ESIA FOR KAWAMAX COMPANY LIMITED

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONSTRUCTION OF 312 NO. RESIDENTIAL APARTMENTS (24 NO. FLOORS) WITH AUXILIARY SERVICES ON PLOT L.R NO. 209/64/15 (NAIROBI BLOCK 34/269), ALONG MOGOTIO ROAD, WESTLANDS SUB-COUNTY, NAIROBI COUNTY

GPRS Co-ordinates, Lat; $1^0$16'00.4" Long: $36^0$48'33.6"

PROPONENT.

KAWAMAX COMPANY LIMITED,
P.O BOX 25050-00603,
NAIROBI.

PREPARED BY

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NEMA Reg. No: 10400
AUGUST 2024

CERTIFICATION

This Environmental and Social Impact Assessment report has been prepared by Emerald Consultancy Kenya Limited (NEMA Reg. No. 10400) in accordance with the Environmental Management and Coordination Act (EMCA) Cap 387 and the Environmental Impact Assessment and Audit Regulations 2003. We the undersigned, certify that the particulars in this report are correct and righteous to the best of our knowledge.

DETAILS OF PROJECT PROPONENT:		
NAME OF THE ORGANIZATION	**KAWAMAX COMPANY LIMITED**	
PROJECT LOCATION	In terms of latitude and longitude it lies between latitudes -1.2667 South and longitudes 36.8092 East.	
ADDRESS	P.O BOX 25050-00603	NAIROBI
TELEPHONE		
PIN	P052262207Z	
NAME OF CONTACT PERSON		
DESIGNATION		
SIGNATURE & DATE		

DETAILS OF ESIA/EA AUDIT EXPERTS

S/NO.	NAME	DESIGNATION	REG.NO.	SIGN.	DATE
1.	JACINTA KALITI	LEAD EXPERT	2065		
2.	AUGUSTINE MUSYOKI	LEAD EXPERT	8965		
3.	EVANS MUTUA	ASSOCIATE EXPERT	10557		
4.	FRANCIS MUSEMBI	ASSOCIATE EXPERT	8806		

ACRONYMNS AND ABBREVIATIONS

CBR	California Bearing Test
CDM	Clean Development Mechanism
CPP	Consultation & Public Participation
CSR	Coorporate Social Responsibility
dB(A)	Decibel of Noise
DOSH	Directorate of Occupational Health and Safety
EA	Environmental Assessment
ESIA	Environnemental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environnemental Management Plan
EMS	Environnemental Management Standards
ESMP	Environmental and Social Management Plan
GHGs	Green House Gases
GoK	Government of Kenya
KPLC	Kenya Power and Lighting Company
KURA	Kenya Urban Facilities Authority
MDD	Maximum Dry Density
MDGs	Millennium Development Goals
NCA	National Construction Authority
NEMA	National Environnent Management Authority
OSHA	Occupational Safety and Health
OSHO	Occupational Safety and Health Officer
PAPS	Project Affected Peoples
PCC	Public Complaints Committee
QMS	Quality Management Standards
RoK	Republic of Kenya
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environnemental Programme
UNFCCC	United Nations Framework Convention on Climate Change

DEFINITION OF TERMS

Environmental Auditor: Means an expert or a firm of experts registered in accordance with regulation 14 of Legal Notice No. 101 of 2003 (Environmental Audit and Impact Assessment Regulations).

Environmental Impact Study: A systematic evaluation of activities and processes of an upcoming project/facility to determine how far these activities and programs conform to the approved Environmental Management plan of that specific project and sound environmental management practices.

Environmental Management Plan: Means all details of project activities, impacts, mitigation measure, time, schedule, costs, impact or activities, including monitoring and environmental audit during implementation and decommissioning phase of a project

Mitigation: Measures which include engineering works, technology improvement management ways and means of minimizing negative aspects, including socioeconomic and cultural losses suffered by communities and individuals, whilst enhancing positive aspects of the project.

Proponent: Means a person proposing or executing a project, program or an undertaking specified in the second schedule of the Environmental Co-ordination and Management Act.

Standards: Means the limit of discharge or emission established under the Act or under these Regulations;

Waste: Includes any matter whether liquid, solid, gaseous or radioactive, which is discharged, emitted or disposed in the environment in such a volume, composition or manner likely to cause an alteration of the environment.

Scoping: Is the process of determining the content and extent of the matters which should be covered in the environmental information to be submitted to a competent authority for

Screening: It is a coarse analysis of the possible impacts of an action with a view to identifying those impacts which are worthy of detailed study for a project to be considered for an ESIA

Decommissioning: This is the permanent withdrawal from a site or close down of

ACKNOWLEDGEMENT

The ESIA team wishes to recognize the whole fraternity of Kawamax Company Limited together with Chiefs and Assistant Chiefs of Westlands for their helpful insights and support in this study.

We are greatly indebted to the Kawamax Company Limited staff and management; For logistical and moral support accorded to the team in the course of undertaking the assessment. Finally the team appreciates the community in the project area and other stakeholders who were very co-operative during this study.

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EXECUTIVE SUMMARY

Sustainability envisages all aspects of social, economic, political and natural environment. A glance at the development trend in urban centers indicates that there have been rapid development projects which threaten forward planning interventions mainly in the form of un-matching infrastructural expansion. The development wave has caught the authorities napping making a scenario of a demand-led instead of an infrastructure-led type of development. This has the potential to bring forth unprecedented negative social and environmental impacts. The purpose of EIA Study process is to identify potential impacts of the proposed project and then identifying the avoidable and the unavoidable for the purposes of avoiding the avoidable and proposal of appropriate measures for mitigating the unavoidable for the purposes of ensuring sustainable development. In so doing, adverse impacts are attenuated while enhancing project benefits but this can only be ensured by commitment of the proponent, sound monitoring and supervision for the purposes of initiating any necessary action to limit adverse impacts disclosed by monitoring.

This report contains findings of Environmental and Social Impact Assessment (ESIA) conducted in June-August of year 2024 for the project which involves constructions of 2 basements, 2 level floor parking and 312 no. apartments (24 floors) with Auxiliary Services and lifts at an Estimated Cost of Kshs. **906,990,684.05**. (Nine Hundred and Six Million, Nine Hundred and Ninety Thousand, Six Hundred and Eighty-Four Kenyan Shillings Only). The proposed project site is located at GPRS Co-ordinates Lat: -1.2667,36.89092 along Mogotio road in Westlands Sub-County, Nairobi County..

The project proponent is Kawamax Company Limited whose core objective is to provide modern residential apartments to this area as they are over stretched and inhibiting the growth of the area.

Pursuant to section 58 of the Environmental Management and Coordination Act, (EMCA) Cap 387, the National Environment Management Authority (NEMA) requires project proponents to carry out Environmental Impact Assessments (ESIA) for such projects which have the potential to cause negative social and environmental impacts. The ESIA report has been prepared by a team of ESIA/Audit experts registered with National Environment Management Authority (NEMA). The team carried out the assessment using a combination of methods including; ground surveys, review of existing literature pertinent to the proposed project, focused group discussions, public meetings and structured questionnaires to the identified stakeholders. The ESIA project report was prepared in line with the administrative procedure provided under the Environmental (Impact Assessment and Audit) Regulations of 2003.

The trend is overwhelming in the area and similar projects such as Hyatt regency, Reliable towers, GTC, Royal offices are complete and others are underway, a trend that has caused a sharp increase in land values in the area due to the demand created for the land in the area by potential investors. Some plots in the neighborhood are under similar development and already occupied. The limited supply of land and the ever-increasing demand for housing has fueled the need for multi-dwellings developments in an effort to alleviate the housing shortage. The proactive designs have provided for adequate ventilation and natural lighting, storm water drainage, water storage and foul and wastewater disposal.

From the proposed designs, the essential set local standards (in terms of physical planning, minimum habitable rooms, basic facilities, health and safety) have been met. The land is registered in the name of the proponent (Please find copy of ownership documents attached). The proposed site is within a well-developed area and all the major urban services (electricity, water, sewer, and road network) are

available in the area. The relevant legislation has been adhered to in the design (discussed in the body of the report).

Environmental management and development problems require an integrated approach, as they are so integrated with social, demographic, economic and political elements. The scope of the assessment study covered the physical extent of the project site and its immediate environs as may be affected, proposed works and activities including installation of utilities/facilities and services.

The objective of the ESIA was to identify potential positive and negative environmental impacts associated with the proposed project and make recommendations on how to enhance the positive impacts on one hand and to mitigate the negative environmental impacts on the other. The findings of the ESIA indicate that the positive impacts far much outweigh the negative impacts.

The project will bring economic prosperity to the area through creation of employment opportunities, skill development, exchange of cultures, modernisation of the area among other benefits.

The potential negative social and environmental impacts identified are those associated with the following aspects: removal of vegetation, soil erosion and sedimentation, dust, noise, indiscriminate disposal of waste, general health and safety aspects and spillage of waste materials on the ground surface.

The ESIA Study has been prepared by Emerald Consultancy Kenya Limited, a NEMA Licensed Firm of Experts Reg. No. 10400 for submission to the National Environment Management Authority (NEMA) for consideration based on the scoping result, field visits and information collected from both primary and secondary sources including information provided by the Project Proponent.

This ESIA has been prepared with the aim of mitigating above mentioned impacts. The mitigation measures include efficient solid waste management, optimal utilization of construction materials, adherence to the occupational health and safety rules and regulations as stipulated in Occupational Health and Safety Act 2007, minimal disturbance of biodiversity and consequent replenishment where possible, use of efficient equipment and machinery to curb emissions and noise.

The report findings indicate implementation of the project is long overdue and community members are eager to have the project take off due to accruing benefits on completion. The project benefits by far outweigh negative impacts whose effects can be minimized

Potential Projects Impacts

Construction Impacts

The **positive impacts** that were identified during the construction of the proposed facilities were;

- Creation of employment for the skilled and semiskilled locals such as social-economists, trainers, casual labourers for facilities construction, cooks and cleaners at the construction sites and casual workers.
- Flourishing of businesses mainly for premises located along Mogotio road due to increased demand for basic commodities and services such as food, accommodation and construction materials.
- Increase in the number of residential houses
- Increased land value as a result of the proposed development
- Gains in the national and local economy

- Protection and conservation of the surrounding environment as a result of implementation of the recommendation of this EIA project report.

The **negative impacts** identified during the construction of the proposed facilities are:

- Increased soil erosion due to excavation works along the facilities alignment as well as improper drainage of runoff from the facilities to lower catchment areas.
- There may be pollution of air resulting from dust, exhaust and engine emissions from vehicles and equipment used during the construction.
- Increase in vehicular movements accessing the construction site may cause traffic jam temporarily.
- There will be increased solid and liquid waste which may lead to pollution of air, land and water sources in the area.
- The facilities construction works may also lead to moral decay; increased cases of sexually transmitted diseases due to influx of workmen who are associated with irresponsible behaviours.
- There is likely to be destruction of biodiversity at the project sites

Implementation Impacts (Operational Phase)

The **positive impacts** identified when the facilities will be under use are;

- Increased business opportunities due to opening up of the area as well as rise in demand for basic commodities. The facilities may lead to development of more businesses as well as improvement of existing ones.
- Increase in better housing in the area.
- There may also be unlimited employment opportunities for people who will be involved in day to day management at the site.

The negative impacts anticipated during operation of the facilities are,

- Exhaust and engine emissions from vehicles used for transportation of materials and equipment may cause air pollution, which can have an impact on public health, crops and vegetation along the facilities, soils and water sources. Regular servicing of these vehicles may reduce the emissions.
- Increased traffic along this route may lead to accidents along Mogotio road.
- The apartments will generate both solid and liquid wastes that if not well managed could cause a menace to the Environment as well as the local community.
- There may also be increased sexually transmitted diseases. Training should continue in the trading centres and in the areas where the workers will be accommodated.

Decommissioning Impacts

  - **Positive Impacts**

- There will be creation of employment although short lived for locals who will be involved in dismantling the facilities.
- The Developer may consider selling off the recyclable materials to community living around the project site. This will come at a subsidized rate to the locals.

- **Negative Impacts**

- There are likely to be accidents during the dismantling of the facilities. Barriers should be put where heavy machinery will be under use to avoid people trespassing.
- All the solid waste accrued from the decommissioning process must be disposed as per the engineer's instruction and also in line with Waste management regulations 2006.
- During the dismantling works, there is likely to be noise to the households living around the sites.
- There will be air pollution from the equipment that will be used during the demolition works from dust. The exhaust fumes from vehicles and equipment used is also likely to pollute the soils, vegetation and water sources around the site. The Contractor may consider watering the area before demolition work starts.

- **Proposed Mitigation Measures**

- The mitigation measures that can be incorporated into the design of the facilities during construction and operation stages of the 312 no. residential apartments (24 no..floors) and auxiliary facilities in order to mitigate the negative environmental impacts are;
- Dust emissions can be reduced during construction by sprinkling occasionally with water along the diversion or access routes or on construction centre section. In the case of deviations, slowing the speed of traffic by using bumps and/ or clearly marked road signs may contribute to reducing dust levels. Haulage routes will need to be identified and maintained by watering to minimize the impact of dust.
- Vehicles to be used during construction must be regularly maintained. Proper disposal of oil drained from trucks and Lorries and used oil filters should be done sensibly.
- The areas to be excavated should be cordoned off through fencing to avoid accidents both to human and animals. Gravel pits must be landscaped and reinstated or back-filled with overburden if the depth of the overburden is sufficient to allow for this.
- People should be informed of intended construction work activities, including likely dates for commencement and completion of works. Warning signs should also be introduced.
- Workmen should be provided with suitable protective gear (such as nose masks, ear muffs, helmets, overalls, industrial boots, etc.).
- There must be a fully equipped first aid kit and a Health Safety and Environment Officer who has first aid training and knowledge of safety regulations. In addition, the developer must have workmen's compensation cover.
- The location of latrines in the site should preferably be downhill of potable water sources, or 50 m to 100m from any water body. Communal bathrooms/ lavatories with soak away pits are less polluting option, but would be slightly more expensive.
- Sexually Transmitted Diseases (STDs) awareness should be conducted in the site as well as in the settlements/ trading centres.
- Facilities safety should be observed through use of signs.
- All the affected communities will be alerted of the construction works through public consultation.

Environmental Management Plan (EMP)

Table 0-1: Summarised Environmental Management Plan

Possible Environmental Impacts	Suggested Mitigation Measures
Air pollution, noise pollution and excessive vibration:	• Spray of water during construction work; • Control of speed and movement of construction vehicles; • Use of low-sulphur diesel for diesel-operated machinery; • Use of ear protection aids by construction workers; • No unnecessary hooting by project and occupants' vehicles • Restriction of construction activities to day time; • Use of attenuated equipment; • Hoarding of the entire construction site; • Limit pickup trucks and other small machinery to an idling time when necessary, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
Clearing of vegetation	• Maintaining of grass around the site; • Planting of ornamental trees.
Disturbance of soil structure	• Put soil traps around perimeter fence and on steep areas; • Landscaping with ornamental trees and grass planting; • Maintaining specified routes for construction vehicles; • Control earthworks; • Use of light machinery and equipment.
Destruction of habitat	• Restrict vehicular movement to set out paths; • Maintaining of trees in areas not affected.
Generation of solid waste	• Provision of waste collection bins; • Re-use of soil, construction debris and other reusable waste; • Proper containment and disposal of solid waste; • Contracting a licensed waste collection and disposal company; • Creation of awareness on proper solid waste disposal; • Reuse of timber off-cuts and wooden support for fuel; • Comply with the requirements of the Environmental Management (Waste Management) Regulations Legal Notice 120.
Increased demand for water and electricity	• Conservation of water and electricity; • Provision of adequate water storage facilities; • Installation of rainwater harvesting structures; • Re-use of water where possible, mainly at construction phase; • Explore additional sources.
Occupational health and safety risks	• Use of suitable personal protective equipment; • Site to be sprinkled with water to minimize dust; • Use of stable ladders and other climbing/support structures; • Sensitize workers on occupational safety; • Maintain cleanliness and organization at the construction site; • Fencing or covering of risky areas such as deep pits; • Safety signage;

	• Engagement of skilled labourers; • Insurance of workers.
Fire hazards and accidents	• Acquire fire fighting facilities; • Sensitize workers on fire safety; • No storage of flammable substances on site; • Keep well stocked first aid box; • Proper handling and use of tools and machinery.
Increase in traffic flow	• Set driving speed limits; • Adequate road warning signs to traffic regulations.
Security	• Guarding of site by a reputable security firm; • Constant site patrol; • Adequate screening of visitors to the site; • Collaboration with existing security machinery; • Partnership with neighbours and police in community policing;
Storm water/run off	• Proper maintenance of the drainage system; • Establish a storm water drainage system.
Generation of waste	• Proper connection of waste water and sewerage system to existing city council system as per approved design.
Public health and safety	• Ensure use of provided pit latrines by construction staff; • Proper handling and disposal of solid waste; • Control of visitors to the site; • Safe decommissioning of existing structures and connections thereof; • Installation of adequate water supply; • Controlled developments around the facility.

- **Decommissioning Phase**

In addition to the mitigation measures provided in above table, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the proposed project have ceased. The necessary objectives and mitigation measures pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the proposed project are outlined in the table below:

Table 0-2: Summarised Impacts During Project Decommissioning.

Environmental impact	Recommended Mitigation Measures
Solid waste generation	All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible.
	All wastes must be removed and recycled, reused or disposed of at a licensed disposal site

	Where recycling/reuse of the machinery, equipment, implements, structures and partitions waste is not possible, the materials should be taken to a licensed waste disposal site
	Donate reusable waste to charitable organizations, individuals and institutions

RECOMMENDATIONS AND CONCLUSIONS

- **Recommendations**

Following the impact analysis presented in the previous sections, here below are the recommendations:

- The Proposed project is to be implemented in compliance with the relevant legislation and planning requirements.
- The proponent must ensure that the impacts are kept to a minimum level
- A clear Environmental and Social Management plans that have been developed must be enforced.
- The proponent should ensure the implement the mitigation guideline provided in the EMP in collaboration with the Contractor.
- The Engineer for the project needs to make progress reports indicating the implementation of the plans.

- **Conclusion:**

From the foregoing the following conclusions are made:

- No serious and adverse objections were received from the communities in the neighbourhood. The facilities will also lead to economic improvement to people living around the facilities. It is therefore considered suitable for the local area.
- The proposed project has actively involved the key stakeholders who did not object the development. Thus the success of the implementation project can be guaranteed.
- The proposed project does not pose adverse socio-economic impacts and is an initiative towards improving accessibility in the area.
- In conclusion, the study recommends timely implementation of the project with strict adherence to the proposed Environmental Management and Social Management Plans.
- The project benefits have been identified to far outweigh the negative impacts for which a mitigation plan has been prepared. Further, the proponent has carefully considered and applied acceptable local and international standard/regulations at all stage of project planning and would thus qualify for funding.

