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ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR PROPOSED CONSTRUCTION OF 27NO. FLOORS RESIDENTIAL HOTEL ON LR NOs 1870/IX/171 AND 1870/IX/172 WESTLANDS, NAIROBI CITY COUNTY

PROPONENT:
EIGHTEEN SEVENTY LOWER KABETE LIMITED
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NAIROBI

SUBMITTED TO:
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

ENVIRONMENTAL CONSULTANT

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EVERGREEN CENTRE–KIAMBU ROAD

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COMPLIANCE

In carrying out this assignment, Kiburu & Associates Limited endeavor to comply with the legal requirement as contained in the national framework environmental law, Environmental Management and Coordination (Amendment), 2015 and other subsequent regulations.

The following registered EIA expert conducted and prepared this report and has applied the required professional standards and practice in carrying out this work.

Environmental Expert	**Category**	**Reg. No.**
Joseph K. Njoroge	Lead Expert	1311

Signature: **…….....**

Date: **…….**

On behalf of Kiburu & Associates Limited **(NEMA Reg.6252)**

PROPONENT

EIGTEEN SEVENTY LOWER KABETE LIMITED

P.O BOX 65185 – 00618,

NAIROBI KENYA

Designation: **……**

Name: **……**

Signature: **……...**

Date: **……**

ACRONYMS AND ABREVIATIONS

dB (A)	:	Means decibels of noise, measured with an A-weighted filter;
Lead Agency		:Means any Government ministry, department, parastatal, state corporation or local authority in which any law vests functions of control or management of any element of the environment or natural resources
EMCA	:	Environmental management and coordination (coordination) act, 2015
NEMA	:	National Environmental Management Authority
EIA	:	Environmental impact assessment
EA	:	Environmental audit
EMP	:	Environmental Management Plan
PEPs	:	Personal Protective Equipment
Km	:	Kilometer
DOSH	:	Directorate of Occupation Safety and Health Services
EHS	:	Environment, Health and Safety
NSWC	:	Nairobi Water and Sanitation Company
WRA	:	Water Resources Authority
WASREB	:	Water Services Regulatory Board
WHO	:	World Health Organization
EMP	:	Environmental Management Plan
^{o}C	:	Degree Celsius
^{o}F	:	Degree Fahrenheit
M^3	:	Cubic Meter (1000 litres)
NCA	:	National Construction Authority

EMP : Environmental Management Plan

EXECUTIVE SUMMARY

Eighteen Seventy Lower Kabete Ltd, herein referred to us the proponent has proposed to embark on an iconic project development to construct and operationalize a twenty seven storey building on her plots L.R 1870/IX/171 and L.R 1870/IX/172 in Westlands, Nairobi City County. The exact location of the mentioned proposed project is at the junction between Peponi Road, Karuna Road and Lower Kabete Road. Currently there are existing 4No. and 1No. storey buildings used as serviced apartments

The project shall be an upscale project that will fully showcase the ultra-modern vitality and vigor atmosphere of Westlands region of Nairobi City while making full use of the geographic advantage, the public interest and the profound local culture. The components of the project as shown in the architectural drawings include:

Storey	**Descriptions**
Basement-5	32No. parking ways
Basement-4	30No. parking ways
Basement-3	30No. parking ways
Basement-2	21No. parking ways
Basement-1	27No. parking ways
Parking-P1	27No. parking ways
Parking-P2	27No. parking ways
Parking -P3	27No. parking ways
1st -5th Floor	Each floor contains: 2No. Studios, 7No. One BR apartments and 3No. Two BR apartments
6th -23rd Floor	Each Floor contains: 2No. Studios, 4No. One BR Apartments, 6No. Two BR apartments
24th Floor	8No. Three BR apartments, Lower duplex
25th Floor	24th Floor apartments' Upper duplex
26th Floor	1No. Gym, 2No. Changing rooms &Sauna, swimming pool ,restaurant and a kitchen
27th Floor	6No. meeting rooms, double maximum room and a sky lounge

The Kenyan Government policy on such projects and/or activities requires that an Environmental and Social Impact Assessment be carried out at the planning stages of the proposed development to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of such projects, programmes and/or activities. Therefore, in compliance with the law and to avoid unnecessary conflicts that may retard development in the country, the proponent undertook this Environmental and Social Impact Assessment and incorporated environmental and social concerns as required.

Environmental Impact Assessment is a tool for environmental Planning and has been identified as a key component in new projects. According to section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 Section 9 (1), and Environmental (Impact Assessment and Audit) regulations, 2003, new projects of such magnitude must undergo Environmental and Social Impact Assessment. The Report of the same must be submitted to National Environment Authority (NEMA) for approval and issuance of relevant licenses. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to incorporate sustainable development with environmental concerns at heart.

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

Kiburu & Associates, a NEMA registered and licensed Firm of Experts, Registration number 6252 was commissioned as the project Environmental Consultants to conduct the Environmental and Social Impact Assessment for the proposed residential hotel in Westlands, Nairobi City County. The scope of work entailed the independent

verification of all environmental and social aspects of the project components and identifying the gaps with applicable Performance Standards of all construction works of the proposed development around the project site, associated facilities and temporary activities, from ground preparation, masonry, and installation of service lines as well as the utilities required. The output of this work was a comprehensive Environmental and Social Impact Assessment report for the purposes of applying for a construction license and ensuring sustainable development.

The consultant on behalf of the proponent conducted the assessment by incorporating but not limited to the following terms of reference:

- The physical location of the proposed development project
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other information deemed relevant to the project.
- The objectives of the proposed project.
- The technology, procedures and processes to be used, in the implementation of the project.
- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project.
- A description of the potentially affected environmental facets.
- The environmental effects of the project including the traffic, infrastructural, social, aesthetics, and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- Undertake a comprehensive public and stakeholder's consultation and participation process through stakeholder analysis and appropriate identification of applicable consultation methodology.
- To recommend a specific environmentally sound and feasible wastewater management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- An environmental management and monitoring plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe, responsibility to implement the measures and monitoring mechanisms.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties, which were encountered in compiling the information.
- An economic and social analysis of the project.

Anticipated Environmental and Social Impacts

Both positive and negative impacts are anticipated within the project cycles of the proposed development project, the following are the possible anticipated positive and negative impacts.

Positive Impacts

- Creation of employment opportunities,
- Increased business opportunities,
- Development of the Nairobi City by making more economic use of land,
- Provision of much needed hotel spaces, parking areas and restaurant ,
- Revenue to National and County governments amongst others,
- Improving growth of the Country's economy,
- Creation of market for supply of building materials.

- Improvement of areas general security
- Optimal use of land.
- Improved opportunities for both local and international tourism

Negative Impacts

- Displacement of the current structures within the site,
- Soil erosion and degeneration during construction period,
- Increased runoff from new impervious areas,
- Extraction of earth material and spoil and related Solid Waste generation,
- Noise and vibration caused by heavy trucks, and construction machinery,
- Effect on air quality-Dust generation and exhaust emissions,
- Oil Spills,
- Rapid increase in water demand,
- Increased Energy Consumption,
- Demand for building materials extracted from natural resource base,
- Workers accidents and hazards during construction.
- Traffic congestion and accidents
- Occupational Safety and Health issues
- Increased pressure on the existing Electricity power, water and sewerage infrastructure
- Increased pressure on the water resources supplied by Nairobi City Water and Sewerage.
- Compromised privacy to the neighbors
- Security concerns
- Solar Radiation, Reflection, Heat and Urban Heat effect on immediate neighbors.

Mitigation Measures

Summary of identified impacts and general initial Mitigation Measures.

Possible impact Mitigation to be enhanced

Displacement of the current tenants, vacation notices will be issued to the tenants in advance for smoother transitions

Soil erosion and degeneration during construction period,

Channel storm water through drains, set up measures to ensure maximum infiltration of rain water into the ground, harness rain water for re-use within the proposed development.

Increased runoff from new impervious areas,

Extraction of earth material and spoil and related Solid Waste generation and

Use of integrated solid waste management strategy.

Environmental Impact Assessment

Risk of release of hazardous materials such as Oil Spills, solvents, paints, batteries and miscellaneous equipment maintenance supplies

Proper containment and disposal of hazardous material in line with the waste Management Regulation, 2006

Noise and vibration caused by heavy trucks, and construction machinery,

Use of silenced machines during construction, restrict construction activities to day time and proper servicing of equipments.

Effect on air quality-Dust generation and exhaust emissions,

Switch off machines when not in use, schedule construction works and install dust screens around the construction site.

Demand for building materials extracted from natural resource base,

Ensure that material sites have requisite approvals from NEMA and other relevant Agencies.
Traffic congestion and accidents
Plan movement of vehicles as will be guided by the Traffic impact Assessment
Increased pressure on the existing Electricity power, water and sewerage infrastructure
Adopt green building technologies in line with the LEEDS Certification. Incorporate solar energy, natural ventilation etc.
The project will embrace Green building concept (also known as green construction or sustainable building) which refers to a structure that is environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition.
Increased pressure on the ground water resources as a result of the overconsumption of the existing borehole that will supplement Nairobi City Water and Sewerage water supply.
Undertake regular water quality analysis and adhere to water act 2016 and its subsequent regulations, rules and guidelines.
Compromised privacy to the neighbours.
Architectural designs will adhere to the Building code and zoning specifications.
Solar Radiation, Reflection, Heat and Shadowing effects on neigbouring premises.
Architectural designs will adhere to the Building code and zoning specifications
Occupational Safety and Health issues.
Adherence to the provisions of the occupational Safety and Health Act 2007
Project structural safety to with stand Earth quake loading and Wind Loading
Given engineering recommendations and conditions based on the geotechnical survey and structural system, the geology can anchor the multi storied structure of this nature.

Conclusion

It is quite evident that the proposed residential hotel development by Eighteen Seventy Lower Kabete Limited will pioneer development and bring along with it positive effects in the project area and other parties involved. The positive impacts including creation of employment; improving growth of the economy; boosting of the formal and informal sector; optimal use of land; incorporation of collective waste management and increase in revenue among others will in turn benefit Kenya as a Nation. However, negative impacts will also be experienced hence the need to mitigate them in order to reduce their adverse effects to the environment and humans.

Considering these positive socio-economic and environmental benefits which will accrue as a result of the development, and the ESIA study having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further implement the proposed Environmental Management and monitoring Plan (EMP) to the letter

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CHAPTER ONE

1.0 INTRODUCTION

This EIA study report focuses on the construction of a 27No. Storey residential hotel at Westlands area in Nairobi county on Plot. **LR. No.1870/1X/172 and 1870/1X/171** these facility will be used for recreation, meetings and residential purposes. Land use patterns of the area are characterized by high-rise buildings comprising of various facilities such as hotels, office blocks, shopping malls. Examples of the immediate site neighbors are the Western Heights, Sarit Centre and the Westgate shopping mall. The architectural plans for the proposed development have been duly approved by the Nairobi County City planning department. Under the Environmental Management and Coordination Act, the proposed development falls under **schedule II, second category**, i.e. urban development.

The choice of the site is influenced by the following factors;

- Location of the site in relation to the zoning plan for the area.
- Improved socio-economic status of Nairobi city
- Anticipated economical and commercial value accruing from access to modern hotels and associated facilities.
- Its location within Nairobi County.
- Availability of suitable land and capital for investment.
- Approval of the development plan by Nairobi City County
- Potential to connect to public utilities (existing and planned).

Since all pertinent approvals have been acquired the proponent seeks a license from NEMA as per the Environmental Management and Coordination (Amendment), 2015.

1.1 EIA Study Objectives

- To identify and assess the potential environmental, health and safety impacts of the proposed development.
- To propose appropriate mitigation measures for the management of environmental, health and safety aspect pertaining the development.
- To make appropriate recommendations for proper and effective environmental management plan for the development
- Ensure that issues raised by neighbors and relevant stakeholders are mainstreamed into the environmental management plan that is developed for the facility.
- Advice the proponent on relevant existing 'green' technologies and advancements that he should incorporate at various phases of the project

1.2 Scope of the report

The report will cover the following

- Vivid Description of the project
- Document all the prevailing baseline information
- Socio-economic study will be done to get the views of different stake holders using;
  1. Questionnaires
  2. Interviews
  3. Visual observations
- Identification of sources of conflicts and make relevant recommendations.
- Assessment of both the positive and negative impacts.
- Induce relevant laws and regulations
- The examination of the project phases, stages and activities to be undertaken.
- The monitoring programme, parameters and procedures to be put in place for control and corrective actions in case of emergencies shall be examined.
- Recommendations for optimum achievement of the planned EMP.
- Appending the various documents that are requirement to aid lead agency's decision making

1.3 Terms of Reference (TORs) for the EIA process

The terms of reference given by the project proponent to the team of environmental assessors during the commissioning exercise of the environmental assessment project were as follows:

- ✓ Appraise the site in order to provide a detailed evaluation and description of proposed development with a focus to determine its impacts, waste generation and disposal and socio-economic, health and safety aspects,
- ✓ Establish baseline information for the development of an environmental management program for the proposed development with a view to identifying areas that are likely to be impacted on by the initial and eventual activities in accordance with prescribed national format of environmental management and coordination legislation plus environmental impacts assessment and audit rules and other legal and regulatory guidelines,
- ✓ Produce a comprehensive EIA report for the site based on systematic and comprehensive environmental impact assessment study carried out for the project based on the Gazetted Regulations (The Environmental Impact Assessment and Audit Regulations, 2003) covering among others policy, health and safety and legal framework, and containing among other issues, identification of key aspects posing significant environmental impacts, recommendations on appropriate mitigating measures in order to minimize or prevent the adverse impacts to manageable levels and

1.4 Methodology

- Environment screening is the first stage in the EIA study process, in which the project, its related act ivies and any other impact emanating and is deemed to be among those requiring Environmental Impact Assessment study under schedule 2 of EMCA
- Physical inspection of the site, the buildings and their environs.

- Desk top studies and review, consultations, questionnaires and interviews with the proponent, his/her consultants, neighbors among other stakeholders.
- Preliminary assessment (reconnaissance survey) of the general property. The environmental scoping was then done relative to the construction operations and activities. This comprehensiveness on the assessment, desktop studies and interviews were held. This involved the proponent and the consultants.
- Relevant studies and technical reports on the construction including design works and other related sources of information were critically reviewed.

1.5 EIA study organization and structure

During the course of undertaking the EIA study, the consultants followed on a continuous sustained feedback mechanism where the proponent was consulted for information, clarifications and opinion. The proponent was further involved in the day to day activities that would eventually lead to the compiling of this EIA project report and was instrumental in providing additional logistical support wherever it was required. Other area which the consultants focused on includes land use patterns within the area and environmental planning and management.

Formal communications with NEMA and other government agencies were handled by the proponent in consultation with the consultant as appropriate. Sometimes communication issues between the proponent and the consultant were handled through emails and telephone.

1.6 Reporting and documentation

The reporting and documentation follows on the format provided by NEMA (through both EMCA, and the Environmental Impact Assessment and Audit regulations-legal Notice No.101 of 2003). The proponent was continually informed throughout the period of report preparation to ensure that he was aware of the issues raised and the recommendations that were likely to be made regarding the best practices to mitigate negative environmental impacts.

