ENVIRONMENTAL IMPACT ASSESSMENT

STUDY REPORT

FOR

THE PROPOSED RESIDENTIAL DEVELOPMENT ON PLOT NO. NAIROBI/BLOCK 93/1574 LOCATED ALONG SONIA LANE IN SOUTH B AREA OF NAIROBI 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

Trio Properties Limited,

P.O. Box 4634-00100,

Nairobi.

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

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EXECUTIVE SUMMARY

Introduction

Housing is a key component of urban development. Improved housing is not only a desirable goal in its own right, but it also contributes to economic growth, social development, improved governance and enhanced security and stability. Failure to deal with housing issues will lead to the continued growth of slums and poorly serviced informal settlements on the urban periphery. Considering these conditions, the proponent, Trio Properties Limited, proposes to construct 176 studio apartments and other auxiliary facilities.

Subsequently, construction activities have an impact to the environment in one way or another, be it the social, economic, biological or physical environments. Such impacts should be checked to avoid or reduce any negative effects to the environment, the general public and its health. With improved infrastructure in the form of housing provision, there is bound to be a rise in business opportunities leading to increased population. Increase of population, be it temporary (during construction as a result of labor import) or permanent (as a result of employees or tenants to reside/operate from the proposed development), is likely to stretch services and other facilities in and around the project area. Measures should be put in place to ameliorate against any potential negative impacts and maximize on any positive ones. Considering the No. of units and the magnitude of anticipated impacts, the above project falls in the high risk category according to the Legal Notice No. 150 and it therefore a full study report.

According to the Environmental Law of Kenya, Section 58 of the Environmental Management and Coordination Act (EMCA) Cap 387, Amended in 2015 and Legal Notice No. 101 of 2003, procedural steps involved in this assessment are as follows:

- Baseline Studies, Identification of key stakeholders, Consultation and public participation
- Scoping and development of the Terms of Reference (ToRs)
- Analysis of project alternatives
- Impacts identification and analysis and Development of mitigation measures
- Development of the Environmental Management Plan (EMP)

Objectives of the ESIA are to:

i. To identify potential environmental impacts of proposed project, policies, plans and programmes
ii. To assess the significance of these impacts

iii. To assess the relative importance of the impacts of alternative plans, designs and site.
iv. To propose mitigation measures for the significant negative impacts of the project on the environment
v. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle
vi. To present information on impacts of alternatives
vii. To present the result of an EIA in such a way that they can guide decision making

In Kenya, ESIA has to be conducted according to the requirements of EMCA. An ESIA document submitted to the enforcement authority, NEMA, enables the issuing of an ESIA License. When properly designed and implemented, ESIA is a powerful tool for ensuring that environmental issues are given due consideration during project design, allowing the benefits of the project to be maximized, while reducing the potential environmental and social costs of development. Thus, all due care should be taken into account to ensure that the environment of the project area is not disturbed in a way that could affect the living standards and styles of the surrounding people in a negative manner.

The ToR for the ESIA were to establish baseline conditions, impact assessment, development of mitigation measures and an EMP with respect to the environment, socio-economic and community participation, physical environment, energy, environmental health/public health and safety, analysis of legislative and institutional framework for environmental management in Kenya, and analysis of project alternatives. It was also required to establish institutional needs to implement the recommended action plans.

The methodology for conducting 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 to the study through public meetings (baraza), key informant interviews and completion of qualitative questionnaires. The applied field methodologies for data collection included: qualitative questionnaires; key informant interviews and random field visits to the project area.

A number of project alternatives were considered in the assessment. These include the "no project" alternative. Although this would lead to preservation of the environmental conditions, this alternative was the least favorable if we are to seriously consider the economic advantage of the proposed project. Potential Decommissioning phase impacts include loss of direct and

indirect employment, demolition waste, noise pollution, dust and exhaust emissions, occupational health and safety hazards.

The EMP that was developed for this ESIA report outlines the actions that are required to address the identified potential negative impacts, responsibility, implementation stage, costs and relevant regulations/standards to guide monitoring and auditing of the effectiveness of the proposed mitigation measures.

The proposed project offers many significant positive impacts at the local, regional, national and even international levels. The anticipated positive impacts include: direct and indirect employment generation, increase in revenue collection, increased business opportunities, promotion of enterprises and above all, increase in the much needed housing facilities in the City of Nairobi.

On the other hand, potential significant negative environmental impacts of the proposed project may affect environmentally sensitive areas such as underground water sources, air quality, humans and their cultural properties. The potential social impacts could include loss of sense of place, lack of privacy, increased traffic and setting of a building trend in the area. The main issues are geographically limited, well defined, and well understood in Kenya. Thus, the proponent's major task in respect of the EMP is to properly manage the potential negative impacts while enhancing the positive ones to ensure a project that is economically, socially and environmentally sustainable. The proposed project could be approved for implementation provided that the proponent adequately incorporates measures to mitigate the potential negative impacts while enhancing the potential positive impacts as well as implementing the EMP.

