from the demolition works shall be reused to fill in the large potholes along the access road, the excess shall be disposed of at the designated dumping sites.
ii. All stony, wooden, metals and glass materials resulting from related activities, during implementation of the proposed project.

iii. Plastic materials resulting from such works as sewerage, drainage and water systems, electricity works etc.

iv. Sanitary litter as generated during implementation and occupation of the project.

v. Kitchen materials and other refuse especially on the occupation of the proposed project

All debris generated during project implementation process will be disposed suitably into the approved dumpsite or as directed by the Engineer, Ministry of Works.

Handling of wastes during occupation phase shall be fundamentally considered and especially through inclusion of a Waste Collection Centre (WCC) at the entrance to the site. This shall enhance storage, collection, transportation and disposal of all solid waste of the entire project, on occupation.

3.4.6 Electricity

The site is already connected to electricity from the National grid. Upon completion of construction, the proponent will extend the connection to the new development upon acquiring relevant permits. Consequently, the proponent will install solar water heaters and backup generator to supplement energy supply.

Plate 7: Transformer that supplies power to the area

Source: field work 30/10/2018

3.4.7 Communication

The area is well covered by communication facilities such as Safaricom, Airtel, Telkom, among others. All these will facilitate communication during the project cycle.

Plate 8: Communication Booster near the Proposed Site

Source: field work 30/10/2018

3.4.8 Security

There will be an entry gate at the proposed project, which will be fully manned 24 hours by a contracted security company. The entire site will also be banded with a boundary wall and CCTV cameras will be placed at strategic points within the property to enhance security. Further, the area is well served with security lights which improve safety or riders, pedestrians and general security of the Area.

CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

EIAs are carried out in order to identify potential impacts associated with the proposed development with a view of taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on EIAs are contained in section 58 to 67 of the Act. According to section 68 of the EMCA Cap 387, the authority shall be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

There are a number of policies, laws and regulations that govern the protection, conservation and exploitation of the natural resources coupled with provisions for environmental management. These national policies, laws and regulations cover infrastructure, water, agriculture, forestry and health just to mention a few. The national environment action plan documents cover policy directions regarding integration of environmental concerns including EIA into development planning process.

Some of the key national laws, policies and regulations that govern the management of environmental resources in the country are discussed herein.

4.2 RELEVANT NATIONAL POLICIES

The following national policies are of relevance to the proposed project:

4.2.1 The National Environmental Action Plan (NEAP)

The NEAP was a deliberate policy effort to integrate environmental considerations into the Country's economic and social development. The integration process was to be achieved through a Multi-sectoral approach to develop a comprehensive framework to ensure that environmental Management and conservation of natural resources are an integral part of societal decision making.

Relevance to the proposed project

The NEAP has indicated how resources within particular sections of the country should be managed in order to ensure their sustainable utilization. The project should be implemented and operated based on these guidelines.4.2.2 Environment and Development Policy (Sessional Paper No. 6 of EMCA CAP 387)

The aim of this policy is to harmonize environmental and development goals so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development.

Relevance to the proposed project

The interaction of the proposed project with physical elements may lead to some negative impacts. Mitigation measures are therefore necessary to ensure balanced coexistence of the project and the surrounding environment and facilities.

4.2.3 The National Poverty Eradication Plan (NPEP)

The objective of NPEP is to alleviate poverty in rural and urban areas by 50 percent by the year 2015 as well as the capabilities of the poor and vulnerable groups to earn income. It also aims to narrow gender and geographical disparities and a healthy, better educated and more productive population. This plan has been prepared in line with the goals and commitments of the World Summit for the Sustainable Development (WSSD) of 1995.

Relevance to the proposed project

Since poor housing is among the indicators of poor societies, pursuits to address it build individuals capacity to relieve poverty.

4.2.4 Sustainable Development Goals (SDG's)

On September 25th 2015, countries adopted the United Nations Sustainable Development Goals (SDG's) aimed at contributing towards ending poverty, protecting the planet, and ensuring prosperity for all as part of a new sustainable development agenda. The SDG's have very significant implications for investment needs and the role of the public sector is fundamental and pivotal. At the same time the contribution of the private sector is indispensable.

Relevance to the proposed project

The proponent has committed to the SDG's through the proposed development in the following ways:

Goal 3 -Good Health & Well Being

Targets achieved:

i. Contribute to improved health and productivity through the provision of a safe and clean environment

Goal 6 -Clean water and sanitation

Targets achieved:

i. The connection of the liquid water to the sewer system will improve water quality by reducing pollution, ensuring zero proportion of untreated wastewater and substantially increasing recycling and safe reuse.

Goal 7: Affordable and Clean Energy

Targets achieved include:

i. The implementation of an energy management system through good orientation, solar shading, natural ventilation, natural lighting, energy efficient fitting and appliances shall contribute to increased energy efficiency.
ii. Use solar energy as an alternative source of energy.

Goal 8 -Decent work and economic growth

Targets achieved:

i. Employment creation that will contribute to reducing the proportion of youth not in employment.
ii. Providing an environment that emphasizes on protection of labor rights and promotes safe and secure working environments for all workers

4.3 Legal Framework

4.3.1 Environmental Management and Coordination Act, CAP 387

In EMCA 1999 and Amendment Act 2015 states in section 3 (1) and (2) that "Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment and that the entitlement to a clean and healthy environment under subsection (1) includes the access by any person in Kenya to the various public elements or segments of the environment for recreational, educational, health, spiritual and cultural purposes.

Part VI Section 58 (2) of the Act states the proponent of any project specified in the Second Schedule shall undertake a full environmental impact assessment study and submit an EIA Study report to the Authority prior to being issued with any licence by the Authority: provided that the Authority may direct that the proponent forego the submission of the EIA Study report in certain cases.

Section 58 (5) states that EIA studies and reports required under the Act shall be conducted or prepared respectively by individual experts or a firm of experts authorised in that behalf by the Authority. The Authority shall maintain a register of all individual experts or firms of all experts duly authorized by it to conduct or prepare environmental impact assessment studies and reports respectively. The register shall be a public document and may be inspected at reasonable hours by any person on the payment of a prescribed fee. Subsection (7) further states that EIA shall be conducted in accordance with the EIA regulations, guidelines and procedures issued under this Act.