CHAPTER ONE: INTRODUCTION

1.1 Overview

The last two decades have experienced an unprecedented growth in population characterized with an increase in rural-urban migration. This in turn has created a high demand for residential houses resulting in overwhelming implications on standard housing infrastructure in the country. Efforts to mitigate this has resulted in the government creating strong policies aimed at increasing the number of housing units in the country to the tune of 150,000 units per annum. These policies take cognizance on the role of the private sector and individuals in bridging this gap.

The proponent, Kawamax Company Limited, is a Kenyan Based construction and real estate company operating country wide and recognizes the importance of good construction practices for sustainable management of the environmental issues and the fundamental role it plays in business sustainability. Environmental performance is a shared responsibility and it is only by working together with neighbouring communities and other stakeholders that will make necessary progress to the journey of sustainable development.

The proposed project involves construction of a 312 no. residential apartments (24 no.floors) and auxiliary facilities at a cost of Kshs. **906,990,684.05** (Nine hundred and six million, nine hundred and ninety thousand, six hundred and eighty-four).

The project will require approval by the County government, NEMA and NCA. Therefore the ESIA was conducted in accordance with the Environmental Assessment and Audit Regulations as promulgated in 2003.

The prediction and assessment is precisely aimed at identification of possible effects the project may have on the environment that is flora and fauna, physical environment, land, biodiversity, animals, human settlement, economic activities and social settings, workers as well as the community within and outside the project area. The ESIA starts with establishment of existing policies, standards as well as any guidelines related to the buildings construction works in Kenya. Specifically, the study will aim at identifying the guidelines that have been stipulated for the protection of environment, pollution prevention, and enhancement of community health, safety and security and conservation of biodiversity, indigenous people and existing cultural heritages. The policies will be used in outlining the measures that the proponent will need to put in place to avoid or if avoidance is not possible, minimize the impacts. This is then followed by collection of baseline information that indicates the existing conditions before the commencement of the Project. The baseline data include relevant physical, biological, socio-economic and labour conditions including any anticipated changes before the project commences. The baseline information is used for monitoring and evaluation how well the mitigation measures are being implemented during the project cycle.

1.2 Proponent's Background

Kawamax Company Limited is a Kenyan Based construction and real estate company operating country wide and recognizes the importance of good construction practices for sustainable management of the environmental issues and the fundamental role it plays in business sustainability. Environmental performance is a shared responsibility and it is only by working together with neighbouring communities and other stakeholders that will make necessary progress to the journey of sustainable development.

1.3 Screening

Screening enables the project Experts & Developers to decide early at planning and design stage whether an ESIA study will be required or not. According to the Legal Notice No. 150 of The Environment Management and Coordination Act (No. 8 of 1999) SECOND SCHEDULE (s.58 (1), (4)) such construction works fall in the category of high risk projects that requires an ESIA to be carried out.

1.4 Scoping

If the project screening indicates that an ESIA study is required, the next important task is "Scoping". The aim of scoping is to ensure that the ESIA study addresses all key environmental and social issues of importance to the decision makers. It involves deliberations of environmental issues with the project stakeholders including project developers, decision makers, the regulatory agency, concerned government and semi-government departments, local community leaders, local NGOs and other concerned to ensure that all environmental, social issues and concerns are discussed and key environmental and social impacts are identified. Scoping will be carried out through consultations with the affected communities, developmental management and monitoring plan in accordance to relevant as well as recommendations from and agreements with the affected communities, local leaders and area administrative authority, site surveys, focus group discussions with affected communities and collected information using questionnaires administered to key stakeholders.

1.5 Objective of conducting the ESIA

The National Environment Management Authority (NEMA) requires project proponents to carry out Environmental and Social Impact Assessments (ESIA) and prepare related reports for developments that have the potential of resulting to negative social and environmental impacts.

The overall objective of Environmental Impact Assessment (ESIA) is to ensure that environmental concerns are integrated in all development activities in order to contribute to sustainable development.

The specific objective of conducting the ESIA with respect to the proposed project was to:

- Examine the likely adverse environmental aspects and associated impacts
- Propose appropriate mitigation measures for the significant negative impacts and
- Develop an Environmental Management Plan (EMP) with mechanisms for monitoring and evaluating compliance and environmental performance.

1.6 Project Justification

- There is an increased development along this corridor occasioned by the rapid expansion of Westlands sub-county. Highrise developments have replaced the former low rise projects which used to dominate the area.
- The necessary facilities such as accessibility, water and power are adequately catered for.
- The proposed development is in line with the Government’s housing policy. It will increase the supply of residential houses.
- The activities involved in the construction, maintenance and management of the proposed development will generate employment for various categories of people.
- The developer is willing to put up Environmental Mitigation Measures.
- An Environmental Management and Monitoring Plan has been formulated to address and mitigate all anticipated negative impacts likely to arise from the project, and therefore the project is expected to be environmentally tenable.

1.7 Scope of the ESIA

The ESIA was undertaken with respect to the proposed construction of a 312 no. residential apartments (24 no. floors) and auxiliary facilities including, a lift ducts and social spaces. The ESIA report was prepared vis-a-vis the guidelines provided under the Environmental (Impact Assessment and Audit) Regulations, 2003. The guidelines provide that the ESIA report must capture the following salient features:

1.8 Description of baseline environmental conditions of the area

- Description of the proposed project and associated activities
- Description of the national environmental legislative and regulatory framework
- The objectives of the project
- The products, by-products and waste generated by the project
- Identification and discussion of any significant impacts to the environment anticipated from the proposed project
- Description of appropriate mitigation measures proposed for the negative environmental impacts
- Provision of an Environmental Management Plan.
- Alternative technologies and processes available and reasons for preferring the chosen technology and processes
- Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies
- Public consultation with various stakeholders.

1.9 ESIA Methodology

The ESIA study process entailed the following steps:

- Meeting with Kawamax Company Limited Management team
- Desk top study (literature review) pertinent to the proposed project and its location
- Review of the relevant laws and statutory requirements
- Field survey to collect baseline information through
- Direct observations
- Interviews and focus group discussions with relevant stakeholders
- Field survey that prepared the project design and project map
- Public consultative meeting with the local community and
- Preparation of the ESIA report as per the Environmental Impact (Assessment/Audit) Regulations of 2003.

1.10 Study Approach

The Study commenced after establishment of applicable Kenyan's Laws and Policies related to the construction of the proposed project. These policies and standards have extensively been discussed in Chapter 4. This information was mainly obtained from literature review. The baseline information/data that was found relevant in this report and needed to be evaluated included:

- Physical characteristics of the project area
- Location of the proposed facilities
- Topography
- Characteristics of existing soils where the facilities will be located

- Natural resources such as water, minerals, wetlands
- Biological life forms in the project area that are likely to be affected by the project
- Biodiversity which includes vegetation cover, forests, indigenous species
- Socio-economic profile of the communities living along the facilities alignment
- Economic activities that the communities living along the facilities profile are engaged in
- The size and demographic features of the population within the project area
- Poverty index of the communities living along the facilities profile
- Community health, safety and security conditions
- Indigenous people living in the area
- Cultural heritage including antiques and monuments that are in existence in the area

The impacts anticipated during the construction and operation of the facilities were related to degradation of environment such as loss of soil through erosion, excavations, destruction of vegetation, pollution of air from dust, noise and water from sediment, waste management, stress on available water sources, community health and safety, creation of employment opportunities, improvement of accessibility to decent housing, improvement in energy industry among others.

The identification of these impacts was done through site visits and surveys, consultation with local opinion leaders and affected communities, focus group meetings with the local communities, interviews to the relevant authorities such as project management and minutes of the meeting held were recorded on paper.

1.11 Study Tools and Techniques

i. Questionnaires

The information that was sought using the questionnaires was related to perception of the community on the proposed project, any anticipated conflicts as a result of the project, socio-economic impacts, collaboration opportunities, benefits accrued from the project and any measures to mitigate negative impacts.

ii. Site visits and Survey

To understand the biophysical nature of the project area the field team visited the site. A survey along the proposed site was done and observations made on the settlement patterns, vegetation and existing ecosystems, forests, cultural heritages, socio-economic activities among others. During the site visits, the team was also able to meet the stakeholders.

iii. Public Consultation

The Consultant through the help of area chiefs, assistant chiefs and the developer organized a meeting with affected communities living around the proposed project site. During this meeting, the communities were briefed on the project background, scope design outline and the regulatory requirements for all the projects of lesser /similar/ higher magnitude whose implementation approval is vested on the National Environmental Management Authority (NEMA). The main objective of the meetings was to give them an opportunity to present their concerns and opinions regarding the proposed project. Key among the concerns was the issue of use of common resources, drainage, public disturbance and traffic congestion. Through the meetings, the community were informed of the

measures the proponent through the contractor was going to put in place to mitigate the impacts incorporating their views.

iv. Data analysis and presentation

Information/data obtained from the field was both qualitative and quantitative although the former formed the bulk of it. In this case therefore the information was synthesized into a report on project impacts, proposed measures for mitigating the impacts including the opinions and concerns of the affected communities.

v. Environmental and Social Management Plan

After carrying out the ESIA, an Environmental and Social Management Plan (ESMP) was then developed. The ESMP clearly showed proposed mitigation measures to identified impacts, parties responsible for mitigation, means and frequency of monitoring and estimated costs.

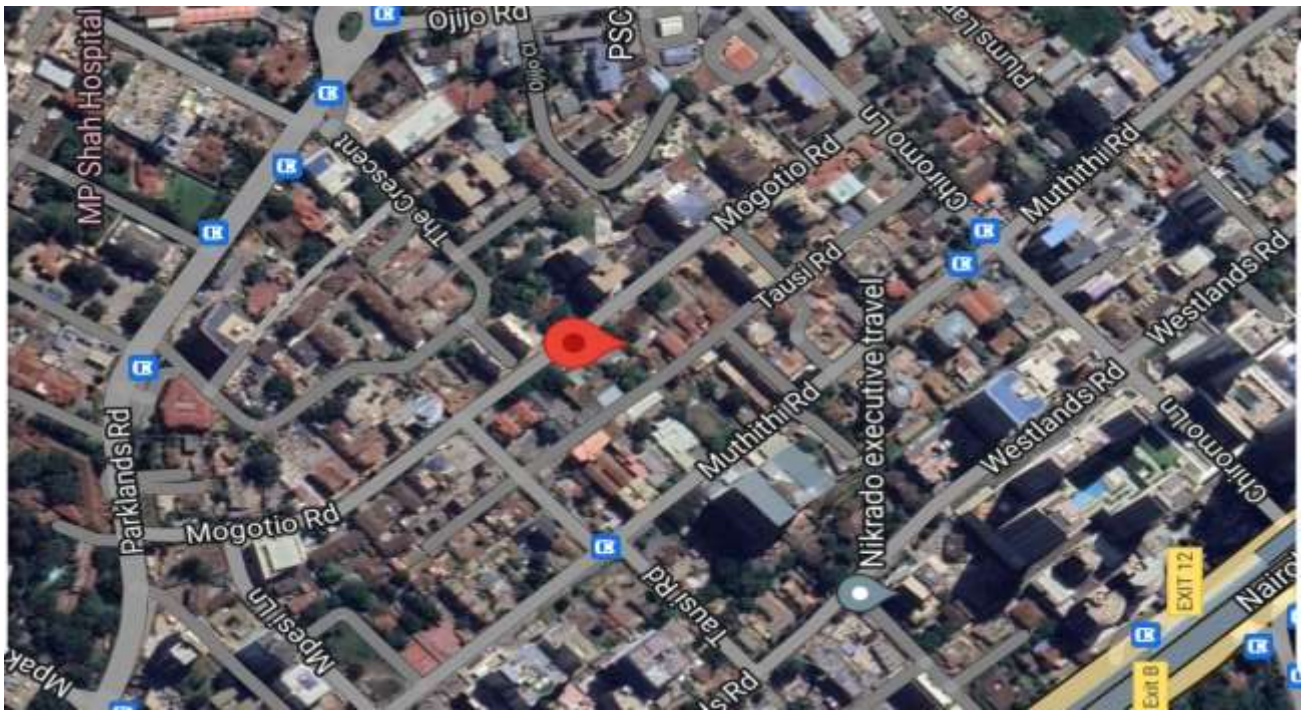
1.12 Environmental Expert Team

Details of the team that carried out the audit are summarized in the table below:

Table 1-1: Team of experts

S/NO.	NAME	DESIGNATION
1.	JACINTA KALITI	LEAD EXPERT
2.	AUGUSTINE MUSYOKI	LEAD EXPERT
3.	EVANS MUTUA	ASSOCIATE EXPERT
4.	FRANCIS MUSEMBI	ASSOCIATE EXPERT

Figure 1; PROPOSED SITE LOCATION



CHAPTER TWO:

2.0. PROJECT DESIGN DESCRIPTION AND ACTIVITIES

2.1 Overview

This chapter give a description of the actual project location, scope and the activities involved in the Construction of the proposed projects. It also highlights on the key inputs and outputs. Description of the plants and equipment that will be used is also provided.

2.2 Project Design Description and Layout Plan

A 24-floors building with 3 basement levels comprising of the following;

Basement 1

- Cleaning Area
- Water tank area.
- Parking spaces.
- Lift ducts
- Staircases

Basement 2

- Parking spaces.
- Cleaning Area
- Lift ducts
- And stair case area

Ground Floor

- Cleaning area
- Waste collection point
- Guard house
- Security office
- Generator room
- Lift entrances
- Parking area

First and Second Floors

- Parking area
- Cleaning area

Third floor

- SPA
- Children playing space
- Restaurant with kitchen area
- Coffee shop
- Multi-Purpose Hall (Gymn Area)
- Office
- Yoga room

Typical 4th to 27th floor

- 7 units of one-bedroom on each floor.
- 4 units two bedroom on each floor.
- 2 units of three bedroom on each floor.

Roof terrace.

- Swimming pool.
- Sun basking/lounge areas

In total the development upon complesion will have a total of three hundred and twelve (312) units of; One Bedrooms- 168 Units,Two bedrooms- 96 Units, Three Bedrooms- 48 Units with other supporting amenities and will be connected to the existing sewerline for effective waste water management.

2.3 Site Ownership

The land parcel *Plot l.r no. 209/64/15(Nairobi block 34/269)* where the proposed project will be located is registered under the name *Kawamax Company Limited. The title and deed plans are attached on annex of this report.*

Figure 2: Building floor Layout for the 24 floors

2.4 Infrastructure

The proposed site is accessed off Mogotio road in west lands. The proposed development will have a comprehensive and robust infrastructure including a perimeter wall, a guarded gate, three level parking and lifts.

2.4.1 Electrical system

There will be connection to the existing electricity main line of the Kenya Power and Lighting Company, which will be used in all phases of the project. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

2.4.2 Water Reticulation system

The Water from Nairobi Water and Sewerage Company will be used during construction and operation phases. More over there will be water harvesting and storage tanks to increase water supply to various components of the development.

2.4.3 Sewerage

The area is served by Nairobi Water and Sewerage Company. The proponent is proposing to connect to the existing sewer line for effective waste water management.

2.4.4 Solid Waste

Solid waste management will consist of labelled dustbins stored in cubicles protected from rain and animals. The solid wastes from the facilities will be separated depending on the nature of the waste and will be disposed of by a NEMA licensed waste disposal company in line with the Environmental Management and Co-ordination (Waste Management) Regulations, 2006.

2.4.5 Security

The site will be hoarded during construction process and a security agency will be contracted to man all access points to the sites. The guards will be charged to control movement of people in and out of the sites. During operations, a perimeter wall will be erected along the site boundaries and the boundary wall will be connected with security alarms. Entry control will be done also by a contracted security agency, and quick response systems will be used within the project area.

CCTV Cameras will also be put in place during operations of the facilities.

2.4.6 Fire safety

The development provides for fire-fighting facilities such as fire extinguishers in the form of hydrants and carbon dioxide gas extinguishers. Emergency exists will be well marked and fire assembly points be well indicated. Occupational Health and Safety audits, fire safety audits and annual fire drills will be conducted as per the DOSHS prerequisites.

2.4.7 Parking area

The development will have ample parking at the 3 basement levels for tenants and visitors which will provide a parking area for a considerable number of cars. The parking will be secured to enhance security.

2.4.8 Perimeter Fence

A concrete perimeter wall will be erected around the project site to offer the premises the required security and privacy.

2.4.9 Landscaping

The site will be landscaped after construction and planted with plant species available locally. This will include establishment of theme gardens and lush grass lawns to improve the visual quality of the site where pavements will not have taken space.

2.5 Buildings Construction

The technology used in the design and construction will be based on international standards, which have been customized by various developers in the world.

The buildings will be constructed as per the respective structural engineer's detail as provided for in the drawings presented in the Appendix. Basically, the building structures will consist of concrete appropriately reinforced with metal (steel and iron). The buildings will be provided with a well-designed concrete staircase for every units and lift ducts for ease of access to the apartments.

The building will be provided with facilities for drainage of storm water from the roof through peripheral drainage systems into the drainage channels provided and out into the natural drainage channel/system. Drainage pipes will be of the PVC type and will be laid under the buildings and the driveway encased in concrete. This is a densely build area with a well-articulated public drainage channel. The building will have adequate natural ventilation through provision of permanent vents in all habitable rooms, adequate natural and artificial light, piped water stored above ground water tanks and fire fighting facilities.