CHAPTER TWO

2.0 PROJECT, DESIGN AND CONSTRUCTION PROJECT DESCRIPTION

The proposed development will comprise construction of a residential hotel containing three BR apartments, two BR apartments, one BR apartment and studios This EIA study report is based on information and consultations with the project proponent, EIA experts, the architects and details contained in the architectural plans and drawings (of the proposed project). Eighteen Seventy lower Kabete limited intends to construct and operationalize these facilities to serve the projected clients with ultra-modern hospitality facilities.

Environmental concerns related to the proposed project will emanate from sourcing of raw materials for construction, actual construction processes, operation phase and a possible decommissioning. The materials to be used will include gravel, sand, coral blocks, cement, paint, wood and fittings. In terms of environmental resource usage, reticulated water supply and boreholes are the main sources of water for domestic use in the area, while energy is sourced from the national grid managed by the Kenya Power.

Environmental issues in the area include mainly disposal of waste water, solid wastes, waste waters and traffic congestion. Wastewater will be managed through a sewer system.

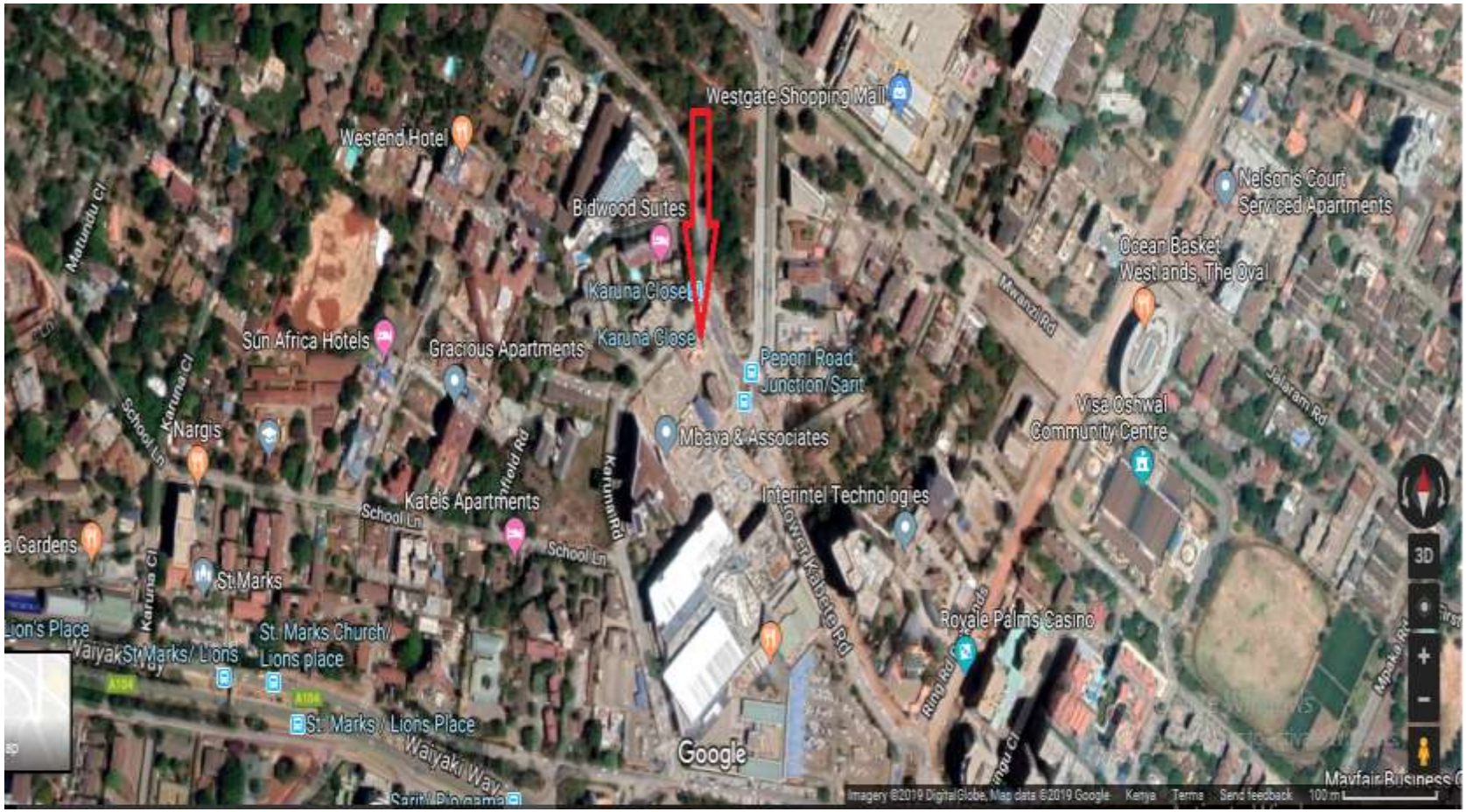
2.1 Ownership and location of the project

The proposed project belongs to eighteen seventy lower Kabete ltd, a registered company under the companies Act; it is located in Westlands at the junction between Lower Kabete Road, Peponi Road And Karuna road .The proposed development is surrounded by mainly high rise commercial and residential establishment (essentially an suburbs set up) and the immediate neighbors to the site include Sarit Centre, Westgate Mall, Western Heights among others.

The proposed development site is shown on the Google map on the next page.

2.2 Planning concept of the proposed project

The population of the Nairobi metropolitan area is growing fast with current population at 3,138,369 people according to 2009 population census. With this population exponentially increasing due to immigration and an ever increasing birth rate coupled with a reduction in child mortality, there is a constant need for expansion of the modern hotel industry to cater for the rising international and local hotel demand .The proponent aims to meet this need with the proposed development. The project aims to create positive impacts such as employment, increment in both international and local tourism. The proposed project is also expected to promote a sustainable and eco-friendly development.



2.3 Architectural Designs

The architectural designs were designed by one the Kenya's best architecture firm Bowman Associates architects, experienced and result oriented architects. The proposed architectural designs have been submitted to the Nairobi County Government and the approval is granted. The permit for constructing the development is also granted.

2.4 The Project Description

The proposed project will consist of 27No.floors with, 5No. Basement floors and 3No.Parking floors as shown on the table

Storey	**Descriptions**
Basement-5	32No. parking ways
Basement-4	30No. parking ways
Basement-3	30No. parking ways
Basement-2	21No. parking ways
Basement-1	27No. parking ways
Parking-P1	27No. parking ways
Parking-P2	27No. parking ways
Parking -P3	27No. parking ways
1st -5th Floor	Each floor contains: 2No. Studios, 7No. One BR apartments and 3No. Two BR apartments
6th -23rd Floor	Each Floor contains: 2No. Studios, 4No. One BR Apartments, 6No. Two BR apartments
24th Floor	8No. Three BR apartments, Lower duplex
25th Floor	24th Floor apartments' Upper duplex
26th Floor	1No. Gym, 2No. Changing rooms &Sauna, swimming pool ,restaurant and a kitchen
27th Floor	6No. meeting rooms, double maximum room and a sky lounge

2.5 Zoning Regulations

The project is designed to maximize use of the plot and to meet the requirements of the Nairobi City Council in terms of ground coverage, plot ratio, road surrender, and building line. It is also designed to meet the councils zoning regulation. The current development ordinance and zoning allows for commercial purposes.

2.6 Project Justifications

There are quite a number of factors which would justify the existence of the proposed development in this particular zone, these include:-

- **Road Network:** The proposed site is located at a strategic and is served by roads of highway and bitumen standards

- **Electricity and telecommunication infrastructure:** The area is well covered by both telecommunication and electricity lines; indeed the project site has adequate access to both utilities and services passing through its wayleaves.
- **Solid waste disposal:** The solid wastes will be collected by Nairobi County Government or the proponent may hire a NEMA licensed garbage and waste collectors to supplement the county's department for more reliable and efficient waste disposal process.
- **Water:** The area has its water source from the Nairobi City Water and Sewerage Company; the Proponent has existing borehole in the site to supplement water supply from NCWSC. Regular tests shall be undertaken to ensure the water quality is within the World Health Organization (WHO) and Water Resources Authority (WRA) acceptable standards as indicate outlined in this report.
- **Effluent disposal:** The project area is well served with a sewer system owned by NCWSC. Therefore, the effluent management will not be a problem when the proposed project is complete. The proponent shall ensure the minimum standards for sewer discharge is meet. The standards are latter discussed in the legal and regulation framework chapter.

Owing to the above reasons the proponent if maximally justified to establish the development with less struggle to obtain utilities.

2.7 Project Specifications

The proposed site is located within the Westlands area of Nairobi City An experienced consultant has made the final design of the project and constructions will follow details as given.
More/fine details for the specifications for the features of the proposed project have been given in the copies of the architectural drawings attached

2.8 Project Activities

2.8.1 Pre-Construction stage/project approvals

This stage involves the activities that happens before the actual construction or decommissioning is commences. The preconstruction stage involves activities ranging from proposal development and planning
The project has been submitted for/ approved by Lead Agencies for implementation as follows:

Consultant/ Approval Authority	**Act**	**Status**	**Remarks**
Kiburu & Associates Limited	EMCA	This study report	K&a to follow up for approvals
Physical Planning Department, Nairobi County	Physical Planning act, Cap. 286 Urban Areas and Cities Act, 2011	Drawings Approved	Architect to Supervise implementation

Bowman Associates architects(BAA)	Architects and Quantity Surveyors Act, Cap 525 Urban Areas and Cities Act, 2011 Physical Planning Act, Cap 286	Drawings Approved	Architect and other consultants providing supervisory activities during the construction phases
NEMA	EMCA	This study report	NEMA to review, approve and the lead expert to provide monitoring and evaluation consultancy services during the construction and operationalization phases

The pre-construction has also involved getting to collaborative agreements with key stakeholders.

Decommissioning of the existing buildings

Currently the plots are occupied by two buildings that survives as serviced apartment's .the 4No. Storey building and the 1 No. storey building well be demolished to create way for deeper excavation required by the proposed development.

2.8.2 Construction and Civil Works Stage

The project will be constructed based on applicable standards of Kenya and any other standards which may be incorporated. The constructions will as well incorporate environmental guidelines, health and safety measures. The project inputs will include the following;

- Construction raw materials will include sand, cement, stones, gravel, ballast, metals, among others. All these will be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies.
- Construction machines will include machinery such as trucks, cranes excavators' concrete mixers and other relevant construction equipment. These will be used for the transportation of materials, demolishing the existing structures and resulting construction debris. Most of the machinery will use petroleum products to provide energy.
- A construction labor force of both skilled and non-skilled workers will be required.

In addition the proponent will hire qualified and registered consultants. During the construction phase of the project, the project's site signboard should be erected on the site and to indicate the following:

- A pictorial impression of the proposed building
- The developer's name and address
- The local authority approval number
- The architect's details
- Environment consultant details

- Quantity surveyors details
- NEMA approval number
- Other professionals involved in the project.

Construction activities include the following:

- A temporary site office and a sanitation facility for use by the construction workers.
- Procurement of construction material from approved dealers
- Storage of the construction materials.
- Extraction, Transportation, storage of construction materials and disposal of the resulting construction wastes/debris using light machinery. All debris and excavated materials will be dumped on sites approved by the council engineer.
- All required works will be done by registered experts such as:
    - Masonry, concrete work and related activities,
    - Structural steel works,
    - Roofing and sheet metal works**,**
    - Electrical work and,
    - Landscaping.

The project begins as soon after the National Environmental Management Authority (NEMA) issues the Environmental Impact Assessment (EIA) license.

2.8.3 Operations

Once the construction of the project is completed the hotel management will make use of the facilities. Activities associated with the premises will automatically lead to generation of waste.

Solid waste and waste water management

The project proponent will provide facilities for handling solid waste generated within the facility. These will include dustbins/skips for temporarily holding waste within the premises before final disposal at the designated dumping site. Sewage generated from the units will be discharged to the sewer system while storm water from the project area will be channeled into the surface drainage system.

Cleaning

The proponent will be responsible for ensuring regular washing and cleaning of the pavement, drainage channels, the passages and the compound in general. Cleaning operations will involve the use of substantial amounts of water, disinfectants, detergents and rugs or washing machines.

General repairs and maintenance

The units 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, repair of the doors and gate, painting, maintenance of flower gardens and mowing grass lawns and replacement of worn out materials among others.

2.8.4 De-commissioning stage

The commissioning of the project will take the duration agreed as per the lease agreement between the proponent and the concerned authorities. Later on, should there be need for decommissioning the project; the following will have to be considered:

2.8.5 Demolition works

Upon decommissioning, the project components including buildings, pavements, and drainage systems will be demolished. This will produce a lot of solid waste, which will be reused for other construction works or not reusable, disposed of appropriately by a licensed waste disposal company.

2.8.6 Dismantling of equipment and fixtures

All equipment including electrical installations, furniture, finishing fixtures 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 these equipment in other projects. This will be achieved through resale of the equipment to other building owners or contractors or donation of these equipment to schools, churches and charitable institutions.

2.8.7 Site 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 Methodology and Baseline Information

3.1 Methodology

The preparation of an Environmental Impact Assessment report is a multi-disciplinary process that requires use of various approaches and data collection methods. In this particular survey, public participation and consultation was widely used and the bottom-top approach of participation applied. Both scientific and social data collection methods were used and they included the following:

3.1.1 Questionnaires

Questionnaires were administered to the neighboring developments randomly to seek their opinion on the proposed development. The questions to the respondents, contained in the questionnaire, were asked and responses recorded by the interviewer

3.1.2 Observations

Field observations formed an integral part of the report as the experts gathered considerable information through observations. This involved site visits and recording the situation on the ground. Observations were also used as a tool for verifying the facts that were gathered through interviews and questionnaires.

3.1.3 Photography

Photos were taken to show the actual site of the proposed development, resources on site and neighboring development.

3.1.4 Secondary data

1. Various literatures were used in aiding the successful completion of the report. They include: The Kenya Gazettes supplement Act 2000, Environmental Management and Coordination (Amendment) Act 2015. Government printer, Kenya Gazette supplements Acts, Physical Planning Act 1999. Government printers, Nairobi City Council, Kenya Gazette supplement No.56, Environmental Impact Assessment Audit regulations 2003. Government printer, Nairobi, Nairobi District Development plan, Environmental Management and Coordination (Waste Management) regulations, 2006 Legal Notice No.12, the Public Health Act, cap 242, the factories and other places of work Act and water Act 2016 among others.

3.2 Baseline Information

The proposed project site is in Westlands, Nairobi City at the junction between Peponi Road,Karuna Road and Lower Kabete Road . The site is under the governance of the Nairobi City County and therefore, it is within the coverage of the proposed Nairobi metropolitan city.

