ENVIRONMENTAL IMPACT ASSESSMENT

STUDY REPORT

FOR

THE PROPOSED STUDENT HOUSING SCHEME DEVELOPMENT ON L. R. NO. 20892/195 IN LUKENYA AREA OF MAVOKO SUB COUNTY, MACHAKOS COUNTY.

This Environmental Impact Assessment (EIA) Study Report is submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination (Amendment) Act, 2015 and the Environmental (Impact Assessment and Audit) Regulations, 2003

Project Proponent:

Dominic Mwangi Kiarie,

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NAIROBI

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

Name of the Expert	Designation	Reg.No.	Signature
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EXECUTIVE SUMMARY

1.0 Introduction

According to the Kenya National Bureau of statistics in the KNBS Economic Survey report of 2014, the Student Enrolment in Public Universities between 2007 and 2013 doubled from approximately 85000 to 170000 respectively. This is as a result of free primary education program and free secondary education initiatives which started in 2003 and 2008 respectively.

Many universities in the country are experiencing an acute housing shortage due to the large number of students flocking the higher learning institutions. Students' accommodation shortage accounts for 40% of the national housing shortfall according to a research by real estate researcher Jumia House. According to the research, there are 280,000 bed spaces in universities against a student population of 769,000, a number that keeps rising. 2015 alone recorded a rise in students' population by 80,000 as a result of the expanded enrolment for both government-sponsored and self-sponsored students.

The situation has put a lot of pressure on on-campus accommodation facilities prompting students to seek alternative accommodation in nearby private facilities. There are on-going plans by universities to build hostels to accommodate over half a million students in the next five years supported by Public-Private Partnerships (PPP) so as to curb the ever growing student housing crisis.

In light of these prevailing circumstances, the Proponent *Dominic Mwangi Kiarie* has proposed to develop a 215 bed capacity student housing scheme on plot LR No. 20892/195 located 300 meters from the Daystar University in Lukenya area, Mavoko Sub-County of Machakos County.

2.0 Scope objective and criteria of the Environmental Impact Assessment study

The Kenya Government policy on all new project, programmes or activities requires that an Environmental Impact Assessment (EIA) is carried out at the planning stages of the proposed project to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of the proposed development. The scope of this full project, therefore, covered:

i. The baseline environmental conditions of the area,
ii. Description of the proposed project,
iii. Provisions of the relevant environmental laws,

iv. Identification and discuss of any adverse impacts to the environment anticipated from the proposed project,
v. Appropriate mitigation measures,
vi. Provision of an Environmental Management Plan (EMP) outline.

The overall objective of the project is to ensure that all environmental concerns are integrated in all the development activities in order to contribute to the sustainable development. Specifically the objectives are:

i. To identify potential environmental impacts, both direct and in direct
ii. To assess the significance of the impacts
iii. To propose preventive mitigating and compensative measures for the significant negative impacts of the project on the environment
iv. To generate baseline data for monitoring and evaluation of how well the mitigating measures are being implemented during the project cycle.
v. To present information on impact of alternative
vi. To present the results of the EIA study that can guide informed decision making
vii. To prepare EMP for the proposed project and decommissioning plan.

3.0 Terms of Reference (TORs)

The consultant conducted the project by incorporating but not limited to the following terms of reference:

a. Location of the proposed project
b. A concise description of the national environmental legislative and regulatory framework, baseline information and any other relevant information related to the project.
c. The objectives of the project.
d. The technology, procedures and processes to be used, in the implementation of the project.
e. The materials to be used in the construction of the project.
f. The products, by-products and waste to be generated by the project.
g. A description of the potentially affected environment.

h. The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
i. To recommend an efficient, environmentally sound and affordable waste water management system.
j. Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
k. Analysis of alternatives including project site, design and technologies.
l. An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
m. Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the course of the project implementation.
n. Propose measures to prevent health hazards and to ensure a secure and habitable working environment for the construction employees, neighbors and for the management in case of emergencies.
o. An economic and social analysis of the project.
p. Such other matters as the Authority may require

4.0 Methodology

The methodology used in the study consisted of the following:

i. Environment screening, in which the project was identified as among those requiring environmental impact assessment under schedule 2 of EMCA, 1999 Legal Notice No. 150 0f 2016
ii. A site reconnaissance and visual survey to determine the baseline information of the project area
iii. Analysis of the project documents
iv. Discussion with the proponent and the entire Project Team
v. Assessment of the site to detail the various existing and likely impacts.
vi. Assessment of health and safety issues
vii. Seeking public views through interviews, public meeting (baraza) and questionnaires.
viii. Proposal of mitigation measures to minimize any anticipated negative impacts.
ix. Preparation and submission of the EIA Study report

5.0 Project Description

The proposed development will comprise of 215 student housing units and auxiliary facilities to be constructed in two blocks, that is, Block A and Block B. The total plinth area will be 7300 square meters (SM) having a plot coverage and plot ratio of 33.58 per cent and 1.804 respectively. A brief description of the proposed development is as follows:

a) **Lower Ground level** will comprise the following;

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 3 units of studio apartments
- 6 units of single rooms with washrooms and having a common living room & kitchenette
- Printing station, laundry area, chill out area, gym with male and female changing rooms, underground water tank and a pump room

b) **Ground level** will consist the following;

- Reception Lobby
- Gate house with toilet and shower
- 12 No. parking spaces

c) **Upper Ground level** will have the following features;

BLOCK A

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 6 units of studio apartments
- 6 units of single rooms with washrooms and having a common living room & kitchenette
- Group study room

BLOCK B

- 2 units of one bedroom apartment having a lounge, kitchen and washroom
- 2 units of studio apartments
- 6 units of single rooms with washrooms and having a common living room & kitchenette
- Dining area, kitchen, tuck shop, janitor rest room, a reception lobby area, chill out area, printing station, resident manager office,

d) **Typical 1st to 4th Floor level** will consist the following features;

BLOCK A

- 4 units of one bedroom apartment having a lounge, kitchen and washroom

- 6 units of studio apartments
- 12 units of single rooms with washrooms and having a common living room & kitchenette

BLOCK B

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 6 units of studio apartments
- 12 units of single rooms with washrooms and having a common living room & kitchenette

e) Other salient features include garden area, staircases, pedestrian walkways, service yard, Control, server, generator, switch, transformer, and waste management rooms

6.0 Environmental Impacts and Mitigation Measures

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

Possible Impact	**Mitigation Measures**
Noise Pollution	▪ Construction works will be carried out between 0800hrs to 1700 hrs. ▪ Provide and enforce use Personal Protective Equipment e.g. earmuffs during construction. ▪ Provide comprehensive policies/ rules pertaining noise control for residents as part of the Housing Agreement. ▪ Ensure quiet from 10pm to 8am in the apartments and outdoor/public areas. ▪ Monitor noise levels as per NEMA & NCG guidelines.
Air Pollution	▪ Screening of the construction site to contain and arrest construction-related dust. ▪ Dust suppression with water-sprays during the construction phase on dusty areas. ▪ Exposed stockpiles of e.g. sand, will be covered and watered daily. ▪ Regular and prompt maintenance of construction machinery and equipment. This minimizes generation of hazardous gases.
Soil erosion	▪ Avoid unnecessary excavations and other soil disturbances that can predispose it to the agents of erosion. ▪ Control over excavation works especially during rainy / wet conditions.

	▪ Provide soil erosion control and conservation measures where necessary e.g. covering excavated soil. ▪ Re-surface open areas on completion of construction and introduce appropriate vegetation
Storm water	▪ Construction of gabions on the lower part of the property. ▪ Rain water harvesting gutters will be installed to reduce the amount of rainfall reaching the surface. ▪ Semi permeable materials will be used for construction of pavements. ▪ Comprehensive landscaping on the riparian reserve and open areas will be done after completion of construction.
Solid waste	▪ Proper disposal of construction waste in the contractor's yard (off the site). ▪ Covering of trucks when transporting building materials and waste. ▪ Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse. ▪ A private NEMA licensed company will be contracted to collect waste from the development.
Liquid waste	▪ A temporary portable toilet will be provided on site to be used by construction workers. ▪ Regular inspection and monitoring of the Waste Water Treatment Plant to avoid overfill and overflow. ▪ Conduct routine inspection and monitoring of the internal drains to identify leakages and blockages. ▪ All waste pipes will have rodding eyes accessible from outside. i.e. free to every part of the system for inspection, cleaning and repair.
Increased water demand	▪ To supplement water from the borehole during construction, the contractor will use water bowsers and tankers from external sources. ▪ Installation of rain water harvesting gutters. ▪ Install water conserving taps. ▪ Encourage re-use of water where possible during construction and operation phase ▪ Recycled water from the (WWTP) will be used for landscaping activities.

