ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED STUDENT RESIDENCE AND CONVENIENCE RETAIL ON LR. NO. 209/346/49 ALONG SCIENCE CRESCENT ROAD OFF RIVERSIDE DRIVE IN CHIROMO

October 2020

This Environmental and Social Impact Assessment report is submitted to the National Environment Management Authority (NEMA) pursuant to the requirements of the Environment Management and Coordination Act, chapter 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003

PROJECT PROPONENT

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DECLARATION

Ashvale Properties LLP:

That the Environmental and Social Impact Assessment study report submitted is based on the proposed construction of student residence on plots LR. NO. 209/346/49 along science crescent road off Riverside drive in Chiromo, Nairobi County.

The study report was prepared to the highest Environmental standards possible.

That during construction and operational phases, the developer will abide by the findings and the recommendations of the study.

NAME: **……**

DESIGNATION: **…….**

SIGNATURE and Stamp: ……

DATE: ……..

EIA CONSULTANTS:

That the Environmental and Social Impact Assessment study report submitted is based on the proposed construction of student residence on plots LR. NO. 209/346/49 along science crescent road off Riverside drive in Chiromo, Nairobi County.

To my knowledge, all information contained in this document is an accurate and truthful representation of all findings as relating to the proposed project as per project' information provided by the proponent and contractor to the EIA consultant:

That the study was conducted to the highest standards possible:

NAME: **Vincent O. Oduor (NEMA Registration Number 346)**

SIGNATURE……..

DATE……...

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ACRONYMS AND ABREVIATIONS

^{O}C	Degree Celsius
CUEA	Catholic University of East Africa
CPP	Consultation and Public Participation
GHG	Green House Gas
EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMCA	Environmental Management and Co-ordination Act
EMP	Environmental Management/Monitoring Plan
HDPE	High Density Polyethylene
KEBS	Kenya Bureau of Standards
Km	Kilometres
KPLC	Kenya Power and Lighting Company
KVA	Kilo Volts Amperes
L.R. No.	Land Reference Number
ETP	Moving Bed Biofilm Reactor
NEC	National Environmental Council
NEMA	National Environment Management Authority
OHSO	Occupational Health and Safety Office
PCs	Private Companies
PPE	Personal Protective Equipment
PPM	Parts Per Million
SWM	Solid Waste Management
WRMA	Water Resources Management Authority
ToR	Terms of Reference
VOC	Volatile Organic Compounds
GRM	Grievance Redress Mechanism

EXECUTIVE SUMMARY

Introduction

The proponent, Ashvale Properties LLP proposes to develop student residence next to The University of Nairobi, Chiromo Campus on LR. NO. 209/346/49 located along Science Crescent road off Riverside drive in Chiromo area, Nairobi County. The plot measuring 0.1906 Ha (0.471acres) borders the University of Nairobi, Chiromo campus on the Southern boundary separated by Mungai road.

The proposed project will entail construction of an 18storey residential block with 704 units accommodating 2,112 students. The Qejani will offer two room typologies i.e. double and quadruple which will be complemented with amenities such as study rooms, common room, backup generator, and treated borehole water, high speed lifts, CCTV, biometric and card access and convenience retail spaces. The project will have salient features described in Table 1 below.

Table 1: Salient features of the proposed project

No.	Description	Parameters
1.	Storeys above ground	18 (G+17)
2.	Storeys below ground	0
3.	Site Areas (sqm)	1,902
4.	Total Built Up Area (Sq.m)	15,767
5.	Total number of Units	704
6.	Number of Beds	2,112

The EIA study was undertaken pursuant to section 58(1) of the Environment Management and Coordination Act (EMCA Chapter 387). The main objective of the study was to identify positive and negative impacts of the proposal as well as outline an environmental management plan (EMP). EIA is a tool for environmental conservation and has been identified as a key component in new project implementation. Consistent with section 58 of the EMCA chapter 387 second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003, new projects must undergo EIA process. The Report of the same must be submitted to National Environment Management Authority (NEMA) for approval and issuance of relevant licenses.

Positive Impacts

Demand for student residence in universities and tertiary colleges far exceeds supply. The project will mainly increase the number of affordable, standardized, safe and convenient student residence. Other positive impacts include employment opportunities, revenue generation to the county and central governments, optimal use of land, economic benefit to the proponent.

Summary of negative impacts & mitigation measures

The study identified negative impacts related to the project. These can be mitigated by implementation of the proposed EMP. They are summarised in below alongside proposed mitigation measures.

Table 2: Impacts and Mitigation Measures

Possible Impacts	Mitigation measures
Soil erosion	Control earthworks; Install drainage structures to control flow of storm water; Ensure management of excavation activities
Air pollution	Stockpiles of earth should be sprayed with water or covered during dry seasons; Provide dust masks for the personnel in dusty areas; Sensitize construction workers on pollution control measurers; Cover all trucks hauling soil, sand and other loose materials ; Provide dust screen where necessary
Noise pollution	Install portable barriers to shield compressors and other small stationary equipment where necessary; Display signs to indicate construction activities; Maintain all equipment; Adhere to provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace as well as NEMA Noise and Excessive Vibration Pollution Control Regulations, 2000.
Road traffic disruption	No overloading of trucks and good driving practices to be practiced. Suitable junction/access point to be provided. Use of appropriate & legible signage. Employment of formal flagmen / women to ensure the public safety.
Increased generation of waste water	Waste water to be connected to the municipal sewer line. Adhering to the water quality regulations of 2006
Increased generation of waste	Adopt waste minimization at source; Monitoring the fate of disposed wastes to ensure they are legally land filled at a recognized controlled site. Adhering to waste management regulations of 2006
Public health and occupational safety	Ensure proper solid waste disposal and collection facilities; Ensure that waste bin cubicles are protected from animals, rains and are well covered; Provide suitable safety gear for all personnel; Connection of waste water to existing County waste system

Recommendations

1) The proponent to implement the measures outlined in the Environment Management Plan (EMP) as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects.
2) Maximize positive impacts as much as possible as exhaustively outlined within the report. This will ensure the best possible environmental compliance and performance standards.
3) Additionally, use solar PV especially for lighting streets and pavements/ walkway lighting. This will reduce demand for fossil fuels in power generation hence curbing GHG emissions.

Conclusion

Considering the positive socio-economic and environmental benefits to accrue as a result of the development, and the EIA 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 recommended mitigation measures and will further implement the proposed EMP.

1. INTRODUCTION

1.1. Background

The proponent, Ashvale Properties LLP proposes to develop student residence next to The University of Nairobi, Chiromo Campus on LR. NO. 209/346/49 located along Science Crescent road off Riverside drive in Chiromo area, Nairobi County. The plot measuring 0.1906 Ha (0.471acres) borders the University of Nairobi, Chiromo campus on the Southern boundary separated by Mungai road.

The proposed project will entail construction of an 18 storey residential block with 704 units accommodating 2,112 students. The Qejani will offer two room typologies i.e. double and quadruple which will be complemented with amenities such as study rooms, common room, backup generator, and treated borehole water, high speed lifts, CCTV, biometric and card access and convenience retail spaces. The project's salient features are presented in Table 1 above.

1.2. The need for the project

University enrolment in Kenya has increased from 27,000 in 1989 to 560,000 in 2016 with no corresponding investment in accommodation leading to a huge gap. Nairobi CBD region which host the majority of learning institutions has witnessed a tremendous increase in student population as presented in Table 3 below.

Table 3: Student population in Campuses within and around the CBD

Institution	Addressable Student Population
University of Nairobi (Main Campus)	23,272
University of Nairobi (Chiromo)	5,571
KEMU CBD Campus	1,177
African Nazarene CBD Campus	230
Mount Kenya University	1,746
St. Paul's CBD Campus	591
KCA CBD Campus	178
Total	**32,765**

Majority of the students in the table above reside in Ngara Hostels and others from their homes therefore having to commute daily to the various institutions in and around the CBD. This possess a security risk for the students when they are in transit especially for those with evening classes and the risk of commuting with laptops which are essential for their learning. With the increase in commuting time, students are subjected to higher commuting costs and the ever present threat of Covid-19 epidemic. The length of commuting time also has a significant effect on commuters' satisfaction, security risk, and efficiency during learning hours. Thus, for students, a tolerance threshold of commuting time must exist at cognitive and mental levels. The tolerance threshold of commuting time represents the maximum amount of one-way commuting time that an individual can tolerate. This has also increased traffic build up within Nairobi CBD.

Feeling the pressure, some institutions have resorted to converting structures not quite meant for accommodating students into hostels. In others, formerly domestic staff quarters

or extensions in the back yards of family homes serve as additional 'student hostels. Often times students are forced to share the houses with either families or amongst themselves. Many of these old structures lack modern amenities such as reliable running water, studying areas, privacy, WI-FI and much more. Such facilities are totally out of sync with the vibrant, creative, expressive and aspirational nature of university students. It is also clear that in these conditions, students cannot enjoy the privacy, comfort, convenience and the security they require to succeed in university and beyond.

In order to bridge the clear gap in the market, Ashvale Properties LLP embarked on the provision of student accommodation with the Qejani product. Qejani will offer two room typologies i.e. double and quadruple. The development will be served with amenities such as study rooms, common room, backup generator, treated borehole water, lifts, high speed, CCTV, biometric and card access and retail spaces.

The proposed project will provide institutional accommodation for the universities and colleges in the area and will remedy both the accommodation shortage and security concern. As such, the proposed student residence will solve these problems as the students will be within walking distance to their respective colleges

1.3. Criteria for the EIA

1.3.1. Scope

The principle policy on all new projects, programmes or activities requires that an EIA be undertaken at the planning stages. This guarantees that significant impacts on the environment are taken into consideration throughout the project lifecycle. Thus the scope of the EIA entailed:

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

1.3.2. Terms of Reference (TOR) for the EIA Process

The terms of reference for the study were developed during the scoping exercise and approved by the licensing authority in line with requirements of part III of the EIA and EA regulations 2003. The TOR's were used as a guide for the study and are appended to this report.

1.3.3. Data Collection

When collecting data, the consultant was guided by EIA regulations as well as ministry of health guidelines on preventing spread of Covid–19 pandemic. Data was collected through questionnaires, use of checklists, observations and photography, site visits and desktop environmental studies in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003.

1.3.4. Reporting and Documentation

The EIA Project Report from the findings was compiled in accordance with the guidelines issued by NEMA for such works and was prepared for submission by the proponent for consideration and approval. The Consultant ensured constant briefing of the client during the exercise.

1.3.5. Study objectives

1. To identify all potential significant adverse environmental and social impacts of the project and recommend measures for mitigation;
2. To generate baseline data that will be used to monitor and evaluate the mitigation measures implemented during the project cycle;
3. To recommend cost effective measures to be used to mitigate against the anticipated negative impacts;
4. To prepare an Environmental Impact Assessment Study Report in compliance with the Environmental Management and Coordination Act Cap 387 and the Environmental (Impact Assessment and Audit) Regulations (2003), detailing findings and recommendations.