Section 59 (1) states that upon receipt of an EIA Study Report from any proponent under section 58(2), the Authority shall cause to be published in the Gazette, in at least two newspapers circulating in the area or proposed area of the project and over radio stating:

(a) a summary description of the project;
(b) the place where the project is to be carried out;
(c) the place where the environmental impact assessment study, evaluation or review report may be inspected; and
(d) a time limit of not exceeding ninety days for the submission of oral or written comments by any member of the public on the environmental impact assessment study, evaluation or review report.

Subsection (2) and (3) of 59 states that the Authority may, on application by any person extend the period stipulated in sub-paragraph (d) so as to afford reasonable opportunity for such person to submit oral or written comments on the EIA report and the Authority shall ensure that its website contains a summary of the report referred to in subsection (1).

Relevance to the proposed project

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

4.3.2 EMCA (Environmental Impact Assessment and Audit) Regulations, 2003

These regulations stipulate how an EIA project report should be prepared and specifies all the requirements that must be complied with. It highlights the stages to be followed, information to

be made available, role of every stakeholder and rules to be observed during the whole EIA study report making process.

Relevance to the proposed project

The proposed project will be planned, designed, constructed and operated based on these regulations. It shall also be maintained and guided by the same regulations and an environmental Audit will be done periodically to monitor compliance with the set environmental standards.

4.3.3 EMCA (Water Quality) Regulations, 2006

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

In addition, of immediate relevance to the proposed project for the purpose of this Study Report is Part II Sections 4-5 as well as Part V Section24.

Part II Section IV states that "Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution".

Part IV Section 24 states that "No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses".

According to these regulations, "Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act".

Relevance to the proposed project

The proponent/contractor shall take care and precaution not to pollute underground water or even surface water in anyway and if a pollution incidence occurs the contractor should notify the authority immediately.

4.3.4 EMCA (Waste Management) Regulation, 2006

The Waste Management Regulations (2006) are contained in the Kenya Gazette No. 69, Legal Notice No. 121. The Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source. The regulation requires licensing of transporters of wastes and operators of disposal site (sections 7 and 10 respectively). Of immediate relevance to proposed development for the purposes of this project report is Part II Sections 4(1-2), 5 and 6.

Section 4 (1) states that "No person shall dispose of any waste on a public highway, street, road, recreational area or any other public place except in a designated waste receptacle".

Section 4(2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority.

Section 5 provides method of cleaner production (so as to minimize waste generation) which includes the improvement of production processes through conserving raw materials and energy.

In section 14 (1) every trade or industrial undertaking is obliged to install anti- pollution equipment for the treatment of waste emanating from such trade or industrial undertaking.

Relevance to the proposed project

The Developer shall ensure that the garbage collector contracted has a valid license from the National Environment Management Authority (NEMA). So as to comply with this, the contractor shall take precaution not to dumb wastes in areas not registered and designated as so. Further, the project proponent shall be required to ensure, through public education and other law enforcement mechanism to ensure that all road users don't dump wastes along the road.

4.3.5 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These Regulations determine that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- Time of the day;

- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

Relevance to the proposed project

The contractor shall be required to abide by these measures; ensure that all machineries are in good working condition to reduce noise.

4.3.6 EMCA (Air Quality) Regulations, 2013

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required stipulated under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits).

Relevance to the proposed project

The proponent shall implement the mitigation measures provided in the EMP to prevent air pollution.

4.3.7 Occupational Health and Safety Act, 2007 CAP 514

The Act makes provision for the health, safety and welfare of persons employed in factories and other places of work. The provision requires that all practicable measures be taken to protect persons employed in the factory and other places of work from any injury. The provisions of the act are also relevant to the management of hazardous and non-hazardous wastes, which may arise at the project site. The act provides that all measures should be taken to ensure safety, health and welfare of all the stakeholders in the work place.

Relevance to the proposed project

Workers and Neighbors' safety will be given priority during construction phase of the project.

4.3.8 The Physical Planning Act of 1996, CAP 286

Part V clause 36 of the act requires that, "If in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development, will have injurious impact on the environment the applicant should be required to submit together with the application an environmental impact assessment report."

Relevance to the proposed project

This Act provides for order in terms of development execution. This development should therefore comply with all the provisions of this law including land use zoning requirements.

4.3.9 The Penal Code CAP 63

Chapter XVII on "Nuisances and offences against health and convenience" contained in the penal code strictly prohibits the release of foul air into the environment which affects the health of the persons. It states "Any person who voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighborhood or passing along a public way is guilty of a misdemeanor"

Relevance to the proposed project

Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of the code.

4.3.10 County Government Act, 2012

The main purpose of the enactment of this Act was to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Functions which were carried out by local governments were effectively transferred to the county governments. The Act gives county the responsibility of planning and co-coordinating all developments within their areas of jurisdiction. Part XI (sections 102-115) of the Act provides for planning principles and responsibilities of the county governments. The land use and building plans provided for in the Act are binding on all public entities and private citizens operating within the particular county. The proposed project is within the Nairobi City Government and thus there will be need of working in liaison with the County Government. The plans for the proposed project must be approved by the County Government

and the County government may also issue directives and authorizations on various aspects e.g. waste management and fire emergency preparedness among others.

Relevance to the proposed project

The proponent will work in liaison with NCC and in particular the Water, Energy, Forestry, Environment and Natural Resources sector. The plans provided in this report have been approved by the County Government of Nairobi a sign of compliance.