7.0 Conclusion and Recommendations

The analysis of the EIA study indicates that the proposed project has significant benefit to the student housing sector. The analysis reveals that the benefits far outweigh the associated costs and negative impacts. The benefits include increase in quality student housing facilities, creation of employment opportunities, and increase utility of the land, creation of employment opportunities especially during project implementation phase, increase in government revenue and improvement of local standards of living. Nevertheless, the project will come with some negative impacts such as increased pressure on existing infrastructure, pollution (to Air, Water, soil) mostly during construction phase, increased waste (solid and liquid) generation and flood risk at the northern part of the property.

In relation to the proposed mitigation measures that will be incorporated during implementation and occupation phases; the project's input to the Kenyan student housing sector; and cognizance of the fact that the project proponent is environmentally conscious, the subject project is beneficial and important for a developing country (like Kenya).

It is our recommendation that the proponent be granted EIA licence to implement the project. Major concerns should nevertheless be geared towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close following and implementation of the outlined Environmental Management and Monitoring Plans (EMPs); which have been strategically packaged with key environmental sustainability elements, tailored toward enhancing the adoption of Integrated Ecosystem Management (IEM).

CHAPTER 1: INTRODUCTION

1.1 General overview

Kenyan universities and colleges enrolment has experienced an exponential growth especially between the period of 2007 and 2013. According to the Kenya National Bureau of statistics in the KNBS Economic Survey report of 2014, the Student Enrolment in Public Universities between 2007 and 2013 doubled from approximately 85000 to 170000 respectively. This has resulted to pressure on the already existing institutional infrastructure.

These have resulted to an acute student housing shortage due to the large number of students flocking the institutions of higher learning. According to a research by Jumia House, there are 280,000 bed spaces in universities against a student population of 769,000, a number that keeps rising. In 2015 alone, there was a recorded rise in students' population by 80,000 as a result of the expanded enrolment for both government-sponsored and self-sponsored students.

The situation has put a lot of pressure on on-campus accommodation facilities prompting students to seek alternative accommodation in nearby private facilities. There are on-going plans by universities to build hostels to accommodate over half a million students in the next five years supported by Public-Private Partnerships (PPP) so as to curb the ever growing student housing crisis.

In light of these prevailing circumstances, the Proponent *Dominic Mwangi Kiarie* has proposed to develop a 215 bed capacity student housing scheme on plot LR No. 20892/195 located 300 meters from the Daystar University in Lukenya area, Mavoko Sub-County of Machakos County.

The proposed project aims to increase the number of available accommodation facilities for Daystar University students. Other advantages associated with the project include and not limited to; optimization of land use and its utility, creation of employment especially during construction phase, creation of a market for goods and services (construction inputs) among others.

Environmental concerns have now been integrated in the planning and implementation processes of any proposed projects; to mitigate conflicts with the environment at the vicinity. In addition, it is now mandatory for EIA to be undertaken on projects of such magnitude and nature to enhance sustainable environmental management as well as controlling and revitalizing the much-degraded environment.

1.2 Objectives of the EIA

Environmental Impact Assessment (EIA) is a process having the ultimate objective of providing decision makers with an indication of the likely environmental consequences of a proposed activity. The main objectives of this EIA therefore include the following:

i. To identify and evaluate the significant environmental impacts of the project
ii. To evaluate the impacts of the various alternatives on the project
iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
iv. To generate baseline data for monitoring and evaluating impacts, including mitigation measures during the project cycle.
v. To seek the views and concerns of all stakeholders in regards to the proposed project.
vi. To highlight environment issues with a view to guiding policy makers, planners, stake holders and government agencies to make environmentally and economically sustainable decisions
vii. To incorporate Environmental Management Plans and monitoring mechanisms

1.3 Terms of Reference (TOR)

The following are the Terms of Reference for the proposed project as developed by the lead expert in conjunction with the project proponent;

i. Assessment and description of location/site, objectives, scope, nature of the proposed project,
ii. Analysis of the proposed project activities during the proposed project cycle; construction, operation, decommissioning phases,
iii. Establish the suitability of the proposed project in the proposed location,
iv. Review and establish all relevant baseline information as will be required by NEMA (Physical, Biological and Social Cultural and economic) and identify any information gaps,
v. Description and analysis of policy legal and institutional framework including but not limited to Kenyan policies, laws, regulation and guidelines which have a bearing on the proposed project and will also serve as benchmarks for monitoring and evaluation, and future environmental audits,
vi. In-depth description of the proposed project and associated works together with the requirements for carrying out the works,

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

viii. Consultation and Public Participation (CPP): Identify key stakeholders and affected persons; hold a public meeting and provide /collect written evidence i.e. minutes,

ix. Identify and analyze proposed project alternatives including but not limited to: Scale and extent; project site alternatives, no project alternatives, design alternatives, material alternatives and technologies alternatives,

x. Identify, predict and carry out in-depth analysis all actual potential and significant impacts on flora, fauna, soils, air, water, the social, cultural and community settings; the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated to be generated by the proposed project, both positive and negative throughout the project cycle,

xi. Recommend sufficient mitigation measures for all the potential negative impacts identified,

xii. Analyze occupational health and safety issue associated with the proposed project,

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

1.4 Scope of the study

The EIA study will involve the following;

a) A description of the project

b) Documentation of all baseline information

c) Socio-economic study to get the views of different stakeholders using;

i. Questionnaires

ii. Interviews

iii. Public meeting/baraza

d) Review of the policy, legal and administrative framework

e) Prediction of any sources of conflicts and making relevant recommendations

f) Assessment of both the positive and negative impacts of all environmental and components

g) Developing mitigation measures for the negative impacts identified

h) Designing of an Environmental Management Plan for the project

i) Designing a monitoring and evaluation plan

j) Examining the projects phases, stages and activities to be undertaken and integrating them with environmental characteristics

k) The monitoring programmes, parameters and procedures to be put in place for control and corrective actions in case of emergencies shall also be examined.

1.5 Methodology

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

i. Screening of the project, a process that identified the project as being among those requiring EIA under schedule 2 of the EMCA 1999 and EMCA (Amendment) 2015,
ii. A scoping exercise that identified the key issues to be addressed in the assessment.
iii. Documentary review on the nature of the proposed activities, policy and legal framework, environmental setting of the area and other available relevant data/information.
iv. Public participation and discussions with the local community, proponent and the project team.
v. Physical investigation of the site and the surrounding areas using a pre-prepared checklist identifying possible environmental and human safety issues that are likely to be affected,
vi. Reviewing the proposed project designs and implementation plan/schedules with a view to suggesting suitable alternatives,
vii. Developing an EMP outline with responsibilities, schedules, monitorable indicators and time frames among other aspects,
viii. A comprehensive report including issues as listed in the Environmental (Impact Assessment) Regulations 2003.

The data used for developing the EIA can be categorized into two, primary and secondary data, as tabulated below;

Table 1

Type of data	***Source of data***
Secondary data	Published books, official government documents and statutes, plans, reports and documentation from members of the project team.
Primary data	Formal/informal interviews, field observations, pictures, questionnaires, views from resident attendees during the public baraza and input from the project team

1.6 Justification of the project

1.6.1 Demand for Housing (Student accommodation)

Housing has for a long time been recognized as a basic human need, with even recent suggestions that it be made a basic human right. Institutions of Higher learning are mandated to provide boarding/accommodation facilities to their students.

The population of students joining institutions of higher learning has been rapidly increasing over the years resulting to the inability of most institutions to fully cater for student accommodation.

The proposed development therefore comes as a timely venture to cater for the existing accommodation deficit, more specifically, in Daystar University.

1.6.2 Adjacent Land use analysis

Currently there are developments adjacent to the site. The common land uses are hostels, public purpose (church), townhouses and educational. Particular reference is *Daystar University, Lukenya getaway, Imani hostels and ACK St. John Daystar parish*. At a radius of five (5) Kilometers, there are shops, religious facilities and other community facilities which will be adequate to serve the incoming development.