1.3.6. Methodology

The general steps followed during the assessment were as follows:

- Environment screening, in which the project was identified as among those requiring environmental impact assessment under schedule 2 of EMCA, chapter 387
- Environmental scoping that provided the key environmental issues
- Desktop studies and interviews with project architects and engineers
- Review of relevant policies, laws, regulations, developmental frameworks as well as multilateral agreements
- Physical inspection of the site and surrounding areas
- EIA Public participation
- Reporting of study findings

2. PROJECT DESCRIPTION

2.1. Project site location

The property, L.R. No. 209/346/49 is located along Science Crescent road off Riverside drive in Chiromo area, Nairobi County measuring approximately 0.1906 Ha (0.471acres). The site currently has 2 maisonette converted into offices. The site borders the University of Nairobi Chiromo Campus on the Southern boundary separated by Mungai road and gently slopes towards Riverside Drive. It is well served with utilities such as electricity, fibre, water and access road as presented in figure below. The parcel is approximately 50 metres and 600 metres from The University of Nairobi Chiromo Campus and The University of Nairobi Main Campus respectively and 1 km to the other Universities located in the CBD namely Mount Kenya University.

Figure 1: Proposed project site

2.2. Design components of the project

The proposed project will entail construction of an 18 storey residential block with 704 units accommodating 2,112 students. The Qejani will offer two room typologies i.e. double and quadruple which will be complemented with amenities such as study rooms, common room, backup generator, and treated borehole water, lifts, high speed, CCTV, biometric and card access and retail spaces.

An artistic impression of the proposed project is as presented on the cover page of this report while the main features are presented in Table 1 on page ix. In addition, detailed architectural drawings for the development area appended to this report for further review.

2.2.1. Electrical system

Construction power will be from the Kenya Power and Lighting Company (KPLC). The project will utilize permanent power supplied by the Kenya power company limited. The various components of the electrical system shall comprise single and twin socket outlet, lockable meter board with glass view panel, gate lights and security alarm panel outlet and CCTV connection system and lifts. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. There shall be back up generators at the facility that automatically come on in-case of power blackouts to ensure all facilities including lifts are operational at all times.

2.2.2. Water supply

Water for construction will be from the municipal supply line. In addition, water extracted from a borehole will be used to supplement this source especially where cleaner water will be required. There will be water storage tanks to increase water capacity at the project site to the required amount. Waste water shall be disposed through the municipal sewer line.

2.2.3. Solid waste management

The main waste from construction activities will be excavated soil. Excavated soils will be used to backfill and landscape after decommissioning of construction activities. During occupation, large amounts of solid waste will emanate from the residencies. Each residencies will have its own waste bin. Students will be required to deposit their waste at a designated point on certain days of the week. From here, a licensed waste handler will transport the waste to designated waste treatment site.

2.3. Description of the project's construction activities

2.3.1. Demolition, excavation and foundation works

Two maisonettes currently on the plot will be demolished as described in section 2.5 below. Some of the usable material will be used for the current project e.g. in construction of a site office. Excavation will be carried out to prepare the site for construction of foundations, pavements and drainage systems. This will involve a combination of earthmoving machinery such as bulldozers and wheel loaders as well as manual labour.

2.3.2. Storage of materials

Building materials will be stored on site. Bulky materials such as rough stones, ballast, sand and steel will be carefully piled on site. To avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in quotas. Materials such as cement, paint and glasses among others will be stored in temporary storage structures built for this purpose.

2.3.3. Masonry, concrete work and related activities

The construction of the building walls, foundations, floors, pavements, drainage systems, among other components of the project involves a lot of masonry work. General masonry includes stone shaping, concrete mixing, plastering, slab construction, construction of

foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and are supplemented by machinery such as concrete mixers, cranes and hoists.

2.3.4. Structural steel works

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

2.3.5. Plumbing

Installation of pipe-work will be done to connect sewage from the student blocks to the Nairobi County sewer line. Plumbing will also be done for drainage of storm water from the rooftop into the peripheral storm water harvesting tanks. Plumbing activities will include metal and plastic pipe cuttings, the use of adhesives, metal grinding and wall drilling among others.

2.4. Description of the project's operational activities

2.4.1. Solid waste and waste water management

The proponent will provide facilities for handling solid waste generated within the project area. These will include dust bins/skips for temporarily holding waste within the premises before final disposal at the designated sites. Waste water generated from the hostels will be discharged into the municipal sewer line while storm water from the building's roof will be channelled into rainwater harvesting tanks and public drainage channels.

2.4.2. Cleaning

The proponent will be responsible for ensuring regular washing and cleaning of the pavements, the car park area, staircases etc. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

2.4.3. General repairs and maintenance

The buildings and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repair and maintenance of electrical gadgets, painting and replacement of worn out materials among others.

2.5. Description of the project's decommissioning activities

2.5.1. Demolition works

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

2.5.2. 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 this equipment to schools, churches and charitable institutions.

2.5.3. 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 top soil and re-vegetation using indigenous plant species.

3. BASELINE ENVIRONMENTAL AND SOCIO-ECONOMIC INFORMATION

3.1. Physical environment

3.1.1. Climatic Conditions

The climate in Nairobi is warm and temperate. There is a great deal of rainfall in Nairobi, even in the driest month. This climate is considered to be Cfb according to the Köppen-Geiger climate classification. The temperature here averages 18.8°C. In a year, the average rainfall is 962 mm. The average annual temperatures of the area range from 18 to 20^{o}C, with average minima and maxima of 12–14 and 24 – 26^{o}C, respectively. The warmest period occurs from January to March. Average potential evaporation is between 1,550 and 2,200 mm per year.

3.1.2. Average Daily Temperatures

The average daily temperature throughout the year varies slightly from month to month with average temperatures of around 17°C during the months of July and August to about 20°C in March. But, the daily range is much higher, with the differences between maximum and minimum temperatures each day around 10°C in May and up to 15°C in February. Between the months of June to September, southeast winds prevail in the coastal parts of Kenya and last up to several days without a break. The clouds cause day temperatures to remain low and most times the maximum temperature stay below 18°C. The minimum temperatures also remain low during cloudy nights, usually hovering around 8°C and sometimes even reaching 6°C. Clear skies in January and February also bring colder nights. The highest temperature ever reached in Nairobi was 32.8°C and the lowest was 3.9°C.

3.1.3. Average Humidity Values

Because of the area's location just south of the equator in combination with humid air pumped in from the Indian Ocean, the humidity values for each day are generally on the higher end. This is not to say that values are always high, since the easterly winds coming off the Indian Ocean tend to keep the temperatures standard throughout the country; therefore the "warm sticky" feeling is usually not associated with Nairobi as much as one would think. In the summer to autumn months of January to April, relative humidity values have been known to plummet to anywhere from 10% to 20%. The typical day, humidity-wise, starts off with nearly saturated in the morning hours, and steadily decreases throughout the remainder of the day.

3.1.4. Average Rainfall

With these routinely high relative humidity figures, it is not surprising that the Nairobi climate is one that produces much rain annually. In fact, from the past 50 years, the expected amount of rain could be anywhere in the range of 500 to 1500 mm, with the average ringing in at 900 mm. The majority of these rainfall figures crash down in Nairobi in one major and one minor monsoon seasons respectively. The major monsoon season occurs within the months of March to May, and is called the "Long Rains" by the locals. The minor monsoon seasons emerges within the October to December Months, and is called the "Short Rains". That is what the meteorologists as a whole know about the

monsoon seasons. What they do not know is exactly when these seasons will start. There is usually not an indication of when these rainy seasons will start, since it is difficult to determine when one starts and when the other finishes. Consequently, one may think there is only one rainy season when looking at the annual rainfall amounts

3.1.5. Average Winds

Winds along the surface are predominantly easterly throughout the entire year. They are shifted to northeast between October and April, and they are shifted southeast between May and September. Right before the "Long Rains" season, the strongest winds occur, reaching speeds of 20 to 25 miles per hour. During the rest of the year, winds are usually at speeds of 10 to 15 miles per hour. During the night, the winds are calm.

3.1.6. Average Sunshine

Early mornings in the area are often cloudy, but the sun peeks through by mid-morning. Throughout the year, there is an average of seven hours of sunshine per day. Thirty per cent more sunlight reaches the ground during the afternoon than in the morning. Of course, there is more sun shine during the summer months, when the sun is more overhead in the southern hemisphere. Infrequently during the rainy season the sun never show through the clouds. Even in August, the cloudiest month, there is an average of four hours of sunshine.

3.1.7. Infrastructure

Access roads to the site are connected to Waiyaki Way. This will be convenient for ferrying of supplies to the site during construction. The area is an educational hub within a walking distance to the University of Nairobi and to other institutions in the central business district. In general, Nairobi city and nearby satellite towns are well served with good communication and transport network such as air, road, and railway. It is centrally located to serve the Eastern African Countries. Bus and train stations are within an easy walk of the City Centre.

3.2. Socio-economic environment

3.2.1. Population

The project area is densely populated. Nairobi County had a population of 3.14 million people being the most populous county in Kenya. The human development index for Nairobi was 0.64[1] which is above the national average. This goes to show that the county in which the project is located has achieved above average development in health, education and income. There are about 32,765 students enrolled in various institutions in the CBD (Table 3). Most of these students lack proper accommodation facilities and are forced to seek unsuitable alternatives.

3.2.2. Land use

Nairobi County has had a marked change in land use over the years. For example a study by (K'Akumu and Onyango 2007) revealed that the area of the city under urban built-up,

[1] https://data.humdata.org/dataset/dbd29b92-99aa-452b-bde1-704058328ae2/resource/b46703cc-196f-4e40-860f-e1dd1709d81c/download/kenya-human-development-index-hdi-per-county.xlsx - Accessed 29th August 2019

open and transitional land cover have increased from 73.08 km^2 in the year 1988 to 228.65 km^2 in the year 2015. While agricultural, grass, secondary growth and riparian vegetation which occupied 126.82 km^2 of the city in the year 1988 have marginally increased to 189.73 km^2 in the year 2015; forest cover have shown mixed gains and loss. In the year 1988, the area of the city under the forest cover was 59.63 km^2 (K'Akumu and Onyango 2007).

This increased to 122.41 km^2 in the year 1995 and thereafter declined by approximately 50% reaching 63.63 km^2 in the year 2000. The decline is attributed to the indiscriminate extraction of forest resources and clearance of the same for urban developments which characterized the periods between the years 1995 to 2002. This situation was reversed in the year 2003 when the new government re-emphasized and re-energized strategies geared towards increasing the forest cover in the country. Such strategies included the degazettement and clearance of illegal structures within the forest reserves. This has since made the area of the city under forest cover to gradually increase from 63.63 km^2 in the year 2000 to 93.44 km^2 in the year 2015 (K'Akumu and Onyango 2007).