4.3.11 The Registration of Titles Act (Chapter 281)

According to section 23 (1) of this Act, the certificate of title issued by the registrar to a purchaser of land upon a transfer or transmission by the proprietor thereof shall be taken by all courts as conclusive evidence that the person named therein as proprietor of the land is the absolute and indefeasible owner thereof, subject to the encumbrances, easements, restrictions and conditions contained therein or endorsed thereon, and the title of that proprietor shall not be subject to challenge, except on the ground of fraud or misrepresentation to which he is proved to be a party. (*Copy of land ownership documents is attached to this Report.)*

4.3.12 The Constitution of Kenya 2010

The Constitution of Kenya is the supreme law of the Republic of Kenya and binds all persons and all State organs at all levels of government. It provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectorial legislative documents are drawn. In relation to environment, Article 42 of Chapter 4, the Bill of Rights, confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70.

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

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

Relevance to the proposed project

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

4.3.13 The Water Act, 2016

This Act of Parliament provides for the regulation, management and development of water resources, water and sewerage services.

Part II section 9 of this Act states that every person has a right to access water resources, whose administration is the function of the national government. Part III section 11 states the establishment of the Water Resources Authority (WRA) whose functions is stipulated in section 12 and include but not limited to receiving water permits applications for water abstraction, collection of water permit fees and water use charges.

Section 63 of the act states that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution.

Section 143 states that a person shall not, without authority conferred under this Act;

a) willfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or
b) throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.

Section 147 states that a person who commits an offence under this Act, or under any Regulations or made under this Act, shall, if no other penalty is prescribed in respect of the offence, be liable to a fine not exceeding one million shillings or to imprisonment for a term not exceeding two years, or to both such fine and imprisonment.

Relevance to the proposed project

The proponent shall ensure that all provisions stated in the act and under any regulations are observed and that the EMP is implemented.

4.3.14 Public Health Act Cap 242

Part IX section 115 of the Act states that no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.

Section 116 requires that the local authorities (county governments) take all lawful, necessary and reasonably practicable measures for maintaining its district (counties) at all times in clean and sanitary condition, and for preventing the occurrence therein of, or for remedying or causing to be remedied, any nuisance or condition liable to be injurious or dangerous to health, and to take proceedings at law against any person causing or responsible for the continuance of any such nuisance or condition.

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act. Section 138 states that no person shall within a township permit any premises or lands owned or occupied by him or over which he has control to become overgrown with bush or long grass of such a nature as, in the opinion of the medical officer of health, to be likely to harbour mosquitoes.

Relevance to proposed project

The proponent shall contract a licensed waste handler to collect all waste from the site to disposal at approved dumping site. Sewage from the site shall be discharged into the conventional sewer system. Further, the proponent shall set up a Waste Water Treatment Plant for treatment of sewer before release to the main sewer trunk.

4.3.15 Energy Act, 2006

The Energy Act, 2006 was enacted on 2nd January 2007 establishes an Energy Regulatory Commission (ERC) mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, Public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to energy sector in Kenya. Section 30 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the EMCA 1999. Moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

4.3.16 National Construction Authority Act, 2011

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

4.3.17 Building Code, 2000

This gives general guidelines for the construction of buildings and attendant safety measures such as installation of firefighting appliances, fire escapes etc. It equally recognizes local authorities as lead planning agencies and thus requires every developer to submit building plans to the relevant local authority for approval. The local authorities are in turn empowered to disapprove any plan submitted if it is not correctly drawn or does not provide sufficient information that complies with the relevant by-laws. Any developer who intends to erect a

building, such as a residential block, must also give the concerned local authority a notice of inspection before the erection of the proposed structure.

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

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

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

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1): (a) to manage public land on behalf of the national and county governments; (b) to recommend a national land policy to the national government; (c) to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya; (d) to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities; (e) to initiate investigations, on its own initiative or on a complaint, into present or historical land injustices, and recommend appropriate redress; (f) to encourage the application of traditional dispute resolution mechanisms in land conflicts; (g) to assess tax on land and premiums on immovable property in any area designated by law; and (h) to monitor and have oversight responsibilities over land use planning throughout the country.

4.4. INSTITUTIONAL FRAMEWORK

There key institutions that deal with environmental issues in Kenya include National Environmental Management Authority (NEMA), the Department of Resource Surveys and Remote Sensing (DRSRS), the Water Department, The Kenya Forest Service (KFS), The Kenya Forestry Research Institute (KEFRI) among others. While implementing the project, both the

proponent and the contractor will have to work in liaison with a number of these institutions when dealing with issues within the jurisdiction of the institutions.

4.4.1 National Environmental Management Authority (NEMA)

The objective for which NEMA was established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director General appointed by the president heads NEMA. The Authority shall:

i. Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.
ii. Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impeding environmental emergencies is given.

Relevance to the proposed project

The contractor and the client will work in liaison with NEMA in getting various permits, licenses, approvals and generally in complying with the provisions of EMCA 1999 and any other subsidiary legislation under the Act.

4.4.2 National Environmental Tribunal (NET)

This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. If disputes to the proposed project arise, they are supposed to be presented here for hearing and legal direction.

CHAPTER FIVE: IMPACT ASSESSMENT AND MITIGATION MEASURES

This chapter provides a detailed description of the implications of the proposed project and adequately describes possible mitigation measures for the impacts identified. Impacts can be categorized into four categories depending on the magnitude, extent, reversibility and duration. The categories are as listed below:

i. Magnitude (minor or major),
ii. Duration (Short-term or long term),
iii. Extent (Specific (localized) or widespread),
iv. Reversibility (Reversible or irreversible).