2.6 Description of the Project's Construction Activities

a) Pre-construction Investigations

The implementation of the project's design and construction phase will start with thorough investigation of the site's biological and physical resources in order to minimize any unforeseen adverse impacts during the project cycle.

i. Sourcing and Transportation of Building Materials

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

ii. Storage of Materials

Building materials will be stored on site. Bulky materials such as rough stones, ballast, sand and steel will be carefully piled on site. To avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in bits or whenever in need. Materials such as cement, paints and glasses among others will be stored in temporary storage structures, which will be constructed within the project site for this purpose.

iii. Excavation and Foundation Works

The soil cover in the proposed construction areas is murramed. However, this shall be excavated and disposed off in approved sites (preferably exhausted quarries). The excavation will be intense and thus the proponent is required to implement the process in a manner that the process does not disturb other neighbours buildings or structures.

iv. Masonry, Concrete Work and Related Activities

The construction of the building walls, foundations, floors, pavements, drainage systems, perimeter fence and parking area among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery such as concrete mixers.

v. Structural Steel Works

The buildings will be reinforced with structural steel for stability. Structural steel works will involve steel cutting, welding and erection. A structural engineer will be used in every step of the building process to certify different stages and processes of the structural works.

vi. Roofing and Sheet Metal Works

The development will use modern roofing technologies of slabing rather than erecting mabati roofs. The roof top of the building will also be used for sun-basking as well as an extra avenue for gymnastic through swimming. This area will be well water proofed to ensure that no seepage of water will be experienced during the life-line period of the building.

vii. Electrical Work

Electrical work during construction of the premises will include installation of electrical gadgets 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.

viii. Plumbing

Installation of pipe-work for water supply and distribution will be carried out within the entire building. In addition, pipe-work will be done to connect sewage from the premises to the sewerline.

ix. Landscaping

To improve the aesthetic value or visual quality of the site once construction ceases, the proponent will carry out landscaping. This will include establishment of a theme garden and lush grass lawns where applicable and will involve replenishment of the topsoil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

x. Building Materials and Energy Used

Several building materials will be required for construction of the facilities and associated amenities. These will include sand, ballast, hard core, timber, cement, clay tiles, metal sheets, electrical gadgets, and steel, plumbing materials, glass and paints among others. Most of these materials will be obtained locally within Thika and Athirver and Nairobi as well as surrounding areas. The main sources of energy that will be required for construction of the project will include mains electricity and fossil fuels (especially diesel). Electricity will be used for welding, metal cutting/grinding and provision of light. Diesel will run material transport vehicles and building equipment/machinery such as bulldozers and concrete mixers. The proponent intends to promote efficient use of building materials and energy through proper planning to reduce economic and environmental costs of construction activities.

xi. Solid Waste Generated

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus oil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. The proponent will take steps to minimize the generation of such waste and to ensure proper disposal procedures.

2.6.1 Equipment to be used in the Construction Works

a) Bulldozers

Bulldozers are versatile machines that will be used for the following operations; to level the earth, to clear sites of debris and vegetation, excavation of the foundations, clear feeder roads, construct temporary roads, to move earth fill within short distances and maintain haul roads.

b) Scrappers

The scrappers will be employed in the earth moving fields to dig loads of soil, haul and discharge the excavated materials on the facilities. The scrapper aids in depositing, spreading and levelling the earth fill load in uniformly thick layers.

c) Shovels

Shovels will primarily be used for excavation and loading construction fills into trucks or tractor pulled wagons. They are capable of excavating in all types of earth except solid rock.

d) Rollers/Compactors

Rollers are essential equipment required for construction. Rollers will be used for compaction of murram to achieve the required consolidation levels. They are of two types; smooth wheeled rollers and sheep's foot rollers. Smooth rollers are effective in compacting granular soils such as sand, gravel and crushed stones. Sheep's foot rollers are suitable for cohesive soils.

e) Dump Trucks

Dump trucks will be employed in hauling materials from the foundations during excavation to the construction sites situated over short and long distances.

f) Concrete Mixers

The proposed project will involve considerable concrete works, both mass and reinforced concrete for construction of structures such as pipe and box culverts, drifts, small bridges, retaining walls, site offices and stores and duty sites. Concrete mixers will be used for concrete batching.

2.7 Project Budget and timeline

The project is estimated to cost about ***Ksh. 906,990,684.05***. The actual construction is expected to take three years.

2.8 Description of the Project's Operational Activities

i. Operation of lifts

Several lift ducts have been provided for purposes of ease of mobility inside the building and access of the apartments. The lift operation is automated.

ii. Parking

Basement, first and second floors are reserved for parking. This is adequate for the whole development.

iii. The Commercial floor.

The third floor has a variety of commercial and social set ups including a gym area, spa, yoga room, coffee shop, restaurant and a children's play space.

iv. Solid Waste

The proponent will provide facilities for handling solid waste generated within the facilities. These will include dust bins/skips for temporarily holding waste within the premises before final disposal at the designated dumping site. The solid wastes from the facilities will be segregated with respect to kind of wastes. Organic wastes will be dumped by a NEMA Licensed Solid Waste handler, recyclable materials will be sold to the recyclers licensed by NEMA while all solid wastes will be taken to the dumpsite. All waste collection bins will be colour coded with respect to nature of waste to be put into it.

v. Waste Water and storm water Management

Sewage generated from each unit will be discharged into the sewer line available in the area. Storm water will be properly channelled to the available county managed drainage channel passing along the building.

vi. Cleaning

The proponent will be responsible for regular washing and cleaning of the common areas. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

vii. General Repairs and Maintenance

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

2.9 Description of the Project's Decommissioning Activities

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

- Demolition of all buildings
- Remove all underground facilities from the site
- The site should be well landscaped by flattening the mounds of soil and
- Planting indigenous trees and flowers
- All the equipment should be removed from the site
- Fence and signpost unsafe areas until natural stabilization occurs
- Backfill surface openings if practical
- Dismantling of Equipment and Fixtures

All equipment including electrical installations, furniture partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of this equipment in other projects. This will be achieved through resale of the equipment to other building owners or contractors or donation of this equipment to schools, churches and charitable institutions.

2.9.1Site Restoration

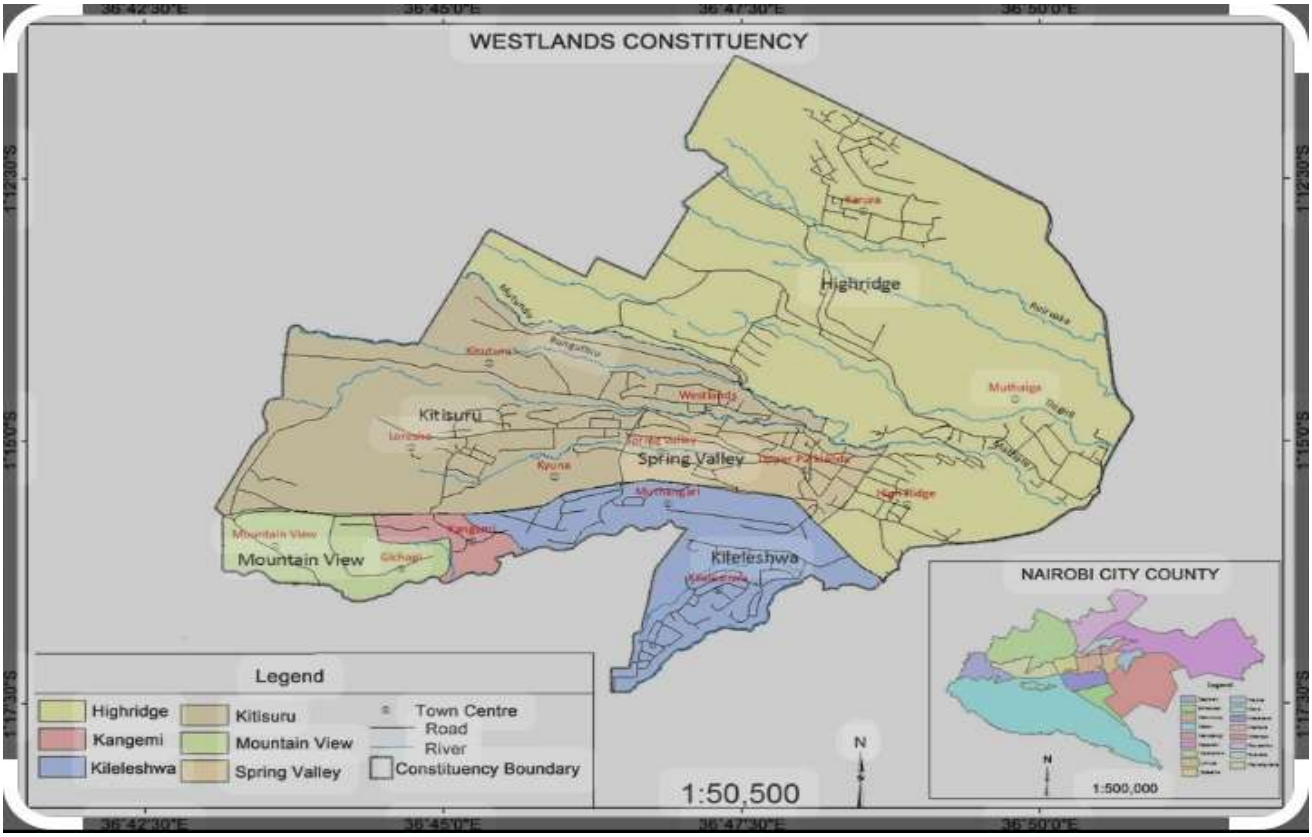
Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species.

CHAPTER THREE:

3.0. BASELINE INFORMATION OF THE PROJECT AREA

3.1 Introduction

Figure 3.1; A Geographical Outlook of Westlands Constituency.



This chapter deals with the background information of Nairobi County which is the basis upon which this Environment and Social Impact Assessment has been grounded on. In view of this it is important to have an understanding of the background information of Nairobi County.

Nairobi is well endowed with a pleasant environment that preserves much of its pristine natural beauty. Ponds, seasonal springs, rivers, flooded grasslands, and swamps abound. Unlike other major cities, Nairobi is not situated on a large river or near the sea. Nevertheless, several streams crisscross the city. Streams running from the Ngong Hills to the south and the ridges to the north become the Athi and Nairobi Rivers. Occasionally hippos and crocodiles can be spotted in the Athi River. Other important sources of water for Nairobi are the Chania and Thika Rivers. There is also the manmade Thika dam, which was constructed as a water reservoir. Natural springs feed a number of small swamps in secluded hollows. In addition, temporary wetlands are created with the coming of each rainy season. The planting of eucalyptus trees, however, has drained most of these springs.

Nairobi National Park is another preservation of natural environment. It is covered by a highland forest of hardwoods. A spectrum of birds and animals find their home in the park. The park itself was established in 1948 as an effort by the government to preserve the remaining natural beauty of Nairobi. Nairobi has a bustling population growth. Rapid urbanization and industrialization consume a lot of natural resources, causing alarming environmental degradation. Construction places a very heavy burden on natural resources. Sand is an important construction material; thus, all rivers in Nairobi have

been extensively excavated in search of sand. The result has been serious soil erosion. Timber is also used in construction, causing depletion of forests surrounding the city.

The background information covered in this Chapter includes the following;

- Location and size
- Physiographic and natural conditions
- Demographic profiles
- Administrative.
- Demographics features
- Human development approach
- Political units
- Infrastructure and access
- Land and land use
- Environment and climate change
- Mining
- Water and sanitation
- Health access and nutrition,
- Energy
- Housing
- Tourism
- Transport and communication.

3.2 Location and Size

Nairobi County borders Nairobi County to the East, Kiambu County to the North and West with Kajiado to the South. Among the three neighbouring counties, Kiambu County Shares the Longest Boundary with the Nairobi county. Nairobi county is a metropolitan with residents from all walks of life, different countries and a wide variety of cultures.

The proposed site for the residential apartments is located at GPRS Co-ordinates **-1.2667, 36.8092 at** Nairobi Westlands highridge area along Mogotio road in Westlands Sub-County, Nairobi County.

3.3 Physiographic and Natural Conditions

a) Physical & Topographic Features

The project site is located at Westlands Area has a flat slope thus drainage is good. The area is characterized by relatively flat type of topography. Though densely developed, the area is covered by loam and clay types of soil.

b) Geology and soils.

Soils of the Westlands area have been described in detail in the report Soils and Vegetation on the research gate website. Nairobi major geological structures are Nairobi trachyte to the west and north east, Nairobi phonolite and Trachytic tuff to the east, and Kerichwa tuffs covering the northern and central parts of Nairobi. Soils of the foot slope area were developed on Basic and Ultra-Basic Igneous Rocks (basalts, nepheline phonolites; older basic tuffs included). They are described as imperfectly drained, very deep, dark grey to black, firm to very firm, bouldery and stony, cracking clay; in places with a calcareous, slightly saline deeper subsoil; in places with a humic topsoil: Pellic Vertisols, stony phase and partly saline phase; with verto-orthic Greyzems and orthic Rendzinas.

c) Climatic Conditions

Nairobi County is generally flat with an altitude of 1795 metres above the sea level, this attributes explains the moderate climatic patterns that are experienced in the county. The coldest period is experienced in June and July while the hottest months are January and December. The mean temperatures range between 18 degrees Celsius and 20 degrees Celsius but this is projected to change as a result of climate change and global warming of the necessary measures is not put in place. The County also experience bimodal rainfall that falls in different times of the year. The average amount

of rainfall is approximately 1500mm per annum. Soils in Nairobi are red volcanic soils which contain all the major plant nutrients and this enables some of the residents to practise agriculture on large scale and small scale.

d) Administrative Units

The total land mass of Nairobi County Nairobi is divided into 11 sub-counties, 17 electoral constituencies, and 85 wards. It borders Nairobi County to the East, Kiambu County to the North and West with Kajiado to the South. Among the three neighbouring counties, Kiambu County Shares the Longest Boundary with the Nairobi county. Nairobi county is a metropolitan with residents from all walks of life, different countries and a wide variety of cultures.

3.4 Demographic Features

a) Population Size

Nairobi has a population of 4,397,073 as per the 2019 national census with 1.4 Million households. The current metro area population is 5,541,000, a 4.6% increase from 2023, which was 5,325,000.

As at the 2019 National Population Census, the then Westlands sub-county had a population estimated at 308,854 people comprised of more than 38,610 households occupying a ground area of 97.50 square kilometers. This kind of a population could benefit from the proposed project.

b) Project Site Neighbourhood Outlook

Neighbourhood Characteristics The site under consideration falls in an area that is fast urbanizing. There are a high number of ongoing constructions which are predominantly mixed developments. The main developments within the area includes Commercial premises such as Reliable Towers which is a ground plus Nine Floors Office Block, & residential apartments. The plate below shows the general characteristic of the area.

Figures 3.2; PROJECT NEIGHBOURHOOD OUTLOOK

3.5 Infrastructure and Access

a) Infrastructure

The area is served by a robust network of well tarmacked roads. The proposed site is located along and accessed by Mogotio road.

Figure 3.2: Project Site Access Roads along Mogotio Road

b) Posts and Telecommunications

The mobile network coverage within the County is of 95 per cent of the total area. The number of land line connection is more than 327 and its use is on the decline particularly because the use of internet as the main source of communication is on the rise and with the availability of fibre optic then the reliance on the landlines is on the decrease.

There are 14 post offices and 20 sub-post offices which are fairly distributed within the County. Radio ownership is 96 per cent which is attributed to low cost of purchase and maintenance while Television coverage is 98 per cent.

c) Financial Institutions

Because of the fact that Nairobi County has very many commercial activities, numerous banks and microfinance institutions have been attracted. Currently there are about ten (10) commercial banks and fourteen (14) microfinance institutions with branches well distributed across the County. These banks and microfinance institutions include, Kenya Commercial Bank, Equity Bank, Cooperative Bank, Barclays Bank, Standard Chartered Bank, KREP Bank, National Bank of Kenya, Faulu Kenya, Kenya Women Finance Trust Kenya, Post Bank, Family Bank, small and micro enterprise programme (SMEP), three village banks and several SACCOS which include; Harambee Sacco, Hazina Sacco and Universal Traders Sacco.

d) Education Institutions

The majority of schools follow either the Kenyan Curriculum or the British Curriculum. There is also International School of Kenya, and Rosslyn Academy, both of which follow the North American Curriculum, Swedish school in N'gong, and the German school in Gigiri. Nairobi is home to several Universities and Colleges like The University of Nairobi, Strathmore University, United States International University, Technical University of Kenya, Catholic University of East Africa, KCA University, Daystar University among others.

The institutions have created opportunities for the youth to acquire skills and knowledge.

e) Energy Access

The department responsible for energy has also set aside a budget with respect to the distribution of power across the County. In particular investors have shown an interest in the generation of wind energy and solar energy. Following the interests expressed by the investors, the County is keen on partnering with the investors so as to see an increase in the availability of energy across the County. The County takes cognizance of the fact that energy plays a very fundamental role in the cost of production of any product which is a key determinant as to whether an investor will set up an industry within the County or not.

Wood, paraffin, charcoal, solar, gas and electricity are the main sources of energy across the County. Though wood is the main source of cooking energy accounting for 81.6 per cent, while the main source of lighting energy is paraffin accounting for 88.1 per cent. From the foregoing it is apparent that diminishing forest coverage within the County can be attributed to the high use of wood as the main source of fuel.

f) Markets and Urban Centres

Nairobi is home to the Nairobi Securities Exchange (NSE), one of Africa's largest stock exchanges. The NSE was officially recognised as an overseas stock exchange by the London Stock Exchange in

1953. The exchange is Africa's fourth largest in terms of trading volumes, and fifth largest in terms of Market Capitalization as a percentage of GDP

Nairobi is the regional headquarters of several international companies and organisations. In 2007, General Electric, Young & Rubicam, Google, Coca-Cola, IBM Services, and Cisco Systems relocated their African headquarters to the city. The United Nations Office at Nairobi hosts UN Environment and UN-Habitat headquarters.

Several of Africa's largest companies are headquartered in Nairobi. Safaricom, the largest company in Kenya by assets and profitability is headquartered in Nairobi, KenGen, which is the largest African stock outside South Africa, is based in the city. Kenya Airways, Africa's fourth largest airline, uses Nairobi's Jomo Kenyatta International Airport as a hub.

Nairobi has not been left behind by the FinTech phenomenon that has taken over worldwide. It has produced a couple of tech firms like Craft Silicon, Kangai Technologies, Jambo Pay and Hostraha Limited Archived 16 November 2022 at the Wayback Machine. which have been in the forefront of technology, innovation and cloud based computing services. Their products are widely used and have considerable market share presence within Kenya and outside its borders.

Goods manufactured in Nairobi include clothing, textiles, building materials, processed foods, beverages, and cigarettes. Several foreign companies have factories based in and around the city. These include Goodyear, General Motors, Toyota Motors, and Coca-cola.

Nairobi has a large tourist industry, being both a tourist destination and a transport hub

g) Housing

There is a wide variety of housing options in Nairobi. The options range from privately owned housing units/apartments, rented units, leased spaces and even houses on mortgage. Most wealthy Kenyans live in Nairobi, but the majority of Nairobians are of average and low income. Half of the population has been estimated to live in slums which cover just 5% of the city area. The growth of these slums is a result of urbanisation, poor town planning, lack of good governance and proper leadership in these settlements and lack of empowerment and social capital among other factors.

Kibera is one of the largest slums in Africa, and is situated to the west of Nairobi. (Kibera comes from the Nubian word Kibra, meaning "forest" or "jungle"). The slums cover two square kilometres and are on government land. Kibera has been the setting for several films, the most recent being *The Constant Gardener*.

Other notable slums include Mathare and Korogocho. Altogether, 66 areas are counted as slums within Nairobi.