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
ASL	Above Sea Level
CCTV	Closed-circuit Television
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
ERC	Electricity Regulatory Commission
Ha	Hectares
KPLC	Kenya Power and Lighting Company
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
WRMA	Water Resources Management Authority
°C	Degrees Celsius

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Worldwide, the need to pursue sustainable development guided by environmental, social, cultural and ethical considerations has been accorded high priority. The goal of sustainable development cannot be achieved without significant changes in the ways development initiatives are planned, implemented and managed. In order therefore to achieve these changes, humanity has to consider as a matter of priority environmental conservation, protection and security as essential elements of the entire process of sustainable development. Kenya has made significant steps in the implementation of environment-friendly legislations, significant of which is the Environmental Management and Coordination Act (EMCA) CAP 387 which makes Environmental Impact Assessment an essential element in the overall project management cycle.

1.2 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
ii. To assess the significance of these impacts
iii. To assess the relative importance of the impacts of alternative plans, designs and site.
iv. To propose mitigation measures for the significant negative impacts of the project on the environment
v. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle
vi. To present information on impacts of alternatives
vii. To present the result of an EIA in such a way that they can guide decision making.

1.3 Project Objectives

The proposed project objectives are:

i. To provide 176 studio apartments in South B area;
ii. To meet the economic desires of the proponent;

iii. To put the current land into more productive and economic use.

1.4 Terms of Reference (TORs)

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 8th November 2018 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. Identify, predict and carry out in-depth analysis of all actual potential and significant impacts on flora, fauna, soils, air, water, the social, cultural and community settings including the direct, indirect, cumulative, irreversible, short-term and long-term effects

anticipated to be generated by the proposed project, both positive and negative throughout the project cycle and recommend sufficient feasible mitigation measures for all the potential negative impacts identified,

xi. Analyse materials to be used in the construction and implementation of the project and wastes to be generated proposing alternative/appropriate options/technologies,

xii. Analyse occupational health and safety issues associated with the proposed project,

xiii. Develop an Environmental Management and Monitoring Plan (EMP) proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures,

1.5 Scope of the study

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the neighboring environment as it may be affected by or may affect the proposed project. Any potential impacts, (localized or delocalized) are also evaluated as guided by EMCA CAP 387 and the Environmental (Impact Assessment and Audit) Regulations 2003. This report includes an assessment of impacts of the proposed site and its environs with reference to the following:

i) A review of policy, legal and administrative framework

Several policies, legal and administrative arrangements and protocols - both local and international - that have a direct bearing on the proposed development were reviewed. This was in an attempt to establish the frameworks within which the significance of the various impacts expected from the proposed development could be evaluated. These have formed the basis for the determination of the significance of the various impacts associated with the proposed project.

ii) Description of the proposed project

The proposed project has been described in terms of location and physical characteristics of the project area, design of the development, wet areas and service quarters, products, by-products and waste. This approach is important because it makes it possible to know the likely sources of impacts how the impacts relate to one another in terms of being direct, indirect, cumulative, reversible etc. in order to suggest practical recommendations for their proper management.

iii) Review of the baseline information

Baseline information forms the basis of degree and magnitude of the impact since they give the conditions of the environment in terms of resources and impacts before the implementation of any project and its infrastructure. This helps in the monitoring exercise and for that matter brings into focus the extent of the accuracy of the prediction of the impacts in question.

iv) Proposition of alternatives

Any planning activity must strive to give practical alternatives with regard to resource allocation. EIA as a planning tool must therefore give options that can be pursued in order to get sustainable results. The alternatives are looked at in terms of product mix, site, technology, design, scale and extent. The comparisons of these with the proposed project give rise to the best project option.

1.6 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.

1.7 Justification of the project

1.7.1 Housing as a Human Right

Housing is a human right in as much as air and/or water. Like food, even those who cannot afford it need it perhaps much more than those who can, because the latter could be in it for the investment returns. By its nature, housing represents a major investment requiring a substantial capital outlay. In the majority of housing projects, the developer, whether as a corporate or individual, has to recognize the time value concept of money.

1.7.2 The Gap

There is a glaring gap between the demand and availability of affordable middle and upper class housing in the more affluent sections of urban centers. It is against this backdrop that areas near cities and urban centers have attracted an interest in housing property development. Land Tenure, Financing, Legal Framework, Building Materials and Appropriate Technology seem to be the greatest challenges to affordable housing in both rural and urban areas. Invariably they generate informal settlements in towns and rural areas alike.

1.7.3 Size of the plot

At 0.073 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*)

1.7.4 Socio-economic Benefits

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's big four agenda: 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.

1.7.5 Neighborhood Development Trend

The neighborhood of the plot is currently undergoing transformation with several high rise apartments coming up. The proposed development shall therefore be in conformity with this trend which shall ensure better utilization of the land giving it higher value.

CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

2.1 Nature of the Project

The proposed development will comprise of one block of 176 studio apartments, 24 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 single dwelling residential townhouse and shall be demolished to pave way for the proposed development.

2.2 Project Location and Size

The subject plot is located along Sonia Lane, approximately 100m from the junction of Sore Road and Sonia Lane in South B area of Nairobi City County. It lies on latitude 1°19'3.47"S and longitude 36°50'36.75"E. The plot measures approximately 0.0728 hectares as indicated on the annexed copies of the title deed, search and survey plan *(Attached is copy of the ownership documents).*

Plate 1: 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 1/2/2000. The certificate of Title is drawn under The Registration of Titles Act (Chapter 300) as Plot No. Nairobi/Block 93/1574 and the current registered proprietor is **Trio Properties Limited** (Post Office Box Number 4634-00100) who is hereby seeking the EIA Licence for the proposed development.

According to the Zoning Ordinances Nairobi City County, South B is in zone 9 which allows for high density residential apartments. The proposed project is in conformity with the zoning. The proponent has applied for a change of use from Single Dwelling to Multi Dwelling (Apartments).

2.4 Project Description

The proposed development will comprise of a total of one hundred and seventy six (176) studio units, 24 parking bays and other auxiliary amenities. A brief description of the proposed development is as follows:

i. **Lower ground floor level** will comprise of 10 parking bays, switch room, pump room, underground water tank, petrol interceptor area, server room and generator room.
ii. **Upper ground floor level** will comprise of 14 parking bays, waste disposal room, caretaker room and laundry area.
iii. **Typical 1st to 11th floor levels** will comprise of 16 units of studio apartments having a lounge, kitchenette and washroom.
iv. **Lower roof terrace** will comprise of a washing area, drying yard, gym, pump room, two lounges and a lap pool.
v. **Upper roof terrace** will comprise of solar panels and roof water tanks.
vi. **Other features** include two lift shafts, staircase, fire riser duct, pressurization duct and gardens.

More/fine details of the proposed development, Specifications and features of the proposed project have been given on the attached copies of the architectural plans 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 such as backhoes and trucks will be used to excavate and carry the overburden to a designated site. Concrete mixers will be used to mix concrete and cement in the specified quantities. Trucks will also be used in transportation of construction materials to the site. Forklifts will be used for lifting ready mix concrete and heavy materials to the upper floors of the proposed development during construction. Most of the machinery will use electricity and petroleum products to provide energy.

iii. A construction labour force of both skilled and non-skilled workers. These will require services such as energy, water supply and sanitation facilities.

2.6 Construction Activities

2.6.1. Pre-construction Investigations and activities

Activities at this stage entail:

i. Investigation of the site's biological and physical resources in order to minimize any unforeseen adverse impacts during the project cycle.

ii. Carrying out soil feasibility studies to determine stability and other site characteristics to guide and inform the construction phase.

iii. Obtaining relevant construction permits from related authorities.

iv. Conducting an EIA and submitting the Study Report to NEMA for licensing.

2.6.2 Construction Stage

i. Demolition

The existing bungalow shall be demolished to pave way for the proposed development. The proponent shall apply for applicable permits from relevant authorities such as NCC and KFS before commencing the demolition exercise and clearing 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 to designated areas by registered NEMA waste handler.

Plate 2: house to be demolished

Source; field work 06/11/2018

ii. Site Preparation

Site preparation will entail building a perimeter wall around the project site to keep away the public. Setting up temporary construction offices and storage rooms for cement, paints, glasses and first aid facilities. Constructing adequate sanitary facilities for workers and mobilizing materials, workforce and machinery required for ground breaking.

iii. Excavation and Foundation works

Excavation works are carried out to prepare the site for laying of foundation, construction of basement and drainage system. Heavy earth moving machinery such as excavators, bulldozers, backhoe, are used for excavation while loaders and tippers shall be used for loading and transporting the overburden to designated disposal site.

iv. Concrete and Masonry works

Concrete works will involving volume batching where materials are measured by volume and expressed in relative ratios or weigh batching where materials are measured by weight before mixing. The ready mix concrete is poured on the already formed works. In order to achieve dense concrete for better strength, air trapped while placing concrete must be expelled. While concreting, vertical penetration by concrete mixers and vibrators on the formwork should give

adequate consolidation. Finishing will entail screeding concrete to the level of form works followed by troweling, edging and patterning and curing of the concrete.

v. Structural Steel works

Structural steel works will involve steel cutting, welding and fixing on the already constructed formwork before concreting is done. The rationale for carrying out steel works is to reinforce the concrete for structural stability.

vi. Electrical and Mechanical work

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. All the electrical works will be carried out by licensed electricians to the satisfaction of the relevant authorities.