4. LEGISLATIVE AND REGULATORY FRAMEWORK

4.1. Constitutional and Legal Framework

4.1.1. Constitution of Kenya (2010)

***Article 42-Environment*;** Indicates that every person has the right to a clean and healthy environment, which includes the right to –

- Have the environment protected for the benefits of present, future generations through legislative and other measures, particularly those contemplated in Article 69, and
- Have obligations relating to the environment fulfilled under Article 70 [2].

Article 43-Economic and social Rights

Indicate that every person has the right to accessible and adequate housing and to reasonable standards of sanitation.

4.1.2. The Environmental Management and Coordination Act chapter 387

The Environmental Management and Coordination Act (EMCA) chapter 387, and its Attendant Environmental (Impact Assessment and Audit) Regulations of 2003 Provides for the establishment of an appropriate legal and institutional framework for the management of environment in Kenya. The Act introduces two important aspects of urban environmental management, which are directly related to the proposed project: environmental impact assessment (EIA) and environmental audit (EA).

Section 58 (1) has underscored that any person being a proponent of a project Shall before financing, commencing or proceeding with submit an EIA report to the National Environmental Management Authority (NEMA) of Kenya[3].

Section 68 (1) gives NEMA the mandate for carrying out all environmental audits of all activities that are likely to have significant impacts on the environment. It authorizes environmental inspectors, as appointed by NEMA to enter in any premise and determine how far the activities carried out conform to statements in EIA study.

Compliance with EMCA

- The proponent has undertaken an EIA as per the requirements of Section 58 (1) of EMCA chapter 387 awaiting approval prior to the commencement of the project.
- The proponent will implement the proposed EMP and adhere to the conditions set in the license of the proposed project.
- The proponent will adhere to subsequent EMCA legislations such as the noise and waste regulations throughout the cycle of the project.
- The proponent shall undertake Environmental audits for the project and submit the reports to NEMA as per the EIA/EA guidelines

[2] LAWS OF KENYA, *The Constitution of Kenya, 2010* (Attorney General Nairobi, 2010), http://www.wipo.int/edocs/lexdocs/laws/en/ke/ke019en.pdf.

[3] George M. Wamukoya and Francis DP Situma, *Environmental Management in Kenya: A Guide to the Environmental Management and Coordination Act* (Centre for Research and Education on Environmental Law, 2000).

4.1.3. Physical Planning and Land Use Planning Act, 2019

An ACT of Parliament to make provision for the planning, use, regulation and development of land and for connected purposes.

Section 57 (1) A person shall not carry out development within a county without a development permission granted by the respective county executive committee member.
(2) A person who commences any development without obtaining development permission commits an offence and is liable on conviction to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding two months or to both.
(3) A county executive committee member shall require a person who has commenced a development without obtaining development permission to restore the land on which the development is taking place to its original condition or as near to its original condition as is possible and that such restoration shall take place within ninety days.

Section 59 (1) A person applying for development permission shall ensure that any documents, plans and particulars that are provided to the respective county executive committee member while applying for development permission have been prepared by the relevant qualified, registered and licensed professionals.

Section 65 A county executive committee member may impose conditions or impose a fine to be prescribed in regulations on an applicant for development permission for building works where that applicant fails to complete the building works within five years.

According to the Third Schedule Development Control,
Section 4. Planning authorities shall require applications for major developments to be subjected to environmental and social impact assessment.

Compliance with this legislation

- The architectural plans of the proposed development have been submitted to the county government of Nairobi for approval upon which the project shall commence.
- The proposed project has been subjected to the requisite ESIA and report submitted to NEMA for licensing to acquire the EIA license.
- The proponent will ensure that the land is utilized in an ecofriendly manner and is restored to its original condition once the project is decommissioned.
- Ensure the development does not in away have injurious impact on the environment and that a developmental footprint of less than 50% is maintained.

4.1.4. Physical Planning (Building and Development Control) Regulations

Under the provisions of the Physical Planning (Building and Development control) Regulations; The Director of Physical Planning shall refuse to recommend any new building or proposed development, or alteration or addition to any existing building if:

i. The proposal is not in conformity with approved development plan.
ii. Such plans disclose a contravention of the physical Planning (Building and Development) rules.
iii. The plans are not correctly drawn or omit to show information required.
iv. On such being required, separate application accompanied by sets of plans has not been lodged in respect of building on separate plots or subplots etc.

Compliance

- Change of use to mixed use (student hostels, convenience retail) has been approved by the county government (see attached change of use certificate)
- The proponent shall adhere to the recommendations given in the building order by the county physical planner
- The proponent shall ensure that the building plans are available on site for inspection by county officials during construction and at any other time.

4.1.5. The Public Health Act (Cap 242)

Section 15 (1x) –Nuisance

Any noxious matter or wastewater discharged from any premise, such as a building constitutes nuisance. Any premise not kept in a clean and free from offensive smell such as gases which are injurious to health such as those from commercial establishments shall therefore generate nuisance. The Act therefore stresses that no person shall cause a nuisance to exist on any land or premise occupied by him.

The Act acknowledge that it shall be the duty of all local authorities to take all lawful measures for maintaining its district at all times in a clean and sanitary condition for remedy of any nuisance or condition liable to be injurious to heath. To safeguard against this, part X of the public Health Act states that where in the opinion of the Medical Officer of Health that food stuffs within a warehouse, or a building are insufficiently protected, the owner shall be compelled to observe the require regulations, else he shall be guilty of an offense[4].

Compliance

- The proponent will ensure solid waste shall be handled by a professional NEMA approved garbage collector on regular basis and disposed appropriately as per the waste regulations.
- Sanitary facilities shall be in conformity with MOH standards and installation of standard fittings. Liquid wastes shall be connected to the County waste water system.

4.1.6. Occupational Health and Safety Act 2007

The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work. It applies to all workplaces where any person is at work, whether temporarily or permanently. Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3months jail term or both or penalties of KES 1,000,000 or 12months jail term or both for cases where death occurs and is in consequence of the employer

Compliance

- The proponent will appoint a reputable contractor who will be responsible for enforcing the requirements during construction and subsequent repairs and maintenance after project completion.

[4] The Republic of Kenya, "The Public Health Act Chapter 242" (Kenya law reports, 2012).

- They will make provision for the health, safety and welfare of persons employed in factories and other places of work. Ensure that every work place shall be kept in a clean state and free from effluvia, arising from any drain, sanitary convenience or nuisance.
- Avail fire extinguishers, which shall be adequate and suitable in case of fire out breaks. Provide adequate means of escape in case of fire outbreak for the employees.
- Provide suitable protective clothing must be provided.

4.1.7. National Building Regulations, 2017

The National Building Regulations (NBR) 2015 is a set of rules to be used by professionals in the building industry to guide design, construction and maintenance of buildings in Kenya. The review was necessitated by the frequent disasters that have befallen the country in the recent past and the generally decaying built environment. The NBR 2015 effectively replaces the outdated 1968 Building Code which has been in use since the colonial era. The 1968 Building Code had many shortcomings and could not adequately address the needs of a safer, secure, healthier, attractive and well maintained built environment. It remained static and failed to move in tandem with the trends and shifts in building industry, such as emerging technologies and materials, green building and security intelligence.
The NBR 2015 is informed by the Constitution of Kenya 2010, Vision 2030 and other relevant unfolding reviews such as the National Construction Act which seeks to register contractors in Kenya.

Section A - 5 Development Permissions; *A - 5.1* No person shall develop or cause to be developed any building on land where development permissions applicable to the area have not been granted.
A - 5.2 Any person who contravenes the provisions of these Regulations shall be guilty of an offence.

Section 27 Construction

All workmanship in the erection of any building shall be in accordance with sound planning and building practice. Any building, including any structural element or component thereof, shall be constructed so as to comply with the design requirements of these Regulations.

Precautions shall be taken during all stages of construction or any building to ensure that the structural system is not damaged or distorted during the course or erection of such building.

Section A - 33 Certificates of Occupation
A - 33.1 On completion of any building works, the person for whom the building works were carried out shall apply to the approving authority for:-
(a) a full Occupation Certificate; or
(b) a Sectional Completion Certificate
(c) a Temporary Occupation permit.

A - 34.5; Protection of Persons and Property

Throughout the progress of any work to which these Regulations apply, every person responsible for the erection of a building, shall ensure by suitable means the safety and protection of all persons and property liable to be affected by the work.

Compliance

- The proponent should ensure that the regulations as guided by various approving and licensing authorities are adhered to strictly.
- The project proponent has submitted the building plans and the required information to the approving authority (County government of Nairobi) for requisite approval before commencement of the work and regular monitoring will follow to ensure compliance with set standards and conditions.
- The proponent should ensure that any persons affected by the project's activities are protected from all harm and that all hoarding of the site is made to prevent unauthorized entry.
- The proponent will obtain Certificate of Completion on decommissioning. They shall further provide firefighting equipment that may include one or more of the following: hydrants, hose reels and fire appliances, , portable fire appliances, water storage tanks and dry risers,

4.1.8. Penal Code (Cap. 63)

The chapter on "Offences against Health and Conveniences" strictly prohibits the release of foul air into the environment, which affects the health of other persons. Any person who voluntarily violates the atmosphere at any place, to make it noxious to health of persons in general dwelling or carrying out business in the neighborhood or passing along public ways is guilty of misdemeanor, i.e. imprisonment not exceeding two years with no option of fine . Under this Act, any person who for the purpose of trade or otherwise makes loud noise or offensive awful smell in such places and circumstances as to annoy any considerable number of persons in the exercise of their rights, commits an offences, and is liable to be punished for a common nuisance, i.e. imprisonment not exceeding one year with no option of fine.

4.1.9. Water Quality Regulations, 2006

The law is based upon the principle that everybody is entitled to a healthy and clean environment. Section 42, is pertinent to the implementation of this project. These Regulations shall apply to drinking water, water used for industrial purposes, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife, and water used for any other purposes[5].

Compliance with this legislation

- Since the area is served by the County waste water and sewer line, there is provision for connection to the existing line for waste water disposal

[5] The Republic of Kenya, "The Environmental Management and Coordination, (Water Quality) Regulations 2006." 2006, www.nema.go.ke.

4.1.10. Noise and Excessive Vibrations Pollution (Control) Regulations, 2009

Part II of the rregulations[6] regulations; section 3 states:

1. 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.

Compliance: The proponent shall take into concern the provisions of the local authority act to ensure that the development complies with the provisions of the Act.

4.1.11. Waste Management Regulations (2006)

This legislation gives guidelines for handling different kinds of waste. Some of the relevant sections to the proposed project are as follows:

Part II Section 1: No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle

Part II Section 6: Any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles:

a) **improvement** of production process through:
   i. Conserving raw materials and energy
   ii. eliminating the use of toxic raw materials within such time as may be prescribed by the Authority
   iii. reducing toxic emissions and wastes
b) **Monitoring** the product 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.
   iii. Reclamation and recycling.
c) **Incorporating** environmental concerns in the design, process and disposal of a product[7].