1.6.3 Size of the plot

At approximately 0.8154 hectares, the plot is large enough to accommodate the proposed development. (*See attached copy of title*)

1.6.4 Economic Benefits

The proposed development will have various economic benefits. The proprietor will be able to generate more income thus enhance their livelihood. The Machakos County government will raise extra revenue from both the enhanced Land Rates and approval fees. The central government will also get more revenue in the form of enhanced Land Rent.

1.6.5 Neighborhood Development Trend

The neighborhood of the plot is currently undergoing transformation with the previous agricultural use being replaced by hostels and residential (mostly townhouses). The proposed development will therefore be in conformity with this trend which will ensure better utilization of the land giving it higher value.

Plate 1: Hostel development on the abutting plots

Source: Field survey 27/07/2017

CHAPTER 2: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

2.1 Nature of the Project

The proponent, Dominic Mwangi Kiarie, is proposing to construct a Student Housing Scheme on plot L.R No 20892/195 in Lukenya area of Machakos County. The proposed development will comprise of 215 bed capacity Housing units and associated ancillary. The development will aim at providing habitable student housing infrastructure and/or increase the utility of the Land in the area.

2.2 Project Location and Size

The proposed project site is located approximately five (5) kilometers off Mombasa road on latitude 1°26'35.23''S and longitude 37°2'39.72''E about 300 meters from Daystar University, Lukenya area of Mavoko sub-county in Machakos County. The parcel of land **L.R. No. 20892/195** measures approximately 0.8154 hectares.

Plate 2: Site Location

Source: Google Earth 2017

2.3 Land Tenure, Use, Ownership and Management

The parcel of land on which the subject development is proposed is held on Leasehold interest for 949 years 9 months from 1st of April 1962. The certificate of Title is drawn under The Registration of Titles Act (Chapter 281) as L.R. No. 20892/195 and the current registered proprietor is Dominic Mwangi Kiarie (Post Office Box Number 35873-00200). *See attached copy of the ownership document.*

2.4 Project Description

The proposed development will comprise of 215 student housing units and auxiliary facilities to be constructed in two blocks, that is, Block A and Block B. The total plinth area will be 7300 square meters (SM) having a plot coverage and plot ratio of 33.58 per cent and 1.804 respectively. A brief description of the proposed development is as follows:

a) **Lower Ground level** will comprise the following;

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 3 units of studio apartments
- 6 units of single rooms with washrooms and having a common living room & kitchenette
- Printing station, laundry area, chill out area, gym with male and female changing rooms, underground water tank and a pump room

b) **Ground level** will consist the following;

- Reception Lobby
- Gate house with toilet and shower
- 12 No. parking spaces

c) **Upper Ground level** will have the following features;

BLOCK A

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 6 units of studio apartments
- 6 units of single rooms with washrooms and having a common living room & kitchenette
- Group study room

BLOCK B

- 2 units of one bedroom apartment having a lounge, kitchen and washroom
- 2 units of studio apartments

- 6 units of single rooms with washrooms and having a common living room & kitchenette
- Dining area, kitchen, tuck shop, janitor rest room, a reception lobby area, chill out area, printing station, resident manager office,

d) **Typical 1st to 4th Floor level** will consist the following features;

BLOCK A

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 6 units of studio apartments
- 12 units of single rooms with washrooms and having a common living room & kitchenette

BLOCK B

- 4 units of one bedroom apartment having a lounge, kitchen and washroom
- 6 units of studio apartments
- 12 units of single rooms with washrooms and having a common living room & kitchenette

e) Other salient features include garden area, staircases, pedestrian walkways, service yard, Control, server, generator, switch, transformer, and waste management rooms

In summary, there are 114 single en suite rooms, 59 studio apartments and 42 one bedroom apartments totalling to 215 units. More fine details of the proposal, specifications and features of the proposed project can be obtained from the drawings (*attached are architectural drawings).*

2.5 Construction Inputs

The project inputs include the following:

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

ii. Construction machines including machinery such as trucks, concrete mixers, and tools and other relevant construction equipment. These will be used for the transportation of materials, clearing of the site and construction debris. Most of the machinery will use electrical and petroleum products to provide energy.

iii. A construction labour force of both skilled and non-skilled workers. These will require services such as energy, water supply and sanitation facilities.
iv. Water for construction purposes.
v. Power from the mains grid or provided by generators.

2.6 Construction Activities

2.6.1 Description of the Project's Construction Activities

2.6.1.1 Pre-construction Investigations

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

2.6.1.2 Sourcing and Transportation of Building Materials

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

2.6.1.3 Clearance of Vegetation.

The site has some vegetation cover including grass, shrubs and few trees. The proponent shall ensure as many indigenous trees as possible are used for re-vegetation as well as conserving the trees along the plot boundary and riparian reserve.

2.6.1.4 Storage of Materials

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

Plate 3: Site

Source: Field work 27/07/2017

2.6.1.5 Excavation and Foundation Works

Excavation will be carried out to prepare the site for construction of foundations, pavements and drainage systems. This will involve the use of heavy earthmoving machinery such as tractors and bulldozers.

2.6.1.6 Masonry, Concrete Work and Related Activities

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

2.6.1.7 Structural Steel Works

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

2.6.1.8 Electrical Work

Electrical work during construction of the premises will include installation of electrical gadgets, devices and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting. All the electrical works will be carried out by a licensed electrician to the satisfaction of the Kenya Power and Lighting Company (KPLC).

2.6.1.9 Mechanical works

The mechanical works shall be done by qualified technicians under the supervision of the Project Mechanical Engineer and shall follow the set standards. The works will include the following:

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

2.6.1.10 Landscaping

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

2.6.2 Description of the Project's Operational Activities

2.6.2.1 Residence

A total of 215 students will reside within the proposed development. Several student activities such as cooking, washing, leisure and recreational activities will thus accompany residence.

2.6.2.2 Solid Waste

The proponent will provide facilities for handling solid waste generated within the facility. These will include dust bins/skips for temporarily holding waste within the premises before final disposal at the designated dumping site. The solid wastes from each block will be assembled in the garbage collection point ready for disposal by a NEMA licensed waste disposal company.

Private waste disposal companies that are approved by NEMA and County Government will be responsible for solid waste disposal.

2.6.2.3 Waste Water and storm water Management

Sewage generated from each unit will be discharged into the Waste Water Treatment Plant (WWTP). Storm water will be properly channeled to improve drainage within the development.

2.6.2.4 Cleaning

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

2.6.2.5 General Repairs and Maintenance

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

2.6.3 Description of the Project's Decommissioning Activities

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

i. Remove all underground facilities from the site
ii. The site should be well landscaped by flattening the mounds of soil
iii. Planting indigenous trees and flowers
iv. All the equipment should be removed from the site
v. Fence and signpost unsafe areas until natural stabilization occurs
vi. Backfill surface openings (if practical)

2.6.3.1 Dismantling of Equipment and Fixtures

All equipment including electrical and mechanical installations, furniture partitions, pipe work and sinks among others will be dismantled and removed from the site on decommissioning of the

project. Priority will be given to reuse of this equipment in other projects. This will be achieved through resale of the equipment to other building owners or contractors or donation of this equipment to schools, churches and charitable institutions.

2.6.3.2 Site Restoration

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

2.7 Construction Products, By Products and Wastes

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

2.7.1 Products

The final product will be a 215 bed capacity Student Housing Scheme having other auxiliary facilities.

2.7.2 By-Products

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

i. **Soil:** The soil generated during excavation will be reused elsewhere in the project. Unusable soil will be transported for disposal at designated dumping sites.
ii. **Pieces of timber/wood:** Large pieces of timber/wood generated during the construction phase will be transported back to the contractor's yard for reuse in future while the small pieces of timber/wood will be disposed-off for use as fuel for cooking and heating.
iii. **Empty cans and drums:** These will be used to store water during construction. The damaged ones will be disposed-off to registered scrap metal and plastic waste dealers.
iv. **Excess sand, ballast and stock piles:** These can be used for future construction activities e.g. renovations. Upon completion of the project, these will be moved by the contractor to a suitable yard.

2.7.3 Wastes

The waste generated during construction will include construction debris, excavated soil and rocks and sanitary waste. The other wastes that may likely to be generated during operation are solid waste such as paper, plastics, cans, organic waste and sanitary waste. These wastes will be

disposed by the proponent in accordance with the standards and documented procedures stipulated in the EMCA Waste Management Regulations of 2006.