The mechanical works during the construction stage will include setting up:

i. Plumbing and drainage pipes
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 works shall be done by qualified technicians under the supervision of the Project Mechanical Engineer and shall follow the set standards.

vii. Interior and Exterior Finishes

Finishes will entail plastering to improve the aesthetic value and to ensure the building is structurally strong. Both internal and external finishes will be carried out in accordance to the specifications of the project architect. The ultimate step will be fixing of wall and floors tiles followed by painting of the entire development.

2.6.3 Description of the Project's Operational Activities

i. Residence

A total of 176 families will reside within the proposed development.

ii. Recreational Activities

Recreational facilities provided within the development include a lap pool, gymnasium, rest longue and a play area.

iii. 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.

iv. General Repairs and Maintenance

Maintenance works during the operation phase will include walls and floors repairs, maintenance of electrical gadgets and equipment, repairs of leaking water pipes, repairs of refrigeration equipment, painting and replacement of worn out materials among others.

2.6.4 Description of the Project's Decommissioning Activities

Decommissioning refers to the final disposal of the project and associated materials at the expiry of the project lifespan. At this stage, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. Measures to be undertaken to restore the environment include:

i. Remove all underground facilities from the site
ii. Landscaping the site by flattening the mounds of soil and backfilling open surfaces.
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

2.7 Construction Products, By Products and Wastes

It is anticipated that the project will generate a variety of products, by-products and wastes during its construction and operational phases. The characteristics of the products, by-products and wastes are discussed in this section.

2.7.1 Products

The final product will be **176 studio apartments, 24 parking bays** and other auxiliary facilities.

2.7.2 By-Products

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

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

2.7.3 Wastes

Waste expected to be generated during construction include debris, sanitary waste, excavated soil and rocks. The operation phase will generate waste such as paper, plastics, cans, glasses, metallic pieces, and organic waste. All wastes will be disposed by the proponent in accordance with the standards and documented procedures stipulated in the EMCA Waste Management Regulations of 2006.

2.8 Project Budget and Duration

The proposed project is estimated to cost **three hundred and forty three million six hundred and ninety five thousand five hundred and twenty six shillings (343,695,526).** The project implementation works is estimated to take 2 years to completion.

CHAPTER THREE: BASELINE INFORMATION

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate

At 1,795metres (5,889ft) above sea level (asl), Nairobi enjoys a moderate climate. The altitude makes for some chilly evenings, especially in the June/July season when the temperature can drop to 10°C (50°F). The sunniest and warmest parts of the year are from December to March, when temperatures average the mid-twenties during the day. The mean maximum temperature for this period is 24°C (75°F). There are two rainy seasons but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. As Nairobi is situated close to the equator, the differences between the seasons are minimal. The seasons are referred to as the wet season and dry season. The timing of sunrise and sunset varies little throughout the year, due to Nairobi's close proximity to the equator.

3.1.2 Topography

The site is fairly flat and lies at an altitude of approximately 1600 meters above sea-level.

3.1.3 Geology and Soils

The soils are predominantly black cotton soils just like most of the region hence a need to excavate the soil and replacing it with red soils before laying of foundation

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

The project area and its environs are characterized by very little or no vegetation covers. Vegetation in the proposed site consists of two trees that the proponent will seek permits before cutting.

Plate 3; Trees within the site

Source: Field Survey 06/11/2018

3.2.2 Fauna

The project site is situated within a commercial/residential zone where human activities have altered the natural habitat for animals over the year. It is expected that the area will be populated by small mammals such as mice, rats, moles and other members of the rodent family.

3.3 SOCIO-ECONOMIC ENVIRONMENT

3.3.1 Land Use

The neighborhood is generally characterized by a mix of high rise residential buildings therefore the project is in conformity with the trend in the area.

Plate 4: Upcoming residential apartments in the neighborhood

Source; Field Survey 06/11/2018

3.3.2 Educational

The different education facilities found in the area include; Nursery Schools (Ark Junior School, Happy Hour Nursery and Fahari Schools); Primary Schools (Mariakani Primary School, Plainsview Primary School); Secondary Schools (Highway Secondary and Our Lady of Mercy Secondary School); and Colleges (Railway Training Institute and Kenya Mass Communication).

3.3.3 Public Purpose

Religious institutions in the neighborhood include churches and mosques such as Our Lady Queen of Peace church, PEFA Church and Masjid Al-huda Mosque.

3.3.4 Commercial Activities

These activities are concentrated along the main road and include shopping malls such as Capital Centre, La Enzi Plaza, Nextgen Mall which have supermarket, shops, and banks. Other commercial activities in the area include light industry (petrol station such as the Oilibya and Total service stations. Banks found within the area include Cooperative and Barclays Bank.

3.3.5 Security

Security in the area is provided by the Industrial Area Police Station.

3.4 INFRASTRUCTURE

3.4.1 Roads and accessibility

The property is accessed along Sonia lane off Sore Road of Nairobi City County. The access road is cabro-paved as seen in the plate below.