Compliance

- The proponent will ensure that all waste are segregated before being transported to a designated waste treatment facility by a contracted NEMA licensed waste transporter
- A contracted waste handler licensed by NEMA will be responsible for safe disposal of solid wastes from the residence

4.1.12. The National HIV Policy

The HIV policy is geared towards ensuring that new development projects encourage preventive and responsible behaviour both for the workers involved in such projects and the local people within which projects are taking place as a goal towards curtailing the spread of the disease. The proponent is advised to put in place adequate measures so as to ensure that implementation of the proposed projects does not heighten the spreads of HIV and AIDS

[6] The Republic of Kenya, "The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009." 2009, www.nema.go.ke.

[7] The Republic of Kenya, "The Environmental Management and Co-Ordination (Waste Management) Regulations, 2006.," n.d., www.nema.go.ke.

4.2. Institutional Framework

The environmental impact assessment for the proposed development is influenced by interest of several stakeholders and lead agencies, either exclusively or concurrently. Some of these stakeholders and lead agencies include:

- National Environmental Management Authority (NEMA)
- Director of Physical Planning
- The County Government of Nairobi
- The Ministry of Education
- The ministry of Environment and Natural resources

4.3. Development Policy Framework

The overall development policy framework for the proposed project is captured in various local authority and government documents. The development of this project has been benchmarked against UN and International guidelines.

4.3.1. The World Commission on Environment and Development

The commission commonly referred to as "the Brundtland Commission" is focused on the environmental aspects of development. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. Social sustainable development maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and wellbeing, adequate nutrition, shelter, cultural expression, and political involvement [8].

4.3.2. The Rio Declaration on Environment and Development

The Rio Declaration on Environment and Development was adopted by more than 178 governments at the United Nation Conference on Environment and Development, known as the earth summit, held in Rio de Janeiro, Brazil from 3rd to 14th June 1992. Under Agenda 21, Principle No. 10 of the declaration underscores that environmental. Issues are best handled with participation of all concerned citizens at all relevant levels. At the national level, each individual shall have appropriate access to information concerning environment that is held by public authorities. States shall encourage and facilitate public participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy shall be provided.

The foregoing discussion is relevant to the proposed development because Kenya legislation demands that public must be involved before any development project that is likely to have adverse impacts to the environment is initiated by a project proponent. The environment Act has further established public complaints committee (PCC) where the issues raised by the public in regard to any proposed development can be addressed[9].

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[8] Gro Harlem Brundtland, *Report of the World Commission on Environment and Development:" Our Common Future."* (United Nations, 1987).

[9] L. Hens, "The Rio Declaration on Environment and Development," *Regional Sustainable Development Review: Africa. Oxford, UK, Eolss Publishers*, 2005, http://www.eolss.net/sample-chapters/c16/E1-48-43.pdf.

4.3.3. Kenya Vision 2030

Kenya aims to be a nation that has a clean, secure and sustainable environment by 2030.The goals for 2030 are: (i) to increase forest cover from less than 3% at present to 4%; and (ii) to lessen by half all environment-related diseases. Specific strategies will involve promoting environmental conservation in order to provide better support to the economic pillar flagship projects and for the purposes of achieving the sustainable Development Goals (SDGs); improving pollution and waste management through the design and application of economic incentives; and the commissioning of public-private partnerships (PPPs) for improved efficiency in water and sanitation delivery. Kenya will also enhance disaster preparedness in all disaster-prone areas and improve the capacity for adaptation to global climatic change. In addition, the country will harmonize environment-related laws for better environmental planning and governance[10].

4.3.4. Sustainable Development Goals (SDGs)

Kenya ratified the sustainable development goals in august 2015. The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The proposed project will be guided by targets and indicators espoused in the following sustainable development goals. Whereas the time frame for achieving the SDGs has been set for year 2030, achievement for certain targets for the current project will be immediately during construction and occupation.

- SDG 4 – Quality Education. The project will enable achievement of this goal through provision of quality and affordable student residencies
- SDG 6 – clean water and sanitation. The proponent will be required to provide clean drinking water for workers during construction and students during operational phase.
- SDG 10 – Reduced inequality. Equal opportunity for employment across gender must be given throughout the project cycle
- SDG 11 – Sustainable cities. The development offers opportunities to achieve this goal. Construction of multistoried buildings it is possible to reduce both the direct and indirect demand of built-up and bio productive areas correspondingly.
- SDG 13 – Climate action. Incorporating solar PV for street lighting will reduce grid emissions thereby mitigating against climate change.

[10] Kenya Vision, "2030: A Globally Competitive and Prosperous Kenya (2007)," *Ministry of Planning and National Development and the National Economic and Social Council (NESC), Government of Kenya, Nairobi (GOK, 2007)*, n.d.

5. PUBLIC PARTICIPATION

5.1. Objectives of the consultation and public participation

The objective of the Consultation and Public Participation (CPP) as required in EMCA chapter 387 was to:-

1. Disseminate and inform the public and other stakeholders about the proposed project with special reference to its key components, location and expected impacts.
2. Create awareness among the public on the need for the EIA for the proposed project.
3. Gather comments, concerns and suggestions of the interested and, would be affected/interested parties.
4. Ensure that the concerns of the interested and, would be affected/interested parties were known to the decision-making bodies and the proponent at an early phase of project development planning.
5. Establish a communication channel between the interested, would be affected/interested parties, the team of consultants and the Government.
6. Incorporate the information collected in the project by EIA Experts.

The purpose for such a process was to identify the positive and negative impacts of the project and subsequently suggest mitigation measures.

5.2. Methodology used in the CPP

The Consultation and Public Participation (CPP) Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA Cap 387 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development[11].

In view of the ongoing pandemic and government guidelines issued, public consultation shall be through the following methods:

- A public forum – members of the public shall be invited to a public forum possibly via zoom or any other media platform. This will be directed by the licensing authority.
- Printed questionnaires – open ended questionnaires shall be handed out to people in the neighbourhood.
- Electronic questionnaires - the open ended questionnaire shall also be posted on the consultant's website. When handing over the printed questionnaire, respondents will be directed to a link to the electronic questionnaire thus will have more options to respond while keeping the recommended social distance
- Posters – posters shall be erected in the project site neighbourhood to inform affected persons about the upcoming project. an email address shall be provided for sending comments
- Media – There will be two advertisements in a national newspaper, one radio advertisement and one Kenya Gazette advertisement as will be directed by the

[11] Adapted from "Introduction" in McKeown, Rosalyn. Education for Sustainable Development Toolkit, Version 2, Centre for Geography and Environmental Education, University of Tennessee, July 2002.

licensing authority. Members of the public will be able to respond to the Authority directly via an email address to be provided in the advertisements.

Information gathered from public consultation shall be collated and submitted to the authority as an addendum to this report.

6. POTENTIAL ENVIRONMENTAL IMPACTS

6.1. Positive Impacts during Construction

6.1.1. Employment Opportunities

One of the main positive impacts during projects construction phase is the availability of employment opportunities especially to casual workers and several other skilled workers such as building and construction engineers. Employment opportunities are of benefit both economically and socially.

Several workers including casual labourers, masons, carpenters, joiners, electricians, and plumbers are expected to work on the site during the construction phase. Apart from casual labour, semi-skilled, unskilled labour and formal employees are also expected to obtain gainful employment during the period of construction. Generally, employment during the construction phase will lead to multidimensional development in the area and in Nairobi at large and improve several people's living standards.

6.1.2. Optimal Use of Land

In Africa the UN predicts that the current 400 million urban citizens will exceed 750 million by 2030 and will reach 1.2 billion by 2050[12]. The increasing population will require adequate facilities at learning institutions that are mostly located in cities. It is also plausible to note that while urban population increases the size of land available for development will continue to decrease. The effect of this trend has been the reduction of farmland and encroachment into animal habitats and migration routes. Thus, it is highly recommended that land being a finite resource must be optimally utilized.

The proposed project will see conversion of idle land into student residence for the surrounding institutions. The residence will accommodate more than 3500 students at a property that initially had a single dwelling house housing one household. This type of land use in a city also makes it easier for provision of services such as waste management, piped water and electricity. It is reported that detached houses/dwellings have a larger ecological footprint than storied houses (Bastinoni, et al. 2006). Thus, through the construction of multistoried buildings it is possible to reduce both the direct and indirect demand of built-up and bio productive areas correspondingly.

6.1.3. Economic Growth

Through the use of locally available materials during the construction phase e.g. cement, concrete and ceramic tiles, timber, sand, ballast electrical cables and others; the project will contribute towards growth of the country's economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel 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.

[12] Pieterse, E. (2009). African cities: Grasping the unknowable. *Inaugural Lecture, University of Cape Town, August*, *26*.

6.1.4. Improvement of the Informal Sector

There are usually several informal businesses, which come up during the construction periods of such projects. These include food vendors who benefit directly from the construction workers buying food and other commodities from them. This will promote the informal sector in securing some temporary revenue and hence improve their livelihood.

6.1.5. Market for Supply of Building Materials

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

6.2. Negative Impacts during construction

6.2.1. Noise pollution

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials and workers to the site. Workers are most likely to be affected since noise beyond some level is itself a nuisance if not maintained within acceptable levels.

6.2.2. Disposal of excavated soil

Site excavations shall be done to the satisfaction of the Principal Consultant's specification hence some materials shall be rejected as waste for disposal. Improper disposal of this category of waste may have adverse impacts on the receiving environment.

6.2.3. Soil Erosion

The excavation and construction activities are likely to loosen the soil particles making them prone to soil erosion. Such problems become serious when the topsoil is left bare and agents of erosion become active. Construction also requires use of sand and other natural materials such as ballast and others used in cement manufacture which must be sourced from a different location. This leaves vast areas prone to erosion. Soil erosion is an important problem both at its source and downstream of the development site. Lost soil will be deposited somewhere, and the location of the deposition could alter downstream hydrology and increase chances of flooding. It may also pose a water quality issue directly as a result of siltation and indirectly from contaminants carried with or attached to soil particles.

6.2.4. Dust Emissions

Particulate matter pollution is likely to occur during the site clearance, demolitions, excavation and loading and transportation of the construction waste. There is a possibility of PM_{10} suspended and settle-able particles affecting the site workers and even neighbours health.

6.2.5. Increased Water Demand

Both the workers and the construction works will create an increased demand for water in addition to the existing demand. Water will be mostly used in the creation of aggregates for construction works and for wetting surfaces for softening or hardening after creating the formworks.

6.2.6. Generation of Exhaust Emissions

Exhaust emissions are likely to be generated during the construction period by the various construction machinery and equipment. Motor vehicles used to mobilise the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through gaseous exhaust emissions.