Analysis of Impacts

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

Table 1 Impact analysis during the project

Impact	**Impacts Analysis**		
	Construction	**Operation**	**Decommissioning**
Provision of housing units		Major Positive Long Term Localized Irreversible	
Employment	Major Positive Short Term Specific Reversible	Major Positive Long Term Widespread Irreversible	Major Positive Short Term Localized Reversible
Revenue	Major Positive Short Term Widespread Reversible	Major Positive Long Term Widespread Reversible	Major Positive Short Term Widespread Reversible
Market for good.	Major Positive Short Term Widespread Reversible	Major Positive Long Term, Widespread Reversible	
Solid Waste	Major Negative Short Term Irreversible Localized	Major Negative Long Term Irreversible Widespread	Major Negative Short Term Widespread Localized
Liquid waste	Major Negative Short Term Localized Irreversible	Major Negative Long Term Widespread Irreversible	Major Negative, Short Term Localized Irreversible

Traffic Density	Major Negative Short Term Widespread Reversible	Major Negative Long-Term, Widespread Irreversible	Major Negative Short-Term Widespread Reversible
Water demand	Major Negative Short Term Widespread Irreversible	Major Negative Long-Term Widespread Irreversible	Major Negative Short Term Widespread Irreversible
Energy demand	Major Negative Short Term Widespread Irreversible	Major Negative Long Term Widespread Irreversible	Major Negative Short Term Widespread Irreversible
Noise Pollution	Major Negative Short, Term Reversible Localized	Minor Negative Short Term Localised Reversible	Major Negative Short Term Reversible Localized
Air Pollution	Major Negative Short Term Reversible Localized	Minor Negative Short Term Localised Reversible	Major Negative Short Term Reversible Localised
Soil erosion	Major Negative Short Term Irreversible Widespread	Minor Negative Short Term Localised Reversible	Major Negative Short Term Irreversible Widespread
Insecurity	Minor Negative Short Term Reversible Localized	Minor Negative Long Term Reversible Localized	Minor Negative Short Term Reversible Localized
Occupation health and safety	Minor Negative Short Term Reversible Localized	Minor Negative Long Term Reversible Localized	Minor Negative Short Term Reversible Localized
Oil pollution	Minor Negative Short Term Localized Irreversible	Minor Negative Long Term Localized Irreversible	Minor Negative Short Term Localized Irreversible

5.1 Positive impacts

Positive impacts resulting from the proposed project are as discussed below:

5.1.1 Provision of housing facility

Establishment of housing units is a major positive impact because the proposed development once operational, aims to meet housing demands considering the steady increase in population.

5.1.2 Provision of employment opportunities

Money trickles into a community well before noticeable construction activity. Planning professionals, attorneys, engineers, architects and designers are commissioned to develop preliminary designs. Financial models are prepared and land is acquired. Redevelopment plans are presented and local businesses strategize for their position in a growing economy. There is an increase in construction related jobs that are available to local workers, thereby increasing wages. There is increased work in landscaping, trucking and transportation, and off-site improvements such as road and sidewalk work, as well as sewer and water systems infrastructure. There are also marketing, financing, and realtor costs that bring money to local coffers.

5.1.3 Increase in revenue

Before any construction is commissioned, local permits have to be sought from the relevant authorities. The fee charged contributes to revenues earned by the government. Likewise when buying goods for the proposed project, the government earns revenue through VAT charged on products

5.1.4 Increased market for goods and services

The financial impact of construction is felt by a variety of business types including lenders, title companies, appraisers, insurance agents, relocation, moving and rental companies, cable and internet providers, cleaning and window washing services, appliance and furniture stores, hardware stores, gutter companies and landscapers. In addition, market for utilities such as water and electricity providers increases.

5.2 Negative environmental Impacts

The issues that are seen as likely to negatively affect the environment and population therein include the following:

5.2.1 Noise and Excessive Vibrations

Noise pollution will be caused by the construction activities, use of heavy machinery and vehicles during transportation of materials to and from the site. Vibrations will be experienced during the excavation of the basement, concrete vibration during concreting of the structural elements and hacking of the walls and building elements during plastering of the members. On occupation of the apartments, there will be minimal noise and vibrations from the units.

Potential Mitigation measures include:

i. Construction works shall be carried out only during the day from 0800hrs to 1800 hrs.
ii. Noise shields shall be used on noisy equipment, such as corrugated iron sheet structures, to minimize the exposure to the neighbors and other workers within the site.
iii. The construction vehicles and machinery shall be switched off when not in use to reduce idling time.
iv. All noisy activities shall be scheduled concurrently during the construction period to reduce the exposure period to the PAPs.
v. Equipment installed with noise abatement devices shall be used as much as practicable.
vi. All machines and equipment shall be maintained regularly to reduce frictional noise.
vii. All workers shall be provided and use PPEs such as earmuffs at all times.
viii. Drivers delivering materials shall avoid unnecessary horning of the trucks/vehicles.
ix. Bill board shall be erected at the construction site entrance to notify of the construction activities and timings.
x. Regular monitoring of noise levels at the site as per the regulations.

5.2.2 Air Pollution

Air pollution will be a major negative impact during the construction phase as a result of increase dust arising from the demolition, excavation, construction activities. This may be a public health hazard resulting to nuisance to the workers and the public. Air pollution may also be as a result of combustion of fossil fuels from the construction machinery.

Potential Mitigation measures are as follows:

i. Use of dust nets/screens around the construction site to contain and arrest dust.
ii. Regular sprinkling of water on work areas to suppress dust.
iii. Use environmentally friendly fuels such as low sulphur diesel.
iv. Minimize the period for idling of machinery and construction vehicles.
v. Regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases.
vi. Minimize exposed areas through the schedule of construction activities to enable dust control.

vii. Ensure no burning of waste such as paper and plastic containers on sites/non-designated areas.

viii. Provide PPEs to the workers in dusty areas on the site.

ix. Monitor the air pollution levels regularly as per the Air Quality regulations.

5.2.3 Liquid Waste

Increase liquid waste will be as a result of increased no. of people in the area during both the construction and operation phase. Inappropriate liquid waste handling may pose a threat to human health of both workers and the neighboring community.

Possible Mitigation measures for managing liquid waste include:

i. The proponent intends to construct a Waste Water Treatment Plant to treat sewer before channeling to the main sewer thus reducing load on the trunk sewer system.
ii. Channel all treated liquid waste to the sewer line.
iii. Provision of adequate and appropriate sanitary facilities for the workers during construction phase.
iv. Proper decommissioning of the sanitary facilities shall be carried out once construction is complete.
v. Sanitary facilities shall be kept clean always through regular cleaning.
vi. Ensure regular maintenance of foul water drainage works at the premises to prevent clogging and fore-stall breakdowns.