Plate 5: Access Road to site)

Source: Field Survey 06/11/2018

3.4.2 Water supply

The general area is served with water supplied by 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. Drill a borehole as an alternative source of water supply
ii. Make arrangements with registered water vendors to supply water to the site in case of short fall in the normal supply during construction period.

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.

3.4.4 Surface 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 earth works and vegetative materials to be disposed of in designated dumping sites to pave way for the proposed project.
ii. 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.
iii. All stony, wooden, metals and glass materials resulting from related activities, during implementation of the proposed project.
iv. Plastic materials resulting from such works as sewerage, drainage and water systems, electricity works etc.
v. Sanitary litter as generated during implementation and occupation of the project.
vi. 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.

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.

3.4.8 Security

There will be a different entry and exit 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 improves safety or riders, pedestrians and general security of the area.

CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Introduction

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 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 study will be done periodically to monitor compliance with the set environmental standards.

4.3.4 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.

4.3.5. 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.

4.3.6 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.

4.3.7 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.

4.3.8 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.

4.3.9 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.

4.3.10 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.

4.3.11 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.

4.3.12 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.)*

4.3.13 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.

4.3.14 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.

4.3.15 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.

4.3.16 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.

4.3.17 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.

4.3.18 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.

4.3.19 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 and monitor and assess 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: CONSULTATIONS AND PUBLIC PARTICIPATION

5.1 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, interviews and public meeting as stipulated in the Environment Management and Coordination Act, Cap 387.

5.2 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.

5.3 Methodology used in the CPP

In accordance to the EIA Regulations 2003 section 17, appropriate notice was circulated to the affected parties/communities on 7th November, 2018 one week prior to the public meeting *(attached is the notice and delivery sheet signed by the AP).*

The exercise was conducted in different ways, namely;

i. interviews and discussion,
ii. field surveys and observations,
iii. administering of questionnaires,
iv. Public meeting held on 15th November 2018 *(attached is a copy of the minutes and pictures).*

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

Plate 6; Public meeting within the project site

Source; public meeting 15/11/2018

5.4 Analysis of the Public Consultation findings

5.4.1 Positive Issues

i. The proposed development addresses the housing shortage in the area
ii. Creation of job opportunities
iii. The project is geared towards achievement of government's Big four agenda

5.4.2 Negative Issues

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

i. Increased waste generation
ii. Noise and air pollution
iii. Insecurity issues due to the number of workmen that will be involved in the project
iv. Water and electricity interruptions
v. Increased energy and water demand
vi. Increased traffic along the access road

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

CHAPTER SIX: PROJECT ALTERNATIVES

6.1 Introduction

This chapter analyses the project alternative in terms of site and non-implementation. The purpose of including alternatives in the ESIA is to identify and evaluate alternate actions that accomplish similar goals and promote sustainable development (Anderson et al., 2003). Alternatives should be economically feasible with minimal adverse environmental impacts and time delays. Diverse alternatives to the proposed action must be included in the ESIA. Alternatives may include both design and location options (Steinneman, 2000). In most case, the ESIA process often occurs too late in the decision-making process to consider a full range of alternatives. This can undermine ESIA goals to encourage more environmentally sound and publicly acceptable solutions. Allowing new alternatives and objectives to evolve in relation to environmental conditions and public preferences may be a solution to most of the environmental and socio-economic problems associated with the implementation of new projects (Anderson et al., 2003).

6.2 No Action Alternative

The '*no-action/project'* alternative, which serves as a baseline for comparative analysis, must be included where the environmental impact of taking the proposed action is too high compared to the impact of not taking the proposed action. The *"No project"* alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. Under *"No project"* option, the proponent's proposal would not receive necessary approval from Authorities. The proposed construction would not be implemented. This option would however, involve several losses both to the proponent and the community as a whole. The *"No Project"* alternative option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

i. The economic status of Kenyans would remain unchanged
ii. The local skills would remain underutilized (in terms of labor provision)
iii. Increased poverty and crime in Kenya due to lack of job opportunities
iv. The housing sector would continue to suffer due to lack of enough residential houses in our urban areas such as Nairobi.

6.3 Relocation Option

Relocation of the proposed project of constructing residential apartments is one of the alternatives in ensuring the environmental and social status of the area is not affected. But, it is quite clear that as per the current situation, the proposed project cannot be relocated. The reason behind this is that the proponent currently owns the proposed site of development, hence getting an alternative site could be a very expensive venture.