2.8 Project Budget and Duration

The proposed project is estimated to cost **three hundred forty million shillings (340,000,000).** The project implementation works is estimated to take 2 years to completion *(attached is the BOQ summary).*

CHAPTER 3: BASELINE INFORMATION

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate

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

3.1.2 Topography

The site lies at an altitude of about 1500 meters above sea-level. It gradually slopes towards the northern part of the property where there is a stream.

3.1.3 Geology and Soils

The geology and soils of an area have a great influence on the type of physical development and also determine the type of land use appropriate for the area. The site has generally shallow red volcanic soils which are well drained and easy to work on during construction.

3.1.4 Water Resources and Wetlands

There is a seasonal stream that borders the northern part of the proposed site. Proper care will be taken into consideration to avoid dumping of any waste to the stream especially during construction and operation phases. A riparian reserve of 15 meters has been set out. A comprehensive landscaping exercise will be carried out to minimize run off during rainy seasons and adequate storm water drains designed and constructed

The project proponent intends to drill a borehole for water supply to the proposed development. However, this will be done after conducting a hydrogeological survey and seeking licenses from the relevant authorities. The proponent will also adhere to the relevant provisions of EMCA (Water Quality) Regulations 2006 when abstracting the underground water.

3.2 BIOLOGICAL ENVIRONMENT

The proponent has reserved ample space for tree planting and landscaping to compensate for affected vegetation and further improve the environment. Adequate measures will be taken to conserve and preserve the ecosystem.

3.2.1 Flora

The project site is generally characterized by shrubs and savanna grass vegetation cover. Exotic grass and trees are found along the riparian buffer zones. The proposed project site is situated in an area where cattle, sheep and goats grazing are dominant hence vegetation is highly consumed by the grazing animals.

Plate 4: Vegetation within the site

Source: Field work 27/07/2017

3.2.2 Fauna

There are different species of birds and animals such as cows, goats, sheep, donkeys e.tc.

3.3 SOCIO-ECONOMIC ENVIRONMENT

3.3.1 Land Use

The proposed site is within an area formerly zoned for agricultural use though the proponent has already obtained an approval for change of user from Agricultural to Hostels *(Attached is a copy of the change of use approval PPA2).*

3.3.1.1 Current Physical Development Planning Policy

There is no current physical development plan for the area. Also, no current local physical development plan and regional physical development plan for the area.

3.3.1.2 Land Uses Adjacent to the Site

The neighborhood, where the proposed development is located is characterized by scattered residential dwelling units (townhouses), commercial facilities which include shops, hostels and institutions such as the Daystar University and Lukenya Community Church.

Plate 5: Land uses adjacent to the site

Source: Fieldwork 27/07/2017

3.3.1.3 Socio-Economic Profile

The proposed Student Housing Scheme will be influenced by two important socio-economic aspects, i.e. population/demography and economic trends in the neighborhood, Lukenya area of Mavoko Sub County, Machakos County.

3.3.2 Educational

The different education facilities found in the area include Daystar University, Lukenya Secondary School, Lukenya Girls High School among others.

3.3.3 Student Housing

There are several student hostels located near the university and aim to targets the students from the institutions. These include Patience and Imani Hostels located within the university and Evergreen, Bethel hostels few meters from the university main entrance.

3.3.3 Public purpose (Church)

Religious institutions in the neighborhood include Lukenya Community Church and ACK St. John's Daystar Parish.

Plate 6: Religious Institutions near the property

Source: Fieldwork 27/07/2017

3.3.4 Commercial Activities

These activities are concentrated along the main feeder road leading to the entrance of the Daystar University and include shops such Imani Plaza, bank services which include the KCB ATM and recreational facilities such as Lukenya Gateway.

3.3.5 Security

Security in the area is provided by the nearby Police Station which is located approximately 1kilometre from the proposed site.

3.4 INFRASTRUCTURE

3.4.1 Roads and accessibility

The property is accessed along 15 meter unnamed road off 18 meter road that feeds Mombasa road in Mavoko Sub-county of Machakos County. The roads are in murram state.

Plate 7: Roads leading to the site


Source: Field work 27/07/2017

3.4.2 Water supply

The area is not connected to the public water supply systems. The proponent intends to abstract water from a borehole to serve the water needs of the intended development. The developer also intends to:

i. Make arrangements with registered water vendors to supply the commodity (water) to the site in case of short fall in the normal supply.
ii. Install standard roof water collection systems for the roof catchments of the proposed building blocks. These include gutters, down pipes and suitable water storage tanks for the harvested rainwater. It will greatly help in minimizing pressure on the existing water supply.

3.4.3 Sewer System

The general area is not served with public sewerage system. The proponent therefore intends to construct a Waste Water Treatment Plant (WWTP). The internal sewer system of the proposed

project will be suitably designed to collect all effluent / waste water from the development. All sanitary works will be done to the entire satisfaction of County Government, Ministry of Health and Public Health Office.

3.4.4 Surface Drainage

The surface water/run-off will mainly be absorbed within the site i.e. open areas. However, increased surface run-off is anticipated from roof catchments of building structure; drive way and parking, which are partially impervious. Therefore as rain falls much water/run-off is anticipated due to slight decrease in recharge areas. In connection to this, the volume of water reaching the drain system will be large and as such it greatly influences the design of effective surface drainage system of the proposed project.

In line with the above, surface drainage systems will effectively be designed and installed to manage the storm water such as may be derived from the parking, driveways and roof of the building blocks. Open (concrete drainage-inverted concrete drains) channels will be used to drain the excess surface water/storm into the public drainage system along the access road.

3.4.5 Solid Waste Management

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

i. Debris resulting from earth works and minimal vegetative materials to be cleared to pave way for the proposed project.
ii. All stony, wooden and glass materials resulting from related activities, during implementation of the proposed project.
iii. Plastic materials resulting from such works as sewerage, drainage and water systems, electricity works etc.
iv. Sanitary litter as generated during implementation and occupation of the project.
v. Kitchen materials and other refuse especially on the occupation of the proposed project

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

Handling of wastes during occupation phase shall be fundamentally considered and especially through inclusion of Waste Collection Centre (WCC) at the entrance to the site. This shall

enhance storage, collection, transportation and disposal of all solid waste of the entire project, on occupation.

3.4.6 Electricity

The site is not served by electricity from the National grid but there are electric lines along the road adjacent to the property. Upon completion of construction, the proponent will connect the proposed development to the national grid upon acquiring relevant permits.

3.4.7 Communication

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

Plate 8: Electricity lines and Telecommunication Booster

Source: Field work 27/07/2017

3.4.8 Security

There will be a single gate to the proposed project, which will be fully manned 24 hours. The entire site will also be banded with a boundary wall.

CHAPTER FOUR: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Introduction

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economy is based. EIA is a useful tool for protection of the environment from the negative effects of development activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), requires an EIA project/study report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development through sustainable use of natural resources without interfering with the environment.

4.2 Relevant Policies

There are a number of policies that are pertinent to this project, chief of which is the constitution of Kenya. A brief description of the policies is given below:

4.2.1 The Constitution of Kenya 2010

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

Chapter 5 of the new constitution provides the main pillars on which the 77 environmental statutes are hinged and covers "Land and Environment" and includes the aforementioned articles

69 and 70. Part 1 of the Chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. Part 2 of the Chapter directs focus on the environment and natural resources. It provides for a clear outline of the state's obligation with respect to the environment. The Chapter seeks to eliminate processes & activities likely to endanger the environment.

There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this Chapter. In conformity with the Constitution of Kenya 2010, every activity or project undertaken within the Republic of Kenya must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. The proposed development project is a development activity that will utilize sensitive components of the physical and natural resources hence need for a clearly spelt out environmental management plan to curb probable adverse effects to the environment. *The proponent will therefore adhere to the provisions of the Environmental Management Plan provided in this report to ensure the public and employee's right to a clean and safe environment is not infringed.*

4.2.2 Kenya Vision 2030

Kenya Vision 2030 is the country's development blueprint which aims at making Kenya a newly industrializing 'middle income country providing high quality life for all its citizens by the year 2030. The vision has been developed through an all-inclusive stakeholder consultative process, involving Kenyans from all parts of the country. The vision is based on three 'pillars' namely; the Economic Pillar, the Social Pillar and the Political Pillar. The Kenya Vision 2030 economic pillar aims at providing prosperity of all Kenyans through an economic development programme aimed at achieving an average GDP growth rate of 10% per annum over the next 25 years from the year 2008. The social pillar seeks to build 'a just and cohesive society with social equity in a clean and secure environment'. On the other hand, the political pillar aims at realizing a democratic political system founded on issue–based politics that respects the rule of law, and protects the rights and freedoms of every individual in the Kenyan society.