3.2.1 Climate

Nairobi and its environs enjoy a double (Bi-modal) seasonal rainfall pattern, the wetter and cooler part of the larger Nairobi area i.e., the Kikuyu plateau as opposed to the Athi plains in the east that are drier and

hotter with high to moderate rainfall from April to May for the long rains and November to December for the shorter rains. The rainfall picks during the month of April and November annually but the regime have been disrupted owing to climate change. The average rainfall is normally below the range of 1200mm per annum and the distribution is poor and unreliable. The coolest months include June, July and some parts of early August, while the hottest months are December, January, February and September with temperatures oscillating between 15^0C and 35^0C. The timing of sunrise and sunset varies little throughout the year, due to Nairobi's close proximity to the equator.

3.3.2 Topography

The project site is situated on the Western side of the Nairobi city. Generally, undulating ranges to nearly level ground characterize the area's topography. The project site is gently sloping towards the lower western side of the area. The gradient of the project site can be considered to be gently sloping with a gradient of about 3%.

3.2.3 Soils

The major soil type in Nairobi area includes vertisols and lithosols. The vertisols are imperfectly drained to well drain and are shallow to very deep soils. They are dark red, friable to firm cracking clay soils that are solid in some places. The lithosols are somewhat excessively drained to well-drained, shallow, dark brown to dark reddish brown, friable to rocky and/ or strong clay loam.

3.2.4 Hydrology

The Nairobi area and its surroundings are environmentally characterized by sporadic water supplies which are quite erratic. This has a comparatively moderately low flow but of perennial character. Surface water sources in the entire of Nairobi area are not reliable due to the high levels of pollution. Nairobi River is like most of the rivers that drain the Aberdare forest affected by the climatic patterns and the associated ground structural control and thus exhibits a characteristic low flow during the dry spells. Nairobi and its environments falls under Athi catchment area. All river waters and storm water sheds South-Eastwards and joins the Indian Ocean after a stretch of hundreds of kilometers.

3.2.5 Biological environment

Trees play an important roles in our daily lives. They serve as important water catchment areas, air purification, act as wind-breaks, block noise and dust, carbon sequestration, soil erosion control, wildlife habitat, and add to aesthetic value among others. Within the proposed project area there exist a few trees The vegetation will be affected to pave way for construction. The following mitigation measures will be incorporated throughout the project cycle

- Landscaping and re-vegetation of all disturbed areas: after the construction phase landscaping will be done by planting combinations of plants and flowers which will improve the aesthetic value and contribute to microclimate modification.
- Trees that does not affect the site to be left intact

Vegetation on the proposed site for proposed block T to be cleared during construction
Source: field work

3.2.6 Neighboring facilities and features.

At the neighborhood of the proposed site there are existing modern developments such as office blocks and Commercial units. The adjacent neighbors to the site are Commercial units that vary in storey. These units cater for the traders in the city center. Commercial units such as banks, post office, hotels and academic institutions thus bringing services nearer to the people.

3.2.7 Administrative and Social Amenities.

It is worthy to note that the area is well served with social amenities and various administrative offices being at the city. The traders in this area are in a mixed economic status including the upper and lower middle class.

3.2.8 Security

The project site is within an area that could be considered secure; however, there are occasional incidences of mugging and carjacking in the evening and night hours. Most of the office and commercial blocks have hired security guards to guard their facilities. The facility has a well-established security system hence for the security for the project is guaranteed.

3.2.9 Street Lighting

The neighborhood to the proposed site has street lighting under the management of Nairobi City Council. Security lighting within the Neigbouring Street can be considered adequate.

3.2.10 Population

According to United Nations (UN) world population is growing by roughly 80 million people each year.
The proposed development site is located in Westlands which is densely populated. Nairobi County has a population of 3,138,369 people (according to the Kenya National Population Housing census, 2009). With this population continuously increasing due to immigration and an ever increasing birth rate coupled with a reduction in child mortality, there is a constant need for globally competitive quality education, training and research for sustainable development the proponent aims to meet this need with the proposed development.

3.3 Infrastructure

The zone where this project is located has essential infrastructures to support this type of development. The site can be accessed through Lower Kabete Road, Karuna Road and Peponi Road. The roads to the site are in good condition and is been upgraded by the Kenya Urban Roads Authority .Power lines and communication masts are available at the project site area.

3.4 Water

According to World Health Organization water consumption is estimated to increase by approximately 19% by 2050. This is accelerated by population growth. The proposed project site area has piped water from NCWSC. Additionally, the proponent will install water storage tanks to store water. Rain water harvesting shall be employed. There also exist boreholes on the project site which will be the main source of water during construction and occupation. Regular tests shall be undertaken to ensure the water quality is within the acceptable Standards.

3.5 Sewer system

The project area is well served with a public sewer system provided by the NWSC. Therefore, effluent management will not be a problem once the proposed project is complete because the development shall be connected to the same.

3.6 Geology

The city of Nairobi lies within a volcanic setting that resulted from lift valley formation .The volcanic rock overlie metamorphic rocks of Neo-Proterozoic era. The metamorphic rocks consists of an ancient sediments which subsequently were metamorphosed as a result of high temperatures and pressures. The metamorphism is believed to have taken place in the late Precambrian to lower Paleozoic times. Following the metamorphism and folding, the area was subjected to erosion lasting for more than 400 million years, leaving an erosion surface dated to end cretaceous age .the underlying rock is strong for supporting multi-storeyed buildings but care must be taken when excavating through it because the strong vibrations undermines the upper weaker materials.

CHAPTER FOUR

4.0 LEGISLATIVE AND INSTITUTIONAL FRAME WORK

4.1 Introduction

The policy, legal and institutional frameworks on health, safety, environmental standards and sustainable use of natural resource related to the activities at the development include the following:

- Policy Guidelines on Environment and Development (Sessional paper No.6 of 1999)
- The Constitution of Kenya, 2010
- The National Environment Action Plan (NEAP)
- The Environment Management and Co-ordination (Amendment)Act 2015
- The Physical Planning Act No. 6 of 1996
- Urban Areas and Cities Act, 2011
- Public Health Act, Cap 242
- Electricity Power Act No. 11 of 1997
- The Water Act, 2016
- Environmental Management and Co-ordination (Waste Management) Regulations, 2006 Legal Notice No.121
- Way Leaves Act, Cap 292
- The Noise and Excessive Vibrations Act, 2009
- Occupational health and safety, (OSHA) 2007
- Work Injury Benefits Act-No. 13 of 2007
- Employment act, No. 11 of 2007
- County Government Act
- Registration of Titles Act Cap 281
- National Construction Authority Act, 2014
- National Museum and Heritage Act, 2006 Cap. 216
- The Environmental Management and Coordination (Water Quality) Regulation 2006
- The Standards Act Cap. 496

4.2 Policy Framework

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

Among the key objectives of the policy paper on Environment and Development (Sessional paper No.6 of 1999) are to ensure that from the onset, all development policies, programmes and projects take environmental considerations into account and to ensure that an immediate environmental impact assessment (EIA) report is prepared for all kinds of developments before implementation.

Under this paper, broad categories of development issues among them the human settlement sector, have been covered that require sustainable approach. The policy recommends the need for enhanced re use/recycle of residues including wastewater, use of low non-waste technologies, increased public awareness and appreciation of clean environment. It also encourages participation of stake holders 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. *Therefore, as required by this paper, the proponent has initialized the undertaking of this EIA report.*

4.2.3 National Policy on Water Resources Management and Development

While the National Policy on Water Resources Management and development (1999) enhances a systematic development of water facilities in all sectors for the promotion of the country's socio-economic progress, it also recognizes the by-products of these processes as waste water. It, therefore, calls for the development of appropriate sanitation systems to protect people's health and water resources from pollution. Projects therefore, should be accompanied by corresponding waste management systems to handle the waste water and other wastes emanating there from. The same policy requires such projects should undergo comprehensive Environmental Impact Assessment Study.
In accordance to this policy, the proponents have been commissioned Kiburu & Associates Limited to undertake the Environmental Impact Study consultancy services

4.2.4 National Environmental Action Plan (NEAP)

According to the Kenya National Environmental Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from industrial, economic and social development programmes that disregarded environmental sustainability. Established in1990, the plan's effort was to integrate environmental considerations into the country's economic and social development. The integration process was to be achieving through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of societal decision making. Under the NEAP process EIA was introduced and among the key participants identified were the industrialists, business community and local authorities.
This EIA report has been prepared in compliance with this plan

4.3 LEGAL FRAMEWORK

4.3.1The Constitution of Kenya

This is the principal guiding law in the country from which all the subsidiary laws are drawn from. **Article 42** of the Bill of Rights of the Constitution grants every person the right to a clean and a healthy environment that should be protected for the benefit of present and future generations through legislative and other measures**. Article 62 Part 1 (f)** of the constitution also stipulates that the state shall 'establish systems of environmental impact assessment, environmental audit and monitoring of the environment.
The proponent is adhering to the Kenya's Supreme law

4.3.2 The Environment (Impact Assessment and Audit) Regulations, 2003

On June 13th 2003, the then Minister of Environment, Natural Resources and Wildlife promulgated the Environment (Impact Assessment and Audit) regulations 2003 (EIA/EA Regulations) under section 147 of the EMCA. These regulations provide the framework for carrying out EIAs and EAs in Kenya.

These Regulations shall apply to all policies, plans, programmes, projects and activities specified in **Part IV, Part V** and the **Second Schedule** of the Act.(1) No proponent shall implement a project -

(*a*) likely to have a negative environmental impact; or
(*b*) for which an environmental impact assessment is required under the Act or these Regulations; unless an environmental impact assessment has been concluded and approved in accordance with these Regulations.

(2) No licensing authority under any law in force in Kenya shall issue a license for any project for which an environmental impact assessment is required under the Act unless the applicant produces to the licensing authority a license of environmental impact assessment issued by the Authority under these Regulations.
(3) No licensing authority under any law in force in Kenya shall issue a trading, commercial or development permit or license for any micro project activity likely to have cumulative significant negative environmental impact before it ensures that a strategic environmental plan encompassing mitigation measures and approved by the Authority is in place.
The proponent shows compliance to these regulations by contracting Kiburu & Associates LTD to undertake this EIA report.

4.3.3 The Environmental Management and Coordination (Amendment) Act 2015

This is an Act of parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.
Part VII on Environmental Audit and Monitoring **section 58** specifically detail the need to undertake Environmental Impact Assessment of all projects likely to cause negative impacts to the environment as listed in the second schedule of the act. Further, **part V** of the Environmental Impact Assessment and therefore mandatory that an Environment Impact Assessment process. It is therefore mandatory that an Environmental Impact Assessment must be undertaken by all ongoing projects to ensure that the activities at their premises comply with all legal and institutional frameworks that are in place to safeguard the environment, health and safety of the workers.
This act forms the basis for this report hence compliance has been achieved.

4.3.4 Environmental Management and Co-ordination (Waste Management) Regulations, 2006 Legal Notice No.121

This regulation deals with management of both normal and hazardous wastes handling from the source to disposal points. The major highlights of the Act are:-
1) No person shall dispose off any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.
2) A waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations.
5 (1) A waste generator shall minimize the waste generated by adopting the following cleaner production methods:
a) Improvement of production process through
i) Conserving raw materials and energy
ii) Eliminating the use of toxic raw materials; and
iii) Reducing toxic emissions and waste
b) Monitoring the products cycle from beginning to end by-
i) Identifying and eliminating potential negative impacts of the product;
ii) Enabling the recovery and re-use of the product where possible; and
iii) Reclamation and recycling; and

a) Incorporating environmental concerns in the design and disposal of a product.

The proponent will provide bins and skips on the development and will contract a private waste handling company who will dispose it off at dumping sites that have been approved by NEMA

4.3.5 The Water Act 2016

Part II, section 18, of the water Act provides for national monitoring and information systems on water resources. Following on this, **sub-section 3** allows the Water Resources Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the authority.

Section 73 of the act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. **Section 75 ,sub-section 1** allows the licensee 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.

With regard to effluent management, in order to avoid underground and surface water pollution, the proponent will be required to directly ensure that the premise is connected to the existing NCWSC sewer line for effective effluent management.

4.3.7 Water Quality Regulations 2006

According to **Part II** of these regulations, every person shall refrain from any act which directly or indirectly causes or may cause immediate or subsequent water pollution and it shall be immaterial whether or not the water resource was polluted before the enactment of the act.

Section 2. No person shall throw or cause to flow into or near a water resource and liquid, solid or gaseous substance or deposit any such substance in or near, as to cause pollution.

No person shall:

a) Discharge, any effluent from sewerage treatment works industry or other point source into aquatic environment without a valid effluent discharge license issued in accordance with the provisions of the act.

b) Abstract ground water or carry out any activity near any lakes, rivers, steam, springs and wells that is likely to have any adverse impact on the quantity and quality of the water without an Environment Impact Assessment license issued in accordance with the provisions of the Act; Or

c)Cultivate or undertake and development activity within a minimum of six meters and a maximum of thirty meters from the highest ever recorded flood level, on either side of a river or stream, and as may be determined by the authority from time to time.

The proponent shall obtain water from the NCWSC within the project area and the existing borehole for use in the project. Additionally, the proposed project plot doesn't have a water body in its immediate neighborhood thus these regulations will be complied maximally. The proponent shall ensure optimum compliance to protect the underground water sources beneath the area

The firth schedule of the regulations outlines the minimum permissible parameters to be disposed in public sewers as shown below

Standards for Effluent Discharge into Public Sewers

1 PARAMETER	Maximum levels permissible
Suspended solids (mg/L)	250
Total dissolved solids (mg/L)	2000
Temperature 0C⁰	20 – 35
Oil and Grease (mg/L) -where conventional treatment shall be Used	10
Oil and Grease (mg/L)- where ponds is a final treatment method	5
Ammonia Nitrogen (mg/L)	20
Substances with an obnoxious smell	Shall not be discharged into the sewers
Biological Oxygen Demand BOD5 days at 20 ⁰C (mg/L)	500
Chemical Oxygen Demand COD (mg/L)	1000
Arsenic (mg/L)	0.02
Mercury (mg/L)	0.05
Cadmium (mg/L)	0.5
Chromium VI (mg/L)	0.05
Chromium (Total) (mg/L)	2.0
Copper (mg/L)	1.0
Zinc (mg/L)	5.0
Selenium (mg/L)	
Nickel (mg/L)	3.0
Nitrates (mg/L)	20
Phosphates (mg/L)	30
Cyanide Total (mg/L)	2
Sulphide (mg/L)	2
Phenols (mg/L)	10
Detergents (mg/L)	15
Colour	Less than 40 Hazen units
Alkyl Mercury	Not Detectable (nd)
Free and saline Ammonia as N (mg/L)	4.0
Calcium Carbide	Nil
Chloroform	Nil

Inflammable solvents	Nil
Radioactive residues	Nil
Degreasing solvents of mono-di-trichloroethylene type	Nil
Degreasing solvents of mono-di-trichloroethylene	Nil

The proponent shall ensure the standards are adhered to during the operation phase of the facilities

4.3.8 The Physical Planning Act - No. 6 of 1996

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes. The Physical planning Act has provisions to control development and use of land in particular areas, especially where a project may involve subdivisions or amalgamation of land parcels, or located in an area otherwise reserved for other uses. The following sections of the Act need to be considered:-

30. (1) No person shall carry out development within the area of a local authority without a development permission granted by the local authority.