6.4 Waste Water/Sewage Management Alternatives

The following available technologies can be alternatives to be considered:

- Use of constructed/artificial wetland
- Use of septic tank and/or bio-digesters
- Use of stabilization ponds/lagoons
- Use of waste treatment plants such a Bio-box or the Vex-P system
- Use of conservancy tanks, partial treatment and pumping to a municipal council sewage system

The available and feasible alternative to sewage and waste water management is the connection to the Nairobi Water and Sewerage Company's system

6.5 Alternatives to Achieving Green Building

The areas of concern may be categorised broadly as follows:

i. Proper and efficient use of resources. These include power, water and other sources of energy
ii. Reducing waste and pollution
iii. Improving occupant health

Green building can take on various forms. From the basic housing level to the national level, efforts are being put to reduce reliance on the costly fossil fuels. Some of the methods that can be adopted in this include:

i. The Use of Renewable Energy

More houses are powering up using solar panels. The availability of the technology and ease of setting up the panels have gone a long way in encouraging its adoption. The use of biomass (popularly known as biogas) is also gaining a significant foot hold in many homes. This is more so in rural areas, where animal waste is enhanced to produce gas used in powering up. Waste (such as papers, plastics, and so forth) is also being used in an ingenious pilot project in areas of

Nairobi to produce heat energy. This has been embraced in these communities as it provides an affordable way to cook and heat water. The proponent is advised to explore the use of renewable sources of energy such as solar for water heating (which is currently a requirement by law) and wind for security lighting.

ii. Adoption of Water Harvesting, Treatment and Re-Use

Large housing projects such as the proposed one, should adopt water treatment and re-use to cut on costs. With demanding clientele who want green compounds all year round, this technology is quite handy. The used water is collected and treated in collection tanks placed within the estates. This water is then re-used for irrigation of lawns and also in flushing toilets. Hence this calls for the adoption of sewage treatment systems such as the bio-box.

In addition, water harvesting should also be taken more seriously. Methods include tanks and also water pans in areas having space. Trenches in gardens are also dug up with the sole intention of trapping run-off water. Hence, the proposed project should entail rain water harvesting without failure.

iii. The Use of Plants or Vegetation

Plants can be used as water towers to aid in replenishing ground water. Homes in hot areas are advised to adopt plants to keep the temperatures down. The project proponent is also advised to establish a vegetation cover around the development.

iv. Adoption of Natural Lighting and Ventilation

Strategic building of windows and porches goes a long way in enhancing natural lighting. Sun roofs are also becoming a common feature in many homes, allowing much sunlight into the rooms. These are just some of the few methods that could be adopted in going green in building the proposed project.

CHAPTER SEVEN: IMPACTS ASSESSMENT AND MITIGATION MEASURES

This chapter provides a detailed description of the positive and negative implications of the proposed project and adequately describes possible mitigation measures for the negative impacts identified.

7.1 Potential Negative Impacts

The potential negative impacts are as discussed below:

7.1.1 Air Quality

Vehicular/equipment engine exhaust emissions are a potential source of impacts to air quality, though they will be minor and temporary during construction. Air quality impacts will be temporary during construction. The project will generate moderately significant vehicle trips to the area. Vehicular and equipment exhaust emissions during project operations will, thus, have a minor incremental/cumulative impact locally and regionally.

Particulate matter (dust particles) would be generated by grading, excavation and the movement of construction vehicles. It is not possible to accurately estimate the particulate concentration that might occur at the site because it is dependent on meteorological conditions and soil moisture. But all the same, mitigation measures need to be put into place. Proposed mitigation measures include:

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.

7.1.2 Increased Water Demand

Water is a major concern especially in construction sites. The proposed development will most likely cause strain to the existing water supply in the area, which will have a direct impact to the main water supply especially if the supply remains constant. This calls for proper mitigation measures to be put into place. Hence proposed mitigation measures include the following:

i. Encourage water reuse/recycling during both construction and operational phases.
ii. Install water conserving taps that turn off automatically when water is not in use.
iii. Encourage proper water management systems
iv. The proponent shall drill a borehole as an alternative source of water

7.1.3 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 and this might strain this resource. However the contractor, construction workers and the eventual occupants will be encouraged to conserve energy through use energy conserving appliances. Thus, the proposed mitigation measures are as stated below:

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 and wind energy especially for site security lighting during the night
v. Create awareness among workers by use of stickers on the need to conserve energy
vi. Diesel generators will be used as backup for electricity production

7.1.4 Liquid Waste

Effluent generation and its management is another challenge related to implementation of the proposed project. It is common for developers to begin construction of projects (be they residential or not) without planning on how effluent will be disposed appropriately; hence waste water (raw sewage) is either channelled to a river, or disposed carelessly. Some are poorly constructed, are of inadequate capacity, make use of low quality structural materials which leads to leakage of sewage to the underground water hence posing a dangerous health risk to the living organism including man. However, the proposed project deviates from this norm and hence, has integrated effective waste water handling system in to its designs. It is also recommend that:

i. All liquid wastes to be disposed of properly by connecting to the NWSC sewer system
ii. Construction of the drainage system to be under the supervision of the structural engineer
iii. Provide mobile toilets to construction workforce
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.