Many Nairobi non-slum-dwellers live in relatively good housing conditions. Large houses can be found in many of the upmarket neighbourhoods, especially to the west of Nairobi. Middle and high income estates include Gigiri, Muthaiga, Langata and Karen. Other middle and high income estates include Parklands, Westlands, Hurlingham, Kilimani, Milimani, Spring Valley, Lavington, Rosslyn, Kitisuru, and Nairobi Hill.

To accommodate the growing middle class, many new apartments and housing developments are being built in and around the city. The most notable development is *Greenpark*, at Athi River, Nairobi County 25 km (16 mi) from Nairobi's Central Business District. Over 5,000 houses, villas and

apartments are being constructed at this development, including leisure, retail and commercial facilities. The development is being marketed to families, as are most others within the city. Eastlands also houses most of the city's middle class and includes South C, South B, Embakasi, Buru Buru, Komarock, Donholm, Umoja, and various others.

h) Land and Land use

The area is a mixed use, both commercial and multi dwelling residentials. This is the reason why the owner has changed the use from single dwelling to multi-dwelling units so as to make good use of the land.

Figure 3.4. General Land Use Outlook and the project neighbourhood.

3.6 Environment and Climate Change

As part of strengthening their sustainability initiatives, Kawamax Company Limited is focused on initiating renewable (solar installation) energy project both for promoting access to clean and affordable green energy sources by the tenants.

a) Major Contributors to Environmental Degradation

Environmental degradation across the entire world is a major concern. The County is not exempted from this degradation. This is particularly so because the County is the main supplier of sand. It is also the home of most of the cement factories that supply cement across the entire county, East African region and COMESA. This obviously has a negative impact on the environment particularly the quality of water because of the emissions and discharges from these industries. In addition to the foregoing, most of the locals use firewood and charcoal as the source of fuel.

b) Effects of Environmental Degradation

The effects of environmental degradation are felt across the globe. As mentioned above, Nairobi County has had its share of degradation. An example is pollution of the Nairobi river. Most of the factories and industries within the County have a tendency of polluting water bodies within their vicinity. Other environment issues of concern in the county include; the mushrooming of slums and the destruction of trees and green areas particularly due to urbanisation.

c) Climate Change and Its Effects in the County

Climate change threatens to adversely affect economic growth in the County and endangers it from becoming a prosperous County with a high quality of life for all its citizens. The cumulative impacts of climate change have the potential to reverse much of the progress made towards the attainment of the Millennium Development Goals (MDGs) and Vision 2030. The effect of the climate change has seen increased periods of drought, erratic rainfalls and increase in temperatures which have led to low agricultural productivity.

d) Climate Change Mitigation Measures and Adaptation Strategies

The County has taken cognizance of the fact that climate change impacts have to be mitigated as such various strategies to address this issue have to be adapted. In view of this, the County has launched several tree planting programmes, clean ups of rivers and sensitization on waste management.

3.7 Water and Sanitation

a) Water Resources

The history of water supply to Nairobi since the city was founded as a rail outpost in 1899 has been to a large extent a history of tapping ever more distant water sources to supply a rapidly expanding city with sufficient water. Other challenges faced included the reduction of water distribution losses, reaching the poor in slums, expanding sewerage and wastewater treatment, and strengthening the Nairobi water utility

b) Water Supply Schemes

The area is served by water from Nairobi Water and Sewerage company. This will be adequate for the proposed development in all stages.

c) Water Sources

Nairobi residents receive water through the piped network and pump water from their own deep wells. Water supply from both sources is about 570,000 m3/day. If one takes into account that the population of Nairobi swells to 5 million during daytime, this corresponds to less than 120 litre per capita per day before distribution losses. However, water is not equally distributed: Wealthier users with access to piped water use much more than average, while those without access to piped water receive much less. Half of Nairobi's population lives in slums, but they consume only 34,500 m3/day, corresponding to less than 20 litre per capita per day. The heavily polluted and relatively small Nairobi River that flows through the city is not used for drinking water supply.

The proponent will connect to the existing Nairobi Water Supply as well as have a back-up plan for drilling a borehole to supplement the county supply in days of water rationing.

d) Sanitation

The existing sewer network of a total length of about 163 km only covers an area of about 208 km^2, which is less than 30% of the 696 km^2 area of the city. It is unclear what share of the population is connected to the sewerage system: Estimates vary from 10 to 48%.

There are two wastewater treatment plants in Nairobi: The Dandora stabilisation ponds treat industrial and domestic sewage and have a design capacity of 80,000 cubic meters per day. They constitute the largest pond system in Africa, but as of 1996 only half its capacity has been used. The Kariobangi wastewater treatment plant has a capacity of 32,000 m^3 per day and uses the trickling filter technology. The effluent from both plants is discharged into the Nairobi River.

The proponent will seek approvals for waste water reticulation into the existing sewer-line serving the area for effective and efficient waste water management.

3.8 Key Issues in the county

- Environmental pollution
- Traffic jams.
- Inadequate communication network
- Poor facilities
- Inaccessibility of remote area
- Mushrooming of slums
- Poorly equipped health facilities
- Climate change effects

CHAPTER FOUR:

4.0. RELEVANT POLICY, LEGISLATIVE AND ADMINISTRATIVE FRAMEWORK

4.1 Overview

This chapter of the ESIA highlights the relevant legal provisions, which govern the process of ESIA under which this project falls. These provisions are broadly categorized as policies, legislations, regulations and administrative frameworks.

The current legal provisions for natural resources management in Kenya are contained in over Seventy seven (77) sector- specific statutes. For a long time, the country lacked an umbrella legislative guide for harmonious and holistic environment management. As such resources were managed sectorial in accordance with the statutes that were in place. However, sometimes these statutes were contradictory. In 1999, the government enacted the Environment management and coordination Act (EMCA) which is an umbrella legal framework under which the environment is being managed. The Act which was repealed in 2015 establishes the institutional framework under which environmental management is to be coordinated. EMCA prevails over all other sectorial laws relating to the environment, in cases of conflict or contradictions. It also grants the public a *Locus standi* in matters of the environment. Kenya is also a signatory to various international environmental laws including the Ramsar Convention, the Vienna Convention, United Nations Framework Convention on Climate Change, The Montreal protocol and the Kyoto protocol.

4.2 National Legislative Frameworks

This sub-sectional explains the various legal provisions which govern the processes of EIA and EA. Some environment related acts that have been created deal with specific areas of the environment such as water pollution, soil erosion, air pollution, and resettlement among others. Before the establishment of Environment Impact Assessment and Environmental Audit regulations of 2003, environmental strategies were implemented through local authorities' acts and policy statements. The EMC Acts led to establishment of NEMA which coordinates all environmental issues in the country and enforces environmental laws.

The following is a highlight of some legal frameworks that govern this project;

Applications of national statutes and regulations on environmental conservation suggest that the proposed development is carried out without compromising the status of the natural resources in the area, public privacy, health and safety. This position enhances the importance of Environmental Impact Assessment for the proposed site to provide a benchmark for its sustainable operation. The key national laws that govern the management of environmental resources in the country are briefly discussed below. It is noteworthy that wherever any of the laws contradict each other, the Environmental Management and Coordination Act (EMC) Cap 387 prevails.

a) The Environment Management and Coordination Act, Cap 387.

This is an Act of parliament, which provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. Section 58(1) states that notwithstanding any approval, permit or license granted under this act or any other law in force in Kenya, any person being a proponent of a project shall, before carrying out, executing, or conducting or causing to be financed, commenced, proceeded with, carried

out, executed or conducted by another person any undertaking specified in the second schedule of this Act submit a Strategic Environmental Assessment report.

The proposed project falls under the second schedule of EMCA i.e.," any activity out of character with its surrounding" since it is likely to cause substantial impact to the environment in areas such as biodiversity, sustainable resource use, ecosystem maintenance, social environment, land use, water and drainage patterns. Some of the related regulations in the EMCA Cap 387 include:

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

These regulations guide on the appropriate waste handling procedures and practices. It is anticipated that, the proposed project will generate large quantities of solid waste during construction which will need to be managed through reuse, recycling or appropriate disposal. It is therefore anticipated that, the amount of materials to be discarded as waste during the project implementation will be minimum.

It is recommended that the proponent should put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal. It is further recommended that the proponent should consider the use of recycled or refurbished construction materials including those excavated from existing facilities. Purchasing and using recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste.

To comply with the requirements of the regulations the proponent should undertake the following in addition to the above-mentioned recommendations;

- Should not dispose any waste on the road, street facilities, recreational area and public places;
- Segregate waste and group them according to their similarity for example plastics, toxic, organic, hazardous etc.
- Ensure all waste is deposited in a designated dumping site approved by the local authority;
- All waste handlers engaged by the proponent should be licensed by NEMA and possess all relevant waste handling documents such as waste transport license, tracking documents, license to operate a waste yard, insurance cover, vehicle inspection documents among others;
- Implement cleaner production principles of waste management strategy namely reduce, reuse and recycle;
- Label all hazardous wastes as specified in section 24 (1-3) of the regulation.

The fourth schedule lists wastes considered as hazardous and solvents, emulsifiers/emulsion, waste oil/water and hydrocarbon/water mixtures. The proposed project will involve use of inputs which are likely to generate the mentioned wastes and thus will need to be handled as required by the regulations.

c) Environmental Management and Co-ordination (Noise and Vibrations Control Regulations, 2009)

These regulations provide guidelines for acceptable levels of noise and vibration for different environments during the construction and operation phase. Section 5 of the regulation warns on operating beyond the permissible noise levels while section 6 gives guidelines on the control measures for managing excessive noises and copy of the first schedule indicating the permissible noise levels for different noise sources and zones. The project team should observe the noise regimes for the different zones especially when working in this area which is termed as silent zones

which include institutions and worship places. These areas are permitted exposure to sound level limits of not exceeding 40 dB (A) during the day and 35 dB (A) at night. The regulation states that a day starts from 6.01 a.m. to 8.00 p.m. while night starts from 8.01 p.m. – 6.00 a.m. Construction sites near the silent zones are allowed maximum noise level of 60 dB (A) during the day and night levels are maintained at 35 dB (A).

The time frame for construction sites are adjusted and the day is considered to start at 6.01 a.m. and ends at 6.00 pm while night duration from 6.01 p.m. to 6.00 a.m. Near the silent zones are allowed maximum noise level of 60 dB (A) during the day and night levels are maintained at 35 dB (A). Part III of the regulation gives guidelines on noise and vibration management from different sources. Sections 11, 12 and 13 of the stated part give guidelines on noise and vibration management from machines, motor vehicles and night time construction respectively. Section 15 requires owners of activities likely to generate excessive noise to conduct an ESIA to be reviewed and approved by NEMA.

Table 4-2: Maximum permissible noise levels for construction sites

Maximum noise level permitted (leq) in dB(A)			
		Day	**Night**
	Health facilities, educational institutions homes for disabled etc.	60	35
	Residential	60	35
	Areas other than the one in (I) and (II) above	75	65

It is anticipated that the proposed project will generate excessive noise and/or vibration during excavations, this noise will originate from the excavation/construction equipment, vehicles and the workers.

To minimize the impacts of noise and vibrations from the proposed activities, the noise generating activities will be limited to working hours between 8.00 am and 5.00 pm. All possible care will be undertaken to ensure that the machinery are properly greased and oiled to reduce friction and possible noise emission. The proponent shall strictly adhere to the provisions and requirements of these Regulations.

d) Environmental Management and Co-ordination (Water Quality Regulations, 2006)

These Regulations provide guidelines on the use and management of water sources; the quality of water for domestic use and irrigation. The proponent will be required to observe the requirements of the Regulations which prohibit anyone to undertake development within a minimum of 6m from the highest ever recorded flood level. Section 4(2), 6 and section 24 of the regulation prohibits pollution of water bodies and r quires that all substances discharged into the water bodies should meet the standards set under third schedule of the regulation.

The project site area does not neighbour any water resources but underground water facilities cannot be ignored, design team has been advised on the requirements of this regulation and they have incorporated the regulations in the design document.

The proposed project will be connected to an already existing water supply from the Nairobi Water and Sewerage Company water supply with a room for drilling own borehole for use during supply inadequacy; during project operations, a wastewater management system will be provided through the connection to the existing sewerline for all waste water systems emanating from the different parts of the proposed project. This is believed to be an efficient way of managing waste water world widely.

e) Environmental Management and Co-ordination (Fossil Fuel Emission Control Regulations, 2006)

These Regulation aim at eliminating or reducing emissions generated by internal combustion engines to acceptable standards. The regulation provides guidelines on use of clean fuels, use of catalysts and inspection procedures for engines and generators.

The activities of this project will involve the use of vehicles and equipment that depend on fossil fuel as their source of energy. It is recommended that the requirements of the regulation be implemented in order to eliminate or reduce negative air quality impacts.

f) Occupational Health and Safety, 2007

This is an act of parliament to provide for the safety, health and welfare of workers and all persons lawfully present at work places, to provide for the establishment of the National council for the Occupational Safety and Health and for connected purposes. The Act was published in the Kenya Gazette Supplement No.111 (Acts No.15) It received presidential assent on 22nd October, 2007 and became operational on 26th October 2007.

The key areas addressed by the Act include:

- General duties including duties of occupiers, self-employed persons and employees
- Enforcement of the Act including powers of an occupational safety and health officer
- Registration of workplaces
- Health General provisions including cleanliness, ventilation, lighting and sanitary conveniences
- Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines , steam boilers, air receivers, refrigeration plants and compressed air receiver.
- Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas.
- Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials.
- Welfare general provisions including supply of drinking water, washing facilities, and first aid.
- Offences, penalties and legal proceedings

Under sections 6 of this Act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplaces. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (section 7). He is also required to establish a safety and health committee at the work place in a situation where the number of his employees exceeds twenty (section 9) and to cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a registered safety and health advisor (Section 11). In addition, any accident,

dangerous occurrences, or occupational poisoning which has occurred at the workplace needs to be reported to the occupational safety and health officer of the respective area by an employed person (Section 21).

According to section 44, potential occupiers are required to obtain a registration certificate from the Director for all premises intended for use as workplaces. Such places shall be maintained in a clean state during the operation phase (Section 47). To ensure machinery safety, every hoist or lift- section 63 and/ or all chains, ropes and lifting tackles- section 64 (1d), shall be thoroughly examined at least every period of six months by a person approved by the Director of Occupational Health and Safety services. Similarly, every steam boiler-section 67(8) and /or steam receiver shall be thoroughly cleaned and examined at least once in every period of twenty four months or after any extensive repairs-sections 69(5). According to section 71 (3), every refrigeration plant capable of being entered by an employee also needs to be examined, tested and certified at least once period of twelve months by an approved person.

In relation to fire safety, section 78 (3) requires spillage or leaks of any flammable liquid to be contained or immediately drained off to a suitable container or to a suitable container or to a safe place, or otherwise treated to make it safe. Furthermore, a clear and bold notice indicating that smoking is prohibited should be conspicuously displayed in any place in which explosive, highly flammable or highly combustible substances, are manufactured, used, handled or stored-section 78 (5). In addition, necessary precautions for dealing with fire incidents should be implemented including provision of means for extinguishing fire and means for escape, in case of fire, for the persons employed in any workplace or workroom-section 81. As far as disaster preparedness and emergence response programme is concerned, section 82 (1) makes it a mandatory requirement for every occupier of a workplace to design evacuation procedures to be used during any emergency situation and to have them tested at regular intervals.

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees.

The employers positive contribution towards the welfare of the employees include provision and maintenance of adequate supply of wholesome drinking water-section 91 and first aid box or cup board of the prescribed standard –section 95 at suitable point (s) conveniently accessible to all employees. Other precautionary measures include: issuance of a permit to work to any employee, likely to be exposed to hazardous work processes or hazardous working environment, including such work processes as the maintenance and repair of boilers, dock work, confined spaces, and the maintenance of machinery and equipment ,electrical energy installations, indicating the necessary precautions to be taken-section 96 (1);provision and maintenance for the use of employees, adequate, effective and suitable protective clothing including suitable gloves, footwear, goggle and head coverings in workplace where employees are likely to be exposed to wet, injurious or offensive substance-section 101(1)

The proponent will be required to comply with the above mentioned provisions throughout the project cycle. This report has comprehensive EMP which integrates EHS issue to ensure the risks, accident and health issues from this activity are minimized to zero. The duties of the proponent and those of the contractor are clearly outlined.

g) Public Health Act 2012

The Act demands the adoption of practicable measures to prevent injurious and unhealthy conditions in the site.

The Act requires the proponent to enhance effective management of Nuisances i.e. noxious matter or wastewater as will be discharged from the proposed project throughout the project cycle. To achieve this, systems on the management of both solid and liquid waste (effluent) will be adopted as proposed in the report.

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

The proponent will be required to construct suitable pit latrines, bathrooms for use by workers in the sites and visitors to the sites & offices during construction phases of the proposed project.

During Project operation, the effluent will be discharged into the existing sewer line connecting the project site. Solid waste will be collected by a contracted and NEMA Licensed Solid waste handler to dispose the unrecyclable wastes as per the waste regulations. Sanitary facilities will conform with MOH standards and installation of standard fittings.

h) Physical Planning Act, 2019

The said Act section 29 empowers the county governments to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same section allows for prohibition or control of the use and development of an area.

Section 30 states that any person who carries out development without development permission will be required to restore the land to its original condition. It also states that no other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local Authority. Authority shall grant license for residential/commercial or industrial use or occupation of any building without a development permission granted by the respective local Authority.

The proposed project lies within Nairobi County, the proponent had undertaken a change of use from single dwelling to multi dwelling units and all drawings have been approved by the Nairobi County government. During commissioning of the building for occupancy, the developer will obtain certificates of clearance for occupation from the County Government after a thorough inspection of the building.

i) Water Act 2016

The Act provides guidelines on use and management of the water resources in the country. This Act prohibits the pollution of water. Part II, section 3 of this act states that "every water resource is hereby vested in the state, subject to any rights of user granted by or under the Act or any other law". Section 18 of this Act provides for national monitoring and information systems on water resources. Following on this, sub-section 3 mandates the water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specified records may require to be kept by site operator and the information thereof

furnished to the authority. Section 73 of the Act provides that a person who is licensed to supply water has the responsibility of safeguarding the water sources against degradation. According to section 75 (1) such a person is required to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

Section 94 of the Act also makes it an offence throw or convey or cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive or unwholesome matter or thing into or near to water resources in such a manner as to cause, or be likely to cause, pollution of the water resources.