31. Any person requiring development permission shall make an application in the form prescribed in the Fourth Schedule, to the clerk of the local authority responsible for the area in which the land concerned is situated.

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

4.3.9 The Land Title Act, 2012, CAP 282

The Land Titles Act Cap 282 section 10 (1) states that there shall be appointed and attached to the Land Registration Court a qualified surveyor who, with such assistants as may be necessary, shall survey land, make a plan or plans thereof and define and mark the boundaries of any areas therein as, when and where directed by the Recorder of Titles, either before, during or after the termination of any question concerning land or any interest connected therewith, and every area so defined and marked shall be further marked with a number of other distinctive symbol to be shown upon the plan or plans for the purposes of complete identification and registration thereof as is herein after prescribed.

In accordance to this act, the proposed project plot has been surveyed and the boundaries marked and the proponent has a title deed to indicate that the above has been achieved

4.3.10 Registration of Titles Act Cap 281

Section 34 of this Act states that when land is intended to be transferred or any right of way or other easement is intended to be created or transferred, the registered proprietor or, I f the proprietor is of unsound mind, the guardian or other person appointed by the court to act on his/her behalf in the matter, shall execute, in original only, a transfer in form F in the First Schedule, which transfer shall, for description of the land intended be dealt with, refer to the grant or certificate of title of the land, or shall

give such description as may be sufficient to identify it, and shall contain an accurate statement of the land and easement, or the easement, intended to be transferred or created, and a memorandum of all leases, charges and other encumbrances to which the land may be subject, and of all rights-of-way, easements and privileges intended to be conveyed.
The parcel of land on which the proposed development is intended to take place was transferred from the previous owners to the current owner as indicated in the title deed appended in this EIA Study report.

4.3.11 Urban Areas and Cities Act, 2011

Local authorities are given power to control or prohibit all developments which, by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighborhoods, and to prescribe the conditions subject to which such developments shall be carried on. These powers were previously granted by The Local Authority Act, Cap 265 which is now repealed by this Act as indicated in **Part VIII, Section 55** that states "All rights, assets and liabilities accrued in respect of the properties vested in the local authorities established under the Local Government Act (Cap. 265) which shall stand repealed after the first election under the Constitution shall be dealt with as provided by law."
The Architectural designs for the proposed project have been approved by the Nairobi City County Planning department for ensured compliance to this act.

4.3.12 Public Health Act Cap. 242

Under this Act, every local authority or health authority is mandated to take all lawful, necessary and reasonable practicable measures to prevent all injurious conditions in premises, construction condition or manner of use of any trade premises. Nuisances under this act include any noxious matter or waste water, flowing or discharged from any premises wherever situated, into any public street, or into the gutter or side channel of any street or water course, or any accumulation or deposit of refuse or other offensive matter. Every council and every urban area council may make by-laws as to buildings and sanitation.
The proponent intends to prevent nuisances within the project jurisdiction as indicated in the Environmental Management Plan.

4.3.13 The Way Leaves Act, Cap. 292

The areas zoned for communication line, sewer lines, power lines, water pipes etc are known as way leaves. The way leave act prohibits development of any kind in these designated areas. Thus any developer is bound by this act to see to it that no development takes place in these areas.

4.3.14 Electricity Power Act No. 11 of 1997

The Electricity Act no. 11 enacted in 1997 deals with generation, transmission, distribution, supply and use of electrical energy as well as the legal basis for establishing the systems associated with these purposes. According to the act the minister through the electricity regulatory is conferred with the legislative power to grant licenses and authorize works for generation and transmission of electrical

energy. However, the provision of section of the act requires such authorization only for generating plants with rating capacity of 1000KW. **Section 9 (3)** of the act addresses environmental integrity of the power generating systems which, must be considered by board in recommending g the grant of license to the minister

In this respect, the following environmental issues will be considered before approval is granted;

1. The need to protect and manage the environment and conserve natural resources
2. The ability to operate in a manner designated to protect the health and safety of the project employees; the local and other potentially affected communities.

The proponent shall obtain electrical power from the Kenya Power and Lighting Company Ltd which is licensed by the Minister as the sole electricity transmissions company.

4.3.15 Building Codes 1968

Section 194 requires that where sewers exists, the occupants of the nearby premises shall apply to the local for a permit to permit to the sewer line and all the waste water must be discharged into the sewer the code also prohibits construction of structures or building on sewer line.

Since exist a sewer line in the area hence the proponent shall apply for a permit to connect into the sewer line.

4.3.16 Penal Code Act (Cap.63) Revised Edition 2009

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. **Section 192** of the same Act says a person who makes or violates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighborhood or those passing along public way, commit an offence.

Section 219 states that it is the duty of every person who has in his charge or under his control anything, that in the absence of care or precaution in its use or management, could endanger the life, safety or health of any person, to use reasonable care and take reasonable precaution to avoid danger. Whether the object is living or inanimate, moving or stationery, the individual will have been deemed to have caused any consequences which adversely affect the life or health of any person by reason of any omission to perform that duty. This therefore means that the proponent will have a duty of care under this Act.

There is no water body in close proximity to the site but the proponent has made arrangements for proper management of effluent which will be discharged. The proponent shall ensure zero tolerance to environmental polluting activities and equipments.

4.3.17 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009

Section 3. On General Prohibitions. Under this Act, except as otherwise provided in these regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Section 4.on Excessive vibrations.

(1) Except as otherwise provided in these Regulations, no person shall- (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimetres per second beyond any source property boundary or 30 metres from any moving source; (2). Any person who contravenes the provisions of this Regulation commits an offence.

This regulations outlined the maximum acceptable noise in a construction site as shown in the table below

Maximum Permissible Noise Levels for Constructions Sites

(Measurement taken within the facility)

Facility		*Maximum noise level permitted (Leq) in dB(A)*	
		Day	Night
(i)	Health facilities, educational institutions, homes for disabled	60	35
(ii)	Residentials	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

Time frame: ***day 6.01a.m. – 6.0p.m. (Leq, 14 h)***
Night 6.01 p.m. – 6.00 a.m. (Leq, 14 h)

In compliance with this act, the construction work should be done from 0800hrs to 1800hrs on weekdays and 0800hrs to 1300hrs on Saturdays. The contractor will also ensure that the machines that produce a lot of noise are installed with mufflers and are well maintained to ensure that the noise produced will be at a minimum and it doesn't interfere with the neighboring activities.

4.3.18 Employment Act – No. 11 of 2007

This is an Act of Parliament to repeal the Employment Act, declare and define the fundamental rights of employees, to provide basic conditions of employment of children, and to provide for matters connected with the foregoing.

Section 3 (1) states that, this Act shall apply to all employees employed by any employer under a contract of service. **(6)** States that, subject to the provisions of this Act, the terms and conditions of employment set out in this Act shall constitute minimum terms and conditions of employment of an employee and any agreement to relinquish vary or amend the terms herein set shall be null and void.

Section 9 of this Act defines the general provision of contract of service as outlined in subsection 1 below;-**(1)**A contract of service—

(a) for a period or a number of working days which amount in the aggregate to the equivalent, of three months or more; or

(b) which provides for the performance of any specified work which could not reasonably be expected to

be completed within a period or a number of working days amounting in the aggregate to the equivalent of three months, shall be in writing.

4.3.19 Work Injury Benefits Act-Act No. 13 of 2007

This is an Act of parliament that was enacted to provide platform for compensation to employees for work related injuries and occupational diseases contracted in the course of their employment or related trainings

Part II on Obligations of Employers (1) Every employer shall obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under this Act to any of his employees.

The proponent and contactors shall provide insurance cover for their employee in case of an occurrence of an accident or contracting an occupational disease

Part III under Right to Compensation (1*)* an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act, and entitled to the benefits provided for under this Act.

The proponent and the contractors shall provide appropriate PPEs for the workers and a fully stocked First Aid kit that should be managed by an individual trained in first aid.

4.3.20 The Energy (Solar Water Heating) Regulations, 2012

Section 3 (1) of these regulations require that all premises within the jurisdiction of a local authority and has the hot water requirements of a capacity exceeding 100 liters per day shall install and use solar water heating systems. (2) Any premises with the above named hot water requirements shall install solar water heating systems within five years of the enactment of these laws.

The proposed development is a residential hotel development and due to the anticipated hot water demand of the facility, the proponent shall endeavor to install the solar water heating system.

4.3.21 The Energy (Energy Management) Regulations, 2012

Section 5. (1) The owner or occupier shall develop an energy management policy for the facility (factories, commercial buildings, institutional buildings and local authorities) which shall have the minimum requirements as provided in the **First Schedule.**

(2) The owner or occupier shall within one year of classification file the energy management policy for every designated facility with the Commission for approval before implementation.

(3) The owner or occupier of a facility shall designate an energy officer for every designated facility, who shall be responsible for the development and implementation of energy efficiency and conservation.

(4) The owner or occupier of a facility shall maintain records of information for every designated facility for a minimum period of five years from the date of occupation of the facility, which shall include;

(a) Monthly and annual electricity, fuel and water consumption;

(b) Monthly production data or occupancy levels; and up to date building plans, infrastructure plans and floor area drawings.

Section 6. (1) 27 the owner or occupier shall cause an energy audit of the facility to be undertaken by a licensed energy auditor at least once every three years. (3) The owner or occupier shall submit the report of the audit to the Commission in a manner approved by the Commission, within six months from the end of the financial year in which the audit is undertaken.

4.3.22 Occupational Safety and Health Act (OSHA) - No. 15 of 2007

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces. **Section 6**. (1) Every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace. **Section 7** also requires that the occupier develops a safety policy for the workplace and ensure that all workers have knowledge of it therefore the contractor shall ensure that a safety policy is in place during both the decommissioning and construction phases.

Section 9. (1) Every occupier shall establish a safety and health committee at the workplace in accordance with regulations prescribed by the Minister if— (a) there are *twenty or more persons* employed at the workplace; or (b) the Director directs the establishment of such a committee at any other workplace.

Section 44. (1) Before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises by sending to the Director a written notice containing the particulars set out in the Fourth Schedule.

The proponent or the contractor should ensure that the construction site for the proposed development is registered with the Directorate of Occupational Health and Safety. All other requirements of this act shall be complied with as outlined within the EMP of this report.

4.3.23 The Factories and other Places of Work (Safety and Health Committees) Rules, 2004

In general, the rules provide guidelines on the following:

Formation of safety and health committees

- Organization and composition of the safety and health committees
- Functions and duties of the committees
- The meetings and minutes of the committees
- The roles of the committee members
- Approval of safety advisers
- Duties of a registered safety and health adviser
- Training of the committee
- Health and safety audits
- Offence in relation to audit
- Other offences relating to other requirements of the legislation.

NB: These rules shall apply to all factories and other work places which regularly employ twenty or more employees.

Among the crucial issues highlighted are the following-

Section 13. (1) The occupier of every factory or workplace shall cause a health and safety audit of the workplace to be carried out at least once in every period of twelve months by a registered health and safety advisor at such a fee as may be agreed upon with such advisor. (2) The report of the audit shall be kept by the occupier for purposes of these Rules and a copy of the same shall be sent to the director by the advisor within a period of thirty days following the audit.

Section 14. (1) Any person authorized to carry out an audit under these Rules who: -

(a) Fails to make a report as required by these rules;

(b) Makes a report which is false or deficient in its technical content; or

(c) Fails to send to the director a copy of any report as required, Shall be guilty of an offence and liable to a fine not exceeding fifty thousand shillings or to imprisonment for a term not exceeding three months, or to both such fine and imprisonment.
The project proponent will need to implement these requirements if they will employ 20 or more regular employees.

4.3.24 National Museum and Heritage Act, 2006 Cap. 216

Section 30. indicates that Where a person discovers a monument or object of archaeological or paleontological interest, the person shall, within seven days, give notice thereof, indicating the precise site and circumstances of the discovery, to the National Museums, and in the case of an object, shall deliver the object to the National Museums or to the District Commissioner to keep it for any particular purpose or for any particular purpose or for any particular period. **Section 31** States that, no person shall move a monument or object of archaeological or palaeontogical interest from the place where it has been discovered otherwise than in such manner and to such place as may be allowed by an exploration license, or by written permit from the Minister after consultation with the National Museums.
The contractor shall report to the authority any finding that is of archaeological and paleontological interest

4.3.25 The Standards Act Cap. 496

The Act is meant to promote the standardization of the specification of commodities, and to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.
The proponent and the contractors has to comply with the provisions of the Act to ensure the overall safety of the development by ensuring strict vetting of material to be used in the construction. Thorough scrutiny of these material and frequents monitoring will be done by the construction supervisory staff on site such the Resident Engineers', EHS and Clerk of Works office.

4.3.26 Persons With Disability Act CAP. 13

The act is meant to provide equal platform for persons with disabilities. Under part (iii) on rights and the privileges of persons with disabilities

On section 11. Realization of rights of persons with disabilities it states that The Government shall take steps to the maximum of its available resources With a view to achieving the full realization of the rights of persons with disabilities set out;
Section 12. Employment (1) No person shall deny a person with a disability access to opportunities for suitable employment. (2) A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees.(3) An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment;
The proponent and the contractor shall ensure equal chances for qualified and willing personnel for the emerging employment opportunities

4.3.28 Environmental Management and Co-ordination (Air Quality) Regulations, 2014

Section 29. No person shall cause or allow the dispersion of visible particulate matter from any material being transported by motor vehicle or by other mode of transportation.

The contractor(s) shall ensure a free board haulage to avoid scattering of materials on transit

Section 33. No person operating construction equipment or handling construction material shall allow emission of particulate matter so as to adversely affect the limits set out in the First schedule.

Section 34. No person shall cause or allow emission of particulate matter during the demolition of structures, buildings, or parts of buildings in such a manner as to adversely affect the limits set out in the First Schedule

Section 35. No person shall cause or allow stockpiling or other storage of material in a manner likely to cause ambient air quality levels to be destroyed.

4.3.29 International Multi-Lateral Environmental Agreement (MEAs)

Kenya is signatory to and/or ratified several international agreements relating to the environment. Both global and regional agreements of potential importance are briefly discussed below:

The United Nations Framework Convention on Climate Change (UNFCCC) was ratified by Kenya in 1994. The objective of the UNFCCC is to regulate levels of greenhouse gas concentration in the atmosphere, so as to avoid the occurrence of climate change at levels that would harm economic development, or that would impede food production activities. One of the ways of doing this is for countries to work towards greater, energy efficiency and, in the process, saving forests and vegetation (which serve as carbon sinks and reservoirs) and turning increasingly to the use of renewable sources of energy.

The proponent intends to employ mechanisms to save and use energy efficiently, reduce emissions to the environment and plant trees.