7.1.5 Occupational Health and Safety

The immediate neighbours and workforce involved would be more subjected to these environmental hazards such as falling debris or materials, dust, vehicle accidents, falling from high areas, open pits etc. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This can compromise health of the workers especially if foodstuffs are prepared in unhygienic conditions. To ameliorate against the above, the proposed mitigation measures include:

i. All workers should be provided with full protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks and gloves.
ii. Construction crew at the site will be sensitized on social issues such as drugs, alcohol and diseases.
iii. A first aid kit should be provided within the site. This should be fully equipped at all times and should be managed by qualified person.
iv. The contractor should have workmen's compensation cover. It should comply with workmen's compensation Act, as well as ordinances, Regulations and Union Agreements.
v. Adequate sanitary facilities should be provided and standard cleanliness maintained.
vi. Food handlers preparing food for the workers at the site should be controlled and monitored to ensure that food is hygienically prepared.
vii. Control the speed of vehicles in and around the project site
viii. Construction sites should be well scaffolded to take care of falling materials

7.1.6 Surface Drainage

Good drainage system is used to prevent land near human settlement from becoming saturated with water which collects or accumulate/flood after a downpour or from other sources. Poor drainage causes dampness to building structures as well as water stagnation. Dampness in the

presence of warmth and darkness, becomes breeding grounds for malaria and other diseases. Hence, proper drainage of the general property/premise comes in handy to enhance effective flow of the much anticipated surface run-off emanating from the roof catchments and other newly pave areas within the site. To prevent bad effects of poor drainage, the following mitigation measures are proposed for this project:

i. During construction, the design of the drainage system should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site.
ii. Drainage channels should be installed in all areas that generate or receive surface water such as drive ways and along the building block-edges of the roofs.
iii. Channels should be covered by approved materials to prevent occurrence of accidents and entry of dirt that would compromise flow of run-off.
iv. Drainage channels should ensure safe disposal of run-off/surface water and should be self-cleaning.
v. Paving of the side walkways, driveways and other open area should be done using pervious materials to encourage recharge and thus reducing water run-off volume.

7.1.7 Solid Waste

Solid waste will be generated both during construction and operation phases of the project. This will include metal cuttings, rejected materials, excavated materials, paper bags, empty cartons, broken glass among other materials from a construction site. Solid wastes if not well managed have a potential of causing disease outbreaks due to the creation of suitable breeding conditions from various pathogens. To avoid occurrence of such effects, recommended mitigation measures include:

i. The contractor or the proponent should work hand in hand with the private refuse handlers and the council to facilitate proper Segregation of waste at the source during the project cycle.
ii. 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
iii. 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.
iv. Efficient use of building material to reduce waste and recycling/reuse where feasible.

v. Manage waste in accordance to the provisions of Waste Management Regulations, 2006.
vi. Any disposal should be by a NEMA licensed person/company at a NEMA approved site

7.1.8 Noise Pollution

Activities related to the project implementation can lead to noise, which is the undesirable sound that can affect job performance, safety and health, of especially those residing around the project site. This can lead to psychologically related effects of noise that include annoyance and disruption of concentration. Physical effects may include loss of hearing, pain, nausea and interference with communications if the exposure is severe. The proposed project is expected to generate noise during construction period. Since the proposed site is located within a residential area, there should be a clear guideline on the working hours whereby construction work should be carried out strictly during the day. Other proposed mitigation measures include:

i. Construction works should be carried out only during the specified time of 0800-1800hrs.
ii. Machineries should be maintained regularly to reduce noise resulting from friction.
iii. Provision of bill boards at the construction site notifying of the construction activity and timings
iv. Workers in the vicinity of high-level noise to wear safety and protective gears.
v. Provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
vi. The proponent should comply with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.

7.1.9 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

On the other hand the anticipated positive impacts include: creation of alternative employment opportunities, improving growth of the economy, improved living standards, provision of the much needed housing facilities and provision of market for supply of construction materials and other services.

7.2 Positive Impacts of the Proposed Project

The proposed development will have positive impacts to the society and the environment in general. Some of the benefits include the following:

i. The optimal use of the land.
ii. Creation of market for goods and services and especially construction inputs which include raw materials, construction machinery and labour. Secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
iii. Provision of the much needed decent housing facilities to the residents of Nairobi County.
iv. Increase in revenue for the government.
v. Job opportunities for Kenyans both during planning, construction and operational phases. They include building Contractors, architectures, structural engineers, mechanical engineers, surveyors, environmental experts, security agents, transporters, construction workers, site mangers and foremen.

CHAPTER EIGHT: 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.