The proponent will connect the apartment into the existing water Supply from the Nairobi Water and Sewerage Company. The proponent will also ensure that a*ppropriate measures to prevent potential for contaminating water resources will be put in place throughout the project cycle.*

j) The forest Act 2005

This applies to all forests and woodlands on state, local authority and private land. Under this Act, no person shall, in state, local authority or provisional forest; fell, cut, take, burn, injure or remove any forest produce, be or remain therein between the hours of 7 p.m. and 6 a.m. unless he is using a recognized facilities or footpath, or is in occupation of a building authorized by the director, or is taking part in cultural, scientific or recreational activities;

The proposed activities will NOT involve cutting of trees & shrubs at the project site as the site has no any vegetation cover. But this does not limit the proponent from engaging/facilitating tree planting activities in the Country towards achieving the 10% tree coverage in the country and ensuring sustainability of the Environment.

k) County Government Act 2012

The Act also contains provisions empowering County Governments to control discharges. Under section 163 a County Governments may control or prohibit activities, both industrial and domestic, which constitutes 'a source of danger, discomfort or annoyance to the neighbourhood', as an offensive trade or as has been gazette by the Minister. Section 165 another way of controlling development by empowering the county governments to refuse to license activities on the ground that the treatment method proposed is not adequate.

The proponent will ensure appropriate measures to avoid or reduce environmental pollution to be put in place during the construction and operation phases of the proposed projects.

l) Way Leave Act Cap 292

Section 3 of the Act states that the Government may carry any works through, over or under any land whatsoever, provided it shall not interfere with any existing building or structures. Notice, however, should be given one month before carrying out any such works (section 4) with full description of the intended works and targeted place for inspection. Any damages caused by the works would then be compensated to the owner as per Section 8 of the Act that states that any person whom without consent causes any building to be newly erected on a way leave, or cause hindrance along the way leave shall be guilty of an offence and any alterations will be done at his/her costs.

The proponent will ensure appropriate measures will be put in place to avoid any interference, damages that may be caused by the proposed project on the way leave.

m) Traffic Act Chapter 403

This Act consolidates the law relating to traffic on all public roads. The Act also prohibits encroachment on and damage of roads including land reserved for roads.

This proposed project will be well demarcated and the proponent will ensure appropriate measures are undertaken not to encroach on OR block the existing Mogotio Road at any given time. The proponent will employ services of traffic marshalls to control traffic along the road at any given time during project operations. The proponent will also ensure enough signages for traffic control have been put into place.

n) Work Injury compensation Benefit Act 2007

This Act provides guideline for compensating employees on work related injuries and diseases contacted in the course of employment and for connected purposes. The Act includes compulsory insurance for employees. The Act defines an employee as any worker on contract of service with employer.

The proponent will make sure that all workers contracted during the project implementation phase have the required insurance covers so that they can be compensated in case they get injured while working.

o) The Malaria Prevention Act (Cap 246)

This Act provides measures to curb the breeding of mosquitoes at development sites. Measures proposed in the Act to control the breeding of the vector include: maintenance of free drainage channels, removal of stagnant water from any land around an area to prevent larvae breeding, removal of waste and broken bottles among other measures.

The proponent will implement measures to control the malaria disease vectors by implementing the mitigation measures proposed in the regulations.

p) The Penal Code (Cap 63)

The Act provides guidelines on protecting the public against ill health and offensive trade activities such as noise and smell among others.

The proponent will observe the provisions of this Act by controlling excessive noise and by controlling pollution of water bodies and land.

q) The Standards Act Cap 496

This Act is implemented by the Kenya Bureau of Standards who provides standards on the requirements of equipment and project materials. Standards regulating security and safety of the public also have to be observed during the design phase of the project.

The proponent will implement the requirements of this Act especially those on standardization of project inputs and equipment in order to reduce waste and pollution.

r) The Land Act 2012

This Act states that; (1) There shall be the following forms of land tenure:

i. Freehold;
ii. Leasehold;

iii. Such forms of partial interest as may be defined under this Act and other law, including but not limited to easements; and
iv. Customary land rights, where consistent with the Constitution.

(2) There shall be equal recognition and enforcement of land rights arising under all tenure systems and non-discrimination in ownership of, and access to land under all tenure systems.

Sections 9 of the Act states that;-

(1) Any land may be converted from one category to another in accordance with the provisions of this Act or any other written law.

(2) Without prejudice to the generality of subsection (1):

a. Public land may be converted to private land by alienation;

b. Subject to public needs or in the interest of defense, public safety, public order, public morality, public health, or land use planning, public land may be converted to community land;

Private land may be converted to public land by:

i. Compulsory acquisition;
ii. Reversion of leasehold interest to Government after the expiry of a lease; and
iii. Transfers; or
iv. Surrender.

c. (Community land may be converted to either private or public land in accordance with the law relating to community land enacted pursuant to Article 63(5) of the Constitution.

d. Under Section 143, the Act states that; Subject to and in accordance with this section and section 146, the Commission may, create a right of way which shall be known as public right of way.

(2) A public right of way may be:
a. a right of way created for the benefit of the national or county government, a local authority, a public authority or any corporate body to enable all such institutions, organizations, authorities and bodies to carry out their functions, referred to in this Act as a way leave; or

b. a right of way created for the benefit of the public, referred to in section 145 of this Act as a communal right of way.

s) The Land Registration Act 2012

This is an Act of Parliament enacted to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes.

Section 6 of the Act states that;

(1) For the purposes of this Act, the Commission in consultation with National and County governments may, by order in the Gazette, constitute an area or areas of land to be a land registration unit and may at any time vary the limits of any such units.

(2) Every registration unit shall be divided into registration sections, which shall be identified by distinctive names, and may be further divided into blocks, which shall be given distinctive numbers or letters or combinations of numbers and letters.

(3) The parcels in each registration section or block shall be numbered consecutively, and the name of the registration section and the number and letter of the block, if any, and the number of the parcel shall together be a sufficient reference to any parcel.

(4) The office or authority responsible for land survey may, at any time, cause registration sections or blocks to be combined or divided, or cause their boundaries to be varied, and immediately inform the Registrar of the changes.

(5) Any order by the Commission under this section shall be published in the Gazette and in at least two daily newspapers of nationwide circulation.

(6) The land registration units shall be established at County level and at such other levels to ensure reasonable access to land administration and registration services.

t. The National Sand Harvesting guidelines, 2007.

In the exercise of the power conferred by section 42 (A) of the environmental Management and co-ordination Act, the Director General of the NEMA issues the sand harvesting guidelines 2007. The guidelines allow for formation of a Technical Sand Harvesting Committee (TSHC) which is guided by environmental considerations & Social considerations. In collaboration with the Riparian Resources management Association (RRMA) the TSHC designates sand harvesting sites, controls sand harvesting in the sites, trade on sand and procedure for acquiring sand harvesting permits.

The proposed activities will involve use of sand, so the proponent will ensure that sand is sourced from TSHC designated sites and from registered sand traders.

4.3 Policy Framework

According to the Kenya National Environment Action Plan (NEAP 1994) the government recognized the negative impacts on ecosystems emanating from industrial, economic and social development programmes that disregarded environmental sustainability. Following this, the establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. The NEAP process introduced Environmental Impact Assessments in the country with among the key stakeholders being industrialists, business community and local authorities. This culminated into the development of the policy on environment and development under the Sessional paper No.6 of 1999.

a) National Environment Action Plan (NEAP)

The Kenya National Environment Action Plan (NEAP) was enacted following Governments recognition of and concern for the negative impacts on ecosystems emanating from industrial, economic and social development programmes that disregard environmental sustainability. As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process, Integrated & Strategic Environmental Impact Assessments were introduced targeting the industries, business communities and local authorities.

b) Policy paper on Environment and Development (Sessional paper No. 6 of 1999)

The key objectives of the policy include:

i. To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account.
ii. To ensure that an independent Environmental Impact Assessment (ESIA) report is prepared for any industrial venture or other development before implementation
iii. To come up with effluent treatment standards that will conform to acceptable health guidelines.

Under this paper, broad categories of development issues have been covered that requires "sustainable development'' approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness raising and appreciation of clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

The proponent has commissioned a team of experts to carry out an Environmental and Social Impact Assessment study, prepare the report for submission to NEMA.

c) The Poverty Reduction Strategy Paper (PRSP)

The PRSP has the twin objectives of poverty reduction and enhancing economic growth. The paper articulates Kenya's commitment and approach to fighting poverty; with the basic rationale that the war against poverty cannot be won without the participation of the poor themselves.

The proposed project, through improving housing and growth of business in the area will, contribute towards economic growth, as well as relieve the daily pressure of poverty for sustainable number of people by creating jobs; also enabling them reach the markets and suppliers on time.

d) Kenya Vision 2030

The Kenya Vision 2030 is the national long-term development blue-print that aims to transform Kenya into an industrial country whose citizenry shall be having high quality of life in a clean and secure environment by 2030.

The Vision comprises of three key pillars: Economic; Social; and Political. The Economic Pillar aims to achieve an average economic growth rate of 10 per cent per annum and sustaining the same until 2030. This is to be achieved by strengthening key sectors of the pillar where infrastructure is one of them due to its role of spurring economic development of the country. Infrastructural development is a key driver of economic development of the country in that it enables other key sectors of the economy such as tourism; agriculture and manufacturing operate smoothly thereby making activities of these sectors easy and cheap to undertake. As such, the 2030 Vision on infrastructure aims at making Kenya to be a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications.

The policy identifies a number of challenges inhibiting the transport sector from performing its facilitative role in respect to national and regional economies. Some of these challenges include; poor energy accessibility, poor quality of transport services, unexploited regional role of the transport system, Urban Environmental pollution, Institutional deficiencies, inadequate human resource

capacity. To address the above mentioned challenges, the Ministry came up with various interventions that have helped improve functionality and service delivery of the sector. Towards this end, a number of Authorities have been created to manage, develop, rehabilitate, and maintenance of various categories of roads such as rural, urban and highways.

The proposed project through facilitating improvement of livelihoods to workers as well living standards to house owners in the region will be synergetic in line with the vision 2030 policy paper.

International Policy Framework

Kenya is a signatory as well as a party to various international conventions, treaties and protocols relating to the environment which aims at achieving sustainable development. According to the Registrar of International Treaties and other Agreements in Environment (UNEP 1999), there are 216 treaties, 29 of which are of interest to Kenya. The country is a signatory to 16 such agreements, which range from use of oil, protection of natural resources and protection of the atmosphere. The agreements are both regional and international and became legally binding on Kenya upon ratification thereof by the rightfully designated Kenyan Authority. The agreements of interest to Kenya can be categorized as those for protecting natural resources, atmosphere and social wellbeing of man.

a) United Nations Convention to Combat Desertification (UNFCCC) of 1994:-

The convention requires parties to take climate change considerations into account in their relevant social, economic and environmental policies and actions. The proponent has undertaken this ESIA with the aim of minimizing adverse effects of the proposed project on the economy, on public health and on the quality of the environment. The requirements of this convention can be militate against to reduce impacts on climate change by growing trees suitable for the area to act as carbon sinks along the highway. The community members in the proposed project area depend majorly on wood and kerosene as their source of energy which are known to directly affect the ecosystem in terms of pollution and effects on water catchments. The project activities will involve use of automobiles that use fossil fuels that contribute to GHGs levels.

The proponent is advised to enhance the positive impacts of the project through engaging activities that control climate change for example supporting tree planting programmes with the community members, schools and conserving the catchment through water conservation.

b) The World Commission on Environmental and Development (The Brundtland Commission of 1987)

The commission focuses on the Environmental aspects related to development and requires all development projects to be sustainable economically, socially and environmentally. The principle of the organization emphasize that development project should not have permanent negative on the biosphere and in particular the ecosystems.

The Project proponent will incorporate mitigation measures to ensure that the project impacts on the ecosystem are reduced. The ESIA consultants used participatory methods to involve the target group and concerned stakeholders in order to inform and enlighten them on the likely negative environment and social impacts in order for them to mitigation measures so as to ensure the proposed project is sustainable throughout its life span.

c) **The Convention of Control of Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD) (1992)**

This convention requires Parties to promote cooperation among affected parties in the fields of environmental protection and the conservation of land and water resources, as they relate to desertification and drought.

The proponent will engage in activities geared towards eradicating drought through supporting tree programmes with relevant local communities, encouraging clean energy use and water conservation.

d) Development Partners Regulations on Environmental and Social Management

The objective of Environmental and Social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for project workers in the identification, preparation, and implementation of programs and projects. Operational policies have often provided a platform for the participation of stakeholders in project design and have been an important instrument for building ownership among local populations.

The proponent is committed to establishing, implementing and maintaining a sound environmental management system to ensure that its activities are environmentally acceptable and sustainable.

4.4 National Administrative Framework

a) The National Environment Council

The National Environmental Council (the Council) is responsible for policy formulation and directions for the purposes of developing the EMCA. The Council also sets national goals and, objectives, and determines policies, and priorities for the protection of the environment.

b) The National Environment Management Authority

The responsibility of the National Environmental Management Authority (NEMA) is to exercise general supervision and, co-ordination of all matters relating to the environment and to be the principal instrument of government in the implementation of all policies relating to the environment. The Authority shall review the project report for the proposed project, visit the project site to verify information provided in the report and issue an ESIA license if it considers that all the issues relevant to the project have been identified and mitigation measures to manage them proposed.

c) National Environment Complaints Committee

The Act has also established a National Environment Complaints Committee, which provides the administrative mechanism for addressing environmental harm. The Committee has the mandate to investigate complaints relating to environmental damage and degradation. Its members include representatives from the Law Society of Kenya, NGOs and the business community.

d) Institution capability related to implementation of the proposed project

Kawamax Company Limited is fully committed to long-term environmentally sustainable development that is consistent with National and International standards. The proponent has a regulatory division which will ensure the compliance of all the regularly requirement both nationally and internationally. The staff attached to this section will work in partnership with the contractor to co-ordinate and supervise the implementation of the Environmental Management plan throughout the project cycle. This will be achieved by ensuring that the relevant legal provisions, documented procedures, work instructions, EMS and QMS manuals are adhered to.

CHAPTER FIVE:

5.0. POTENTIAL SOCIAL AND ENVIRONMENTAL IMPACTS

5.1 Overview

This chapter outlines the potential negative and positive impacts that will be associated with the project. The impacts will be related to activities to be carried out during construction of the project and the operation stage of the project. The operational phase impacts of the project will be associated with the activities carried out within the premises. In addition, closure and decommissioning phase impacts of the project are also highlighted.

The impacts of the project during each of its life cycle stages (construction, operation and decommissioning) can be categorized into: impacts on the biophysical environment; health and safety impacts and socio-economic impacts.

5.2 Negative Environmental Impacts of Construction Activities

5.2.1 Extraction and use of construction materials

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

Mitigation

- Purchase all construction materials from NEMA Licensed Quarries.
- Properly demarcate the project area to be affected by the construction works to avoid spill over effects to neighboring areas.
- Carry out all excavation works as instructed in the approved architectural plans for the building.

5.2.2 Dust emissions

During construction, the projects will generate substantial quantities of dust at the construction site and its surrounding. The sources of dust emissions will include excavation and levelling works, and to a small extent, transport vehicles delivering building materials. Emission of large quantities of dust may lead to significant impacts on construction workers and the local residents, which will be accentuated during dry weather conditions.

Mitigation

- Implement a standard set of feasible dust control measures at the site such as:
- Covering all trucks hauling soil, sand and other loose materials and/or require these trucks to maintain at least two feet of freeboard;
- Watering all dust-active construction areas to suppress dust emissions; and

- Paving or applying water when necessary or applying non-toxic soil stabilizers on all unpaved access roads and parking areas.

5.2.3 Exhaust emissions

The trucks used to transport various building materials from their sources to the project site will contribute to increase in emissions of CO_2, NO_2 and fine particulate along the way as a result of diesel combustion. Such emissions can lead to several environmental impacts including global warming and health impacts. Because large quantities of building materials are required, some of which are sourced outside the County, such emissions can be enormous and may affect a wider geographical area. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent running of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas.

Mitigation:

Reduce exhaust emissions by implementing the following:

- Advice drivers at the site to minimize vehicle idling time;
- Properly tune all equipment and maintain them in good working conditions; and
- Properly plan the transportation of materials and ensure that vehicle fills are increased so as to reduce the number of trips done and the numbers of vehicles on the roads.

5.2.4 Biodiversity disturbance

The project will involve clearance of trees and shrubs to create room for facilities diversions. Such vegetation clearance will alter the ecosystems functionality in the project area by;

- Destroying life plants forms i.e. trees, shrubs, herbs and micro-flora e.g. bacteria, fungi
- Destroying habitats for meso-fauna e.g. squirrels, rabbits, birds, snakes, chameleons, frogs and toads.

Mitigation

- Ensure that any flora and fauna removal and disturbance is restricted to the actual project area to avoid spill-over effects to neighboring areas and that the same are restored by:
    - ✓ Properly demarcating the project area to be affected by the construction works.
    - ✓ Strictly controlling construction vehicles to ensure that they operate judiciously and over designated areas to minimize destruction of vegetation.
    - ✓ Re-establishing vegetation in some parts of the disturbed areas through implementation of a well-designed landscaping programme by planting of ornamental trees, flowers and hedges.

5.2.5 Noise and vibration

The construction works, delivery of construction materials by heavy trucks and the use of machinery/equipment including bulldozers, generators, tippers and concrete mixers will contribute high levels of noise and vibration within the construction site and the surrounding area.

The effects of noise include:

- Noise interferes with communication and can lead to tinnitus (ringing in the ears);
- Nuisance;
- Fatigue and tiredness, reduced efficiency, low morale and severe and permanent loss of hearing which may persist for several hours due to prolonged exposure to noise;
- Deterioration of the environment within the project site and the surrounding areas through vibrations produced by heavy construction machinery;
- Weakening of adjacent buildings resulting into cracking of their walls by vibrations.

Mitigation

Adhere to the Kenya Noise Prevention and Control rule passed in 1996 under legal notice No.296 as a subsidiary legislation to the Occupational Health and Safety Act (OSHA) of 2007 which requires putting in place measures that will mitigate noise pollution. Consider especially the rule which states that, "No worker shall be exposed to noise level in excess of the continuous equivalent of 90 dBA for more than 8 hours within any 24 hours duration".

a) Minimize noise at the site and in the surrounding areas through:

- Sensitization of truck drivers to switch off vehicle engines while offloading materials;
- Instructing truck drivers to avoid running of vehicle engines or hooting especially when passing through noise sensitive areas such as religious areas, hospitals and schools;
- Properly servicing and maintaining and tuning construction machinery such as generators and other heavy duty equipment to reduce noise generation; and
- Placing noisy equipment in sound proof rooms or in enclosures to minimize ambient noise levels.

b) Minimize the impacts of temporary construction noise and vibration by:

- Planning the construction work to take place only during the day when the neighbours are also at work.
- Maintaining reasonable working hours so as to reduce the number of complaints concerning noise from the workers and neighbours.
- Operating shorter shift periods for workers who come in direct contact with high concentrations of noise or other hazards.
- Posting notices at the construction site informing the public of the construction activities, time and day.
- Providing ear protective devices to prevent high frequency noise emitted by the high frequency machines during construction phase.