4.4 INSTITUTIONAL FRAMEWORK

4.4.1 National Environment Management Authority (NEMA)

NEMA was established after the EMCA Act of 1999 and its main role is to coordinate and supervise all environmental matters in the country. All set environmental policies and goals are implemented by the Ministry of Environment through NEMA. The EMCA Act also provides for establishment of a technical committee (Standards and Enforcement Review Committee (SERC)) to enforce quality environmental standards, national environmental committee, the county environment committee,

4.4.2 Energy Regulatory Commission (ERC)

ERC was established under the Energy Act 2006, with its main objectives being to regulate the electrical energy, petroleum and related products, renewable energy and other forms of energy. The commission is mandated to prepare the indicative national energy plan among other functions.

4.4.3 The National Construction Authority

The National Construction Authority (NCA), which constituted under the Act No. 41 of 2011, is mandated to register contractors and to prepare a new register of builders cleared to work in Kenya.
This is a move aimed at weeding out rogue contractors and reduces the amount of malpractices that have seen buildings collapsing and many key stage projects being delayed. The NCA provides the legal and regulatory requirements for registration as a contractor. This includes Qualification and classification of contractors. *Building works are included under Class A of the classes of Contract works for which a contractor must be registered by the NCA. The proponent shall therefore contract a registered contractor to undertake the works upon project licensing by NEMA.*

4.4.4 Water Resources Authority (WRA) (previously Water Resources Management Authority WARMA)

The Water Act 2016 was enacted introducing institutions to govern water and sanitation sector in the republic. The Water (Amendment) Act 2016 defined the structures and responsibilities of the water institutions in the provision of safe and affordable water and adequate sanitation to the citizens. The Water Resources Authority (WRA) was set up by the legislation water resource management. Other institutions that were established under the act are, The Water Services Regulatory Board (WASREB), the Water Sector Trust Fund (WSTF), Water Services Boards (WSBs) and Water Service Providers (WSPs) were also set up by the legislation. They in effect ensure the delegation of regulation, financing, investment planning and development and service provision
Summary of institutional arrangements relevant to the proposed project

Institution	Envisioned role in the proposed project	Project phase required
NEMA	Issuance of EIA license and monitoring for compliance with conditions and environmental law	Implementation, operation and decommissioning
Nairobi City County	Approval of plans and building inspections, issuance of licenses	Implementation, operation and decommissioning
Physical planning department	Building certification	Implementation
WRMA	Extraction of water resources	Implementation and operation
NCWSC	Supply of water for the premises and maintenance of the sewer system	Implementation, operation and decommissioning
Occupational Health and Safety Department	Ensure safety of workers at construction site	Implementation
National Construction Authority	Registration of project, contractor	Implementation and operation

Overall **NEMA** plays the regulatory role in the management of environment in the country. The legal framework discussed above in respect of the proposed project is the roles to be played by the above institutions in enforcing compliance with the overall NEMA regulations.

CHAPTER FIVE

5.0 ENVIRONMENTAL IMPACTS, ISSUES OF CONCERN AND MITIGATION MEASURES

5.1 Anticipated Impacts

Impacts can be positive and negative, direct or indirect. Environmental impacts for the project are determined by breaking down the project into its activity components and examining the tasks in each component. Once the environmental impacts have been identified, mitigating measures are then prescribed and subsequently, an Environmental Management Plan (EMP) is formulated for the project. The Environmental Impacts of the project and the mitigation measures of the negative impacts are listed in the below:

Positive impacts

Plate No.	Positive Impact	Justification
1	Provision of high-class, modern and hospitality facilities	The proposed project is a hospitality infrastructural development that is comprised of residential apartments and studios. This will quest the much needed modern hospitality facilities within the Kenya and East African region.
2	Employment creation	The establishment and construction shall provide employment opportunities to both the locals and outsiders both directly and indirectly. Directly; Through the hiring of the locals to provide skilled, semi-skilled and unskilled labor for the construction as well as chefs, caretakers, gardeners etc during the operational stage Indirectly; This shall be achieved by the employment granted to the quarry workers and material suppliers during the construction phase as they will not be directly involved in putting up the proposed development
3	Regional Growth	Through the project, the Westland region shall be increasing growth owing to this magnificent project
4	Contribution of Government Revenue	The proposed project shall go a long way in contributing to Government Revenue at both the County and National Levels by the payment for approvals by the Sub-county and payment of land-rates to the Sub-county, payment of taxes from materials bought etc

Negative Impacts

5.2 Loss of Biodiversity

Construction Phase

Within the proposed site, there is currently limited vegetative cover mainly composed of scattered trees and landscaping flowers and shrubs therefore the loss will not be significant. Some of the trees shall be cleared for the purposes of setting up the proposed construction.

Operational Phase

During the operational phase, the proposed landscaped areas should be set aside for the proliferation and sustenance of bio-diversity within and around the proposed project area.

Mitigation:

- Vegetation cover that does not interfere with the sitting of the project will be left intact.
- After completion of the project the proponent will rehabilitate the land by planting trees and ornamental flowers and beautification shrubs on the zoned areas.
- Project construction will disturb as little area as possible in order to minimize potential negative impacts to biodiversity.
- Demarcate areas within the proposed project plot which shall be restricted for use in tree planting and landscaping purposes
- Rain-water and water run-off may be collected and directed to the water storage tanks to be used in the toilets**.**

5.4 Effluent disposal

Developers construct houses without planning on how effluent will be disposed appropriately; hence waste water (raw sewage) is either channeled to a river, or disposed carelessly. Inadequate maintaining sewer line leads to blockage of pipes. Areas not served with a sewer line use septic tanks which also poses other risks if not well managed. Some are poorly constructed and others have inadequate water supply hence posing a dangerous health risk to the living organism including man.

Construction Phase

During the construction phase and due to the location of the proposed project plot, there is need to provide the construction workers and any/all visitors to the site with safe and healthy sanitation facilities

Operational Phase

The proposed project shall be composed of residential apartments, hence the anticipated effluent that will be produced will be of relatively high volume. The preferred waste management mechanism in the area is the existing sewer line by the Nairobi City Water and Sewerage Company.

Mitigation

- Construction of a temporary workers' lay-down area
- Connection to the existing NCWSC sewer line
- Provision of adequate water supply

- Prompt cleaning of the system
- Adequate and periodic maintenance of the plant

5.5 Occupational Health and safety

Construction Phase

During the construction phase, there will be increased dust, noise and air pollution. The immediate neighbors and the workforce involved would be subjected to these environmental hazards. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This can compromise health of the workers especially if foodstuffs are prepared in unhygienic conditions.

The nature of the proposed project also poses an increased risk of physical injury to the workforce, visitors and/ or neighbors.

There is also the added risk of disease spread due to e.g. poorly prepared/ handled food, contaminated water and poor social behavior.

Operational Phase

Such developments that are termed as medium to high density developments carry their own hazardous impacts ranging from physical injury from falls, household accidents, fire risk, disease spread, noise etc.

Mitigation:

- Carrying out of periodic (***monthly***) worker sensitization and training via a "**Safety Briefing**" of the workers by the Environmental Health and Safety Officer
- All workers should be provided with protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks and gloves.
- Construction crew at the site will be sensitized on social issues such as drugs, alcohol, diseases.
- A first aid kit should be provided within the site. This should be fully equipped at all times and should be managed by qualified person.
  Upon project completion, the proponent shall assign qualified individual(s) to be full-time within the development for purposes of administering basic first-aid when and if such cases arise.
- The contractor should have workmen's compensation cover. It should comply with workmen's compensation Act, as well as ordinances, regulations and union agreements.
- Adequate sanitary facilities should be provided and standard cleanliness maintained.
- Food handlers preparing food for the workers at the site should be controlled, monitored and vetted to ensure that food is hygienically prepared
- Regular maintenance of machinery on site to mitigate against accidents attributable to mechanical failure
- Workers should be sensitized on and provided with evacuation procedures in case of fire.
- Workers should practice drills at least once a month to ensure that they have the knowledge to act accordingly in case of fire.
- Periodic fire and emergency drills to be carried out within the development during the operational phase
- The site shall be registered with the Directorate of Occupational Health and Safety.
- Proper hoarding to be put in place to ensure safety for neighbors and passersby especially on the Senate Towers set to undergo extension and renovation works

- Construction crew at the site will be sensitized on social issues such as drug and alcohol abuse and diseases such as HIV/AIDS
- Provide sufficient scaffolds and approved dust screens around the entire buildings during construction works
- The doorways in the apartments should be adequate for emergency purposes, open outwards .The stairways should be wide enough and located at both ends of the building and should be clear of any obstructions at all times. The construction of stairways should give provision for clients with special needs/disabilities.

5.6 Soil Erosion

The activities involved in the site preparation and construction phase of the development may have a major negative and moderate impact on soil and geology of the project site. This is due to the removal of vegetation from the area which will leave considerable areas of soil exposed to the elements, which may result in soil erosion. Heavy machinery will be traversing the site due to the construction activities this may lead to soil compaction and erosion of the soil. Uncontrolled soil erosion can have adverse effects on the local water bodies.

Hazardous substances such as diesel used for the operation of machinery and stand-by generators, may be stored on the property. This may have a significant negative long-term impact on soil quality in the area.

Operational phase

The building roofs and pavements will lead to increased volume and velocity of storm water or runoff flowing across the area covered by the buildings. This will lead to increased amounts of storm water entering the drainage systems, resulting in overflow and damage to such systems in addition to increased erosion or water logging in the neighboring areas.

Mitigation Measures

- Avoid unnecessary movement of soil materials from the site.
- Provide soil conservation structures on the areas prone to soil erosion mostly to reduce impact by the run-off.
- Control construction activities especially during rainy conditions
- Re-surface open areas after completion of the project and introduce appropriate vegetation.
- Provide suitable storm water drainage channels to effectively discharge water to safe areas. Channels need to be regularly maintained and repaired to avoid point discharge incase of breakages or blockages.
- Conduct landscaping after the project completion to maximally control any possible chance of soil movement.
- Employ water harvesting techniques to harvest rain water to minimize surface run-off

5.7 Surface drainage and increased run-off

Good drainage system is used to prevent land near human settlement from becoming saturated with water which collects or accumulate/ flood after a downfall or from other sources. Poor drainage causes dampness to building structures as well as water stagnation. Dampness is influenced by poor drainage, in the presence of warmth and darkness, breeding grounds for mosquitoes and other diseases carrying pests can be directly traced to it. Drainage of the general property/premise comes in handy to enhance effective

flow of the much anticipated surface run-off emanating from the roof catchments and other areas within the site.

Construction works and paved roads could also result in additional run off through creation of impervious areas and compaction of soils. Impervious area and compacted soils generally have higher run off coefficients than natural area and increased flood peaks are a common occurrence in developed area.

Construction Phase

During the construction phase, there shall be a lot of water run-off emanating from e.g. watering the site to mitigate against dust and particulate matter pollution, rain water, cleaning and mixing of construction materials etc

Operational Phase

Water run-off shall be ample emanating from cleaning operations within the individual units, rain water and irrigation of the green-zones.

Mitigation

- During construction, the design of the drainage system should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site.
- Drainage channels should be installed in all areas that generate or receive surface water such as car parking, drive ways and along the building block-edges of the roofs.
- Channels should be covered by approved materials to prevent occurrence of accidents and entry of dirt that would compromise flow of run-off.
- Drainage channels should ensure safe disposal of run-off/surface water and should be self-cleaning
- Paving of the sideways, driveways and other open area should be done using pervious materials to encourage recharge and thus reducing water runoff volume.
- Development of a Storm-water Management Plan that minimizes impervious area infiltration by use of recharge area and use of detention and/or retention with graduated outlet control structures

5.8 Solid Waste

It is another national challenge which needs to be addressed. Waste collection within the area boundary is the responsibility of the Nairobi City Council, but since the council is faced with many challenges, solid waste management being among them; private companies have come in to offer such services. Developers should comprehensively address the issues of waste in their planning before doing any construction to avoid creating illegal dumping sites within estates which pose a health risk to the residents. To curb this issues the proponent will make arrangements with Nairobi City Council Company to collect waste within the facility. Large amounts of solid waste will be generated during construction and operational phase. This will include metal cuttings, rejected materials, excavated materials, paper bags, empty cartons, broken glass among other materials from a construction site. Solid wastes if not well managed have a potential of causing disease outbreaks due to suitable breeding conditions from various pathogens. During the operational phase there will be massive generation of waste from the community.

Mitigation:

- The contractor or the proponent should work hand in hand with the private refuse handlers and the Nairobi County to facilitate waste handling, and disposal from the site. The resulting debris will be collected, transported and disposed off at suitably approved dumpsites.

- It is recommended that land clearance, excavation and construction waste be recycled or reused to ensure that materials that would be disposed of as waste are diverted for productive use. In this regard the proponent is committed to ensuring that construction materials are left over at the end of construction will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community and residents.
- Proponent should ensure the construction of a central waste collection point with bulk storage facilities and provide adequate waste receptacles at convenient points to prevent littering during occupation
- There should be adequate provision for separation of different wastes depending on their types. For example, a site for kitchen waste and waste from the institution's compound as well as segregation of biodegradable (natural wastes) and non-biodegradable waste
- All the waste disposal sites should be well fenced and access denied to any unauthorized persons.
- Signage to be incorporated within the development on proper waste management and on the importance of waste segregation to create awareness.

5.9 Noise

Noise is unwanted/undesirable 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.

Construction Phase

It is postulated that the project will generate noise during the construction stage. There are various anticipated sources of noise from the construction works ranging from machinery noise, hammering, cutting etc. contractor awarded the construction job are expected to abide by the set code in regard to workers discipline and the types of machinery to be used. It is recommended that this aspect be given significant weight during the pre-qualification and tendering process. Furthermore, the contractors are expected to use as much manual labor as possible to reduce any noise that would be generated by machinery.

The project site being located in a mixed use environment, the issue of noise needs to be strictly addressed to avoid disrupting residing and office operations.

Operational Phase

During the operational phase, there are anticipated to be various sources of noise as the proposed project within a learning institution with a high number of students, staff and visitors.

Mitigation Measures:

- Construction works should be carried out only during the specified time on weekdays preferably evening and night hours when learning and office operation are not taking place to avoid disruptions
- Machinery should be maintained regularly to reduce noise resulting from friction
- Provision of billboards at the construction site notifying of the construction activity and timings
- Sensitize drivers of construction machinery on effects of noise and how to manage it
- Workers in the vicinity of high-level noise to be provided with safety and protective gears such as ear muffs

- Provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- Contractor to consider offsite concrete mixing to reduce noise impact during concrete mixing
- Acquire the noise and excessive vibrations permit from NEMA for any demolition works to be conducted
- Access to the site must follow a designated route to reduce noise during movement by the transport vehicles
- Promote good neighborliness within the development to ensure project goodwill by adjacent neighbors.

5.10 Increased Water Demand

An increase in population in an area results in an increase in water demand hence exerting pressure on the existing water supply. Water is a major concern especially in construction sites.

Construction Phase

Although there is adequate water supply from the NCWSC, the proposed development may cause some strain to the existing water supply since construction activities are known to be heavy water consumers. There exists two boreholes on the site but conservation measures need to be employed to avoid over-extraction due to high demand.