8.1 EMP FOR THE CONSTRUCTION PHASE

Table 4: 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	250,000
Vegetation loss / disturbance	• Apply for tree cutting permit from relevant authorities before cutting of any tree	- Proponent - Contractor	Routine inspection	50,000
Soil erosion	• Ensure management of excavation activities • Control activities especially during rainy seasons • Provide soil erosion control and conservation structures where necessary. • Compact loose soils to minimize wind erosion	- Proponent - Contractor - Workers - NEMA inspectors	Routine inspection	100,000

Air pollution	• Sprinkling of water on dusty areas regularly • Careful screening of construction site to contain and arrest construction related dust. • Daily enclosing, covering and watering of exposed stockpiles e.g. sand • 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.	- Proponent - Contractor - County Public Health Officer - Workers - NEMA inspectors	Daily inspection Routine maintenance	200,000
Noise and excessive vibrations	• Construction activities to be restricted within the stipulated time. • 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	150,000
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 contractors yard (off the site)	- Proponent - Contractor	Routine maintenance	100,000
Storm water drainage	• Proper installation of drainage structures/facility • Install cascades to break the impact of water flowing in the drains	- Proponent - Contractor	Routine inspection	100,000

	• Ensure efficiency of drainage structures through proper design and maintenance • Provide gratings to the drainage channels		Random inspection	
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 • 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	150,000
Increased water demand	• Employ services of waters vendors to supplement water supply • Sensitize workers to reduce water wastage • Use of water efficient appliances and fittings • Drill a borehole to as an alternative source of water	- Contractor - Workers	Daily inspection	250,000
Traffic congestion	• Employ traffic marshals to control traffic in and out of site • Ferry building materials during off-peak hours • Put up traffic signage 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	- Proponent - Contractor - Drivers	Daily observation	150,000
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	- Proponent - Contractor - Workers - NHIF and NSSF officials	Random checks	150,000

	appropriate fees • A comprehensive contingency plan shall be prepared before construction begins on accident response.			
Insecurity	• Provide security guards during construction period for both during the day and night • Construct temporary barrier (iron sheet) around the site before commencement of construction • Keep records of all movement in and out of the construction site	- Contractor - Proponent	Daily observation	250,000

8.2 EMP FOR THE OPERATION PHASE

Table 5: 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	100,000
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	250,000
Storm water drainage	• Proper maintenance of drainage structures • Inspection and maintenance of water harvesting facilities • Collection of excess storm water into underground tanks for reuse e.g. car washing	- Proponent	Routine inspection and maintenance	100,000

Increased water use	• Use water efficient appliances and fittings • Drill borehole as alternative water source • 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 for general lighting. • Use of energy efficient fixtures and fittings • Maintenance of electrical components.	- 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
Insecurity	• Engage services of security guards • Install and regular maintenance of the CCTV cameras • Place hotline numbers on strategic places • Sensitize residents on security precautions • Sensitize the residents on "*Nyumba Kumi Initiative"*	- Proponent - Residents	Periodic checks Routine maintenance	150,000
Traffic	• Provide warning lights and other signs to reduce risk of accidents • Provision of adequate on-site parking bays • Regular maintenance of the parking bays	- Proponent	Routine maintenance	100,000

8.3 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 6: 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	450,000
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	150,000
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 EMCA (Noise and excessive vibration pollution control) Regulations 2009	- Proponent - Contractor - Workers - NEMA inspectors	Routine inspection and maintenance	250,000
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. ▪ Accordingly, adherence to safety procedures will be enforced.	- Contractor - Workers - Proponent - NEMA inspectors	Daily monitoring	200,000

	▪ All workers will be adequately insured against accidents.			
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	300,000
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

During the preparation of this ESIA report for the proposed development it was observed and established that most of the negative impacts on the environment are rated low and short term with no significant effect. The positive impacts are highly rated and will benefit all stakeholders at large. The project proponent has proposed to adhere to prudent implementation of the EMP. The proponent is obtaining all necessary permits and licenses from the relevant authorities and have qualified and adequate personnel to do the project as proposed. He has proposed adequate safety and health mitigation measures as part of the relevant statutory requirements. Further, the proponent shall undertake a different EIA for the proposed borehole. The project should therefore be licensed to implement this project subject to adherence to the EMP proposed in this report and the statutory requirements.

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REFERENCES

1. Kenya gazette supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government printer, Nairobi
2. Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. Government printer, Nairobi
3. Kenya gazette supplement Acts, Environmental Management and Coordination (Water Quality) Regulations, 2006. Government printer, Nairobi
4. Kenya gazette supplement Acts, Environmental Management and Coordination (Waste Management) Regulations, 2006. Government printer, Nairobi
5. Kenya gazette supplement Acts, Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) Regulations, 2009. Government printer, Nairobi
6. Kenya gazette supplement Acts Building Code 2000. Government printer, Nairobi
7. Kenya gazette supplement Acts Physical Planning Act, 1999. Government printer, Nairobi
8. Kenya gazette supplement Acts Public Health Act (Cap. 242). Government printer, Nairobi
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. Location map
6. Copy of the invitation letter
7. Copy of minutes of the public meeting
8. Questionnaires