5.2.6 Risks of accidents and injuries to workers

Because of the intensive engineering and construction activities including erection and fastening of structural steel sections for the buildings, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and risk of vehicular accidents.

Mitigation

- Have a fully equipped first aid kit at the site at all times and ensure that trained first aid personnel are available to handle any incidents due to pollution at site.
- Provide all construction workers with Personal Protective Equipment (PPE) including masks, goggles, scarfs, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA 2007.

5.2.7 Increased soil erosion

Excavation works associated with this project may lead to increased soil erosion at the project site and release of sediments into the drainage systems. Uncontrolled soil erosion can have adverse effects on any local water bodies.

Mitigation Measure

- Ensure good landscaping to facilitate water percolation.
- Level all hilly areas to reduce acceleration of water downstream.
- Ensure all drainage systems are made of concrete.

5.2.8 Solid waste generation

Large quantities of solid waste will be generated as a result of excavations on the site. In addition, additional solid waste will be generated at the site during construction of the buildings and their related infrastructure. Such waste will consist of metal cuttings, rejected materials, surplus materials, surplus soil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. Such solid waste materials can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impact on human and animal health. This may be accentuated by the fact that some of the waste material contain hazardous substances such as paints, cement, adhesives and glasses, while some of the waste materials including plastic containers are not biodegradable and can have long-term cumulative effects on the environment.

Mitigation

- Prioritise waste recycling for recyclable materials.
- Contract a NEMA Licensed solid waste handler to handle all solid waste generated during construction.
- Ensure purchases meet demands to avoid wastages.

5.2.9 Energy consumption

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environment implications on its availability, price and sustainability.

The project will also use electricity supplied by Kenya Power & Lighting Company (KPLC) Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources.

Mitigation

- There will be need to use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability.
- Ensure energy savings bulbs and machines are used during construction.
- Ensure appliances using electricity and are not in use are switched off.

5.2.10 Water use

The construction activities will require large quantities of water that is supplied. Water will mainly be used for concrete mixing, dust suppression and sanitary and washing purposes. Excessive water use may negatively impact on the water source and its sustainability.

Mitigation

- Water should be used sparingly
- Ensure water harvesting techniques are put into consideration.
- Create awareness on the need of conserving water and switching off pipes when not in use.

5.2.11 Social disturbance

The construction works may cause disturbance to the local population with interactions of non-local workers with residential communities. The movement of trucks and other equipment in the project area during the works implementation will cause noise and dust if the works will be in dry weather. This noise and dust may also affect the schools in the vicinity of the construction works.

Mitigation

- Ensure all operations and movements of materials and trucks are done during day time.
- Reduce intervals of lorries' movements through ensuring haulage trucks with adequate capacities are used for movement of materials.

5.2.12 Spread of HIV & AIDs

The social interactions between the locals and non-local work force may cause spreading of diseases especially HIV & AIDs and the Covid-19 pandemic.

Mitigation

- Providing awareness on HIV/AIDs to workers and community members.
- Provide condom dispensers that should be refilled on time.

5.2.13 Increased insecurity

As a result of influx of the people in the area; workforce of non-locals and rising of illegal structures for vending food stuffs, social drinks will create a good environment where crime is likely to thrive.

Mitigation

- Ensure that all the site areas are well fenced
- Ensure that security lights are provided during night falls.
- Ensure that all access points are monitored.

5.2.14 Soil compaction

As machines and people move on ground the soil is compacted. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface and thus limiting aerobic activities of soil dwelling organisms. This may have negative consequences on soil productivity on a localized scale. Compaction also enhances run-off during the rainy season resulting into soil erosion.

Mitigation

- Strictly control construction vehicles to ensure that they operate judiciously and over designated areas to reduce soil compaction.
- Rip off any compacted areas after construction to allow aeration of soil and ease infiltration of water into the soil.
- Transition phase from construction to operation

During the transition phase from the completion of the development to the start of operations, the following will be done:

a) Remove any wastes from the site;
b) Extend sanitary and waste collection facilities at the site;
c) Rehabilitate any areas adversely affected by the construction through spillages of pollutants: liquids, chemicals, cement and paint among others at the site and any other areas disturbed as a result of the construction outside the site.
d) Plant grasses and ornamental trees at the site.
e) Put up fencing around the site for protection from intruders and unauthorized persons and ensure privacy.

5.3 Positive Environmental Impacts of Construction Activities

5.3.1 Creation of temporary employment opportunities

Several employment opportunities will be created for construction workers during the construction phase of the project. This will be a significant impact since unemployment is currently quite high in Westlands Sub County and the surrounding areas.

5.3.2 Provision of market for supply of construction materials

The project will require supply of large quantities of construction materials most of which will be sourced locally in Nairobi County and the surrounding areas. This provides ready market for construction material suppliers such as quarrying companies, hardware shops and individuals with such materials.

5.3.3 Increased business opportunities

The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as food vendors around the construction site.

5.3.4 Skill transfer

The incoming skilled and semi-skilled work force will provide for transfer of skills to the area residents and vice versa also true.

5.3.5 Generate revenue to the County and National governments

The construction process will generate revenue to both the local and County governments from Cess payments for the construction materials at the County government cess points as well as through payment of income tax and other taxes by the proponent and workers.

5.4 Negative Environmental Impacts of Operational Activities

5.4.1 Water resources; supply and use

Construction consume a lot of water due to the mixing of concrete and the various activities that are conducted. Water will be sourced from the approved sources i.e. the county government connection. The projects operation will also bring in very large population which will have direct impact to the water supply (hence high water demand). However, to take care of potential problems, the following is recommended:

Mitigation Measures

- Avoid excessive use of the water.
- Roof catchments should be provided with gutters to facilitate collection of the run-off. This water should be stored for general use i.e. cleaning, fire fighting etc. In fact, the water can be consumed after suitable treatment and approvals by relevant department.
- Sufficient Storage water tanks should be provided.
- The water supplier should ensure long lasting and reliable water supply within its jurisdiction.
- Provide notices and information signs to the involved stakeholders on means and needs to conserve water resource i.e. _KEEP/LEAVE THE TAP CLOSED‘, _WATER IS LIFE. SAVE IT‘etc. this will awaken the civic consciousness of the community with regard to usage and management of the water resources.
- Install water conserving taps that turn-off automatically when water is not in use. The taps should have reduced hand-wash cycle.
- Encourage water reuse/recycling mostly during installation and occupation phases.

5.4.2 Waste water

Sewage is the used water or liquid waste of a community, which includes human and household wastes together with street-washings, industrial wastes such as ground and storm-water as may be mixed with it.

Effluent/sewage resulting from sanitary facilities and wastewater from washrooms is of significant importance to the environment. It must never come into contact with the surrounding i.e. water, soil, air etc. It must always drain effectively into the sewerline via well designed and laid pipe networks.

Sound sanitation should be ensured to influence prevention of the sporadic outbreak of diseases dangerous for the general health of the community (within the projected area), workers and the general public. Either controlling or eliminating such environmental factors that contribute in some form or the other to the transmission of the diseases can achieve this.

Mitigation Measures

- The Truck Sewerline Connection system should be made of hard, strong, durable, smooth, impervious, and non-corrodible materials.
- Sanitary facilities must be kept clean always.
- The design connections of the sewer line should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it must have the capacity to consistently handle the loads even during peak volumes. The gradient should be sufficient to ensure and maintain maximum depth of flow.
- The trunk must be regularly monitored to avoid overfilling and overflowing. They must be checked regularly to monitor level of effluent and efficiency
- Branches should be streamlined in the direction of flow and there should be no right-angled junctions that would affect the flow of the effluent
- All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround
- All waste pipes must have cleaning roding eyes accessible from outside. i.e. free to every part of the system for inspection, cleaning and repair
- All manholes on drive ways and parking areas must have heavy-duty covers set and double sealed airtight; as approved by specialists.
- Wastewater sources should be determined, and potentially harmful substances identified that may contaminate the water (e.g. disinfectants cleaning agents, cytostatic and, antibiotic agents etc).

5.4.3 Solid Waste

Like in many establishments and human activities, residential developments and in general all facilities generate waste with the largest component being the general waste but with a small proportion of hazardous waste which where the main concern could lie. Waste may be categorized into various categories such as household or general waste, genotoxic waste, hazardous waste, radioactive waste, infectious and chemical wastes and sharps. Contaminated waste may pass on dangerous pathogens through ingestion, inhalation, skin cuts/abrasions and or through mucous membranes. Sharps may not only cause cuts and punctures but also infect these wounds if they are contaminated with pathogens. Because of this double risk—of injury and disease transmission—sharps are considered as a very hazardous waste class.

There is need to consider vectors such as rats, flies, cockroaches which feed on waste and thus may transmit pathogens.

On completion of the internal construction works, the sites will be generating waste products from various operations and activities. H*ouse refuse-r*emoval and disposal of house refuse comes under public cleaning and is very important and costly item on the budget. If it is not removed promptly away from the generation points, it accumulates in large heaps harbouring rats, flies and vermin which disseminate germs of disease. A good deal depends upon the mutual cooperation between the County Governments and the public.

Proper maintenance and use of dustbins is the key to the satisfactory solution of the problem of sanitary storage and collection of refuse without causing nuisance.

The problem of dealing with in house refuse resolves itself into four parts: *storage, collection, transportation and disposal*. Therefore bins come in handy during storage and collection; both in the specific areas and on foot paths of the streets for the throwing of whatever rubbish such as paper wrappings, cigarette ends etc., into them instead of scattering them all over. Transportation of the collected waste need be simplified and finally, the use of sound method of waste disposal. The proponent should provide for dustbin cubicles in the project site to facilitate solid waste management.

Mitigation Measures

- Use of information on potential hazards as available from Material Safety Data Sheets (MSDS) provided by manufacturers or vendors on disposal. It is recommended that the management check with pharmaceutical companies for specific information on proper disposal of expired products.
- Best practices should be adopted aimed at reducing waste. Ways of reducing waste include: serving non packaged food; recycling paper products and packaging; use of non-disposable, multi-use materials and use of electronic medical records system
- Disposal of radioactive waste should be strictly as set out in the regulations and as per the guidelines of the World Health Organization. It should be held under lead-shielded protection and where conditions warrant, should be allowed sufficient time for 'decay' with strict monitoring
- All hazardous waste should be handled and managed as per the Waste Regulations. Provisions of the Waste Regulations should be adhered to the letter- regarding handling, storage, transportation and final disposal.

- The wastes should be properly segregated and separated to encourage recycling of some useful waste materials; Use of an integrated solid waste management system; through a hierarchy of options: source reduction, reuse, recycling, and disposal (sanitary land filling)
- The contractor or proponent should work hand in hand with private refuse handlers and the County government to facilitate sound waste handling, and disposal from the site. All wastes must be taken to the approved dumpsites.
- There should be several bins - The bins should have a close fitting cover, lest stray dog's might scatter the refuse. The receptacle(s) must be kept in a good condition, and sanitarily clean by frequent washing and disinfecting. The first action should be reduction of waste at source and all stakeholders must be encouraged and sensitised on reduction or waste. Biodegradable waste should be composted for use in the gardens. There should be several bins clearly labelled and colour coded to handle various categories of waste. Emphasis should be on reuse and recycling and any unrecyclable waste should be disposed to approved dump sites and as per the Waste Regulations
- In addition to the bins to be provided at various stations, the proponent should provide a number of dustbins strategically on the footpaths of the driveways for the pedestrians to throw whatever rubbish instead of scattering them on the road surface or compound. These bins should better be fixed to posts one or two feet above the ground so as not to be within reach of dogs and other scavengers etc.
- The collection should be made at least once in 24 hours, and it should be done in such a way as to minimize nuisance of smell and dust during filling into carts or vans or any employed (suitable) collection method. All the refuse collected from house to house must be carried away from the storage site to a safe place where it can be suitably disposed. Lastly, suitable and most effective method of disposal should be applied.

- Train or educate the involved stakeholders on the importance and means of waste (garbage) management and handling especially during operation.
- The contractor or proponent should work hand in hand with NEMA , Ministry of Health and the County Government to facilitate Sound Waste management as per the prevailing regulatory provisions.

5.4.4 Public Safety, Traffic Flow, Occupational Safety and Health (OSHA)

All workplaces have their challenges on health and safety depending on the nature of operations and activities carried out within the respective places. Residential among others have their challenges and various stakeholders need to be protected.

Mitigation measures

- Provide properly fitting Personal Protective Equipment (PPE) depending on tasks being performed to avoid injuries and illness
- Practical and very high standards must be set for handling and management of hazardous substances from procurement, handling, use and disposal. Information on potential hazards should be made available from Material Safety Data Sheets (MSDS) provided by manufacturers or vendors
- A written procedure for safely managing hazardous materials in the work place should include: work area and place of work/activity, substance description (chemical and synonym), environmental and human risks protective measures and handling instructions, emergency instructions and first aid proper disposal information
- The requirements of the OSHA should be strictly adhered to, the Building Code and other relevant regulations must be adhered to particularly during maintenance or any construction works. Only specialised machine operators should operate machinery and specialised equipment and all moving parts should be provided with appropriate guards.
- Properly design to allow for deceleration and acceleration to the road. Clearly indicate direction of traffic throughout the project cycle.
- Adapt effective emergency response plans throughout all the phases.
- Safety awareness may be gained through regular safety meetings, occupational health and safety training or personal interest in safety and health. This awareness will increase ability to respond if, some day in future, one is a bystander in an emergency.
- Sanitary facilities should be provided (for each sex where conditions warrant). Standard cleanliness of the facilities should be maintained.
- Local individuals preparing food for the workers at the site should be controlled to ensure that food is hygienically prepared.
- The management should initiate sensitization programs for various health and social issues such as drugs, alcohol, diseases etc. There should be training programs to facilitate this.
- Sound waste management.
- Public awareness campaigns on the prevention and management of prevalent diseases such as malaria, STDs and HIV AIDS and equipment of the proposed facility to manage the same.

- Ensure (consistently) good water quality through regular water analysis to ascertain compliance to public health standards.

5.4.5 Accident prevention and Emergency Response Plan (ERP)

Emergencies and disasters are a reality of everyday life. Stakeholders must therefore be sensitized and prepared on how to react during all the phases. Absence of such plans may be risky since there would be no guidelines to handle or control emergencies if they occur. The proponent shall take all necessary steps to prevent accidents in the entire project cycle. All safety procedures should be followed while measures to prevent and manage fires are taken as discussed elsewhere in this report. For further management of any foreseeable accidents, the proponent shall develop an ERP which is documented and all the stakeholders are provided with the requisite training and annual drills conducted.

The ERP shall typically contain all information on all likely types of emergencies likely to be encountered mainly emergencies, accidents and fires. The ERP shall include actions to be taken in case of emergencies and shall display emergency contacts (ambulance, doctors, police and fire engines) telephone list; simple instructions on do and don'ts in various emergencies such as fires etc. On traffic safety, entry and exit points are provided with clear views. Bumps shall be erected to control speed along the driveway. The ERP shall also promote good neighbourliness which shall go a long way in emergency response. Such plans must be properly documented and made available to all. A fire assembly point must be identified and clearly marked for example.

5.4.6 Security

Security is a prerequisite for any development. The developments require tight security to ensure safety of all the stakeholders, machinery and equipment's; drugs and chemicals some of which may be harmful if in the wrong hands. Some protection is also required while in some areas and therefore access must be checked.

The area is well covered with communication facilities, which facilitate security to large extents. After the project is over, security guards and facilities should be provided.

Mitigation Measures

- The developments should be enclosed using suitable walls to beef-up security and to control movement within
- Security guards must always guard the gate to the facility to keep away the intruders and to control movement within and create order.
- Lighting as well as security alarms should be installed in strategic positions all over the buildings,
- The guards stationed at the gates should document movements in and out of the building.

5.4.7 Fire preparedness

Fire outbreaks can occur anywhere and thus the need to take precaution. Fire incidences usually subject detrimental effects to the environment. Fire causes both economic and social drawbacks. There are operations that are prone to such outbreaks at the site such as re-fuelling of machineries ets. It is therefore always important to consider the issue of fire.

Mitigation Measures

- Potential causes of fire are many and varied electrical faults, smoking, gas leaks, carelessness etc. Fire incidences result to economic and social drawbacks. It is therefore always important to

consider the issue of fire by bringing in the element of preparedness. In this regard, the design should provide and recommend implementation of fundamental firefighting measures and control facilities.

- Install an automatic fire alarm system for the entire project mostly on occupation, provide one 30m hose reels per floor and provide for adequate fire reserve water storage tanks with an automatic booster pump for hose reel and three 9kgs water or powder fire extinguisher for every floor and one per each fuelling pump.
- Provide appropriate Fire Hydrant Ring main with suitable outlet points.
- Install heat and smoke detectors on each floor
- Install manual electric break-glass fire alarm system with secondary power
- All installation to follow Fire Masters requirements approval.
- Conduct regular firefighting drills/simulations to sensitize workers/stakeholders and adapt an emergency response plan for the entire project during occupational phase.
- Ensure that all fire-fighting equipment are strategically positioned, regularly maintained and serviced.
- Provide fire hazard signs such as 'No Smoking' signs, Direction to exit in case of any fire incidence and emergency contact numbers should be provided as well as the assembly points.
- Conduct regular firefighting drills within the site and adapt an Emergency Response Plan for the project (during construction and implementation stages)

5.4.8 Energy

Energy is a very important component in everyday life and it is a major cost particularly in such residential units. Energy is required for lighting, air conditioning and ventilation, water heating, powering machinery and equipment among other functions. Energy is required virtually everywhere.

Mitigation Measures

- Kenya Power should ensure uninterrupted power supply to the site as well as other facilities where power consumption is high.
- The proponent shall install a standby generator.
- Designing of the building to provide natural lighting, ventilation and space heating. hot water
- Inspecting or installing a combined evaluating energy-consumption profiles for heat and power system office equipment, motors, steam, services, etc.
- Inspecting and cleaning HVAC systems improving lighting efficiency improving heat insulation
- Replacement of incandescent (bulbs) with fluorescent lamps/energy saving bulbs/ led bulbs,
- Reducing overhead lighting,
- Installing motion-sensors on light switches,
- Incorporating monitoring of lighting-control settings and natural light (daylight) into new buildings or building renovations.
- Installation of solar panels for lighting and solar water heaters.

5.4.9 Air Quality

Construction sites contribute to air pollution indirectly by using electricity from fossil-fuel generating plants (on-site), and directly, by burning fuel for space heating and hot water.