6.2.7. Building Materials and Energy Consumption

The main sources of energy that will be required for construction of the project will include mains electricity and fossil fuels (especially diesel). Electricity will be used for welding, metal cutting/grinding and provision of light. Diesel will run material transport vehicles and building equipment/machinery. The proponent should promote efficient use of building materials and energy through proper planning to reduce economic and environmental costs of construction activities.

6.2.8. Generation of solid wastes

During construction solid waste will be generated. These include papers used for packing cement, plastics and timber remains among others. Dumping around the site will interfere with the aesthetic status of the area. This has a direct effect to the surrounding community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic, pest breeding, pollution of physical environment, invasion of scavengers and informal recycling communities.

6.2.9. Risk of accidents

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

Workers are also likely to be exposed to diseases from contact with potentially harmful building materials. It is therefore recommended that before the construction activities, materials should be thoroughly inspected and harmonised to the occupational health and safety standards.

6.2.10. Oil spills

The machines on site may be containing moving parts which will require continuous oiling to minimise the usual corrosion or wear and tear. Possibilities of such oils spilling and contaminating the soil and water on site are real. Likewise, moving vehicles on site may

require oil change. But these dangers are curbed by maintaining the machinery in specific areas designed for this purpose.

6.2.11. Increased energy consumption

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil fuel is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. The project will use electricity supplied by KPLC for construction and operation. Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. Approximately 32% of electricity in Kenya is generated from thermal sources[13]. Thus it should be prudently used e.g. by installing occupational sensing lights and use of energy saving bulbs. The buildings will be IFC Edge compliant with applications that can support the environmental aspect of the project including low flow faucets, showerheads, dual flash water closets and LED lighting. Such initiatives will lower grid emissions and the overall project carbon footprint.

6.3. Positive Impacts during Occupation Phase

6.3.1. Increased student enrolment due to accommodation availability

Increased enrolment in universities over the past decade has subsequently augmented demand for accommodation. Most universities if not all in Kenya do not have adequate facilities for the increasing numbers. Shortage of accommodation facilities in public and private universities is forcing students to live in residencies outside the campuses, exposing them to insecurity. A government scheme to encourage the private sector to put up residencies near universities has not met the demand for accommodation, leaving most students at the mercy of unscrupulous landlords and criminals[14]. University enrolment has for a long time been curtailed by the lack of student accommodation. At times, the expensive accommodation available makes the cost of higher education unaffordable to the majority of people.

The proponent has been working to meet the high demand for student accommodation facilities. Their model seeks to not only provide accommodation but to do it the right way. This model includes providing among others comfortable, secure, standard, affordable residencies. The initiative will give parents some form of relief knowing that their children are living in secure environments as they study. The proposed project will add more than 3500 more accommodation units for at least seven institutions in the project area (refer to **Error! Reference source not found.** above) but this will not be sufficient in meeting the demand in the area.

6.3.2. Employment Opportunities

Employment opportunities are one of the long term impacts of the proposed project that will be realised after construction and during the operation and maintenance of the building. These will involve other sources of employment of many skilled and semi-skilled people to work in the proposed commercial building.

[13] https://energypedia.info/wiki/Kenya_Energy_Situation - Accessed 4th September 2019
[14] https://www.nation.co.ke/news/Residencies-crisis-death-trap-college-students-/1056-5027630-qfd4g3/index.html -Accessed 3rd June 2020

6.3.3. Incorporation of proper Waste Management System

The project is designed such that there will be provision of a well-planned strategic waste management system. The wastes will thus be collected from the site in bulk and as one unit such that the careless disposal leading to proliferation of wastes within the surrounding areas will be curbed.

6.3.4. Increased Revenue generation

Revenues paid to the national and county government in form of taxes will increase once the project is complete. The value of the plot will increase leading to increased land rates payable to the County government.

6.3.5. Improving growth of the Economy

Through the use of locally available materials during the construction phase of the project including 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 students will be in constant need of basic needs hence ready market for foodstuffs and stationary among others.

6.3.4. Increased Business Opportunities

The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as food vendors around the construction site. The project management will wish to reside in the neighborhood hence increased demand for accommodation and other resources.

6.4. Negative Impacts during operation

6.4.1. Increased Pressure on Infrastructure

During construction there shall be increased use of these roads to ferry material and equipment. Further pressure will be experienced during occupational phase albeit to a lesser extent since vehicle movement into the facilities shall be restricted to the parking slots available. Furthermore, the proponent shall provide bus transportation to the students.

6.4.2. Water use

Domestic consumption of water during the operation phase of the project will involve the use of large quantities of water that will take place due to the increased number of households in the area. A hydrogeological survey had been carried out to ascertain that there will be sufficient ground water for all neighbours using boreholes within the area.

6.4.3. Solid Waste Generation

It is envisaged that substantial amounts of solid wastes will be generated from the proposed development once it is complete. The bulk of the solid waste produced during the operation of the project will entail paper, plastic, glass, metal, textile and organic wastes. Such

wastes can be harmful to the environment through obstruction of drainage systems, clogging of water bodies and negative impacts on animal health. Some of these waste materials especially the plastic/polythene are not biodegradable hence may cause long-term effects to the environment. Even the biodegradable ones such as organic wastes may be harmful to the environment because as they decompose, they produce methane gas, a greenhouse gas known to have a high warming potential.

6.4.4. Increased storm water flow

The building roofs and pavements will lead to increased volume and velocity of storm water or run-off flowing across the area covered by the units. 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 Neighbouring areas.

6.5. Positive Impacts during decommissioning

6.5.1. Rehabilitation

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation, which will lead to improved visual quality of the area.

6.5.2. Employment Opportunities

Employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.

6.6. Negative Impacts during decommissioning

6.6.1. Noise and Vibration

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

6.6.2. Generation of Solid Waste

Demolition works will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

6.6.3. Increased dust emission

Large quantities of dust will be generated during demolition works. This will affect demolition workers as well as the neighbors and plants in the area.

6.6.4. Loss of all occupational phase benefits

Decommissioning of the project will result in loss of all the positive impacts accrued during occupation of the residencies. These impacts have been discussed in section 6.3 above.

6.7. Climate change impacts

The proposed project construction and operational activities will have an impact on climate change. It is important to study the climate impacts of construction, operation and decommissioning phases. Such studies will guide project proponents and policy makers in allocating resources for mitigation. Here we only highlight the foreseen impacts but a detailed life cycle analysis of the project will give a clearer data and results.

The project' impact on climate will largely depend on energy consumption, material extraction, water use and waste water treatment, food waste and other wastes generated, type of solid waste treatment among others. Consumption of fossil fuels to power machinery and vehicles will lead to direct emission of greenhouse gases (GHGs) to the atmosphere. Anaerobic and aerobic treatment of waste water will generate methane- a potent GHG with a global warming potential that is 28-36 times that of carbon dioxide. If methane is not recovered from the process its impact to climate will be significant.

Another source of methane will be decomposition of food waste in landfills and waste treatment sites. About 11% of all the greenhouse gas emissions that come from the food system could be reduced if we stop wasting food[15]. When we waste food, we also waste all the energy and water it takes to grow, harvest, transport, and package it. And if food goes to the landfill and rots, it produces methane. Thus, it will be important to advise incoming occupiers of the residencies to reduce food waste and or donate leftovers.

The project will also be impacted by climate change. These impacts include increased surface temperatures and excessive rainfall. Increased surface temperatures occasioned by positive radiative forcing associated with anthropogenic GHGs may make it uncomfortable for construction workers. Additionally, high surface temperatures may increase room temperature in the residencies making it uncomfortable for students. Some students may resort to using air conditioning at these times thus increasing electricity demand and associated grid emissions. On the other hand, excessive rainfall may cause flooding within the compound as well as increase surface runoff that may damage infrastructure e.g. roads.

It is important that climate change impact mitigation measures are incorporated into the project design.

[15] https://www.worldwildlife.org/stories/fight-climate-change-by-preventing-food-waste - Accessed 5th September 2019

7. MITIGATION MEASURES AND MONITORING PROGRAMMES

7.1. Mitigation of Construction Related Impacts

7.1.1. Air Quality

Controlling dust during construction is useful in minimizing nuisance conditions. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (greenhouse gases, and diesel related particulate matter) that would occur in the exhaust from heavy equipment are also included. The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction.

All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips and minimize idling of engines.
Dust emissions will be controlled by the following measures:

- Watering all active construction areas as and when necessary to lay dust.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with physical sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Cover construction site with hessian cloth/ scaffolding netting to contain the dust within the premises and plant trees around the site upon construction completion.

7.1.2. Minimize the Effects of Noise Emitted from the Site

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:

a) Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
b) Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
c) A substantial permanent increase in ambient noise levels (more than five decibels) in the project vicinity above levels existing without the project.
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimise the impact of temporary construction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Establishment of noise buffer.

- Use quiet equipment (i.e. equipment designed with noise control elements).
- Co-ordinate with relevant agencies regarding all substation construction activities in the residential areas.
- Install sound barriers for pile driving activity.
- Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
- Construction/Demolition works should be done during the day when people are away and also the outside environment is also noisy.
- Adhere to the provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace.

7.1.3. Minimize the Effects of Exhaust Emission

In order to control exhaust emissions the following measures shall be implemented during construction:

a) Vehicle idling time shall be minimized
b) Alternatively fuelled construction equipment shall be used where feasible
c) Equipment shall be properly tuned and maintained

This will also be achieved through proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.

7.1.4. Hydrology and Water Quality Degradation

Soil sampling and trial holes digging will be conducted before construction begins and soil information will be provided to construction crews to inform them about soil conditions and potential hazards. If hazardous substances are unexpectedly encountered during trenching, work will be stopped until the material is properly characterised and appropriate measures are taken to protect human health and the environment. If excavation of hazardous materials is required, they will be handled in accordance with applicable regulations. If suspected contaminated groundwater is encountered in the depths of the proposed construction areas, samples will be collected and submitted for laboratory analysis of petroleum hydrocarbons, metals, volatile organic compounds and semi-volatile organic compounds. Appropriate personal protective equipment will be used and waste management will be done in accordance with applicable regulations. Oil absorbent material and storage drums will be used to contain and control any minor releases of engine and other equipment oil.

7.1.5. Worker Accidents and Hazards when Handling Hazardous Wastes

Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided. In addition the proponent is committed to adherence to the occupational health and safety rules and regulations stipulated in Occupational Health and Safety Act, 2007. In this regard, the proponent is committed to provision of appropriate personal protective equipment, as well as ensuring a safe and healthy environment for construction workers as outlined in the EMP.

7.1.6. Increase of disease Vectors

Disease vectors such as rats, flies, and cockroaches increase where refuse is exposed or uncollected and can be a hazard. Complete refuse collection and handling service will be provided by the proponent so that this is not a hazard in compliance with the Public Health Act and as also required in the Occupational Safety and Health Act, 2007 regarding hygiene at the workplace.

7.1.7. Possible Exposure of Workers to Diseases

Possible exposure of workers to diseases from building materials at construction site shall be mitigated by occupational health and safety standards enforcement as required in the OSHA, 2007.