The proposed project is in line with the economic and social pillars of Kenya vision 2030 and therefore its implementation will contribute to Kenya's realization of the objectives set in the Kenya Vision 2030.

4.2.3 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. The proposed development has been designed by professional architects and engineers and as such will have all amenities/utilities that are essential for safeguarding public health for all people using the facilities during the construction, operational and decommissioning phases of the project. *The proponent will adhere to the provisions of the relevant Act of parliament; Public Health Act (CAP 242).*

4.2.4 Sustainable Development Goals (SDG's)

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

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

Goal 3 -Good Health & Well Being

Targets achieved:

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

Goal 6 -Clean water and sanitation

Targets achieved:

i. The Waste Water Treatment Plant will improve water quality by reducing pollution, ensuring zero proportion of untreated wastewater and substantially increasing recycling and safe reuse.
ii. A riparian reserve has been set out to preserve the stream as recommended by Water Resources Management Authority (WRMA).

Goal 7 -Affordable and clean energy

Targets achieved:

i. The installation of the solar PV's will increase the share of renewable energy in the Kenya National Grid.

ii. Implementation of an energy management system shall contribute to increased energy efficiency.

Goal 8 -Decent work and economic growth

Targets achieved:

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

4.3 Institutional Framework

There are different institutions that deal with environmental issues in Kenya. Some of the key institutions include National Environmental Management Authority (NEMA), the Department of Resource Surveys and Remote sensing (DRSRS), the Water Department, The Kenya Forest Service (KFS), The Kenya Forestry Research Institute (KEFRI) among others. While implementing the project, both the proponent and the contractor will have to work in liaison with a number of these institutions when dealing with issues within the jurisdiction of the institutions.

4.3.1 National Environmental Management Authority (NEMA)

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

i. Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.
ii. Take stock of the natural resources in Kenya and their utilization and consultation, with the relevant lead agencies, land use guidelines.
iii. Examine land use patterns to determine their impact on the quality and quantity of the natural resources.
iv. Carry out surveys, which will assist in the proper management and conservation of the environment.

v. Advise the government on legislative and other measures for the management of the environment or the implementation of relevant international conservation treaties and agreements in the field of environment as the case may be.

vi. Advise the government on regional and international environmental convention treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements where Kenya is a party.

vii. Undertake and co-ordinate research, investigation and surveys in the field of environment and collect and disseminate information about the findings of such research, investigation or survey.

viii. Mobilize and monitor the use of financial and human resources for environmental management.

ix. Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA.

x. Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur.

xi. Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impeding environmental emergencies is given.

xii. Undertake, in co-operation with relevant lead agencies programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard.

xiii. Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.

xiv. Render advice and technical support, where possible to entities engaged in natural resources management and environmental protection so as to enable them to carry out their responsibilities satisfactorily.

xv. Prepare and issue an annual report on the state of the environment in Kenya and in this regard may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency and,

xvi. Perform such other functions as government may assign to the Authority or as are incidental or conducive to the exercise by the authority of any or all of the functions provided under EMCA.

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

4.3.2 National Environmental Action Plan (NEAP)

The NEAP was a deliberate policy effort to integrate environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectorial approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision making. The NEAP has indicated how resources within particular sections of the country should be managed in order to ensure their sustainable utilization. *The project shall be implemented and operated based on these guidelines*

4.3.3 National Environmental Tribunal (NET)

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

4.4 Legal Framework

Kenya has several statutes that govern environmental standards and quality. Most of these statutes are sector specific covering issues such as public health, planning, air quality, agriculture, water quality, and land use. This section seeks to bring to light statutes and legislation pertinent to the development of the proposed development herein referred to as the proposed project.

4.4.1 Environment Management and Coordination (Amendment) Act, 2015

The Environmental Management and Co-ordination (Amendment) Act, 2015 is an act of Parliament enacted by the Parliament of Kenya to amend the Environmental Management and Co-ordination Act,1999. It commenced on 17th June 2015 No. 5 of 2015 and it provides a legal and institutional framework for the protection and conservation of the environment (in line with Article 42 of the constitution), as well as providing the necessary mechanism to monitor that, which include Environmental Impact Assessment, Environmental Auditing and Monitoring as prescribed by Article 69 of the Constitution.

Section 58 (1) of the Act states "Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee".

The project report should be conducted or prepared by individual experts or a firm of experts authorized by NEMA, which maintains a register of all experts authorized to carry out Environmental Impact Assessment studies and reports as Section 58(5) stipulates.

The proponent also engaged Solomon Kyeni as the Lead Expert and other environmental experts to undertake this study report in fulfillment of the above requirement.

Section 59 (1) states that upon receipt of an environmental impact assessment study report from any proponent under section 58(2), the Authority shall cause to be published in the Gazette, in at least two newspapers circulating in the area or proposed area of the project and over the radio"

This Act provides a legal and institutional framework for the management of the environmental related matters. This report has been written pursuant to section 58 (1) of this Act and the proponent shall take note of its provisions.

EMCA 1999 has several subsidiary legislations that were enacted to ensure effective implementation of the Act. A few regulations that are pertinent to the proposed project are described below:

4.4.1.1 The Environmental Management and Coordination (Water Quality) Regulations, 2006

The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells and other water sources). It is an offence under Regulation No.4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment. Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.

The proponent will ensure that appropriate measures to prevent pollution of underground and surface water sources are implemented throughout the project cycle.

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

The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

i. Domestic waste
ii. Industrial waste,
iii. Hazardous and toxic waste
iv. Pesticides and toxic substances
v. Biomedical wastes
vi. Radioactive waste

Regulation 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated.

The Proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal. Regulation 14 (1) requires every trade or industrial undertaking to install at its premises anti-pollution equipment for the treatment of waste emanating from such trade or industrial undertaking. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA.

During the construction phase of the project, the Proponent shall ensure that the main contractor implements the above mentioned measures as necessary to enhance sound environmental management of waste.

4.4.1.3 The Environmental (Impact Assessment and Audit) Regulations, 2003

The EIA exercise under the Act is guided by the Environmental (Impact Assessment and Audit) Regulations of the year 2003, which was given under legal notice no. 101. The regulations stipulate the ways in which EIA and audits should be conducted. The project falls under the second schedule of EMCA, 1999 section 58 (1), (4) that require an EIA be conducted. As stipulated by the legal notice No. 101, 2003, PART V, Section 31 (3((a) (i) and (ii) it is required that an environmental assessment be undertaken to provide baseline information upon which subsequent environmental control audit shall be based. *It is in the wake of these regulations that the proponent commissioned the Lead expert to carry out an EIA exercise, write a report and submit it to NEMA with an aim of being awarded an EIA license.*

4.4.1.4 Environmental Management and Co-ordination (Noise and Excessive Vibrations Regulations 2009

The regulations define noise as any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health or the environment. The regulations prohibit any person from making or causing 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. Article 13 2(d) of the regulations allows for construction work at night for public utility construction, construction of public works, projects exclusively relating to roads, bridges, airports, public schools and sidewalks, provided noise generated is not caused within a residential building or across a residential real property boundary where such noise interferes

with the comfort, repose, or safety of the members of the public. The second Schedule of the Regulations provides for the maximum permissible level of noise at construction sites.

4.4.1.5 The Environmental Management and Coordination (Air Quality) Regulations, 2008

The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the EMCA, 1999. It also covers any other air pollution source as may be determined by the Cabinet Secretary in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

i. Back-burning to control or suppress wildfires;
ii. Firefighting rehearsals or drills conducted by the Fire Service Agencies
iii. Traditional and cultural burning of savannah grasslands;
iv. Burning for purposes of public health protection;

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution.

4.4.2 The Occupational Safety and Health Act, 2007

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

Workers and occupants' safety will be given priority during both construction and operation phases of the project.