Operation Phase

Occupation of the proposed development will bring about an increase in water consumption, which will have a direct impact to the main water supply especially if the supply remains constant. This calls for water harvesting and storage and sourcing for a more reliable and ample water supply

Mitigation

- Avoid wasting the water supplied to the site during construction
- Encourage water reuse/recycling during both construction and operational phases
- Roof catchments should be provided with rain water harvesting systems to enhance collection and storage of rain water. Such water can be used to flush the toilets and in cleaning to save on water
- Provide notices and information signs on means and needs to conserve water resource to awaken the civic consciousness with regard to water usage and management.
- Ideally, the scale, magnitude and nature of the proposed project demands for the supply of reliable clean water. The proponent intends to put up a massive water storage tank of approximately 200,000M^3 to ensure a reliable water supply.

5.11 Increased Power Demand

There will be high power consumption especially during occupation phase of the project. The existing power supply from the KPLC Sub-station may be inadequate and will need to be upgraded to enhance the power capacity and to avoid straining the existing supply. However the residents will be encouraged to conserve energy and to use energy conserving appliances as much as possible. Energy conservation involves proper use of electrical appliances, lighting systems for example use of energy saving bulbs, switching off of electrical gadgets used for different purposes and power supply when not in use.

Mitigation

- Upgrade the existing power supply system through establishing another Sub-station and a standby generator
- Use of energy saving appliances such as energy saving bulbs to save on energy demand
- All electrical appliances should be switched off when not in use
- Utilize natural light inside buildings to avoid using electricity for lighting during the day
- Invest in alternative sources of energy especially clean energy technologies such as solar energy for use in water heating
- Create awareness to the student community on the need to conserve energy e.g. through use of stickers with awareness messages such as ‘’***Switch Off’ or ‘’save energy’’ “Switch Me Off”***

5.12 Potential Fire Hazard

Potential fire hazard from the development could emanate from LPG use in the cooking areas, electric cookers and faulty electrical appliances. This poses a major threat to facilities and the occupants of building in case of such occurrences.

Mitigation

- Installation of fire alarm system including fire detectors, smoke detectors and firefighting equipment
- Setting up appropriate emergency response measures
- Conducting regular fire drills
- Secure storage of all flammable materials and fuels such as LPG gas, laundry detergents and chemicals, pints and other workshop related materials.

5.13 Potential Disaster Risk

Disaster means an emergency event that occurs with little or no warning, causing extensive destruction of prosperity, lives and disruption of normal operations. Disasters can be divided into **Natural disasters** or **Man-made disasters.**

Natural disasters are calamities that occur without human involvement. They include earthquakes, floods, drought, landslides and volcanic eruption and windstorms.

The man-made disasters are calamities caused by the actions of human beings either directly or indirectly such as student unrest, food poisoning, industrial accidents, and chemical contamination, pollution and terror threats.

Mitigation measures

1. ***Develop a disaster Risk Reduction (DRR) Strategy***

Disaster Risk Reduction refers to actions designed to minimize destruction of life, property and disruption of normal operations. There needs to be disaster risk strategy if the effects of disasters are to be minimized. This risk reduction strategy calls for the establishment of a Disaster Crisis Response Team with the mandate to prevent, mitigate and effectively prepare against potential disaster hazards. It also includes organizing and carrying out rescue and rehabilitation operations during and after a disaster has struck.

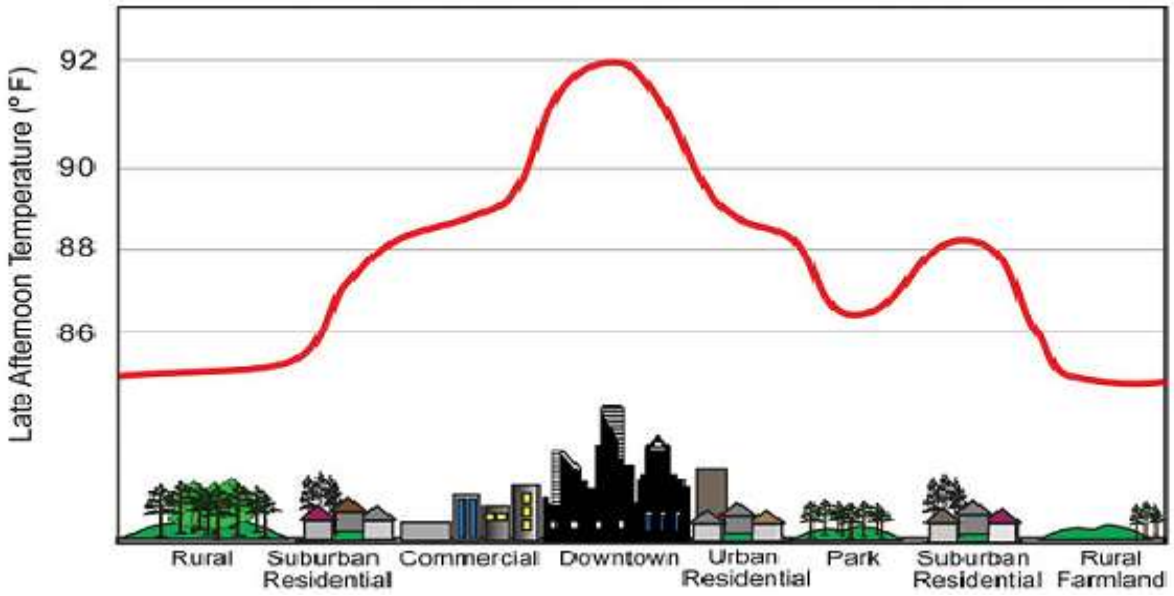
2. ***Early Warning Mechanisms***

It is important to note that not all disasters are rapid or sudden. Some disasters develop over time and there is usually a lead time to receive information and react to early warnings. Careful monitoring and early warning are useful only if they help to avert potentially dangerous events or circumstances that can lead to emergency or disaster or if they lead to actions taken to minimize damage.
The purpose of monitoring and early warning is to enable remedial measures to be initiated and to provide more timely and effective relief through disaster and emergency preparedness actions. Early-warning mechanisms will provide the institution and other stakeholders with relevant information to enable them make informed decisions for evacuation or relocation. The following should be considered:

- Develop effective post evacuation maps at major entrances and exits to buildings, enclosed stairways and offices for use in case of emergency.
- Organize and practice drill sessions for fire, lockdown, shelter-in-place and other situations that the safety department determines necessary to practice to create awareness and train the employees on emergency procedures. Fire drills are required at least once a month. It is recommended that other drills follow the same format.
- The proponent should maintain well equipped emergency kit(s) comprising of items such as First aid kit, Whistles, Fire blankets, Flash torches, Fire extinguishers and Blueprints of the buildings
- The management needs to ensure that facility is safe from natural and human made disasters by observing the safety of their operating environments.
- Regular intelligence gathering to avert any anticipated disaster.

5.14 Increment in Ambient Temperatures

The materials to be used for making the structures (concretes, iron sheet roofing, glasses etc.) have higher heat absorption potential compared to the current vegetation cover in the area. During the daytime when the sun releases its incident rays to the earth's surface .Scientifically this has been found adverse effects on peoples and the ecosystems. Research has found that urban areas are relatively hotter than immediate neighboring rural and semi urban areas. The effects creates heat waves that have adverse effect on people's health and safety



Mitigation Measures

- ❖ The proponent will ensure **adequate landscaping** to reduce this effect (heat island effect) for a conducive learning environment created through evapotranspiration and plant's cooling effect.
- ❖ The proponent shall use **energy efficient** appliances and equipment's.
- ❖ Installing **cool roof**, it helps reflect back the sun's incident rays and heat away from building

5.15 Summary of Positive Impacts of the Proposed Project

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

- Through construction of the proposed development, the project will ensure optimal use of the land to the great benefit of the country and its people with land being a scarce resource in Kenya
- Provision of modern, digital learning and research facilities
- Creation of market for goods and services and especially construction inputs which include raw materials, construction machinery and labor. Secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
- Create a major boost to the education sector through increased student enrolment
- Massive job opportunities for Kenyans both during planning, construction and operational phases. They include building contractors, architectures, structural engineers, mechanical engineers, surveyors, environmentalists, security agents, transporters, construction workers, site managers and foremen.
- Increase in revenue for the government; from processing of the building plans to the City council and through annual rates.

5.16 Summary of Negative Impacts of the proposed Project

Against the background of the above positive impacts, there are a few negative drawbacks that are anticipated mostly during the construction of the project. They include the following:

- Loss of biodiversity from the project site which has a some trees and patches of grass
- Waste water management and disposal
- Increased water demand
- Increased power demand
- Solid waste management
- Oil spills during construction
- Dust emissions
- Accessibility to the existing road network
- Soil compaction, erosion and pollution
- Noise and vibrations
- Population density
- Increased traffic, both vehicular and human, along the roads that the site is accessible
- Air pollution during construction.
- Health and safety for the workers during construction phase

5.17 Summary of the Mitigation Measures

One of the objectives of the environmental assessment has been to identify measures to be taken by the proponent to mitigate environmental impacts. These will include:

- A code of practice to minimize construction noise, vibration dust and disturbance o the site.
- Planting of trees, and wild flowers to supplement the ground cover on the excavated area.
- Application of soil conservation measures to reduce surface runoff during wet seasons and especially during construction phase.
- Recovery of all debris generated and reuse of materials where possible e.g. the stone chippings which can be used as hardcore.
- Recycling and reuse of appropriate materials.
- Provision of security measures to deter intruders and protect them from the risk of injury; and fitting of noise mufflers on generator exhausts.
- Installation of oil/diesel separators on site to keep oils from storm runoff.
- Predetermined route to the site, oil spillages will be minimized by using right machinery that are regularly serviced and operators who are qualified following the operations instructions strictly.
- The contractor will ensure management of excavation activities, activities will be controlled especially if construction will take place during rainy season.
- After construction the proponent shall rehabilitate the land by removing any unnecessary materials that shall be covering the land and preventing natural biodiversity.
- To minimize potential impacts to bio diversity, grass cover that does not interfere with the sitting of the project will be left intact,

- Sensitize drivers of construction machinery on effects of noise; billboards will be suitably erected on the start of the project to psychologically prepare the people in the vicinity.
- Signs must indicate and inform the public when the works start and when it will be completed, construction activities to be restricted to daytime to avoid accidents and possible harm to gears provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- Vehicle speeds in the construction area will be limited to minimize dust in the area, discourage idling of vehicles i.e. vehicle and equipment engines will be turned off when not in direct use to reduce exhaust emissions.
- Regular maintenance of construction plant and equipment, engage sensitive construction workers.
- Provide personal protective Equipment such as nose masks to the workers on site, the construction contractor will water the site with exposed soil surface twice each day during dry weather.
- All residual waste materials to be recycled sold or disposed in an environmentally friendly manner. Wastes will be properly segregated and separated to encourage recycling of some useful wastes; dustbins will be provided at the construction site.
- A first aid kit will be provided within the site and it will be fully equipped at all times.
- Sanitary facilities will be provided, local individuals preparing food for the workers at the site will be controlled to ensure that food is hygienically prepared
- Construction crew at the site will be sensitized on social issues such as drugs, alcohol, diseases, ensuring proper solid waste disposal and collection facilities, ensure effective waste water management.
- Provision of safe drinking water, contractor to take an insurance cover for workers in case of major accidents on site.
- For the prevention of accidents the contractor shall adhere to the guidelines under the factories and other places of work act.

CHAPTER SIX

6.0 ANALYSIS OF PROJECT ALTERNATIVES

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

6.1 Site Relocation Option

The above land was registered as the proponent's by the in anticipation of maximally utilizing the plot. Considering that the land owner does not have another site and the strategic location of the site, this means that he has to look for land elsewhere. Searching for land to accommodate the space and size of the project and completing official transaction it may take a long time although there is no guarantee that such land could be available at a convenient fee in Westlands area. The proponent will spend another one year on design and approvals since design and planning has to be according to the prevailing site conditions. Project design and planning before the stage of implementation will cost the proponent unnecessary large sum of money. Whatever has been done and paid up to this level will be counted as a loss to the developer.

Assuming the proposed magnificent project will be given a positive response by the relevant authorities including NEMA, the project would have been delayed for about two year's period before implementation. This is a delay that the proponent can ill afford. This would also lead to a situation like no other project alternative option; the other consequences of this would be a discouragement to local/private investors especially in this sector that has been shunned by many public and private investors from the bone statements relocation of the project to different site is NOT VIABLE hence it's ruled out.

6.2 No project Alternative

The no project alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from the extreme environmental perspective as it ensures non-interference with the current conditions. Under no project alternative, the proponent's proposal would not receive the necessary approval from NEMA, proposed project would not be constructed and there would be no demand for the development. This option will however, involve several losses both to the land owner and the community as a whole. The plot owner will continue paying rent of the plot while the property minimally benefit him. The no project option is the LEAST PREFERRED from the socio-economic and partly environmental perspective due to the following factors;

- Discouragement to the investors
- Land will not yield optimally
- No employment opportunities will be created for Kenyans bearing in mind that the proposed project will have employment opportunities both directly or indirectly during construction and operations phases and thus improve lifestyles and livelihoods
- Local and international tourism facilities will remain dwindling.
- Development of infrastructural facilities (roads, electrical etc. will not be undertaken).

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, and the government of Kenya.

6.3 Analyses 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 save on energy and water will be given first priority without compromising on cost or availability factors. Heavy use of timber during construction is discouraged because of massive degradation of forests in Kenya. Timber from exotic and fast growing species would be preferred to indigenous species in the construction where need will arise.

6.4 Domestic Waste Water Management Alternatives

Five locally available technologies are discussed below:

6.4.1 Waste Water Treatment Plant

This involves the construction of a plant and use of chemicals to treat the effluents to locally acceptable environmental standards before it is discharged into the river nearby. It is usually expensive to construct and maintain but it is the most reliable, efficient and cost effective in the long term. The sludge obtained can be composted and used for agricultural and gardening purposes. This method requires a large truck of land and presence of a large river to dissolve the effluent to negligible levels for proper functioning. Owing to this reasons the method is deemed unfeasible and NOT PREFERABLE due to the existing more suitable alternatives as outlined below.

6.4.2 Use of Stabilization Ponds/Lagoons

This refers to the use of a series of ponds/lagoons which allow several biological processes to take place, before the water is released back to the river. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used/heavy metals sink and decomposition processes take place. They are usually a nuisance to the public because of smell from the lagoons/ponds. This option is NOT PREFERABLE in the area because the required space is not only available, and the surrounding community is not likely to accept the option.

6.4.3 Use of Constructed/Artificial Wetland

This is one of the powerful tools/methods used in raising the quality of life and health standards of local communities in developing countries. Constructed wetland plants act as filters for toxins. The advantages of the system are the simple technology, low capital and maintenance costs required. However they require space and a longer time to function. Long-term studies on plant species on the site will also be required to avoid weed biological behavioral problems. Hence it NOT THE BEST ALTERNATIVE for this kind of project located in a congested town settings.