5.2.4 Solid waste

Solid waste during construction and decommissioning include stones, wood, broken glasses, cans, rods of metal, sharp objects (nails).The occupation phase will generate waste mainly organic leftover from the kitchen, paper, plastic and containers.

Proposed mitigation measures for solid waste include:

i. Engage the services of registered waste handlers to transport waste to designated disposal sites.
ii. Segregation of waste at the source during the project cycle.
iii. Provision for waste management rooms at strategic places within the apartments. The proponent has provided refuse room for collection and sorting of garbage before disposal
iv. Use of an integrated solid waste management system; through a hierarchy of

options: source reduction, recycling, composting and reuse, will facilitate waste handling during occupation phase.

v. Efficient use of building material to reduce waste and recycling/reuse where feasible.
vi. Manage waste in accordance to the provisions of Waste Management Regulations, 2006.

5.2.5 Water demand

Implementation and operation phases of the project will create additional demand as a result of increased tenancy. The possible mitigation measures to ensure consistent availability:

i. Installation of water conserving taps that can be turned-off when water is not in use will be done.
ii. Drilling of a borehole to complement water supply
iii. Encouragement of water re-use/ recycling during both construction and occupation phases of the project
iv. Supplement water supply through buying from other vendors and installation of underground and rooftop water storage tanks.

5.2.6 Storm water drainage

The drainage of the general site is necessary to enhance flow of the surface run-off expected given that the proposed site is steeply sloping. Proposed mitigation measures for anticipated increase in surface runoff include:

i. Drainage channels shall be installed in all areas that generate or receive surface water. The channels will be covered with gratings or other suitably approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off.
ii. Designing channels with regards to peak volumes.
iii. Paving of the sidewalks and other open areas using pervious materials to enhance water percolation thus reducing run-off volume.
iv. Proper grading of land to avoid pooling of water below the grade structural components.

5.2.7 Insecurity

Insecurity may arise during the construction phase since intruders may try to steal the building materials especially when the site is not fenced. During the occupation phase, cases of theft are likely to occur and as a result, the proponent shall:

i. The project site will be enclosed using a perimeter wall to enhance security and to control movement within the site.
ii. Security guards will be expected to monitor the gate of the facility to keep away the intruders and to control movement within the site. The guards stationed at the gates will document movements in and out of the site/ property.
iii. Contractor shall provide adequate security during the construction period when there are no works on the site.
iv. Installation of CCTV cameras at strategic points for monitoring and enhancing the security of the property during operation and occupation phase

5.2.8 Traffic Density

During delivery of the construction materials to the site trucks may cause a snarl up as they maneuver to enter and leave site. Proposed mitigation measures include:

i. Proper signage should be ensured during delivery of materials.
ii. Adequate traffic control personnel should be deployed to ensure smooth flow of traffic from and into the site.
iii. Transportation should be done during off-peak hours to ensure minimum disturbance to the neighborhood using the same road.
iv. Speed limits should be strictly adhered to.

5.2.9 Energy Demand

It is expected that there will be high power consumption especially during occupation phase. The proposed development will be connected to the existing power line. However, in order not to overburden the already strained powerline, the proponent has proposed the following mitigation measures to curb energy during the operation phase:

i. All electrical appliances and lights should be switched off when not in use.
ii. Use energy conserving electric lamps for general lighting.
iii. Utilize natural light inside buildings to avoid using electricity for lighting during the day.
iv. Explore the use of solar energy especially for hot water production
v. Diesel generators will be used as backup for electricity production
vi. Create awareness among workers by use of stickers on the need to conserve energy

5.2.10 Soil Erosion

Due to massive excavation anticipated during the laying of foundation, immense soil erosion is expected especially during the construction phase. Essential measures to mitigate soil erosion include:

i. Create diversions to help drain excess water
ii. Use mulching matting to hold vegetation on slope
iii. Encourage the planting of ground cover

5.2.11 Oil Pollution

Oil pollution will result from spillage or leakage of oil from construction machinery and vehicles that use petroleum products. Heavy metals such as mercury, lead Sulphur are contained in petroleum products and exposure of workers to spillages and leakages may cause health hazards. Proposed mitigation measures for oil spill include:

i. Routine inspection and regular maintenance of all machinery shall be done to avoid any oil leaks to the project site.
ii. The machinery will be serviced regularly in the contractor yard away from the site to avoid spillage in the project site.
iii. All oils/grease and materials shall be stored in a store in the contractor's yard away from site.
iv. Proper disposal of oil handling materials such as drums, oily materials and cans at designated areas.

CHAPTER SIX: ENVIRONMENTAL HEALTH AND SAFETY

6.1 EHS Management and Administration

The EHS is a broader and holistic aspect of protecting the worker, the workplace, tools /equipment and the biotic environment. The objective of the EHS on the proposed project is to develop rules that will regulate environmentally instigated diseases and occupational safety measures during construction and the operation phases of the proposed project by:

i. Avoidance of injuries.
ii. Provision of safe and healthy working environment for workers comfort so as to enhance maximum output.
iii. Control of losses and damages to plants, machines, equipment and other products.
iv. Enhance environmental sustainability through developing sound conservation measures.

6.2 Policy, Administrative and Legislative Framework

It is the primary responsibility of the contractor/proponent to promote a safe and healthy environment at the workplace and within the neighborhood in which the proposed project will be constructed by implementing effective systems to prevent occupational diseases and ill-health, and to prevent damage to property.

The Guiding Principles to be adopted by the contractor/proponent should aim at:

i. Promotion and maintenance of high standards of health and safety for its employees, the neighboring population and the public at large.
ii. Ensuring protection of the environment and prevention of any form of nuisance/pollution.
iii. Commitment and exercise constant vigilance in order to provide employees, neighbors of the project and the environment, with the greatest safeguards relating to Environment Health and Safety.
iv. Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public.

6.2.1 EHS management strategy to be adopted by the contractor

The following strategies will be adopted to achieve the above objectives:

i. Maintain an effective reporting procedure for all accidents.
ii. Provide appropriate tools and protective devices for the success of the project.

iii. Encourage, motivate, reward and support employees to take personal initiatives and commitment on EHS.