4.4.3 The Public Health. Act (Cap. 242)

Section 115 of the Act states that no person/institution shall cause nuisance or, conditions likely to be injurious or dangerous to human health. Section 116 require local Authorities (currently

County governments) to take lawful, necessary and reasonably practicable measures to maintain areas under their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under Section 118 waste pipes, sewers, drains refuse pits in such a state, situated or constructed as in the opinion of the medical leer of health to be offensive or injurious to health. Any noxious matter or waste water, discharged from any premises into a public street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also termed as a nuisance. Other nuisances are accumulation of materials or refuse which in opinion of the medical officer of health is likely to harbor rats or other vermin.

The proponent will be required to abide by these provisions throughout the project cycle.

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act.

The proponent will be required to contract a licensed solid waste collector to collect all solid waste from the site to an approved dumping site. Sewage from the site will be discharged into a conservancy tank which is the appropriate method for this area awaiting construction of the sewer line.

4.4.4The Physical Planning Act, 1996

The act was promulgated in 1996 and under (section 36) it is concerned with land use and development control matters, to ensure orderly and sustainable development. The statute stipulates the procedure for preparation of local short and long term physical development plans. It also provides procedures for urban renewal or re-development plans. It aims at guiding the development in the whole country irrespective of the land tenure limitations. It helps to reinforce the EMCA in the sense that it is a requirement according to section 36 for any project proposals submitted to any local authority for development permission to have an EIA report undertaken, if the local authority considers the activity of the project to have injurious impact on the environment.

The proponent has complied with this provision by appointing EIA/Audit experts prepare and submit this EIA project report to NEMA. Formal approval of architectural and engineering drawings will be required prior to commencement of the project.

Section 30 (1) of the Act stipulates that no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33.

Section 29 of this Act provides for development control. It empowers the local authority to prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area.

The council is further empowered by the Act to reserve and maintain all the land planned for open spaces, parks, urban forests and greenbelts in accordance with the approved physical development plan.

The Act further states that, No licensing Authority shall grant, under any written law a license for commercial or industrial or occupation of any building or in respect to any premises or land, for which no development permission has been granted by the respective local authority.

The proposed site is currently used for agricultural use. The proponent applied for change of user from agricultural to hostels and was granted by County Government of Machakos. (See copy of approval of change of user in the annex)

4.4.5 County Government Act, 2012

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

The proponent will work in liaison with Machakos County Government and in particular the department of Environment and Natural Resources.

4.4.6 Penal Code Act (Cap.63)

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighborhood or those passing along public way, commit an offence. *The Proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impacts*

4.4.7 The Registration of Titles Act (Chapter 281)

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

Copy of land ownership documents is attached to this EIA Project Report.

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

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

4.4.9 Water Act, 2002

This Act of Parliament provides for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services; to repeal the Water Act (Cap. 372) and certain provisions of the Local Government Act.

Section 25 (1) states that a permit shall be required for any of the following purposes:—

a) Any use of water from a water resource, except as provided by section 26;
b) The drainage of any swamp or other land;
c) The discharge of a pollutant into any water resource;
d) Any purpose, to be carried out in or in relation to a water resource, which is prescribed by rules made under this Act to be a purpose for which a permit is required.

The proponent shall apply for a permit to drill a borehole and abstract water.

4.4.10 Energy Act, 2006

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

4.4.11 National Construction Authority Act, 2011

The act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contactors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they satisfy they are in Kenya for that specific time.

The foreign contractors must also produce a certificate of compliance. Furthermore they must lodge an affidavit with the NCA that once the project they have been licensed is over, they shall wind up their business. This prevents them from engaging in any other construction in the country.

4.4.12 Building Code, 2000

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

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

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

CHAPTER 5: PUBLIC PARTICIPATION

5.1 Introduction

This chapter describes the process of the public consultation followed to identify the key issues and impacts of the proposed project. Views from the local residents, stakeholders, surrounding institutions and development partners who in one way or another would be affected or rather interested in the proposed project were sought through administering of questionnaires, interviews and public meeting as stipulated in the Environment Management and Coordination Act, 1999.

Section 17 of the Environmental (Impact Assessment and Audit) Regulations 2003, states that an EIA should *"seek the views of persons who may be affected by the proposed project."*

5.2 Objectives of the Consultation and Public Participation (CPP)

The objective of the consultation and public participation was to:

i. Disseminate and inform the stakeholders about the project with special reference to its key components and location.

ii. Gather comments, suggestions and concerns of the interested and affected parties.

iii. Incorporate the information collected in the EIA study.

Plate 9: Public meeting held within the site

Source: Fieldwork 5/08/2017

Plate 10: The proponent addressing the gathering

Source: Field work 05/08/2017

5.3 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 1999 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development. The environmental assessment study exercise which was conducted on the 27th July 2017 to 5th August, 2017. In accordance to the EIA Regulations 2003 section 17c, appropriate notice was circulated to the affected parties/communities on 27th July 2017 one week prior to the public meeting *(attached is the notice and delivery sheet signed by the AP).*

The exercise was conducted in different ways, namely;

i. interviews and discussion,
ii. field surveys and observations,
iii. administering of questionnaires,
iv. public meeting held on 5th August 2017*(attached is a copy of the minutes).*

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative

impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

5.4 Analysis of the Public Consultation findings

5.4.1 Positive Issues

i. Creation of employment opportunities
ii. Increase and enhance property values in the neighbourhood
iii. Improve security in the area
iv. Address the critical gap and demand for quality purpose-built housing for students and young professionals
v. Lower the current cost of housing
vi. Increase supply of quality and affordable student accommodation
vii. Creation of business opportunities
viii. Improvement of the infrastructure

5.4.2 Negative Issues

The residents of Lukenya through their association, Lukenya Welfare Residents Association, raised the following concerns in relation to the proposed development *(attached letter from Machakos County Government dated 5th August 2017):*

i. Anticipated increased noise from the development
ii. Littering the area
iii. The Development being out of character with the neighborhood
iv. Flooding at the lower part of the property

On anticipated increased noise from the development, the hostels will have comprehensive policies and guidelines for residents staying at the residence which they will all sign as part of their Housing Agreement. The guidelines will include various provisions to ensure an appropriate standard of conduct and as part of living in a community. There will be a quiet hours from 10pm to 8am daily in all the apartments including all public areas and outdoor areas as well as balconies/patios, study rooms and lounges. Residents who violate Quiet Hours will be asked to remove the equipment causing disturbance or they may have their Housing Agreement cancelled. The proposed development is a modern, purpose-built student housing residence which will be professionally managed by a highly trained and experienced team in hospitality management, counseling amongst others.

As regards Littering the area, measures to mitigate this concern will include and not limited to;

i. Segregation of waste will be done at source. Each room will have a litter bin. On all floor levels, dedicated bins will be placed to collect biodegradable and non-biodegradable wastes.
ii. Wastes shall be collected daily from all bins and transferred to the waste management area.
iii. Daily sweeping and collection of waste from common areas such as lobbies, staircases, entrances shall be done by cleaners employed by the proponent.
iv. Hiring of a licensed solid waste transporter to collect and transport waste for dumping at NEMA approved site.
v. Public awareness will be conducted through signage and information notices informing the public to dispose waste appropriately shall be posted within the premises at strategic points.

On development being out of character with the neighborhood, we wish to affirm that the change of user is to allow hostel use which is compatible to the residential use. Developments located south of the subject plot are mostly residential townhouses, north of the plot are hostels and commercial establishments. Approximately 50 meters from the site is a 4-storey hostel, therefore the proposed development is not out of character with the neighborhood due to similar existing developments approved in the area. The proposed development therefore should be supported as it is compatible with surrounding land uses. A change of use from agricultural to hostels was granted by the County Government of Machakos *S/NO: 732564552017(Attached is a copy of the approval).*

On flooding at the lower part of the property, the land slopes towards the seasonal stream crossing the property at its northern boundary. Flooding may occur during heavy downpour but the developer will take various measures to mitigate this possibility. They include;

i. Ensure the riparian reserve is observed in accordance with Water Act 2002 (WRMA to peg before fencing of the site).
ii. Construction of gabions on the lower part of the property.
iii. Comprehensive landscaping on the riparian reserve and open areas.
iv. Semi permeable materials to be used for construction of pavements.
v. Construction of a box culvert on the access road

5.5 Stakeholders' Suggestions

The following suggestions were raised during the public meeting held on 5th August 2017:

i. The project proponent should consider developing townhouses that are compatible with the area
ii. The developer could also construct a social facility to benefit the neighbourhood

The developer has acquired a change of user from agricultural to hostels, the proposed development is compatible with residential use and is in a neighbourhood already developed with hostels, measures will be taken to mitigate all negative impacts and a chunk of resources have already been invested in the project thus implementation of the proposed project outweighs the suggestions of the residents.