Emissions Caused by Anesthetic Gases: The most commonly used inhalative anesthetic agents are nitrous oxide, halothane, enflurane, sevoflurane and isoflurane. Nitrous oxide (N2O), a breakdown-

stable compound, reacts in the stratosphere with atomic oxygen to form NOx which, in turn, breaks down ozone. Halothane, isoflurane and enflurane are partially halogenated inhalation anesthetics with ozone breakdown potential, and atmospheric ―life spans of 0.7 years, 2.0 years, and 2.4 years, respectively. However, the life spans of these gases are much shorter than those of gases like chlorofluronated hydrocarbons (CFC) which may range from 76 years for CFC 11 to 140 years for CFC 12. A shorter atmospheric life span coupled with a chemical structure that results in substantial breakdown before reaching the stratosphere, means that halothane, enflurane, and isoflurane have a much lower ozone breakdown potential than CFC (e.g., CFC: 100 %, halothane: 36 %, enflurane: 2 %, isoflurane: 1 %). Some practical measures for reducing anesthetic gas emissions include: using vacuum (local exhaust) systems using no-mask anesthesia; if masks are required, use double masks checking appliances and connections regularly for leaks checking the tightness of the anesthesia appliances after each cleaning and after changing of hoses measuring room concentrations regularly for excessive emissions monitoring technical air units regularly to make sure they are working properly. It is also very important that the potential for employee occupational exposures be thoroughly assessed by qualified EHS personnel.

Other Atmospheric Emissions: Powder-based inhalers should be used instead of dosed aerosol dispensers with halogenated hydrocarbons. (Halogenated hydrocarbons are still used as propellants mainly in dispensers for broncholytic/antiasthmatic agents).

5.4.10 Noise and vibration

Noise is unwanted sound that can affect job performance, safety, and health. Psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe.

During construction, noise will come from vehicles, and other operations within the site. Construction Machines generate/ produce a lot of noise. Hearing protection is thus essential when noise exposures cannot be controlled at their source.

Mitigation Measures

- Use suppressors or silencers on equipment or noise shields for instance corrugated iron sheet structures.
- Construction/maintenance works should be carried out only during the specified time i.e. from 0800 hrs to 1700 hrs; when most of the neighbours will be at work.
- There should be no unnecessary horning of the involved machinery and vehicles.
- Workers should be provided with relevant personal protective equipment/ materials such as earmuffs and earplugs when operating noisy machinery and when in noisy environment.
- These provide a physical barrier that reduces inner ear noise levels and prevent hearing loss from occurring.

5.4.11 Fats and greases

With time when the project becomes operational, the kitchens will discharge waste water potentially laden with waste fats and greases from the food remains and dish washing. These may be of concern and have the potential to pollute soils and water.

Mitigation

Install standard fat/grease traps in the channels leading from the kitchen. The traps must be regularly monitored for scheming and regular tests of sample waters to ensure compliance to set standards.

5.4.12 Creation of vector and rodents breeding grounds

If the project commences with no well-designed storm water drains, the rain water may end up stagnating and hence creating conducive breeding areas for mosquitoes and other water based vectors leading to transmission of human diseases like malaria and cholera. Poor solid waste and bush management practices may also lead to breeding grounds for pests such as rats and other scavenging animals. Disease vectors such as rats, flies, and cockroaches increase where refuse is exposed or uncollected and can be a hazard.

Mitigation

a) Complete refuse collection and handling service is to be provided by the proponent so that this does not turn into being a health hazard.
b) Cover solid wastes and/or enclose solid waste collection areas in a wire mesh to prevent habitation by scavenging animals.
c) Proper management of waste water and storm water as outlined in the report.

5.5 Impacts Cross-Cutting between Construction and Operation Phases

5.5.1 Increased traffic flow

During the construction, there will be an influx of traffic to and from the proposed construction site. There will be increased movement for both vehicles and people on the existing access roads near the site. Vehicles especially those to be used in facilitating the construction work for example transportation of construction materials and/or construction workers or supervisors to the site. People coming to the site will include those seeking employment opportunities, workers, managers, environmental inspectors and suppliers of foodstuffs to the construction workers. Though increased traffic during construction is a short term impact, it has the effect of causing congestion on the access roads which may subsequently results in accidents on the roads.

During the operation phase, traffic flow will increase due to the increase in number of people visiting the premises and distribution and fuelling of vehicles in and out of the facility. These will include residents; visitors; and environmental inspectors among others. However, it is expected that traffic flow during the construction phase will be controlled and thus of no major concern.

Mitigation

a) Provide for adequate space at the entrance/exit along the access road to give drivers enough room to manoeuvre into and out of the project site;
b) Provide for adequate parking spaces at the site;
c) Provide road signage to alert road users of the presence of the facility and check for incoming or out-going vehicles; and
d) Properly plan transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.

5.5.2 Increased demand on water resource-use

During the construction phase, both the workers and the construction works will create additional demand for water. Water will mostly be used by the workers in cleaning, in mixing of concrete for construction works and for wetting surfaces, curing or cleaning completed structures. During operation, both workers and activities at the site will create additional demand for water. Water will mostly be used in general cleaning, preparation of meals and in discharge of wastes. The increased water-use may be a source of possible sources of conflicts with other members of the community.

Mitigation

a) Consider the Water Act, 2016 and EMCA, cap 387 which govern water abstraction and use and require permits for abstraction of large volumes of water for commercial use.
b) Ensure that installation of water supply system follows local government requirements.
c) Consider rain water harvesting to have alternative water supply

5.5.3 Increased demand on energy resource-use

During the construction period, electricity may be required to run machines such as soil compacting machines and drills. Fuel will be required to run generators and construction vehicles. On completion, the project shall consume large amount of electricity for lighting due to the high number electric appliances required. This will include cooling system for short life products storage and bulbs. Since electric and fuel in Kenya are generated mainly through natural resources, namely water and geothermal resources, increased use of electricity have adverse impacts on these natural resource bases and their sustainability. The management intends to put fluorescent tubes and energy saving bulbs for lighting purposes. It is the government policy to minimize energy consumption.

Mitigation

- Minimize energy consumption by:
- Using energy efficient night-time lighting only at the premises;
- Provide light sensor switches to ensure outdoor lights are not used during daytime;
- Switching off all energy using equipment when not in use; and
- Installing alternative energy sources such as solar panels and automatic generators not only for power back-up but also to reduce dependency on electricity.
- The management of the area should be advised to adopt more energy efficient measures to reduce on power consumption which would translate to cost saving and less burden on the insufficient power supply system in the county.

5.6 Impacts during the Decommissioning Phase

Demolition is the most critical part of decommissioning. If the project is demolished the likely impacts will include: dust, noise and vibrations, solid wastes and impacts associated with occupational health and safety among others.

5.6.1 Noise and vibrations

The demolition works may lead to significant deterioration of the environment within the project site and the surrounding areas through noise and vibrations. Noise is a health hazard while vibrations have the effect of lowering the strength of adjacent buildings by creating cracks in the walls.

5.6.2 Dust and exhaust emissions

Large quantities of dust will be generated during demolition works. Exhaust emissions will result from the machinery and equipment used in demolition. Dust and exhaust emissions are linked with health problems ranging from respiratory disorders to complex diseases of the respiratory system.

5.6.3 Solid wastes

Demolition of the project buildings and related infrastructure will result in large quantities of solid wastes. The wastes will contain the materials used in construction including concrete, metals, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since it is composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphates and ammonia which may be released as a result of leaching of demolition waste are known to lead to degradation of ground water quality report.

5.7 Positive Beneficial and Social Impacts

The following benefits and socio-economic impacts are expected from the proposed development:

5.7.1 Improved security

Lighting up the proposed site after it starts operation will improve the security within the project area. Security for the operation within the facilities will further be enhanced by the security personnel to be deployed by the proponent after the commissioning of the facility for operations.

5.7.2 Increase in revenue

There will be positive gain in revenue system arising from the tax to be collected from the project proponent by the government.

5.7.3 Creation of employment opportunities

The proposed project will create numerous employment opportunities throughout the project cycle. During construction the contractor will deploy several workers on the site who will include a site manager, masons, security personnel and other ancillary staff. Employment opportunities are one of the long-term major impacts since people will be employed to work in the facility ranging from casual to permanent employees. These will involve security personnel, operation staff and people who will supply their commodities to the proposed development. Indirect employment will be created where suppliers of food stuffs and other goods and products will gain income by supplying their commodities at the site.

5.7.4 Improved living standards

The project will by extension help improve the living standards of those who will get employed and their households including those operating related businesses or suppliers of foodstuffs and construction material or operation equipment. Improved living standards have the positive impact of improving health which further is a measure against disease occurrences.

5.7.5 Optimal use of land

Construction of the proposed project shall greatly render land economically useful. Land is a scarce resource in Kenya and through construction of the proposed project, this will ensure optimal use of land to the great benefit of the country and its people.

5.7.6 Improved aesthetics

The proposed development if executed will improve the aesthetic value of the land in the area which will attract more private and local investors.

5.7.7 Provision of access to modern residential apartments

Good living is an asset. However, it is unfortunate that good living conditions may not promptly be available when required due to inadequacy in the much required better and affordable apartments. The proposed development will help in bridging this gap.

5.7.8 Promotion of healthy competition and convenience

Being privately owned facilities, the services are more likely to be fair due to competition from other similar service providers. The location is convenient to the area residents and those within the radius.

5.7.9 Optimal utilization of the land

The operations have been confined on the plot number thus maximizing the use of available spaces for productivity. The building will bring more than 1000 people to live under one roof and on the same plot number.

5.7.10 Land Value

The development will raise the land value in the area and beyond due to the nature of developments that will be coming up. The project will be a game changer in residential apartments in the Westlands region.

5.7.11 Promotion of development

The proposed project has the potential to influence the both the residential and commercial trends in the area in various ways and in the long run the multiplier effect will lead to development and reduction of poverty. The proposed project shall contribute in overcoming the challenges of today‘s life including strategies for alleviating poverty and promoting sustainable development.

5.7.12 Creation of market for goods and services and secondary businesses

The proposed project shall consume various materials and equipment/facilities. Various professionals have and shall continue giving their services during the installation, operational and decommissioning phases and thus making livelihoods. Those doing commercial activities in the neighbourhood shall also have their market widened.

5.7.13 Economic returns and promotion of secondary business

Economic-investment by the proponent shall increase wealth. The former property owner enjoyed income generated through the selling of the building. The project shall also create market for goods and services. Many secondary businesses are also likely to spring up. Other businesses will also come up in the neighbourhood when the project is complete that will be serving the workers in the different work stations.

5.7.14 Promotion of social cohesion

The development will bring together people with diverse traditions and culture. It will lead to promotion of cultural interaction.

5.8 Mitigation to Decommissioning Phase Impacts

a) The proponent should prepare and submit to NEMA a decommissioning report three months before decommissioning takes place.

b) The use of the site or the building may be changed to other appropriate uses after renovation, rehabilitation and some structural changes have taken place. These uses may include change into offices, a restaurant or shops.

c) The decommissioning and alternative land-use options will be facilitated by appropriate professional personnel incorporating environmental experts; local council planners; public works officers and public health officers among others.

d) Mitigation for decommissioning phase impacts will follow general guidelines discussed in this report.

CHAPTER SIX:

6. ANALYSIS OF PROJECT ALTERNATIVES

6.1 Overview

This section analyses the project alternatives in terms of site, technology scale and waste management options.

6.2 The Proposed Project Alternative

This ESIA has been prepared for submission to NEMA; facts, findings and recommendations/ proposals of which are based on the proposed site, design, materials and proposed technologies. This helps in evaluating and examining the foreseeable effects of the project on the environment and therefore assisting in addressing how the proposed development has to ensure that all environmental measures are complied with during the premises preparation and during operational phase. The alternative consists of the proponent's/applicant's final proposal with the inclusion of the legal guidelines, regulations and procedures as stipulated in the EMCA, Cap 387 which aims at reducing environmental impacts to the maximum extent practicable. Appropriate Environmental Management Plans have been prepared as per the proposed project.

6.3 Relocation Alternative

Relocation option to a different site is an option for the project implementation. At the moment, the proponent has no alternative sites for relocation though can look for another site. Finding and acquiring similar property in a suitable place and completing official transaction on it may take a long period. Besides, there is no guarantee that such piece of land would be available and suitability is another very important factor, which cannot be ignored. While we appreciate that monetary costs should not be used to justify a wrong project, this would also attract extra costs in terms of money and time for example whatever has been done and paid to date would be a direct loss to the proponent. This may also lead to a No Action Alternative situation. The other consequence is that it would discourage both foreign and local investors especially in the housing sector that has a big deficit. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. The problem is further aggravated by the fixed characteristics of land and the bottlenecks of the planning policy.

6.4 The No Action Alternative

The No Action Alternative 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. The anticipated insignificant environmental impacts resulting from proposed project would not occur.

This option will however, involve several losses to both the project proponent/land owner and other stakeholders; society and government. The No Project Option is the least preferred with reasons such that there will be no incremental housing facility, forfeiture of economic benefits that would accrue to the proponent, the public and the government, and it could also discourage investors wishing to invest in the housing sector.

From the analysis, it becomes apparent that the No Project Alternative is not the appropriate alternative.

6.5 Alternative design, layout and technology

Various alternative designs and technology has been evaluated by the proponent and various professionals involved i.e. the architect, engineers, physical planner and surveyors. After extensive discussions and relevant considerations, the various options were assessed and the most optimal design and technology were agreed as per the proposed plans, materials and technology. There is the alternative design as to accommodate details and the size of the usable areas. These alternatives however shall call for little re-designing and could be worth further exploration.

6.6 Alternative land use

The proponent has an option to use the land for other purposes other than the proposed apartments development and other supportive amenities. The proponent may decide to use the building for commercial use such as a hotel, office block etc or even commercial use, may opt to sell the leasehold interest; or for the myriad of the alternative other land uses. This option however calls for change of use and whatever the type of project, it will still have its potential impacts some even worse than the proposed project depending on their nature for example industrial activity.

6.7 The comparison of alternatives

Under the proposed Development Alternative, the project would create a new residential apartment facility and would provide employment directly and indirectly to the public over and above the services provided. Under the No Action Alternative, there would be no development at all. There would be no benefits from the site and neither would there be the insignificant environmental Impacts. Layout redesign may perhaps give an optimal design and should be explored for optimization of the benefits and environmental enhancement.

Provided the Environmental Impact mitigation measures are implemented as well as adoption of sound management practices, negative impacts will be avoided/minimized. However, commitments related to development alternative would ensure that potential impacts are minimized to levels of insignificance as envisaged in the EMP.

Mitigation for the proposed Action

Mitigation measures for the proposed action are included in herein in this report.

6.8 Analysis of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The facilities construction will be made using locally sourced stones, cement, sand (washed and clean), structural steel and fittings that meet the Kenya Bureau of Standards requirements.

The alternative technologies available include the conventional concrete, prefabricated concrete panels, or even temporary structures. These may not be desirable from a cost and durability perspective. The technology to be adopted will be the most economical and one sensitive to the environment.

6.9 Solid waste management alternatives

A lot of solid wastes will be generated from the proposed project. An integrated solid waste management system is recommendable. First, the proponent will give priority to reduction at source of

the materials. This option will demand a solid waste management awareness programme in the management and the staff. Recycling and reuse options of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. Finally, the proponent will need to establish agreement with the Nairobi County government to ensure regular waste removal and disposal in an environmentally-friendly manner. In this regard, a NEMA registered solid waste handler would have to be engaged.

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CHAPTER SEVEN:

7.0. PUBLIC PARTICIPATION

7.1 Overview

This chapter outlines actions undertaken to consult community members living near the Project, Project Affected People (PAP) and other concerned key stakeholders. The purpose of public consultation was to create awareness of the oncoming project, collect views on community concerns on the project, positive and negative effects of the project and how to mitigate them. It also presents major findings and outcomes of public consultations.

Figure 7.1: Public Engagement Forum

TEAM OF EXPERTS ANSWERING COMMUNITY CONCERNS WITH RESPECT TO THE PROJECT

7.2 Data Collection Methodology

The ESIA study was carried out using various methodological approaches best suited to address the study objectives. Secondary data were reviewed and later deductions made in relation to project on focus. Primary data was collected by means of interviews to community members and administration

of questionnaires to target respondents. Other methods used included collecting views in public baraza, photography and making observations on site.

7.3 Data Collection and Reporting

7.3.1 Key Informants

The data collection exercise was conducted between 5th June and 10th August 2024 for respondents whereby questionnaires were administered to different categories of project stakeholders.

These included administrative officers; Chief and Sub chiefs of Nairobi Westlands along in whose jurisdictions the developments will be.

7.3.2 Community Consultation

Community consultation was done in two ways, first by conducting direct interviews to randomly selected homesteads of residents living near the project & by holding a public consultation meeting.

Public consultation meeting for the project was conducted on 8th of August 2024, with the meeting being done at the proposed site.

The objectives of public consultation meetings were to;

- ✓ To inform the public of the oncoming project and implementation methodology;
- ✓ To collect views residents on the oncoming project, problems they anticipate and how these can be mitigated;
- ✓ To gather information on likely impacts of the project as perceived by the locals.

7.4 Results for Public Consultations

From the meetings held, all those consulted were full of support of the oncoming project with some feeling that it had been long overdue. 100% of the people interviewed and those that attended the public barazas were in support of the project. The community welcomed the proposed project citing that the project will ease access to a better and modern housing apartment. All respondents were also concerned of chances of local people getting employment opportunities on the project and other benefits.

Both positive and negative impacts as expressed by the public are as presented below. Also the included are the proposed mitigation measures aimed at minimizing the negative impacts.

7.4.1 Key issues raised by community members:

a) Traffic management along the Mogotio access road.
b) Use of alternatives for the common resources.
c) Issue on noise and dust pollution
d) Ensure there is employment of locals in the project.
e) To ensure that dust pollution is controlled during construction phase of the project.
f) To ensure that awareness is created on matters of health and safety especially on the spread of HIV and AIDs.
g) Ensure that all construction activities are being undertaken during the day time.

7.4.2 Positive issues raised by stakeholders for the project in the construction phase

- Creation of employment for those hired to work on the project. Most stakeholders felt the need of the contractor giving priority to the locals when employing and only outsourcing labour in fields where there are no professionals available locally.
- Boost of business for those who will offer food stuffs and other goods and services to the workers and the contractor
- Acquisition of technical knowledge for local people involved in the project especially those youth hired to handle the machinery.
- Appreciation of land value in the area.
- Provision of alternatives to housing.

7.4.3 Negative issues during construction phase

- Increase in the number of traffic accidents due to increased traffic.
- Increase in noise and dust levels from heavy truck during operation.
- Damping of excavated soil will result to waste lands
- Social interactions of locals with workforce's will increase social immorality like prostitution along the market centres, resulting in an increase in the incidence of STDs, including HIV/AIDS;
- It will increase crime rates and insecurity especially during construction.