6.2.2 Safety requirement at the project site during construction and operation period

a) The contractor

The contractor will ensure that:

i. Safe means of entry and exit exist at the proposed project site.
ii. Adequate briefing of job at hand on the safe system of work before commencement of work.
iii. Safety harness must be worn before entry into all confined spaces.

b) The Traffic /Drivers

Within the construction premises, the following traffic rules will be observed: -

i. Observe speed limits and all other signs and obey traffic rules.
ii. Use the vehicle for the purpose to which it is intended only.

6.3 Emergency procedure during construction and operation

An emergency situation means:

i. Unforeseen happening resulting in serious or fatal injury to employed persons or the neighboring communities.
ii. Fire or explosion.
iii. Natural catastrophe.

In the event of such an emergency occurs during construction, the workers shall:

i. Alert other persons exposed to danger.
ii. Inform the EHS coordinator/contractor/proponent.
iii. Do a quick assessment on the nature of emergency.
iv. Call for ambulance on standby.
v. When emergency is over all workers shall be notified by putting a message: "ALL CLEAR"

In the event of such an emergency during operation the workers shall: -

i. Alert other persons exposed to danger.
ii. Ring the nearest police station and call for ambulance on standby.

CHAPTER SEVEN: CONSULTATIONS AND PUBLIC PARTICIPATION

7.1 Introduction

This chapter describes the process of the public consultation followed to identify the key issues and impacts of the proposed project. Views from the local residents, stakeholders, surrounding institutions and development partners who in one way or another would be affected or rather interested in the proposed project were sought through administering of questionnaires and public meeting as stipulated in the Environment Management and Coordination Act, Cap 387.

Section 17 (1) of the Environmental (Impact Assessment and Audit) Regulations 2003, states that during the process of conducting an environmental impact assessment study, the proponent shall in consultation with the Authority, *seek the views of persons who may be affected by the project.*

7.2 Objectives of the Consultation and Public Participation (CPP)

The objective of the consultation and public participation was to:

i. Disseminate and inform the stakeholders about the project with special reference to its key components and location.
ii. Gather comments, suggestions and concerns of the interested and affected parties.
iii. Incorporate the information collected in the EIA study.

7.3 Methodology used in the CPP

In accordance to the EIA Regulations 2003 section 17, appropriate notice was circulated to the affected parties/communities on 2nd Nov, 2018 one week prior to the public meeting. The CPP exercise was conducted in form of:

i. administering of questionnaires,
ii. Public meeting to be held on 9th Nov, 2018.
iii. Interviews with the AP

7.4 Analysis of the Public Consultation findings

7.4.1 Positive impacts

Positive impacts from the project as identified by neighbors include:

i. Creation of employment opportunities
ii. Improved security of the area
iii. Provision of affordable housing units thus reducing shortage

iv. Promote positive economic development

v. Creation of business opportunities

7.4.2 Negative Issues

The following are negative issues raised by the neighbors/affected parties (AP) that need to be addressed;

i. Increased traffic along the access road.

ii. Increased water demand

iii. Air and noise pollution (dust) especially during the construction phase

iv. Increased solid and liquid wastes

Annexed to this report are questionnaires and list of stakeholders consulted as it regards the proposed project. All the raised concerns have well been addressed in the proposed EMP owing to the fact that the proponent will fully implement it to the latter.

Plate 10 Public Meeting

Source: Public Meeting

CHAPTER EIGHT: PROJECT ALTERNATIVES

8.1 Introduction

This chapter examines alternatives to construction of the proposed development in terms of the site, products, materials, technology and waste management. The impact of each alternative compared to the proposed project is also analyzed. Evaluation of the alternatives is governed by a "rule of reason," which requires the evaluation of alternatives "necessary to permit a reasoned choice." Such information is meant to provide reviewer with a basis for decision making.

8.2 No Project Alternative

This option implies that the proposed project should not be implemented. Adopting this option means less pressure on the land to be developed, less impact on the neighboring population compared to implementation of the proposed project. The No project alternative is preferable in situations where the proposed project area is in ecologically sensitive areas. Nonetheless, the proposed site is in an ecologically stable environment. From a socio-economic perspective the "no project" alternative may not be the best alternative because it does not attract urban development and is therefore deemed inappropriate.

8.3 The Proposed Project Alternative

The proposed project is deemed as the most suitable because it incorporates aspects of sustainability in its designs. For instance, the proponent intends to construct a Waste Water Treatment Plant (WWTP) to treat liquid waste before releasing into the main sewer system. The initiative is sustainable because it will reduce the load on the main sewer line. In addition, the use of solar energy for water heating and installation of a backup generator reduces reliance on the Kenya Power Lightning Company (KPLC) for provision of energy.

8.4 Alternatives to Site

Currently, there is no other alternative site available to the proponent for the proposed development. Finding an alternative and suitable land to accommodate a project of such magnitude and scale is farfetched. In addition, seeking new project design and planning before the implementation stage would call for cost; already incurred in the proposed development and also lead to delays in the implementation of the project. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option.

8.5 Alternative land use

Alternative land uses such as hotel, institution or offices may be considered for the site. However, given the steady demand for quality housing units in the area as attributed by the feasibility study conducted by the proponent, coupled with the size of the plot and the net return; it is advisable for the proponent to undertake the proposed development.

8.6 Alternative design

The architectural design that was selected proved to be the most feasible. It provides sufficient housing requirements for the residents, a variety of units to choose from, privacy, security, recreational facilities among other specifications favorable for households. It concurs with the stipulated standards and specifications. The proponent settled on this design as a unique design that best meets the objectives of the project.

8.7 Alternative construction materials and technologies

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security, environmental and aesthetic requirements. Equipment that saves on water and energy will be given priority. The concrete pillars will be built using locally sourced stones, sand, cement, metal bars and fittings that meet the Kenya Bureau of Standards (KEBS) requirements. An alternative would be the use of clay bricks for the walls but considering their durability, stone walls would be preferred.

The alternative technologies available include the conventional brick and mortar style, prefabricated concrete panels or even temporary structures. Due to cost and durability, the brick and mortar style is most popular in Kenya.