5.6 Analysis of the public consultation

The overall conclusion from the interviews and analysis of public consultation led to determination of the following:

i. The project is located in an idle land and is unlikely to have adverse effects to the environment if managed properly.
ii. The proposed development will provide habitable student housing units and thus alleviate the shortage
iii. The project will uplift the market value and economic viability of the premises around the site.
iv. The proposed project will benefit the members of the community at large through boosting of the area economically and creation of jobs
v. If the EMP is adhered to, all the potential negative impacts will be addressed conclusively

NB. During the public baraza, the residents through their chairman trashed the attendance list in order to assume that the meeting was not called for as a stakeholders meeting for EIA study but rather a planning (change of user) which contradicts reasons for our invites that were accompanied by Social site assessment questionnaires.

That notwithstanding, the issues raised through their objections to Mavoko sub-county were 90% environmental and we have tried to address them satisfactorily in this report.

CHAPTER 6: PROJECT ALTERNATIVES

6.1 No project alternative

Without the proposed development, the subject plot would remain in its current underutilized state. Advantage associated with this are that there would be no negative implications on the environment brought about by implementing the project.

However the disadvantages of a 'no project alternative' outweigh the advantages. This are;

a) The proponent would be at loss financially since they have already invested a lot of resources in terms of professional and statutory fees.
b) The statutory bodies and professionals firms engaged in the project would lose out on potential revenue.
c) The proponent would lose out on the opportunity to invest and increase his income.
d) Potential job opportunities would be missed.
e) The government would lose out on taxes and the opportunity to encourage investment in the private sector.
f) The value of land would remain underutilized.
g) The student fraternity will lose out on an increase in standard accommodation facilities.

6.2 Relocation alternative

Given the nature, timeframe and objectives of the project, the proponent settled on this as the most feasible site. The proponent has settled on this site because it is located in an area that is compatible with the proposed development (there is a 4-storey hostel development 50 meters from the site). The site is the most logical and convenient. Furthermore, the search for an alternative site would imply increase in the expenditure, time and costs for the proponent.

6.3 Alternative land use

Alternative land uses such as residential (townhouses) or social facility may be considered for the site. However, given there is demand for student accommodation in the area as attributed by the feasibility study conducted by the proponent, coupled with the size of the plot and the net return, it is advisable for the proponent to undertake the proposed development.

6.3 Alternative design

The architectural design that was selected proved to be the most feasible. It provides sufficient space requirements for students, a variety of rooms to choose from, privacy, security,

recreational facilities among other specifications favorable to students. It concurs with the stipulated standards and specifications.

The proponent settled on this design as a unique design that best meets the objectives of the project. *Attached are the architectural drawings.*

6.4 Alternative construction materials and technologies

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security, environmental and aesthetic requirements. Equipment that saves on water and energy will be given priority. The concrete pillars will be built using locally sourced stones, sand, cement, metal bars and fittings that meet the Kenya Bureau of Standards requirements.

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

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

CHAPTER 7: DESCRIPTION OF EXISTING AND ANTICIPATED IMPACTS AND THEIR MITIGATION MEASURES

7.1 Existing impacts

The subject property is covered by grass and a few trees. The vegetation cover prevents occurrence of soil erosion and provides habitat for birds and insects.

7.2 Anticipated Impacts

The proposed development will bring about several environmental and social-economic impacts. These impacts can described as either negative or positive.

7.3 Environmental impacts

7.3.1 Positive impacts

Positive impacts on the site will be experienced after completion of construction phase. A landscaping plan will be implemented to replace the cleared vegetation and improve natural aesthetic of the property.

7.3.2 Negative Impacts

7.3.2.1 Soil Erosion

Soil erosion refers to the loss/removal of the top soil due to natural (wind, water), animal or human activity. In this particular project, soil erosion will be attributed to human activity through movement of machinery, excavation works and digging of trenches. However, it is important to note that soil erosion will not be a major environmental issue of concern since there will be no major excavation or leveling to be done.

Potential Mitigation measures

i. Provide soil erosion control measures i.e. suppressing open surfaces with water or use of soil erosion control structures on soil-erosion prone areas within the site.
ii. Avoid unnecessary excavations and other soil disturbances that can predispose it to the agents of erosion.
iii. Avoid unnecessary movement of soil materials from the site.
iv. Control over excavation works especially during rainy / wet conditions
v. Re-surface open areas on completion of the project and introduce appropriate vegetation.

7.3.2.2 Impact on Flora and Fauna

During construction, habitat destruction may occur where the habitat is removed to make way for a new development. Plants and animals in these areas are usually directly impacted resulting to

total loss or reduction of biodiversity. Mobile animals (birds, insects & mammals) retreat into remnant part of the habitat or migrate.

De-vegetation results to generation of environmental impacts such as soil erosion, hydrological imbalance, decreases air purifiers etc.

The proposed project will cause major disturbances to the birds and insects on the site; vegetation (shrubs, grass & trees) will be cleared.

Potential Mitigation measures

i. Propose restoration programmes early e.g. landscaping and rehabilitation proposals and their role in mitigating impacts for the affected areas.

ii. Manage the introduced vegetation on completion of the development to restore or improve the site.

iii. Landscaping as proposed in the designs should be done by specialists.

7.3.2.3 Air Pollution

During the construction stage there will be emission of dust and gas to the atmosphere resulting to low air quality. The vehicles entering the site to deliver building materials and the machinery used for construction generate hazardous exhaust fumes such as Carbon Oxides (CO_X), Sulphur Oxides (SO_X) and Nitrogen Oxides (NO_X). Dust particles are caused by excavation works, vibration of machinery and movement of vehicles.

The dust and gases have a direct negative impact to the health of workers.

Potential Mitigation measures

i. Provide personal protective equipment such as nose masks, goggles etc. to the workers

ii. Regular and prompt maintenance of construction machinery and equipment. This minimizes generation of hazardous gases.

iii. Control over areas generating dust particles. Such areas should be regularly sprinkled with water to reduce/suppress dust. Such areas (and excavated soil) can be enclosed to mitigate effects of wind on them.

7.3.2.4 Noise Pollution

Noise is unwanted/undesirable sound that can affect job performance, safety, and health. Psychological effects of noise include annoyance and disruption of concentration. Physical

effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe.

The construction phase will be characterized by significant noise pollution, emanating from concrete mixers, excavators, workers, trucks and other vehicles accessing the site.

The operation phase will be characterized by minimal noise pollution coming from the students who will reside in the housing scheme.

Potential Mitigation measures

i. Use of noise suppressors or silencers on noisy equipment or noise shields i.e. corrugated iron sheet structures.
ii. Construction works should be carried out only during the specified time i.e. from say 0800hrs to 1700 hrs.
iii. Machineries should be maintained regularly to reduce noise resulting from friction.
iv. Workers should be provided with suitable Personal Protective Equipment (PPE) such as earmuffs when operating noisy machinery and when in noisy environment.
v. Drivers delivering materials should avoid unnecessary horning of the trucks/vehicles
vi. Provision of a bill board at the construction site/gate notifying of the construction activity and timings.

During the operation phase, measures to control noise should be implemented. Such as;

a) Provide comprehensive policies and guidelines for residents which they will all sign as part of their Housing Agreement
b) Ensure quiet hours from 10pm to 8am daily in all the apartments including all public areas and outdoor areas as well as balconies/patios, study rooms and lounges are observed
c) Recruit highly trained and experienced team in hospitality management and counseling
d) Monitor noise levels as per NEMA & NCG guidelines

7.3.2.5 Oil leaks and spills

Oil spills are prevalent in construction sites. Though this may not be common for the subject project, it is wise to control and observe leakages/spillages that may occur especially during maintenance of the involved machinery.

Potential Mitigation measures

i. All machinery should be keenly inspected not to leak oils on the ground. This can be ensured through regular maintenance.
ii. Maintenance should be carried out in a well-designed and protected area and where oils/grease is completely restrained from reaching the ground. Such areas should be covered to avoid storm from carrying away spilled oils into the soil/water systems.
iii. All oils/grease and materials should be stored in a site's store, in the contractor's yard.
iv. Proper disposal of oil handling materials such as drums, oily clothes/papers/materials and cans.