7.1.8. Accidents during Construction and Operation

Workers accidents especially in deep trenching operations and from gas accumulation in sewers and other confined spaces shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.

7.1.9. Reduction of Impacts at Extraction Sites and Efficient Use of Raw Materials

The proponent will source building materials such as sand, ballast and hard core from registered quarry and sand mining firms, whose projects have undergone satisfactory environmental impact assessment/audit and received NEMA approval. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated.

To reduce the negative impacts on availability and sustainability of the materials, the proponent will only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the proponent will ensure that wastage, damage or loss (through run-off, wind, etc.) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

In addition to the above measures, the proponent shall consider reuse of building materials and use of recycled building materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.

7.1.10. Minimization of Run-off and Soil Erosion

The proponent will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include terracing and levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off.

7.1.11. Minimization of Construction Waste

It is recommended that demolition and construction waste be recycled or reused to ensure that materials that would otherwise be disposed as waste are diverted for productive uses. In this regard, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed. Furthermore, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass 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 groups, institutions and individual residents or home owners.

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

Additional recommendations for minimization of solid waste during construction of the project include:-

a) Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time
b) Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
c) Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials
d) Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
e) Use of construction materials containing recycled content when possible and in accordance with accepted standards.

7.1.12. Reduction of Energy Consumption

The proponent shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. In addition, proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the proponent shall monitor energy use during construction and set targets for reduction of energy use.

7.1.13. Minimization of Water Use

The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use. The proponent will install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff.

7.1.14. Controlling Oil Spills during Construction Phase

The proponent will control the dangers of oil, grease and fuel spills during construction by maintaining the machinery in specific areas designed for this purpose. Machinery site repair will be discouraged and repair work restricted to approved garages to avoid pollution from oil, grease and fuel.

7.1.15. Public Health, Safety and Awareness

a) The contractor should provide a small section of the construction site with a shed and a water stand where the food can be served to the construction workers to promote hygiene and health of the employees.
b) A fully equipped first aid kit should be provided at the site.
c) The contractor must have workmen's compensation cover as required by law (The Workmen's Compensation Act), as well as relevant ordinances, regulation and union's agreements.
d) The workers, immediate neighbour and other stakeholders should be sensitized on the dangers and risk associated with the construction works for enhanced self-responsibility on personal safety.
e) The proponent should ensure that the completed buildings are fitted with safety facilities including fire detectors, fire-fighting equipment, fire exits, adequate access and buffer between the residential premises.
f) Disabled access features and safety signage should be placed strategically around and within the buildings.
g) Appropriate sanitation conveniences should be provided at the site as required in the OSHA, 2007 and echoed in the Public Health Act.

7.1.16. Environmental Monitoring and Grievance Redress Mechanism

The proponent should post an Environmental officer on site to monitor all operations during construction to ensure strict compliance to the EMP and institute a Grievance Redress Mechanism (GRM) where all issues raised by the neighbours will be filed, addressed and responded to accordingly without delay.

7.2. Mitigation of Impacts during Operation Phase

The project will be developed and operated into a student accommodation similar to the currently operating properties in Parklands, Jogoo Road and Outer-ring ring roads. The existing facilities have co-existed with the neighboring communities harmoniously due to the stringent regulations governing student's behavior and activities within the premises. No noise, parties or alcohol are allowed within the premises and entry is strictly via student's biometrics scan / card access thus no strangers can access the premises. Safety measures including fire protection; smoke detectors in every room, portable fire extinguishers and Fire hose reels, are of the highest standards.

7.2.1. Ensuring Efficient Solid Waste Management

The proponent will be responsible for efficient management of solid waste generated by the project during its operation. In this regard, the proponent will provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated

from the hostels. Moreover, the proponent will ensure that such waste is regularly and appropriately disposed.

An integrated solid waste management system is recommended. First, the proponent will give priority to Reduction at Source of the materials. This option will demand a solid waste management awareness programme in the management and the residents. Recycling, reuse and compositing of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. The recyclables will be sold to waste buyers within Nairobi City. 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. The proponent will adhere to the Environmental Management and Coordination (Waste Management), Regulations 2006.

7.2.2. Ensure Efficient Energy Consumption

Students will be sensitized to ensure energy efficiency in their domestic operations. Use of light sensors and LED fixtures will reduce the overall electricity consumption. Furthermore, security lights that have to be kept on throughout the night will be powered by solar.

7.2.3. Ensure General Safety

A competent security firm will be engaged to ensure the general safety and security at all times. The existing perimeter wall will be enhanced by installation of electric fence. The proponent is also advised to install CCTV cameras at strategic zones within the compound.

7.2.4. Ensure Efficient Water Use

The proponent will install low flow faucets and dual flash water closets to ensure water-conservation. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff. In addition, the occupants of the facility will be sensitized to use water efficiently.

7.3. Mitigation of Impacts during Decommissioning Phase

7.3.1. Efficient solid waste management

Solid waste resulting from demolition or dismantling works will be managed as described in Section 7.2.1.

7.3.2. Reduction of Dust Concentration

High levels of dust concentration resulting from demolition or dismantling works will be minimized as described in Section 7.1.1.

7.3.3. Minimization of Noise and Vibration

Significant impacts on the acoustic environment will be mitigated as described in Section 7.1.2.

8. ANALYSIS OF PROJECT ALTERNATIVES

8.1. Relocation Option

If the authority deems the project to have adverse impacts that cannot be mitigated, then the proponent may be forced to relocate it to a new site. Currently, the developer does not have an alternative site. The current site was also sought due to its proximity to the University of Nairobi with a view of solving student accommodation issues.

Relocation means that the proponent has to search for a new site. This may take long with no guarantees for a suitable find. The other consequence of this is that it would discourage investors especially in the housing sector. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. Furthermore, the EIA study revealed that the project is vital is solving a key public concern and the associated impacts aren't adverse and can be mitigated.

8.2. No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the landowner and the community as a whole. The landowner will continue to pay rent for the plot while the plot remains underutilized hence no substantial income to the owner. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors among others:

- It will jeopardize the goal of increasing more safe and affordable student residencies
- No employment opportunities will be created for thousands of Kenyans who will work in the proposed project area and the nearby towns

From the analysis above, it becomes apparent that the No Project alternative is not an alternative to the proponent, local people, and the government of Kenya.

8.3. Alternative project scope and scale

The project proponent has the option of reducing the project scope to cater for a smaller population of students by reducing the scale of the development. In the project conceptualization, the proponent considered that university enrollment in Kenya has increased from 27,000 in 1989 to 560,000 in 2016. It's also noteworthy to consider the UN population projections for Africa whereby the UN predicts that the current 400 million urban citizens will exceed 750 million by 2030 and will reach 1.2 billion by 2050[16]. The increasing population will require adequate facilities at learning institutions that are mostly located in cities. It is also plausible to note that while urban population increases the size of land available for development will continue to decrease.

[16] Pieterse, E. (2009). African cities: Grasping the unknowable. *Inaugural Lecture, University of Cape Town, August*, *26*.

To decrease the project scope, the proponent would not have made a futuristic investment that can respond to the current student needs while anticipation the future student population needs too as advocated by Environmentalists under the concept of "sustainable development".

The Universities Act Cap 210B, Seeks to "promote university education for the benefit of the people of Kenya through the establishment and progressive development of public universities." However, the Government is not expressly obligated to provide residence for students. A student without accommodation cannot concentrate on his studies and one with a safe residence will be keen to ensure that the areas general security is guaranteed. Qejani seeks to feel the lacunae in the Universities (Establishment of Universities) Standardization, Accreditation and Supervision Rules, 1989 which does not list housing and/or accommodation as a resource to be considered by the Commission for Higher Education when reviewing an application for the establishment of a university. The project will support the existing and licensed higher education institutions within the area.

8.4. The proposed development alternative

Under the proposed development alternative, the developer will be issued with an EIA License. In issuing the license, NEMA will approve the proponent's proposed development. The proponent will be required to implement the project in line with the licensing conditions and the proposed environment management plan.

8.5. Analysis of Alternative Construction Materials and Technology

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

Beautiful and durable re-enforced concrete roofs because they are good in heat insulation with minimal (if any) iron sheet roofs are to be used. Heavy use of timber during construction is discouraged because of destruction of forests. The exotic species would be preferred to indigenous species in the construction where need will arise. However, this construction methods and technologies to be used will require very little timber.

9. ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

9.1. Introduction

An Environmental Management/ Monitoring Plan (EMP) has been developed to assist the proponent in mitigating and managing environmental impacts associated with the life cycle of the project. It is noteworthy that key factors and processes may change through the life of the project and considerable provisions have been made for dynamism and flexibility of the EMP. As such, the EMP will be subject to a regular regime of periodic review during project implementation.

Table 5, Table 6 and **Table** 7 form the core of this EMP for the construction, operational and decommissioning phases of the proposed project respectively. In general, the Tables outline the potential safety, health and environmental risks associated with the project and detail all the necessary mitigation measures, their financial costs, as well as the persons responsible for their implementation and monitoring. The EMP will be used as checklist in future environmental audits.

9.2. Cost of mitigation

Using best practices in other parts of the world, the costs of the mitigation measures and of the institutional and training requirements to implement them will be estimated with a ceiling budget of approximately **2.5% of the total project cost.** A comprehensive work program, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measure will be prepared based on this budget guideline.

9.3. EMP for demolition phase

9.3.1. Introduction

Two maisonettes at the site are earmarked for demolition. They are made of concrete walls reinforced by steel bars and wood frames. The foundation is also concrete while the floor is made of tiles. The roof is made tiles while the doors and windows are a mix of steel and wood. The building will be demolished to create space or the incoming project.

9.3.2. Objective

The prime objective is to implement and EMP during demolition of the buildings. Specific objectives are:

- To demolish the building considering the safety so as to ensure the protection of the worker, general public, and adjacent property;
- To demolish the existing the building adopting the standard safety measures and segregate the debris in to recyclable and non-recyclable for proper disposal and management of wastes;
- To separate out the potential hazardous materials and dispose with proper environmental management and safety,
- Transport and dispose materials which cannot be reused and recycled in safety manners

9.3.3. Demolition process

Demolition of the building involves several activities of them foremost step would be a detailed pre-demolition preparatory works such as desired equipment, manpower, removing hazardous or regulated materials, obtaining necessary permits from the authority, submitting necessary notifications, disconnecting utilities, and development of site-specific safety and work plans for the workforce among others. Extra care should be taken while the demolition is in progress. The demolition EMP is presented in Table 4: EMP for demolition below.