6.4.4 Connection to a Sewer System

Connection to a sewer line will solve the waste management issue at a very minimal cost and in environmentally efficient manner. This is the MOST VIABLE option because the proposed project area is served by the NCWSC sewer line and the proponent will therefore connect the development to the sewer line and adhere to all the set mitigation measures to ensure efficiency of the system.

6.4.5. Use of Septic Tanks

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is expensive to construct and requires regular empting. Septic tanks if not well constructed and monitored can lead to blockages and leaks to the underground water. Bearing in mind that the Vision 2030 aims for a Kenyan nation that has a clean, secure and sustainable environment, due to the issues of environmental pollution the method is RULED OUT.

6.5 Solid Waste Management Alternatives

The proposed project will generate massive solid wastes both during demolishing of the existing buildings, construction and operational phases. An **integrated solid waste management** system is recommendable. 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 tenants. Secondly, **recycling**, **reuse and composing** of waste will be an alternative in priority. This calls for a source separation programme to be put in place. The recyclable will be sold to waste buyers within Nairobi City and the surrounding areas. The third priority in the hierarchy of options is combustion of the waste that is not recyclable in order to produce energy. Finally, **sanitary land filling** will be the last option for the proponent to consider.

6.6 Water Supply Alternatives

Water is becoming a scarce resource day by day in most parts of the country especially in urban area and towns. The scarcity is further exacerbated by climate change, environmental degradation and exponential Kenya's population growth. Kenya is termed as a water scarce country with about 700m3 per capita, 300m3 lower as per United Nations minimum recommendation of 1000m3 per capita , therefore the proponent should keenly looked into methods of sustaining water supply.

6.6.1 Alternative one - Rain Water Harvesting

Rain water flowing into drainage systems during wet seasons should be harvested and used for various purposes. In addition, a lot of water can also be harvested from the roof of the building that will be put up on the project site. This water can be used for watering flower gardens and grass lawns, flushing toilets and general cleaning purposes. The method is only efficient only during the wet seasons and should not be used solely.

6.6.2 Alternative two – Tanker/Bowsers Water Supply

Several commercial water supply companies operate in Nairobi. These are usually licensed by Water Resources Authority (WRA) to supply water to clients when normal NCWSC water supply system is cut-off. The proponent can use these services as a supply option. However, this option is NOT SUSTAINABLE since it's expensive and there is no guarantee of being supplied with clean water.

6.6.3 Alternative three – Drilling of a Borehole

The proponent has an existing borehole in the site that will cover the water supply deficits experienced from other water supply sources. The proponent shall undertake regular water quality test regularly to ascertain the consumption fitness of the water. This method/alternative is RELATIVELY SUSTAINABLE though the aquifer (Nairobi aquifer suite) beneath the project site is highly sunk with boreholes compromising the water quality and quantity.

6.6.4 Alternative four – Combined Water Supply

This is the MOST PREFERRED water supply by the environmental consultants. A dedicated mains water infrastructure system is to be provided for the development. It is proposed that there will be a new water main connection to serve the development from the existing Nairobi City Water and Sewerage Company (NCWSC) main. Nairobi Water and Sewerage Company water supply will be supplemented by the existing borehole.

CHAPTER SEVEN

7.0 PUBLIC PARTICIPATION

7.1 Introduction

This chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed construction of a residential hotel in Westlands Nairobi County

7.2 Objectives of the consultation and public participation

The objective of the consultation and public participation was to:

1) Disseminate and inform the stakeholders about the project with special reference to its key components and location
2) Gather comments, suggestions and concerns of the interested and affected parties
3) Incorporate the information collected in the EIA study

In addition, the process enabled,

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

7.3 Background and Methodology

From the field work, it was apparent that the majority of the stakeholders were aware of the proposed project construction and the direct impacts. The proposed construction was nevertheless received with mixed reactions by the community as they anticipated numerous impacts both negative and positive alike. The neighbors and major stakeholders independently gave their views, opinions, and suggestions as in the best of their interest and in the interest of the factors that affected the circumstances, influences, and conditions under which their organizations exist. The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned. In general the, the following steps were followed in carrying out the entire CPP process:-

- Identification of institutions and individuals interested in the process- database of the interested and affected parties
- Administration of questionnaires to the different target groups and local community members along the proposed project Site
- Meetings at various levels and with different target groups

7.4 Issues raised

This Sub-Section covers the views and opinions of the key stake holders who were consulted during the study. It highlights both positive and negative socio-economic and environmental impacts anticipated during the construction and operational phases of the project. This is followed by suggested mitigation measures that the developer should incorporate to minimize environmental degradation and promote sustainable development. The opinion and the expectations of the stakeholders are also highlighted.

7.5 Positive Issues

7.5.1 Improving Growth of the Economy

Through the use of locally available materials during the construction phase of the proposed project, material such as cement, concrete and ceramic tiles, timber, sand, ballast, electrical cables etc., the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.5.2 Increased modern hospitality facilities

The Interviews revealed that the project will improve on the available ultra-modern hospitality facilities within the country.

7.5.3 Creation in Employment

The community was optimistic that the construction of the project will open up new fields of employment. Despite the fact that most of the project will need skilled labor force, the people expressed hope that they will be able to access employment once the project commences mostly as casual workers. This will be a source of income for several individuals and households and hence is expected to boost the GDP and improve the living standards of the people.

7.5.4 Increased Business Opportunities

Those with businesses along and around the area were optimistic that increased number of tourist and staff in the area will result in increased business volume and the quality of this business. According to them, the number of customers will increase from the construction workers, the security and maintenance personnel during the operation phase. Other stakeholders especially those with interest in establishing relevant businesses in the area, expressed their joy since there will be a major customer base for their products and services.

7.6 Negative Issues

7.6.1 Air Quality Reduction

Emissions in forms of dust, particulate matter, fugitive emission and, exhaustion from project machines and equipment are anticipated during the project construction phases. These emissions emanating from trucks and construction equipment are known to have adverse impact on the environment, plant and human health including effect on the upper to lower respiratory infections and silicosis condition.

- ✓ Activities likely to generate dust include speeding of vehicles on earth surface not palliated with water, excavation of earth materials in dry sections;
- ✓ Activities likely to generate particulate matter include loose material transportation, vehicle and machines exhaust emissions, operations at the batching plant, stone crushing machines, fire among others.
- ✓ Some of the particulate matter to be generated include sand, soot, cement, gravel and murram, among others; and
- ✓ Exhaust emissions likely to be generated include smoke, hydrocarbons and nitrogenous gases among others pollutants from vehicles, machinery and equipment exhausts.

People especially the neighboring community expressed concern over possibility of generation of large amount of dust and fumes within the project site and surrounding areas as a result of excavation works and transportation of construction materials. The proponent shall ensure that dust levels at the site are minimized through sprinkling water in areas being excavated and along the tracks used by the transport trucks and diversions within the site. Proper shielding of the site and installation of dust screens will be effected to trap dust and contain construction activities. Mitigation measures presented within the EMP will also be implemented fully to minimize the impacts of dust generation.

7.6.2 Noise Pollution

Some residents expressed their fears over noise pollution that would come from the construction works. They requested the proponent to use minimum noise producing machines and to reduce the duration of idling of vehicles making deliveries.

7.6.3 Waste generation

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paints and solvent containers, broken glass among others. Solid wastes if not well managed have a potential of causing accidents and disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. Some excavation materials will be rendered unusable and thus will have to be disposed off. This also applies to some of the soil/rocks which may not be reusable after excavation processes are complete. All these materials needs to be collected, transported and disposed off

appropriately in approved designated areas. It is encouraged that other alternative uses of these materials should be found e.g. filling excavated areas at the site.

7.6.4 Increased water demand

It is expected that both the workers and the construction works will create an increased demand for water and electricity in addition to the existing demand. Water will be mostly used in the mixing of concrete for construction works and for wetting surfaces for softening or hardening after creating the formworks, watering dusty diversions and active construction sites. Water from the existing borehole should be used sustainably during construction. Suggestions have been made to the proponent to consider investing on alternative water sources e.g. harvesting rain water and constructing high capacity water storage tanks which will otherwise relief the public water supply system.

7.6.5 Accidents and hazards during construction and Operation Phase

During construction it is expected that construction workers are likely to have accidental injuries and hazards as a result of accidental occurrences, handling hazardous waste, lack or neglect of the use of protective wear etc. All necessary health and safety guidelines should be adhered to so as to avoid such circumstances and ensure safety for student and passersby.

7.6.6 Expectations of the Surrounding Local Community

The respondents have high expectations regarding the proposed construction of the project and believe that once it starts operating;

- Many youths will be considered for employment by the contractor
- Local Residents will be allowed to supply some of the raw materials
- There will be improved infrastructure
- The associated negative environmental Impacts and health hazards will be addressed
- Environmental auditing and monitoring to minimize negative impacts associated with project.

CHAPTER EIGHT

8.0 ENVIRONMENTAL MANAGEMENT PLAN

8.1 Introduction

The objectives of the Environmental Management Plan are:

- To guide the project implementers in project planning.
- To guide the project implementers on the likely impacts of the project and when they are likely to occur.
- To give an assessment of the capacity requirements for the implementation of the EMP.
- To guide the project implementers to allocate adequate resources for the implementation of the mitigation measures.

8.2 Costing

As will be noted from the plan, some impact mitigation activities which costing is not done. This is because costing for such activities may have been catered for, under another project component/phase for a similar or related activity. For instance, the cost of provision of dust coats and masks is entered once, as it is not expected that the contractor will have to buy this item again for all the purpose listed in the subsequent phases. A set of protective clothing will last one worker throughout the construction phase.

8.3 Plan Period

The EMP provided here is to cover the first year of the project's operations. It is then expected that an Environmental Audit will be undertaken at the end of the year to evaluate conformity to the EMP as well as identify any gaps and recommend corrective adjustments to the plan. This is then addressed through a loop mechanism from construction phase to operational phase to identify the success of the project versus the failures. This should be analyzed through the environmental criteria of impact and mitigations.

8.4 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.4.1 CONSTRUCTION PHASE

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring means	Recommended frequency of monitoring	Estimated Cost (Kshs)
Demolition of existing structures	• Apply for demolition permit from relevant authorities such as NCC ,NCA and NEMA before commencing the demolition • Engage a registered private contractor to carry out the demolition • Provide workers with personal protective equipment (PPE) • The demolition exercise will be limited at day time only • All personnel working on the project will be trained prior to commencing the demolition • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	-Project proponent -Contractor -NEMA inspectors	Inspection	Daily during the demolition process	**50,000**
	Noise and Air pollution • All active demolition areas will be watered at least twice a day to reduce dust. • Careful screening to contain and arrest demolition related	- Project proponent - Contractor - NEMA inspectors	Periodic checks	Daily during the demolition process	**15,000 pm**

Demolition of existing structures	dust will be adopted • Use of equipment designed with noise control elements will be adopted where necessary. • Trucks used during demolition exercise on site shall be routed away from noise sensitive areas in the neighborhood, where feasible. • Idling time for pick-up trucks and other small equipment will be minimized to limited time. • Use of very noisy equipment will be limited to daytime only.				
	Debris and related wastes • A registered private contractor will be engaged to collect demolition debris/wastes to avoid illegal final dumping at unauthorized sites will collect demolition debris. • All debris/wastes to be collected regularly to control air pollution and injury etc • All persons involved in refuse collection shall be in full protective attire. • All trucks hauling demolition debris/wastes shall be covered. • Exposed demolition debris of e.g. dust and sand, will be enclosed, covered, and watered daily before transported to disposal site.	- Project proponent - Contractor - NEMA inspectors	Periodic checks	Daily during the demolition process	**22,000**

	Health and safety of workers • All workers will be sensitized before the exercise begins, on how to control accidents related to the demolition exercise • A comprehensive contingency plan will be prepared before	- Project proponent - Contractor - NEMA inspectors	Periodic checks	Daily during the demolition process	**30,000**

	demolition begins, on accident response. - Adherence to safety procedures will be enforced at all stages of the exercise - All workers, pursuant to labor laws, shall be accordingly insured against accidents. - All workers will be provided and instructed to wear protective attire during demolition, including helmets.				
De-vegetation resulting from site clearance and excavation	- Ensure proper demarcation and delineation of the project area to be affected by construction works. - Apply for tree cutting permit from relevant authorities before cutting of any tree - Preserve all trees located at the boundary of the plot	- Proponent - Contractor - Engineer - Architect	Periodic checks Routine maintenance	Weekly	**15,000**

Soil erosion	Ensure management of excavation activities Observe Efficiency of erosion control measures Control activities especially during rainy seasons Provide soil erosion control and conservation structures where necessary. Compact loose soils to minimise wind erosion Control earthworks	- Proponent - Contractor - Workers - NEMA inspectors - -	Inspection Routine maintenance	Daily; Once a month during project lifetime	**17,000**
Air pollution	Dust suppression with water-sprays during the construction phase on dusty areas All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality	- Proponent - Contractor	Inspection/ observation	Daily	**30,000**

	impacts during construction. - Drivers of construction including bulldozers, earth-movers etc will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon and minimize idling of engines. - Careful screening of construction site to contain and arrest construction-related dust. - Exposed stockpiles of e.g. sand, will be enclosed, covered, and watered daily. - Ensure construction machinery and equipment are well maintained to reduce exhaust gas emission - Control speed and operation of construction vehicles	- County Public Health - Officer - Workers - NEMA inspectors			
Noise pollution	- Use of Suppressors on noisy equipment or noise shields for instance corrugated iron sheet structures - Sensitize drivers of construction machinery on effects of noise - Trucks used at construction site shall be routed away from noise sensitive areas where feasible. - Maintain plant equipment to suppress frictional noise - Construction activities to be restricted to daytime i.e. 8am to 5pm - Workers in the vicinity or involved in high-level noise to wear respective safety & protective gear. - Comply with EMCA (Noise and excessive vibration	- Proponent - Contractor - County Public Health - Officer - Ministry of Labour - Workers - NEMA inspectors	Inspection/ observation	Random	**25,000**

	pollution control) Regulations 2009				
Traffic and Road safety	Enforce speed limits for construction vehicles especially along the roads leading to the site Provide bill boards at the site/entrance to notify motorists and general public about the development Ensure that the vehicles comply with axle load limits Ferry building materials during of off-peak hours Employ traffic marshals to control traffic in and out of site Employ well trained and experienced drivers. Ensuring free board haulage.	- Proponents - Contractor - Ministry of Transport - NEMA inspectors - Workers	Observation	Daily	**100,000**
Oil pollution	Proper storage, handling and disposal of new oil and used oil and related wastes Maintain construction plant and equipment to avoid leaks Maintenance of construction vehicles to be carried out in the contractors yard (off the site) Provide oil interceptors along the drains leading from car wash and service bays	- Contractor - Workers	-Inspection -Observation	Daily	**10,000**

Storm water drainage	- Proper installation of drainage structures/facility - Install cascades to break the impact of water flowing in the drains - Ensure efficiency of drainage structures through proper design and maintenance - Provide gratings to the drainage channels	- Contractor - - - -	-Inspection -Routine maintenance	During construction and on completion of each structure	**150,000**