Other various technologies include; concrete frame construction, timber construction, prefabricated space frame construction, steel frame and aluminum frame. The technology to be adopted will be most economical and one sensitive to the environment. Heavy use of timber during construction is discouraged because of destruction of forests.

CHAPTER NINE: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMP)

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

The EMPs have considered for all phases; construction, operational and decommissioning.

9.1 EMP FOR THE CONSTRUCTION PHASE

Table 2: Environmental Management and Monitoring Plan during construction phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
Demolition of the existing structure	• Apply for demolition permit from relevant authorities before commencing the demolition • Engage a registered private contractor to carry out the demolition • Provide workers with PPE • The demolition exercise to be limited to day time only • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	-Project proponent -Contractor -NEMA inspectors	Daily inspection	300,000
Soil erosion	• Create diversions to help drain excess water • Use mulching matting to hold vegetation on slope • Encourage the planting of ground cover	-Proponent -Contractor	Routine inspection	150,000
Air pollution	• Sprinkling of water on dusty areas regularly • Daily enclosing, covering and watering of exposed stockpiles	-Proponent -Contractor	Daily inspection	250,000

	• Careful screening of construction site to contain and arrest construction related dust. • Ensure construction machinery and equipment are well maintained to reduce exhaust gas emission • All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. • Drivers of construction including bulldozers, earth-movers etc. will be under strict instructions to minimize unnecessary trips and minimize idling of engines.	-County Public Health Officer -Workers -NEMA inspectors	Routine maintenance	
Noise and excessive vibrations	• Construction activities to be restricted to daytime i.e. 8am to 6pm • Use of suppressors or noise shields on noisy equipment for instance corrugated iron sheet structures • Sensitize operators of construction machinery on effects of noise • Trucks used at construction site shall be routed away from noise sensitive areas where feasible. • Maintain plant equipment to suppress frictional noise • Workers in the vicinity or involved in high-level noise to wear PPE • Minimize vibrations by using hi-tech equipment that produces lesser vibrations during excavation. • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	-Proponent -Contractor -County Public Health Officer -Workers -NEMA inspectors	Random inspection Routine maintenance	350,000
Oil pollution	• Proper storage, handling and disposal of new / used oil and related wastes • Maintain construction machinery and equipment to avoid leaks • Maintenance of construction vehicles to be carried out in the	-Proponent -Contractor	Routine maintenance	150,000

	contractors yard (off the site)			
Storm water drainage	• Proper installation of drainage structures/facility • Install cascades to break the impact of water flowing in the drains • Ensure efficiency of drainage structures through proper design and maintenance • Provide gratings to the drainage channels	-Proponent -Contractor	Routine inspection Random inspection	250,000
Solid waste and liquid waste	• Segregate the waste at the site • Ensure proper disposal of construction waste to approved sites • Engage services of a registered NEMA waste handler to dispose the waste • The proponent shall set up Waste Water treatment plant to treat sewer before release to the main ser trunk • Covering of the trucks during transportation all the building materials and waste • Sensitize workers on the reuse of materials where appropriate. • Provision of adequate and appropriate sanitary facilities for the construction workers • Proper decommissioning of all the sanitary facilities	-Proponent -Contractor -Workers	Weekly checks	300,000
Increased water demand	• Drill a borehole to supplement water supply • Connect to NCWSC • Employ services of waters vendors to supplement water supply • Sensitize workers to reduce water wastage • Use of water efficient appliances and fittings	-Contractor -Workers	Daily inspection	350,000
Traffic congestion	• Employ traffic marshals to control traffic in and out of site • Ferry building materials during off-peak hours • Provide traffic signage at the site/entrance to notify motorists and general public about the development	-Proponent -Contractor -Drivers	Daily observation	200,000

	• Enforce speed limits for construction vehicles especially along the roads leading to the site • Ensure that the vehicles comply with axle load limits • Employ well trained and experienced drivers			
Health and safety of workers	• Construction work shall be limited to daytime only • Workers to be adequately insured against accidents. • All workers will be sensitized before construction begins on how to control accidents related to construction. • Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance at strategic points • Provide first aid kits at strategic places in the site • All workers to wear protective gear during construction e.g. helmets. • Provide clean water and food to the workers. • Ensure that the workers are registered with NHIF / NSSF and remits appropriate fees • A comprehensive contingency plan shall be prepared before construction begins on accident response.	-Proponent -Contractor -Workers -NHIF and NSSF officials	Random checks	250,000
Insecurity	• Provide security guards during construction period for both during the day and night • Keep records of all movement in and out of the construction site • Project area will be fenced with a perimeter wall to limit the access	-Contractor -Proponent	Daily observation	250,000

9.2 EMP FOR THE OPERATION PHASE

Table 3: Environmental management and monitoring plan during Operation phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
Sewage/waste water spillage	• Regular inspection and maintenance of the internal sewer system. • Residents should report any incidence of blockages in their units immediately they occur	- Proponent Residents	Periodic checks Routine Maintenance	250,000
Solid waste generation	• Encourage segregation of waste (organic and inorganic) and provide for clearly marked dustbins to serve the specified use. • Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures. • A private NEMA licensed company to be contracted to handle solid waste and dispose it of in designated dumpsites. • Routine cleaning of the waste management rooms	- Proponent - Residents - County public health officer	Periodic Checks	150,000
Air pollution	• Gardening of landscaped areas • Watering of uncovered areas • Regular inspection and maintenance of generator and water pumps • Comply with Air Quality regulations 2014	- Proponent	Weekly checks Routine maintenance	100,000
Noise and vibration Pollution	• Installation of silencers on the generators and transformer rooms • Do annual noise measurements. • Sensitize residents on minimal permissible noise levels • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	- Proponent - NEMA inspectors - Residents	Periodic checks	150,000
Storm water drainage	• Proper maintenance of drainage structures • Inspection and maintenance of water harvesting facilities • Proper grading to avoid pooling of water	- Proponent	Routine inspection and maintenance	100,000