Table 4: EMP for demolition

Environmental Impacts	Mitigation measures	Implementation stage	Mitigation cost	Responsible party
Air, Noise and Dust Pollution During the Dismantling of the building	-Water spraying at the demolition site -Fencing / Install barriers(GI sheets, geo-net) to shield from dust and aggregates -Avoid usage of machines/equipment with extra noise; -Do not accumulate and burn waste at the site -Comply with the provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace	Demolition	10,000	Contractor and proponent
Land pollution	-In case of hazardous waste store in safe place and make the provision for management -Dispose at the designated site identified in coordination with the County Government of Nairobi	Demolition	5,000	Contractor and proponent
Disturbance to the neighbouring Population and pedestrians	-Install barriers(Hessian cloth/ scaffolding net) to shield from dust and aggregates -Give prior notice of activities to the neighbouring stakeholders -Restrict demolition works to daytime between 8:00am and 5:00pm	Demolition	10,000	Contractor and proponent
Vibration Impact	Precaution should be taken while using the machines and equipment, during demolition Comply with the provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace		No cost	Contractor and proponent
Impacts due to the disposal of waste materials	The solid waste will be segregated at source level and collected in a separate container -Reusable or useful materials like, building blocks doors and metal reinforcements will be sold to willing buyers - Debris will be disposed at designated sites considering all the environment factors	Demolition	5,000	Contractor and proponent
Safety for the Demolition Workers	-Make mandatory the use of safety gears (helmets, safety belts, masks, gloves and boot) by workers depending on nature of work. -Workers will be provided with first aid and health facilities at the site. -There will be provision for group accidental insurance for the workers. -Adhere to provisions of OHS, 2007 guidelines.	Demolition	10,000	Contractor and proponent

9.4. EMP for construction phase

The necessary objectives, activities, mitigation measures, responsibilities and monitoring indicators pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase of the proposed project are outlined in Table 5 below

Table 5: EMP for Construction Phase

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
1. Curb project associated conflicts and Lost Time Injuries (LTI) e.g. land ownership disputes.				
Project implementation disputes	Sufficient planning for adequate resources required i.e. financial, personnel and equipment	Proponent & Contractor	Project planning phase (100,000)	Monetary and material Resources allocated for the project
	Land transfer agreements should be formalized before the project start as per the laws of the land	Proponent/Government of Kenya	Project planning phase (400,000)	Land ownership documents
	Community support mobilization and sensitization through consultative forums or questionnaire methods	Proponent & EIA Experts	Project planning phase (600,000)	Public meetings and interviews conducted
	Change of use to multiple residential and commercial (Mixed use)	Proponent & County government	Project planning phase (800,000)	Change of use certificate obtained
2. Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High Demand of Raw material	Source building materials from local suppliers who use environmentally friendly processes in their operations	Project Manager & Contractor	Throughout construction period	Number of complaints received from material sources e.g. stone quarries

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered	Project Manager & Contractor	Throughout construction period	-
	Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	Project Manager & Contractor	Throughout construction period (10,000)	Quantity of damaged material
	Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Project Manager & Contractor	Throughout construction period	Quantity of recycled material e.g. steel used
3. Minimize vegetation disturbance at and or around construction site				
Vegetation disturbance	Ensure proper demarcation and delineation of the project area to be affected by construction works.	Contractor, Civil engineer & Project Manager	During construction phase (40,000)	Percentage of area left undisturbed by development Percentage of area covered by vegetation
	Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage	Civil Engineer, Architect and Project Manager	During construction phase	-
	Designate access routes and parking within the site	Civil Engineer, Architect and Project Manager	During construction phase (5,000)	-

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Introduction of vegetation (trees, shrubs and grass) on open spaces and their maintenance	Architect & Landscape specialist	Monthly to Annually (300,000)	Number of trees planted and % of area covered by vegetation
	Design and implement an appropriate landscaping programme to help in re-vegetation of part of the project area after construction	Architect & Landscape specialist	2 months (40,000)	Percentage of area landscaped
4. Reduce storm-water, runoff and soil erosion				
Increased storm water, runoff and soil erosion	A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed	The Civil Engineer, Mechanical Engineer and Project Manager	1 month (400,000)	Types of soil erosion control measures in place; Number of complaints received from neighbours;
	Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.		1 months (70,000)	
	Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site		Throughout construction period	
	Ensure that any compacted areas are ripped to reduce run-off.		2 months (400,000)	
	Open drains all interconnected will be provided on site	Civil Engineer	Throughout construction period	-

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
5. Minimize solid waste generation and ensure efficient solid waste management during construction				
Increased solid waste generation	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling	Project Manager & Contractor	Throughout construction period (500,000)	Quantity of wastes removed from the site; Quantity of recycled and reused waste
	Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed rather than cutting them to size, or having large quantities of residual materials	Project Manager & Contractor	During construction phase	Inventory of material used
	Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed.	Project Manager & Contractor	During construction phase	Inventory of unused material
	Ensure that damaged or waste construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects	Project Manager & Contractor	During construction phase	Inventory of damaged material
	Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or homeowners.	Project Manager & Contractor	During construction phase	Quantity and type of donated material

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time	Project Manager & Contractor	Throughout construction period (900,000)	-
	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Project Manager & Contractor	During construction phase (100,000)	-
	Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials.	Project Manager & Contractor	Throughout construction period	Inventory of unused material
	Use building materials that have minimal or no packaging to avoid the generation of excessive waste	Project Manager & Contractor	Throughout construction period (400,000)	Quantity and type of packaging
	Use construction materials containing recycled content when possible and in accordance with accepted standards.	Project Manager & Contractor	Throughout construction period	Inventory of recyclable material such as steel
	Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	Quantity and type of reused material
	Dispose waste more responsibly at designated waste treatment sites or landfills only.	Project Manager, Mechanical Engineer & Contractor	Throughout construction period (100,000)	Quantity of disposed wastes; Number of waste Tracking documents filled

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Waste collection bins to be provided at designated points on the site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period (30,000)	Number of waste Tracking documents filled; Waste transport licenses from the waste handler; number of waste related complaints received from tenants, homeowners and neighbours
	Private waste disposal company to be contracted to transport and dispose the solid waste from site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period (400,000)	
	Running an educational campaign amongst employees, e.g. through use of posters, to encourage reuse or recycling of the solid waste	Project Manager, Mechanical Engineer & Contractor	Throughout construction period (20,000)	
6. Reduce dust emissions				
Dust emission	Ensure strict enforcement of on-site speed limit regulations	Project Manager & Contractor	Throughout construction period	Dust emission levels measured
	Avoid excavation works in extremely dry weathers	Project Manager & Contractor	Throughout construction period	
	Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles	Project Manager & Contractor	Throughout construction period (400,000)	
	Personal Protective equipment to be worn always when at work place	Project Manager	Throughout construction period (800,000)	
7. Minimization of exhaust emissions				
Exhaust emission	Vehicle idling time shall be minimized	Project Manager & Contractor	Throughout construction period	-

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	Project Manager & Contractor	Throughout construction period	Type and quantity of fuel used' number of trips and distance per truck and other vehicles
	Sensitise truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off vehicle engines at these points	Project Manager & Contractor	Throughout construction period	Number of training sessions for drivers
8. Minimization of noise and vibration				
Noise and vibration	Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Project Manager & Contractor	Throughout construction period	Number of training sessions with truck drivers
	Sensitise construction drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and hospitals	Project Manager & Contractor	Throughout construction period	-
	Ensure that construction machinery are kept in good condition to reduce noise generation	Project Manager & Contractor	Throughout construction period (900,000)	Noise levels measured at the site
	Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures to minimize ambient noise levels	Project Manager & Contractor	Throughout construction period (400,000)	Noise levels measured at the site

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	The noisy construction works will entirely be planned to be during daytime when most of the neighbours will be at work.	Project Manager & all site foremen	Throughout construction period	Number of noise complaints received
	Comply with the provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace	Project Manager & all site foremen	Throughout construction period (400,000)	Noise levels measured during construction activities; Number of noise complaints received
9. Minimization of energy consumption				
Increased energy consumption	Ensure electrical equipment, appliances and lights are switched off when not being used	Project Manager & Contractor	Throughout construction period	-
	Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy	Project Manager & Contractor	Throughout construction period (600,000)	Number of energy saving lights used
	Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts by using feasible short routes	Project Manager & Contractor	Throughout construction period	Quantity of fuel consumed
	Monitor energy use during construction and set targets for reduction of energy use.	Project Manager & Contractor	Throughout construction period	Quantity of fuel consumed
10. Minimize water consumption and ensure more efficient and safe water use				
High water demand	Install water conserving taps that turn-off automatically when water is not being used	Project Manager & Contractor	One-off (1,400,000)	Number of water conservation taps installed

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Promote recycling and reuse of water as much as possible	Project Manager & Contractor	Throughout construction period (40,000)	-
	Install a discharge meter at water outlets to determine and monitor total water usage	Project Manager & Contractor	One-off (400,000)	Quantity of water used
	Promptly detect and repair water pipe and tank leaks	Project Manager & Contractor	Throughout construction period (150,000)	Number of recorded leaks and repairs
	Sensitise staff to conserve water by avoiding unnecessary water use	Project Manager & Contractor	Throughout construction period	Number of trainings done on water conservation
	Ensure taps are not running when not in use	Project Manager & Contractor	Throughout construction period	-
11. Minimize release of liquid effluent				
Generation of wastewater	Use portable chemical toilets where there is no viable alternative	Mechanical Engineer & Project Manager	During construction (400,000)	-
	Conduct regular checks for pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	Mechanical Engineer & Project Manager	Throughout construction period (40,000)	Number of repairs done and complains received
	Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated	Mechanical Engineer & Project Manager	Throughout construction period (40,000)	Analytical report for effluent
12. Minimize occupational health and safety risks				

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
Approval of building plans	Ensure that all building plans are approved by the Local Authority and the local Occupational Health and Safety Office	Proponent	One-off (900,000)	-
Incidents, accidents and dangerous occurrences.	Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Project Manager, Developer & Contractor	Continuous (400,000)	Number of accidents occurring during construction; Type of PPEs used by workers
	Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.	The Contractor, Project Manager& Site Safety Officer	Continuous (150,000)	-
Insurance	Ensure that the premises are insured as per statutory requirements (third party and workman's compensation)	Developer	Annually (200,000)	Number of insured workers and vehicles
Health and safety committee	Provisions must be put in place for the formation of a Health and Safety Committee, in which the employer/contractor and the workers are represented	Project Manager	Continuous	-
Sanitary conveniences	Suitable, efficient, clean, well-lit and adequate sanitary conveniences should be provided for construction workers	Project Manager	Continuous (400,000)	Type of sanitary facilities provided; number of complaints received

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
Medical examination	Arrangements must be in place for the medical examination of all construction employees before, during and after termination of employment	Project Manager, Developer & Contractor	Continuous (400,000)	Frequency of medical examination
Machinery/equipment safety	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Project Manager, Developer & Contractor	Continuous (700,000)	Number of accidents recorded; Types of PPEs provided
	Ensure that equipment and work tasks are adapted to fit workers and their ability including protection against mental strain	Project Manager, Developer & Contractor	Continuous (150,000)	–
	All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Project Manager	Continuous (150,000)	–
	Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Project Manager	Continuous (150,000)	Number of training sessions done
	Equipment such as fire extinguishers must be examined by a government authorized person. The equipment may only be used if a certificate of examination has been issued	Project Manager	Continuous (150,000)	Frequency of inspection of fire extinguishers