Health and safety of workers	• All workers will be sensitized before construction begins, on how to control accidents related to construction. • A comprehensive contingency plan will be prepared before construction begins, on accident response. • Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance • Accordingly, adherence to safety procedures will be enforced. • Provide first aid kits at strategic places in the site • All workers to wear protective gear during construction e.g. helmets. • Provide clean water and food to the workers. • Construction work will be limited to daytime only • All workers will be adequately insured against accidents. • Sensitize workers on the importance of NHIF and NSSF • Ensure that the workers are registered with NHIF and NSSF and remits appropriate fee	- Contractor - Ministry of Labour - County public health officer - Workers - Proponent - NEMA inspectors - NCC inspectors - NHIF and NSSF officials	-Routine activities checks	Daily Monthly for remittance of appropriate fee	**110,000**
Fire outbreak	• Install firefighting equipment as provided elsewhere in the report • Sensitize the residents on fire risks i.e. conduct regular fire drills	- Contractor	-Observation	Random	**80,000**

	Adapt effective emergency response plan Maintain fire fighting machinery regularly Provide emergency numbers at strategic points				
Solid and liquid waste	Ensure proper solid waste disposal and collection facilities Ensure effective wastewater management Design of sewerage system should be as provided in the approved plans Wastes to be collected regularly to control air pollution and vermin/insects etc. Receptacles will be provided for waste storage prior to collection. Sensitize workers on the 5 R"s of waste management i.e. reduction, recycling, reuse, repurpose and refuse Refuse collection vehicles will be covered to prevent scatter of wastes by wind. Wastes will be collected by a licensed operator to avoid illegal final dumping at unauthorized sites. All persons involved in refuse collection shall be in full protective attire. As provided for by the Building Code, a temporary latrine will be provided on site to be used by construction workers	- Contractor - Proponent - County Public Health Officer - NEMA inspectors - Registered waste management company	-Routine Activities checks	Daily	**50,000**

Increased water demand	Management of water usage. Avoid unnecessary wastage Recycling or reuse of water where possible	- Contractor - Proponent	-Inspection -Observation	Random	**60,000**
	Make use of rain harvesting techniques such as roof catchments to provide water Employ services of waters vendors to supplement the council‟s water supply Drill a borehole	- WRMA - Ministry of water - NEMA inspectors - Workers			To be included in the Bill of Quantities
Vegetation	Design and implement an appropriate landscaping and tree planting program to help in re-vegetation of part of the project area after construction. Introduction and maintenance of vegetation (trees, shrubs and grass) on open spaces and around the site Planting and grassing should be done just before the rains or irrigated on dry spells.	- Contractor - Proponent	-Inspection -Observation	Random	**120,000**
Record Keeping	Collection, analysis and document of relevant environmental data of the site	- Proponent/contractor	-Inspection	Weekly	**20,000**
Internal Audits	Monitoring will involve measurements, observations, evaluations, assessment of changes in water quality, Emergency plans, waste management, Noise levels, contractor safety etc.	- Proponent/contractor	Inspection	Monthly	**10,000**

Security	Provide security guards and facilities during construction period The gate should always be controlled by the security men Construct a gate house	- Contractor - Proponent	Observation	Daily	**750,000**
Increase in STI infections	Sensitization of local communities and staff working on the project on dangers of free lifestyle	- Proponent & Ministry of Health	Voluntary screening Secondary data	Annual	-

8.4.2 EMP FOR OPERATION PHASE

ENVIRONMENTAL MANAGEMENT PLAN DURING OPERATION PHASE

Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Monitoring means	Frequency for Monitoring	Estimated Cost (Kshs)
Sewage/waste water spillage	• Direct waste water to the city‟s sewer • Regular inspection and maintenance of the waste disposal systems	- Proponent - Occupants - County public health officer	Periodic checks	Periodic checks	**50,000**
Solid waste generation	• Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures • Use of an integrated solid waste management system i.e. 5 R‟s of waste management • A private solid waste handler to be contracted to handle solid waste	- Proponent - Occupants - County public health officer	Periodic Checks	Periodic and surprise checks	**60,000**

Air pollution	• Cabro-paving on exposed areas • Proper landscaping and maintenance • Watering of uncovered areas • Periodic maintenance of generator, waterpumps and transformers	- Proponent - Ministry of Health - County public health officer - NEMA inspectors	Periodic Activities	Periodic and surprise checks	**25,000**
Traffic	• Provide warning lights and other signs to reduce risk of accidents • Provision of adequate on-site parking bays	- Proponent	Periodic and surprise checks		**15,000**
	• Maintenance of the parking bays				
Health and safety	• Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance • Document an emergency response procedure • Train residents on emergency response e.g through fire drills and first aid training • Engage a caretaker to ensure maintenance of a clean environment	- Proponent - County Public Health Officer - Ministry of Labour - NEMA inspectors	Routine Activities	Periodic checks and Accident audits	**22,000**

Noise and vibration Pollution	Installation of silencers on the generators and transformer rooms Provision of personal protective equipment for workers Do annual noise measurements. Do employee medical examination Comply with L.N. 25:Noise prevention and control rules, 2005 and L.N. 61: Noise and vibration pollution regulation, 2009 Sensitize residents on minimal permissible noise levels	- Proponent - County Public Health Officer - Ministry of Labour - Workers - NEMA inspectors	Periodic	Periodic checks	**5,000**

Security	Engage services of security guards Install CCTV cameras Incorporate the community policing initiative Place hotline numbers on strategic places	- Proponent - Occupants	Routine	Periodic checks	**50,000**
Storm water drainage	Proper maintenance of drainage structures/facility Provide gratings to the drainage channels	- Proponent	Inspection Routine maintenance	Once a month	**100,000**

In-house operation procedures and regulations	Ensure good maintenance of the drainage network. Institute appropriate monitoring procedures and guidelines on environmental performance, Establish environmental audit and protocol and schedule as per the EIA/audit regulations, encourage workers participation in environmental conservation aspects.	- Proponent	Routine operation procedure	Periodic	-
Increased water demand	Harvest rain-water Install water conserving taps that turn off automatically when not in use Sink a borehole Provision of roof/ underground tanks for water storage	- Proponent - Occupants	Routine maintenance Inspection	Daily	-

Energy	- Switch off electrical appliances when not in use. - Switch off all lights immediately when not in use or are not needed. At end of functions take necessary measures to switch off lights immediately. - Use energy conserving bulbs e.g. LED bulbs for general lighting. - Make use of alternative source of energy such as solar power, which is renewable. The proponent should include solar power systems to the block.	- Proponent - Occupant	Routine maintenance Inspection	Daily	To be included in the bill of quantities

8.4.3 EMP FOR THE DECOMMISSIONING PHASE

ENVIRONMENTAL MANAGEMENT/MONITORING PLAN (EMP) FOR THE DECOMMISSIONING PHASE

Note: A due diligence environmental audit will be undertaken and submitted to NEMA at least three months prior to decommissioning and in line with the Environmental Management and Coordination Act.

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility Party	Time Frame	Cost (ksh)
1. Construction Equipment/ machinery/structures & wastes				
Scraps and other debris on site	- Use of an integrated solid waste management system i.e. through a hierarchy of options: - Waste materials generated as a result of project decommissioning activities will be characterized in compliance with standard waste management procedures/regulations. Disposal locations will be selected by the contractor/project engineer based on the properties of the particular waste stream.	Contractor & Project Proponent	One-off	50,000
	- All buildings, machinery, equipment, structures and partitions that will not be used for other purposes should be removed and recycled/ reused say in other projects	Contractor & Project Proponent	One-off	-
	- Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to approved dumpsites.	Contractor & Project Proponent	One-off	-
2. Rehabilitation of project site				

• Vegetation disturbance • Land deformation: soil erosion, drainage problems	- Implement an appropriate re-vegetation programme to restore the site to its original status - During the vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; - Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; - Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	Contractor & Project Proponent	One-off	25,000
	- Comprehensive Landscaping	Contractor & Project Proponent	One-off	50,000
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 hazards such as fire - Staircases and other hazardous areas should be suitably protected say using strong rails to avoid occurrence of accidents	Contractor & Project Proponent	One- off	-
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.	Contractor	……..	-

8.5 INTERNAL AUDIT

During the operation phase, the property management will undertake a regular monitoring which is intended for proper safety and protection of the environment. The proponent or property manager will follow the monitoring system that will assist in observation, evaluation assessment and reporting on the performance of different/various variables.

Suggested audit check (aspect, performance criteria and frequency indications) table for the various environmental issues relevant to the proposed residential/commercial development

Aspect	Performance	Frequency
Water and use **And consumption**	Water to be tested for compliance with WRA and WHO standards for drinking water Monitor electricity and water consumption from the county grid, other supplies and harvested water Monitor petroleum consumption by the generator if provided	Quarterly Monthly
Air emissions	Sample and analyze generator emissions	Annually
Solid waste generation	Keep records of all solid waste transported and dumped at the county dumpsite	Review annually
Neighborhood issues	Keep records of complains or	Review annually

	compliments coming from third parties and action taken	
Aesthetic value	Ensure proper landscaping	Review quarterly
Emergency preparedness	Servicing fire extinguishers Review records of incidents and accidents and document action to take to prevent recurrence Ensure fire alarm systems working Conduct fire drills and awareness Test back-up generator to ensure it is in working order	Review annually

8.6 DECOMMISSIONING

Decommissioning is a controlled process used to safely retire a facility that is no longer needed. During decommissioning, facilities or structures are cleaned or secured so that the facility does not pose a risk to the health of the general public and/ or the environment now or in the future. Following completion of the construction of the project, any areas of land used for the project shall be re-instated for sustainable future use.

- The users will be given at least two months notice before decommissioning starts
- Termination of power supply to the development
- Termination of water connections
- All facilities within the proposed site and development will be decommissioned in an environmentally friendly manner
- Provision of personal protective equipment (PPEs) to the workers who will participate in the demolition exercise
- Waste from the site to be disposed in an environmentally friendly manner that shall be covering and preventing the natural biodiversity
- Landscaping and re-vegetation of all disturbed areas.
- Building materials that cannot be recycled should be disposed-off by a registered waste handler recognized by NEMA in relation to Environmental Management and Co-ordination (Waste Management) Regulations, 2006 Legal Notice No.12

CHAPTER NINE

9.0 CONCLUSION AND RECOMMENDATIONS

9.1 CONCLUSION

The proposed development projects by the Eighteen Seventy Lower Kabete Limited is a positive approach to provide adequate hospitality facilities to support Kenya's economy. Accordingly in the Tourism and hospitality sector provides globally competitive facilities for sustainable development, which will position Kenya as a regional Centre of tourism and hospitalty. The government and the private sector are consequently striving to improve on the available hospitality facilities by allocating resources to the tourism sector.

The proposed project design has integrated mitigation measures with a view of ensuring compliance with all the applicable laws and procedures. The proposed project will be implemented to the approvals by, among others, the physical planning departments, Nairobi City, County Government and NEMA. During the project construction phase, the proponent and contractor will avoid inadequate/inappropriate use of natural resources, conserve nature sensitively and guarantee a respectful and fair treatment of all people working on the project, general public in the vicinity and inhabitants of the project.

In relation to the proposed project, mitigation measures that should be incorporated during the construction phase, development's input to the society and cognition that the project proponent is economically and environmentally sound, this development will be considered beneficial and important. It is our conclusion that the proposed development is a timely venture that will increase higher education facilities within the county, the surrounding counties and country at large.

9.2 RECOMMENDATIONS

It is our recommendation that the magnificent project be allowed to go ahead provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close follow-up and implementation of the recommended Environmental Management and Monitoring plans (EMPs).

We recommend this:

- The proponent should follow the guidelines as set by the relevant departments to safeguard and envisage environmental management principles during construction and operations/occupation phases of the proposed project.
- It is important that WARNING OR INFORMATIVE SIGN (bill boards) be erected at the site. These should indicate the operation hours and when works are likely to be started and completed. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.
- Adopt a comprehensive ENVIRONMENT MANAGEMENT SYSTEM focusing on management of resources such as land, water and energy as well as waste management
- All solid waste materials and debris resulting from construction activities should be disposed off at approved dumpsites.
- All construction materials and especially pipes, pipe fittings, sand just to mention a-few should be sourced/procured from bonafide /legalized dealers.
- During construction all LOOSE SOILS should be compacted to prevent any erosion by river, water and wind.

- Other appropriate soil EROSION CONTROL MEASURES can be adapted. Any stock piles of earth should be enclosed, covered or sprinkled with water during dry or windy conditions to minimize generation of dust particles into the air.
- Once earthworks have been done, RESTORATION OF THE WORKED AREAS should be carried out immediately by backfilling, landscaping/leveling and planting of suitable tree species.
- Proper and REGULAR MAINTENANCE OF CONSTRUCTION MACHINERY AND EQUIPMENT will reduce emission of hazardous fumes and noise resulting from friction of metal bodies. Maintenance should be conducted in a designated area and in a manner not to interfere with the environment.
- A fully equipped FIRST AID KIT should be provided within the site
- Workers should get food that is hygienically prepared. The source of such food should be legalized or closely controlled.
- The contractor should have WORKMEN'S COMPENSATION COVER and is required to comply with workmen's compensation Act as well as other relevant ordinances, regulations and Union Agreements
- The contractor should provide ADEQUATE SECURITY during the construction period.
- Undertake ANNUAL ENVIRONMENTAL AUDITS of the development in line with Legal Notice No. 101 of 2003.
- The proponent should have an ENVIRONMENTAL HEALTH AND SAFETY OFFICER on the site during the construction.

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ANNEX 1

PUBLIC CONSULTATIONS

ANNEX 2

ARCHITECTURAL DRAWINGS

ANNEX 3

PLOT OWNERSHIP DETAILS

ANNEX 4

PROPOSED SITE PHOTOGRAPHS

PROPOSED SITE PHOTOGRAPHS

PLATE NO:	PHOTOGRAPH	REMARKS
1. Section of the existing Storey building to be decommissioned		The building consists of 4No.storey that are set for demolition to pave way for excavation
2. Similar development within the neigbouring visinity		The place is experiencing boom in skyscrapers
3.site immediate neighbours		The immediate neighborhood is used as serviced apartments and the environmental parameters thresholds should be adhered to.

4. Neighboring developments		Western Heights .There exist modern commercial facilities within the project area neighborhood. During construction, the contractor shall be advised to adhere to the EMP to ensure any adverse impacts such as noise and dust are well mitigated.
5. Rehabilitation of Lower Kabete road		The proposed project site will be easily accessed through the road. During the shipment of the construction materials and the hotel clients
6. Existing water supply system		The proposed site has its water supply from the Nairobi City Water and Sewerage Company and an existing borehole. Due to the high water demand, the proponent is advised to put up water storage tanks and employ water harvesting techniques.

7. Well established storm water drainage system		The hotel storm water will have an easier way down to the watershed
8. Sewer connection		The proposed site is served with a sewer by NCWSC .the proponent will ensure connection to the sewer system once the facility is ready for operation.
9.Power Grid		The site is well served with KPLC electricity grid and the proponent shall connect to it