Increased water use	• Drill borehole to supplement other sources • Use water efficient appliances and fittings • Install water conserving taps that turn off automatically when not in use • Place notices at water taps e.g. 'TURN OFF TAP AFTER USE' • Provision of roof/ underground tanks for water storage	- Proponent - Residents	Daily Inspection Routine maintenance	150,000
Increased energy use	• Switch off electrical appliances when not in use. • Switch off all lights immediately when not in use or are not needed. • Use energy conserving bulbs e.g. LED bulbs • Use of energy efficient fixtures and fittings • Maintenance of electrical components. • Use solar energy to heat water for penthouses • Install generator as backup for electricity	- Proponent - Residents	Daily Observation Routine maintenance	150,000
Fire	• Install fire fighting equipment • Sensitize the residents on fire risks i.e. conduct regular fire drills • Adapt effective emergency response plan • Maintain fire fighting equipment regularly • Provide emergency numbers at strategic points	- Proponent - Residents	Routine inspection	100,000
Traffic	• Provide warning signs to reduce risk of accidents • Provision of adequate on-site parking bays • Regular maintenance of the parking bays	- Proponent	Routine maintenance	100,000
Re-vegetation	• Design and implement an appropriate landscaping and tree planting program to help in re-vegetation of the project area after construction. • Introduction and maintenance of vegetation (trees and grass) on open spaces and around the site	-Proponent -Contractor	Routine inspection	100,000

9.3 EMP FOR THE DECOMMISSIONING PHASE

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

Table 4: Environmental management and monitoring plan during Decommissioning phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Recommended frequency of monitoring	Estimated Cost (KShs)
Demolition of existing structures	▪ Apply for demolition permit from relevant authorities before commencing the demolition ▪ Engage a registered private contractor to carry out the demolition ▪ Provide workers with PPE ▪ The demolition exercise to be limited to day time only ▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	-Project proponent -Contractor -NEMA inspectors	Daily inspection	350,000
Air pollution	▪ Dust suppression with water sprays on dusty areas ▪ Careful screening of construction site to contain and arrest construction related dust ▪ Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission	-Proponent -Contractor -NEMA inspectors	Daily inspection Routine maintenance	100,000
Noise and excessive vibrations	▪ Demolition activities to be restricted to daytime (8am to 5pm) ▪ Use of Suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures ▪ Workers in the vicinity or involved in high level noise to wear respective safety & protective gear. ▪ Comply with Noise and excessive vibration pollution control regulations	-Proponent -Contractor -Workers -NEMA inspectors	Routine inspection and maintenance	100,000
Health and safety of workers	▪ All workers to wear PPEs e.g. helmets. ▪ All workers will be sensitized before demolition begins, on how to control accidents related to construction.	-Contractor -Workers -Proponent	Daily monitoring	200,000

	▪ Accordingly, adherence to safety procedures will be enforced. ▪ All workers will be adequately insured against accidents.	-NEMA inspectors		
Solid and liquid waste	▪ Ensure proper solid waste disposal and collection facilities ▪ Refuse collection vehicles will be covered to prevent scatter of wastes by wind. ▪ Demolition wastes to be collected by a licensed operator to avoid illegal final dumping at unauthorized sites. ▪ All persons involved in refuse collection shall be in full protective attire.	-Contractor -Proponent -NEMA inspectors	Daily monitoring	250,000
Re-vegetation and comprehensive landscaping	▪ Implement an appropriate re-vegetation programme to restore the site to its original status ▪ During the re-vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; ▪ Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; ▪ Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	-Contractor -Proponent	Random inspection and monitoring	350,000

CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

The proposed project will provide modern and spacious residential houses in Riverside Area and its environs. The activities for which the proposed development is intended are not such that they are likely to interfere with the peace of the neighbors. The project has been planned in full cognizance of the requirements of the neighborhood where it is to be implemented and all standard planning considerations have been taken into account and given the attention they deserve. The project is an environmentally low risk project and thus poses no significant threat to the environmental aspects of the area. The likely environmental impacts expected from the implementation of the building are minimal and will be restricted to construction stage. Appropriate mitigation measures have been put in place to take care of these both in the design of the project and recommendations elsewhere in this report.

Recommendations

The proponent and contractor are advised to implement Environmental Management and Monitoring Plan (EMP) so as to reduce adverse impacts and boost good environmental practices. Guidelines on environment, health and safety must also be followed in order to reduce incidences of accidents, health problems and compromise to environmental well-being.

Recommendations for the prevention and mitigation of adverse impacts are as follows:

i. Ensure that worker's occupational health and safety standards are maintained mainly during construction phase.
ii. The proponent should ensure that the proposed EMP is fully implemented.
iii. Construction activities to be undertaken within the time stipulated in the licensing conditions.
iv. The proponent shall conduct a different EIA for the proposed Borehole
v. All solid waste materials and debris resulting from construction activities must be disposed off at approved dumpsites. There should be proper waste segregation to allow for recycling. Some excavation such as stone materials should be used for backfilling.
vi. Once the construction is completed and fully occupied, the management should engage services of waste management companies registered by NEMA in compliance with the

requirements of the Environment Management and Coordination (Waste Management) Regulations, 2006.

It is thus the recommendations of the experts that the proposed project be allowed to go on by granting an Environmental Impact Assessment license subject to adherence of the proposed EMP and conditions that will be on the EIA license.

REFERENCES

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5. Kenya gazette supplement Acts, Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) Regulations, 2009. Government printer, Nairobi
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9. Kenya gazette supplement Acts Water Act, 2016. Government printer, Nairobi
10. Kenya gazette supplement Acts Occupational Safety and Health Act, 2007. Government Printer, Nairobi
11. Kenya gazette supplement Acts County Government Act, 2012.Government printer, Nairobi

APPENDICES

1. Copy of ownership documents
2. Copy of expert practicing licenses
3. Copy of architectural plans
4. Copy of change of use approval
5. Copy of TOR Approval
6. Copy of the invitation letter
7. Copy of minutes of the public meeting and attendance sheet
8. Questionnaires
9. WWTP Plans