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
	Reports of such examinations must be presented in prescribed forms, signed by the examiner and attached to the general register	Project Manager	Continuous (150,000)	Number of reports
Storage of materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Project Manager	Continuous (150,000)	-
	Ensure that items are not stored/stacked against weak walls and partitions	Project Manager	Continuous (150,000)	–
Safe means of access and safe place of employment	All floors, steps, stairs and passages of the premises must be of sound construction and properly maintained	Project Manager & Contractor	Continuous (150,000)	–
	Securely fence or cover all openings in floors	Project Manager & Contractor	Continuous (150,000)	–
	Provide all staircases within the premises with suitable handrails on both sides	Project Manager & Contractor	Continuous (150,000)	
	Ensure that construction workers are not locked up such that they would not escape in case of an emergency	Project Manager & Contractor	Continuous (150,000)	–
	All ladders used in construction works must be of good construction and sound material of adequate strength and be properly maintained	Project Manager & Contractor	One-off (150,000)	–

Foreseen Impacts	Proposed Mitigation Measures	Responsibility For Implementation	Time Frame & Mitigation cost (Ksh)	Monitoring indicators
Emergency preparedness and evacuation procedures	Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency	Project Manager & Contractor	One-off (150,000)	Evacuation procedures and trainings done
	Such procedures must be tested at regular intervals	Project Manager & Contractor	Every 3 months	
	Ensure that adequate provisions are in place to immediately stop any operations where there in an imminent and serious danger to health and safety and to evacuate workers	Project Manager & Contractor	One-off	
	Ensure that the most current emergency telephone numbers posters are prominently and strategically displayed within the construction site	Project Manager & Contractor	One-off	
	Provide measures to deal with emergencies and accidents including adequate first aid arrangements	Project Manager & Contractor	Continuous (150,000)	Number of workers trained on first aid
First Aid	Well stocked first aid box which is easily available and accessible, should be provided within the premises	Project Manager & Contractor	One-off (150,000)	Number of first aid kits provided
	Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Project Manager & Contractor	One-off (150,000)	Number of workers trained as first aiders; ratio of first aiders to rest of workers
13. Ensure the general safety and security of the site and surrounding areas				
Increased Pressure on Infrastructure	Coordinate with other planning goals and objectives for the region	Architect, Project Manager, Contactor and the Developer	Continuous (150,000)	Approvals from county government and other agencies

	Upgrade existing infrastructure and services, where feasible.	Architect, Project Manager, Contactor and the Developer	Continuous (150,000)	
Insecurity	Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site.	Security Officer, Project Manager & Police	Continuous (150,000)	Number of recorded site intrusions
	Body-search the workers on entry, to avoid getting weapons on site, and leaving site to ensure nothing is stolen.	Security Officer	Continuous (150,000)	
	Ensure only authorised personnel get to the site	Security Officer	Continuous (150,000)	
	Security alarms will be installed	Security Officer	Continuous	
14. Environmental monitoring of the project				
Environmental concern during the construction phase	Due to the magnitude of the project the proponent will liaise with the environmental consultants throughout the construction phase and ensure that the conditions of approval are adhered to.	Proponent, Contractor and Consultant	Throughout construction phase (150,000)	Number of environmental related complaints received from workers and neighbours

9.5. EMP for occupational phase

The necessary objectives, activities, mitigation measures, responsibilities and monitoring indicators pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of the proposed project are outlined in **Table** 6 below

Table 6: EMP for Operation Phase

Foreseen Negative impacts	Proposed Mitigation Measures	Responsible Party	Time Frame	Monitoring indicators

Foreseen Negative impacts	Proposed Mitigation Measures	Responsible Party	Time Frame	Monitoring indicators
1 Minimization of solid waste generation and ensuring more efficient solid waste management				
Increased generation of solid waste	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary landfilling.	Proponent/Property Managers	During the life of the project (150,000)	Quantity of recycled, composted & land filled waste Number of tenants/homeowners segregating their waste
	Provide solid waste handling facilities such as waste bins and skips	Proponent/Property Managers	Continuous (150,000)	Type and number of waste bins and skips provided
	Ensure that solid waste generated is regularly disposed appropriately at authorised waste treatment sites	Proponent/Property Managers	Continuous (450,000)	Frequency of waste collection Quantity of waste collected
	Donate redundant but serviceable equipment to charities and institutions	Proponent/Property Managers	Continuous (150,000)	Types and quantity of equipment and material donated
	Comply with the provisions of Environmental Management and Co-ordination (Solid Waste) Regulations 2006	Proponent/Property Managers	Continuous (50,000)	Number of waste tracking documents filled Waste transport licenses from the waste handler Quantity of segregated wastes
2 Minimise risks of liquid waste release into environment				
Liquid waste release into the environment	Connect all waste water streams to the municipal sewer line	Proponent/Property Managers	During construction phase	Permit or sewer connection works
	Conduct regular inspections of the ETP and plumbing and make adjustments and or repairs promptly	Proponent/Property Managers	Continuous (150,000)	Number of recorded complaints from neighbours, homeowners and tenants

Foreseen Negative impacts	Proposed Mitigation Measures	Responsible Party	Time Frame	Monitoring indicators
	Comply with the provisions of Environmental Management and Co-ordination (Water Quality) Regulations 2006 and related by laws	Proponent/Property Managers	Continuous	Cost of sewerage connection and use paid to the county government
3 Minimize energy consumption				
Energy Use	Installation and use of solar PV for lighting pavements and roads;	Proponent	Continuous (950,000)	Number of solar street lights installed;
	Switch off electrical equipment, appliances and lights when not in use	Proponent/Property Managers	Continuous (150,000)	Savings (electricity bills) made when compared to a business as usual scenario
	Install occupation sensing lighting at various locations such as the parking areas which are not in use all the time	Proponent/Property Managers	One-off (150,000)	Number of occupational sensing lights installed
	Install energy saving fluorescent tubes at all lighting points within instead of bulbs which consume higher electric energy	Proponent/Property Managers	One-off (150,000)	Savings (electricity bills) made when compared to if incandescent bulbs were used
	Monitor energy use during the operation of the project and set targets for efficient energy use	Proponent/Property Managers	Continuous (150,000)	Targets set and met
	Sensitise workers on how to use energy efficiently	Proponent/Property Managers	Continuous (150,000)	Number of advice notices on energy saving
4 Minimize water consumption and ensure more efficient and safe water use				
Water management	Promptly detect and repair water pipe and tank leakages	Proponent/Property Managers	Continuous (150,000)	Number of repairs done
	Workers/visitors to conserve water e.g. by avoiding unnecessary toilet flushing	Proponent/Property Managers	Continuous (150,000)	-

Foreseen Negative impacts	Proposed Mitigation Measures	Responsible Party	Time Frame	Monitoring indicators
	Ensure taps are not running when not in use	Proponent/Property Managers	Continuous (150,000)	-
	Install water conserving taps that turn-off automatically when water is not being used	Proponent/Property Managers	One-off (150,000)	Number of water conservation taps installed
	Install a discharge meter at water outlets to determine and monitor total water usage	Proponent/Property Managers	One-off (150,000)	Quantity of water used per month
5 Minimization of health and safety impacts				
Implement all necessary measures to ensure health and safety of workers and the general public during operation of the offices as stipulated in the Occupational Safety and Health Act,2007		Proponent/Property Managers	Continuous (150,000)	Number of occupational accidents recorded per year
6 Ensure the general safety and security of the premises and surrounding areas				
Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises		Proponent/Property Managers	Continuous (150,000)	Number of security complaints received
7 Control of informal activities around the project site				
Mushrooming of Informal Settlement		Sub County Administration	Continuous (150,000)	-number of kiosks around the project perimeter fence
8 Ensure environmental compliance				
Undertake an environmental audit within 12 months after operation commences as required by law		Consultant	12 months after operation commences (150,000)	Number of improvement notices and or compliance letters obtained

9.6. Decommissioning Phase

In addition to the mitigation measures provided in Table 5 and **Table** 6, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. The necessary objectives, mitigation

measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined in Table 7 below.

Table 7: EMP for Decommissioning Phase

Foreseen Negative Impacts	Proposed Mitigation Measures	Responsible Party	Time Frame	Monitoring indicators
1. Demolition waste management				
Demolition waste	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling.	Project Manager & Contractor	One month (50,000)	Quantity of waste generated
	All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible	Project Manager & Contractor	During decommissioning (50,000)	Quantity of recovered material that can be recycled
	All foundations must be removed and recycled, reused or disposed of at a licensed disposal site	Project Manager & Contractor	During decommissioning (50,000)	
	Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site	Project Manager & Contractor	During decommissioning (50,000)	Quantity of material recycled or sold for recycling
	Donate reusable demolition waste to charitable organizations, individuals and institutions	Project Manager & Contractor	During decommissioning	Quantity of material donated
2. Rehabilitation of project site				
Site degradation	Implement an appropriate re-vegetation programme to restore the site to its original status	Project Manager & Contractor	During decommissioning (50,000)	Area of and that has been re-vegetated

Foreseen Negative Impacts	Proposed Mitigation Measures	Responsible Party	Time Frame	Monitoring indicators
	Consider use of indigenous plant species in re-vegetation	Project Manager & Contractor	During decommissioning (50,000)	Number of indigenous trees planted
	Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent area and the development.	Project Manager & Contractor	During decommissioning (50,000)	-

10. CONCLUSION AND RECOMMENDATION

10.1. Conclusions

1) The proposed development is in line with Kenya's goal to build safe learning and accommodation facilities for student in higher education.
2) Key positive impacts that will result from the project include; growth of the economy, boosting of the informal sector during the construction phase, provision of market for supply of building materials, employment generation, increase in government revenue and optimal use of land.
3) Negative environmental impacts that will result from establishment of the proposed project which include pressure on the existing facilities, noise pollution, dust emissions, solid waste generation, increased water demand, increased energy consumption, generation of exhaust emissions, risk of workers accidents, possible exposure of workers to diseases.
4) Negative impacts can be sufficiently mitigated by implementation of the proposed Environment Management Plan
5) The building will be IFC Edge compliant with applications that can support the environmental aspect of the project i.e. low flow taps, low flow shower heads, LED lighting among others.

10.2. Recommendations

1) The proponent to implement the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects.
2) Maximize positive impacts as much as possible as exhaustively outlined within the report. This will ensure the best possible environmental compliance and performance standards.
3) Additionally, use solar PV especially for lighting streets and pavements/ walkway lighting. This will reduce demand for fossil fuels in power generation hence curbing GHG emissions.
4) This proposed project is recommended for licensing.

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