7.4.4 Positive effects during operations

- Provision of access to a better decent housing system
- Boost for trade due to ease of access by visitors plying the Garissa road thereby bringing business to the area.
- The developments will increase land prices in the area.
- Increased incomes for those that will be working at the facilities will lead to improved living standards and consequent empowerment of community members.
- Ease of access of the CBD from the point of housing.

7.4.5 Negative effects during project operations

- Solid wastes generation might spoil the aesthetic value of the lands nearby.
- Traffic caused by the amount of people moving in and out of the building.
- Insecurity in the area due to increase in population.
- Increase in surface runoff from the buildings catchment

7.5 Proposed Mitigation Measures to negative impacts both during and after construction

An environmental management plan (EMP) has been prepared to address all impacts identified by institutional respondents and community members.

Areas that require mitigation actions include:-

- Use of appropriate machines and regular maintenance of machinery to reduce noise and smoke emissions to the environment.
- Dust minimization by watering dusty areas.

- Have workers housed in campsite with perimeter walls and have security agents at camp's gate. Also have regular security agents' patrol on project area.
- Have visible warning signs indicating ongoing project works.
- Engage health workers to sensitize the community on dangers of HIV/Aids and STIs.
- Ensure traffic marshalls are in place at all given time.
- Connect the surface run-off to the county drainage

CHAPTER EIGHT:

8.0. ENVIRONMENT AND SOCIAL MANAGEMENT PROGRAM

8.1 Overview

An Environmental & Social Monitoring Plan (ESMP) for a development project is used to provide a logical framework within which identified negative environmental impacts can be avoided, mitigated and monitored. In addition the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. The ESMP is a vital output of an Environmental and Social Impact Assessment as it provides a checklist for project monitoring and evaluation. The ESMP outlined below will address the identified potential negative impacts and mitigation measures of the Project based on the chapters on Environmental Impacts and Mitigation Measures of the Negative Impacts.

8.2 Pre-Construction & Construction Phases ESMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase of the project are as outlined in the table below:

The key responsibilities regarding compliance to the above ESMP rest on the Contractor. However, it is important that the project proponent ensures adequate monitoring and evaluation for the Contractor for non-conformances.

8.3 Operational Phase ESMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase the project is outlined below.

8.4 Decommissioning Phase

In addition to the mitigation measures provided above, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined in below.

Table 8-1: CONSTRUCTION PHASE ESMP

Objective/ Plan	Recommended Mitigation Measures	Responsible	Timeline	Cost
Increased exploitation of raw materials	Maximize sourcing of construction materials from suppliers who use environmentally friendly processes in their operations	Contractor	Throughout the construction period	**Nil**
	Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the amount necessary is ordered	Contractor	Throughout the construction period	**Nil**
	Ensure that damage or loss of materials at the construction site are kept minimal through proper storage	Contractor	Throughout the construction period	**Nil**
Run off and soil erosion	Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil. E.g. silt traps, barriers, tree planting.	Contractor	Throughout the construction period	**100,000/=**
	Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site.	Contractor	Throughout the construction period	**50,000/=**
	Ensure that any compacted areas are ripped to reduce run-off	Contractor	6 Months	**100,000/=**
	Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residuals.	Contractor	Throughout the construction period	**Nil**
	Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed off	Contractor	One-off	**Nil**
	Ensure that damaged or wasted construction materials will be recovered for refurbishing and use in other projects	Contractor	One-Off	**Nil**
	Utilize opportunities for donating recyclable/reusable or residual materials to local community, groups, institutions and individual local or home owners	Contractor	One-off	**Nil**
	Use of durable, long-lasting materials that will not need to be replaced often, thereby reducing the amount of construction waste generated over time	Contractor	Throughout construction period	**100,000/=**

Solid Waste Management	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by the damage or exposure to the elements	Contractor	One-off	**20,000/ =**
	Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials	Contractor	Throughout the construction period	**Nil**
	Use construction materials that have minimal or no packaging to avoid the generation of excessive packaging waste	Contractor	Throughout the construction period	**40,000/=**
	Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site	Contractor	Throughout the construction period	
	Dispose waste more responsibly by dumping at designated dumping sites or engaging the use of a registered waste disposal company on Nairobi County government	Contractor/ Nairobi County Government	Throughout the construction period	100,000/=
Air pollution	Sprinkle water on graded access routes each day to reduce dust generation by construction vehicles	Contractor	Throughout the construction period	**50,000/=**
	Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas. Switch off vehicle engines at these points	Contractor	Throughout the construction period	30,000/=
	Ensure proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done per vehicle or the number of vehicles on the facilities	Contractor	Throughout the construction period	**20,000/=**
Noise Pollution	Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Contractor	Throughout the construction period	**20,000/=**
	Sensitize construction drivers to avoid running of vehicle engines or hooting especially when passing through sensitive areas such as residential areas and schools	Contractor	Throughout the construction period	**20,000/=**
	Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels.	Contractor	Throughout the construction period	**20,000/=**

	Ensure that construction machinery are kept in good condition to reduce noise generation	Contractor	Throughout the construction period	**20,000/=**
Depletion of energy resources	Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts	Contractor	Throughout the construction period	**30,000/=**
	Monitor energy use during construction and set targets for reduction of energy use.	Contractor	Throughout the construction period	**25,000/=**
Exploitation of water resources	Promote recycling and reuse of water as much as possible. Organize collection of rainwater on site.	Contractor	Throughout the construction period	**50,000/=**
Accidents	Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Contractor	continuous	**60,000/=**
Hygiene	Ensure that the premises are insured as per statutory requirements (third party and workman's compensation)	Proponent	annually	**50,000/=**
	Develop, document and display prominently an appropriate SHE policy for construction works	Contractor	One-off	**45,000/=**
	Provisions must be put in place for the formation of a Health and Safety Committee, in which the employer and the workers are represented	Contractor	One-off	**70,000/=**
	Suitable, efficient, clean, well-lit and adequate gender specific sanitary conveniences should be provided for construction workers	Contractor	One-off	**100,000/=**
Machinery Safety Injuries caused by machineries and equipment	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Contractor	One-off	**80,000/=**
	Ensure that equipment and work tasks are adapted to fit workers and their ability including protection against mental strain	Contractor	continuous	**40,000/=**
	All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Contractor	One-off	**50,000/=**

	Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Contractor	continuous	15000 per training
	Equipment such as fire extinguishers must be examined by a government authorized person. The equipment may only be used if a certificate of examination has been issued	Contractor	continuous	**40,000/=**
	Ensure that materials (cement bags, aggregates, bitumen drums) are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Contractor	Continuous	**100,000/=**
	Conduct sensitization campaign for the public on risks related to construction sites.	Contractor	Twice (before construction begins) repeated after 1	**100,000/=**
	Ensure that items are not stored/stacked against weak walls and partitions	Contractor	continuous	**30,000/=**
Poor storage of materials	All floors, steps, stairs and passages of the premises must be of sound construction and properly maintained.	Contractor	continuous	**40,000/=**
Emergencies	Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency. Such procedures must be tested at regular intervals	Contractor	Every three months	**65,000/=**
	Ensure that adequate provisions are in place to immediately stop any operations where there is an imminent and serious danger to health and safety and to evacuate workers	Contractor	One-off	**35,000/=**
	Ensure that the most current emergency telephone numbers posters are prominently and strategically displayed within the construction site	Contractor	One-off	**15,000/=**
	Provide measures to deal with emergencies and accidents including adequate first aid arrangements	Contractor	continuous	**20,000/=**
	Sensitize the public on potential emergency situations	Contractor	Twice (before construction begins) repeated after 1	**40,000/=**

	Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Contractor	One-off	**70,000/=**
	Fire-fighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.	Contractor	One-off	**50,000/=**
	Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained	Contractor	One-off	**235,000/=**
Accidents	Enough space must be provided within the premises to allow for adequate natural ventilation through circulation of fresh air	Contractor	One-off	**50,000/=**
	Well stocked first aid box which is easily available and accessible should be provided within the premises	Contractor	One-off	**50,000/=**
	Ensure that all chemicals used in construction are appropriately labelled or marked and that material safety data sheets containing essential information regarding their identity, suppliers classification of hazards, safety precautions and emergency procedures are provided and are made available to employees and their representatives	Contractor	One-off	**100,000/=**
	Keep a record of all hazardous chemicals used at the premises, cross-referenced to the appropriate chemical safety data sheets	Contractor	continuous	**30,000/=**
	There should be no eating or drinking in areas where chemicals are stored or used	Contractor	continuous	**10,000/=**
	Ensure that workers at the excavation sites and other dusty sites are adequately protected from inhalation of substantial quantities of dust through provision of suitable protective gear (e.g. nose masks)	Contractor	One-off	**70,000/=**
	Provide workers in areas with elevated noise and vibration levels, with suitable ear protection equipment such as ear muffs	Contractor	One-off	**50,000/=**
Provisions of PPE to Workers	Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and construction personnel must be trained to use the equipment	Contractor	One-off	**200,000/=**

Health	Ensure that construction workers are provided with an adequate supply of wholesome drinking water which should be maintained at suitable and accessible points.	Contractor	One-off	**35000/=**
	Signs such as "NO SMOKING" must be prominently displayed within the premises, especially in parts where inflammable materials are stored	Contractor	One-off	**50,000/=**
	Provide and maintain adequate and suitable accommodation for clothing not worn during working hours for construction employees	Contractor	One-off	**150,000/=**
	Provide and maintain, for the use of all workers whose work is done standing, suitable facilities for sitting sufficient to enable them to take advantage of any opportunities for resting which may occur in the course of their employment	Contractor	One-off	**60,000/=**
	All work places must be kept in a clean state, and free from effluvial arising from any drain, sanitary convenience or nuisance	Contractor	continuous	**50,000/=**
Sanitary	Accumulations of dirt and refuse should be cleaned daily from the floors, benches, staircases and passages	Contractor	Daily	**100,000/=**
	Ensure that conveniently accessible, clean, orderly, adequate and suitable washing facilities are provided and maintained in within the site	Contractor	One-off	**70,000/=**
Insecurity	Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the Construction site.	Contractor	continuous	**200,000/=**
	Conduct sensitization campaign for the public on risks related to construction sites.	Contractor	Twice (before construction begins) and a repeated after	**100,000/=**

TABLE 8-2: ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN DURING OCCUPATION AND OPERATION

Environmental/ Social Impact	Project phase	Proposed Mitigation and Aspects for Monitoring	Responsibility for intervention and Mitigation	Estimated Cost (Kshs)	Monitoring means	Recommended frequency of monitoring and indicators
Energy resources	Installation	• Ensure electrical equipment, appliances and lights are switched off when not being used • Design to provide for adequate natural lighting	Proponent	-	Inspection/ observation/re cords	Daily
	Operation	• Install energy saving bulbs at all lighting points instead of bulbs which consume higher electric energy • Install solar systems to complement heating and lighting • Encourage use of natural lighting during the day • Sensitize workers to use energy efficiently by switching off when not in use • Monitor energy use by setting targets for efficient energy use.	Proponent	500,000	Inspection/ observation/re cords	Daily
Fats and grease		• Construct and ensure sound working of fats/grease traps along the drains leading from kitchen	Proponent	5,000 monthly	Inspection	Weekly
Air pollution	Operation	• Use of environmentally friendly alternatives • Encourage use of clean fuels	Contactor	50,000	Inspection/ observation	Daily
Oil pollution	Operation	• Proper storage, handling and disposal of oil and oil wastes. • Maintain plant and equipment to avoid leaks • Maintenance of equipment should be carried out in off the site • Ensure NO servicing of vehicles is undertaken on the site	Contractor	5,000 monthly	Inspection	Daily

Water Sources	Operation	• Management of water usage. Avoid unnecessary wastage • Construct water reservoirs and rainwater harvesting systems • Supplement water supply with water from other sources with necessary approvals. • Recycling of water where possible • Install water conserving taps that turn off automatically when water is not being used. • Make use of roof catchments to provide water i.e. for general purpose	Proponent	50,000 monthly	Inspection/ observation	Random
Public health and occupational safety	Operation	• Train staff/workers on occupational health and safety • Provide full protective gear & workmen's compensation cover in addition to the right tools and operational instructions & manuals. • Adopt sound waste management system to ensure proper solid waste disposal and collection facilities. • Adopt sound housekeeping practices • Engage the services of qualified personnel and/or ensure training. • Ensure use of standard materials and to the specifications. Avoid undesirable, substandard, hazardous or unauthorized materials and products • Sensitized staff on social/health issues such as drugs • Ensure machinery and equipment servicing and maintenance as per schedules & legal requirements • Provide material safety data sheets Post clear warning signs e.g. 'No unauthorized use of machines' &	Proponent	250,000	Observation	Daily

		equipment , ensure there are guards on moving parts e.t.c. • Ensure adherence with the legal requirements of OSHA Act. • Sensitize stakeholders on environmental management				
Record Keeping	Operation	• Collection and analysis of relevant environmental data of the site • Ensure good maintenance of all systems • Institute appropriate monitoring procedures and guidelines on environmental performance. • Establish an environmental audit protocol and schedule as per the ESIA/Audits regulations. • Encourage workers and tenants' participation in environmental conservation aspects.	Proponent/ contractor	30,000 annually	Inspection	Monthly
Internal Audits	Operation	• Monitoring will involve measurements, observations, evaluations, assessment of changes in water quality, waste management, Noise levels, contractor safety etc	Proponent/ contractor	60,000 annually	Inspection	Random
Fire safety and preparedness	Operation	• Conduct training on fire fighting, evacuation and emergency response • Adapt effective emergency response plan • Maintain/service fire fighting machinery regularly • Provide emergency numbers at strategic points • Sensitize the residents on fire risks i.e. conduct regular fire drills	Proponent	100,000 annually	Observation	Random
Security	Operation	• Provide security guards and facilities during the entire project cycle	Contractor	30,000 monthly	Observation	Daily

Waste Management	Operation	• Strictly abide by the provisions of the Water Act & the Environmental Management (Water Quality) Regulations; and Waste Management Regulations • Waste management installations (e.g. Sewers) be isolated from public water pipes to avoid contamination of the later, • Incorporate suitable facilities for collection, segregation and safe disposal of solid wastes such as bins, placenta pit etc • Dustbin cubicles must be protected from animals and rain • Bins should be regularly cleaned and disinfected. The bins to be colour coded • Provide possibilities for waste recycling options - in-house and offsite. • Ensure a continuous review of waste management procedures with changing technology and regulatory changes.	Proponent	30,000 monthly	Observation	Daily
Wastewater	Operation	• Explore installation of a suitable systems for monitoring of the effluent to ensure compliance and remedial action	Proponent	100,000	observation	Weekly

TABLE 8-3: ENVIRONMENTAL & SOCIAL MANAGEMENT/MONITORING PLAN FOR THE DECOMMISSIONING PHASE

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility Party	Time Frame	Cost (ksh)
1. Construction machinery/structures and wastes				
Scraps and other debris on site	• Use of an integrated solid waste management system i.e. through a hierarchy of options: • Wastes generated as a result of facility decommissioning activities will be characterized in compliance with standard waste management procedures. Disposal locations will be selected by the contractor based on the properties of the particular waste stream. • All equipment, and tools that will not be used for other purposes should be removed and recycled/ reused say in other projects • Where recycling/reuse of the machinery, equipment, implements, structures, tools and other waste is not possible, the materials should be disposed to approved dumpsites.	Contractor, Proponent	One-off	500 ,000
Potential Pollution	• Procedures for finding contaminated material during excavations will be established • Covering and damping of excavated materials • Appropriate storage of contaminated material if found. Ground contamination and storm water contamination will be limited on site by proper handling and storage of materials and equipment.	Contractor, Proponent	One-off	250,000
2. Rehabilitation of the building				
damage to floors, walls & ceiling	• Repair and maintenance works • Re-painting	Contractor, Proponent	One-off	1,000,000

Restoration of site	• Monitoring and inspection of the area for indications of leakages will be conducted and appropriate measures taken to correct any occurrences; • Carry out soil tests foe contaminants & if need be scoop out any contaminated soils and replace with uncontaminated soil from another source Comprehensive Landscaping	Contractor, Proponent	One-Off	2,000,000
3. Safety of the project				
Occupational hazards	• Ensure that safety measures have been effectively integrated and positioned in respective areas of the project to control and manage fire outbreaks • Staircases and other hazardous areas is suitably protected say using strong rails to avoid occurrence of incidences	Contractor, Proponent	One-off	50,000
4. Safety and Social-Economic impacts				
• Loss of income • Reduced ability to support dependants • Loss of quality of life • Loss of benefits i.e. medical, insurance cover etc	• The safety of the workers should surpass as a priority of all other objectives in the decommissioning project • Adapt a project – completion policy: identifying key issues to be considered. • Assist with re-employment and job seeking of the involved workforce. • Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. • Offer advice and counseling on issues such as financial matters. Encourage workers to register with retirement benefits scheme of their choice	Contractor, Proponent	One- off	3,500,000

CHAPTER NINE:

RECOMMENDATION AND CONCLUSION

From the foregoing the following conclusions are made:

No serious and adverse objections were received from the communities occupying the surrounding area. The facilities will also lead to economic improvement to people living around the facilities profile. It is therefore considered suitable for the local area.

The proposed project has actively involved the key stakeholders who did not object the development. Thus the success of the implementation project can be guaranteed.

The proposed project does not pose adverse socio-economic impacts and is an initiative towards improving decent housing, energy and commercial services in the area.

In conclusion, the study recommends timely implementation of the project with strict adherence to the proposed Environmental Management and Social Management Plans.

The project benefits have been identified to outweigh the negative impacts for which a mitigation plan has been prepared. Further, the proponent has carefully considered and applied acceptable local and international standard/regulations at all stages of project planning and would thus qualify for funding.

Recommendations

Following the impact analysis presented in the previous sections, here below are the recommendations.

1 The Proposed project to be implemented in compliance with the relevant legislation and planning requirements.
2 The proponent must ensure that the impacts are kept to a minimum level.
3 A clear environmental and social management plans that have been developed must be enforced.
4 The proponent should ensure implementations of the mitigation guideline provided in the EMP in collaboration with the Contractor.
5 The Resident Engineer for the project needs to make progress reports indicating the implementation of the plans.

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APPENDICES.

1 Proponents Change of Land use

2 Site plans and layout

3 Approved plans for the 312 no. residential apartments (24 no.floors)

4 Certificate of incorporation for KAWAMAX COMPANY LIMITED

5 Land ownership documents

6 Proponents KRA Pin

7 Certificate of practise for the ESIA Firm

8 Experts Certificates of Practising

9 Comprehensive Bill of Quantities.

10 Quantity Surveyors Certificate

11 Letter of approval from the Nairobi County Government

PICTORIALS PROPOSED SITE AND NEIGHBOURHOOD OUTLOOK

PROJECTT SITE LOCATION