7.3.2.6 Solid Waste

The proposed project is expected to generate significant amounts of solid waste during construction and operation phase.

Waste during construction will mostly comprise of stones, wood, broken glasses, containers, rods of metal, pieces of iron sheets, sharp objects (nails), non-biodegradable materials and other assorted materials. This may cause severe injuries and accidents if left unattended on the site.

The waste generated in operation phase will be mainly organic waste and packaging waste. If not removed promptly, the waste accumulates into large heaps harboring rats, flies etc which disseminate germs or diseases. Non-biodegradable waste such as polythene bags may block drainage systems and chock water bodies.

Potential Mitigation measures

i. Efficient use of building material to reduce waste and recycling where possible
ii. Engage the services of registered waste handlers to transport waste to designated disposal sites
iii. Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse, will facilitate waste handling during occupation phase.
iv. Provision for dustbin cubicles
v. Segregation of waste at the source
vi. To manage waste in line with the Environmental management and coordination (Waste Management) Regulations, 2006

7.3.2.7 Liquid Waste

Effluent/sewage resulting from areas such as sanitary facilities and kitchen is of significant concern with respect to the environment. It should never come into contact with the surrounding i.e. water, soil, air etc to avoid disease outbreak- cholera, diarrhea. It should always drain effectively into the sewerage systems via well designed (closed) and laid pipe networks. For this particular project, the proponent will construct a waste water treatment plant.

Potential Mitigation measures

i. Construction of the Waste Water Treatment Plant.
ii. The design of the internal sewerage system should consider the estimate discharges from individual sources and the cumulative discharge of the entire project i.e. it should have the capacity to consistently handle the loads even during peak volumes.
iii. All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in concrete surround. All manholes on drive ways and parking areas should have heavy-duty covers set and double sealed airtight; as approved by specialists.
iv. Sanitary facilities should be kept clean always, through regular washing/cleaning.
v. Frequent monitoring of the internal drainage system.
vi. Blockages and damages should be fixed expeditiously

7.3.2.8 Surface drainage

The drainage of the general site comes in handy to enhance effective flow of the much anticipated surface run-off emanating from the roof catchments and other impermeable areas within the site. The subject plot gently slopes towards a stream; during operation phase there is a risk of flooding on the lower part of the plot since a large section will be covered by hardscape.

Potential Mitigation measures

i. Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface.
ii. Semi permeable materials should be used for construction of pavements.
iii. After completion of construction, the proponent should embark on comprehensive landscaping to increase softscape cover on the plot.

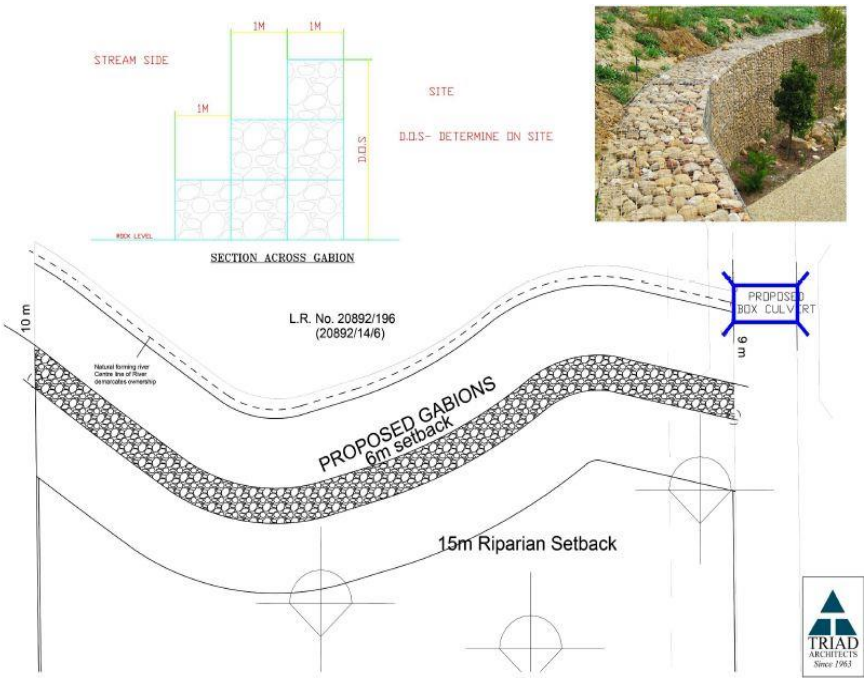
7.3.2.9 Flood risk and storm water management

There will be a significant amount of surface run-off emanating from the roof catchments and other impermeable areas during operation stage. The topography of the plot is gently sloping and there exists a stream on its lower side. This exposes the lower section of the plot at risk of flooding when there is heavy downpour.

Potential Mitigation measures

i. Construct gabions on the northern part of the plot
ii. Construct drainages on the property to direct surface run-off to landscaped areas.
iii. Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface.
iv. Semi permeable materials should be used for construction of pavements.
v. After completion of construction, the proponent should embark on comprehensive landscaping on the riparian reserve and open areas.

Plate 11: Gabion to be constructed at the northern part of the property



Source: Triad Architects 2017

7.4 Social-economic Impacts

7.4.1 Positive impacts

7.4.1.1 Employment creation

The proposed project will create many jobs for both skilled and semi-skilled workers. During the construction phase, the project will employ a large workforce including; masons, plumbers, electricians among others, cooks among others.

For the operation phase, the project will employ a small work force including; cleaners, security guards, caretakers among others.

7.4.1.2 Provision of market for supply of building materials

During the construction phase, the project will consume a lot of building materials sourced both locally and in other parts of the region. This will have a positive impact towards the economic status of the supplies and to the national economy through V.A.T rates for goods.

7.4.1.3 Gains in the local economy

The economy of the neighborhood will receive a boost especially during the construction phase due to the activities of the workers; buying food, drink and commodities.

7.4.2 Negative Impacts

7.4.2.1 Public Health

During construction, there will be increased dust, air and noise pollution. These are considered harmful to human health. The residents and workforce involved will be subjected to these environmental hazards putting them at high risk.

Waste material such as pieces of glass and nails left lying on the ground may cause injuries/ accidents to the workers. Food for the construction workforce is usually provided by mobile individuals most of which operates without licenses. This can compromise health of the workers especially if such foodstuffs are prepared in unhygienic conditions.

Potential Mitigation measures

i. Depending on the occupational safety and health hazards anticipated while performing assigned job tasks, workers will require using properly fitting personal protective equipment (PPE) to avoid injuries and illness. These include working boots, overalls, helmets, goggles, earmuffs, masks, gloves etc

ii. A First Aid Kit should be provided within the site and during construction phase. This should be fully equipped at all times and should be managed by qualified persons.

iii. Adapt a suitable emergence response plans to manage occurrence of anticipated hazards during construction phase.

iv. Safety awareness may be gained through regular safety meetings, safety training or personal interest in safety and health.

v. The contractor should have workmen's compensation cover. It should comply with workmen's compensation Act, as well as other ordinances, Regulations and union Agreements.

vi. Sanitary facilities should be provided; and maintain Standard cleanliness of the facilities.

vii. Local individuals preparing food for the workers at the site should be controlled, monitored and evaluated to ensure that food is hygienically prepared.

viii. Workers should always be sensitized on social issues such as drugs, alcohol, diseases such as HIV/AIDS and STIs etc.

ix. Ensure provision of safe drinking water for the workers on site.

7.4.2.2 Insecurity

Insecurity may arise during the construction phase since intruders may try to steal the building materials deposited on the site. This especially happens in cases where there is no fence.

Potential Mitigation measures

i. The project site should be enclosed using suitable walls to beef-up security and to control movement within the site.

ii. There should be guard houses at the gate. Security guards should always monitor the gate of the facility to keep away the intruders and to control movement within the site.

iii. Contractor should provide adequate security during the construction period when there are no works on the site.

iv. The guards stationed at the gates should document movements in and out of the site/property.

7.4.2.3 Fire

Fire outbreaks are common in Kenya and they usually subject detrimental effects to the environment. Fire causes both economic and social drawbacks. There are operations that are prone to such outbreaks at construction sites. It is therefore important to consider the issue of fire.

Potential Mitigation measures

i. Hire competent and properly authorized electrical contractor to do the wiring and other electrical works.

ii. Install fire alarm system for entire project

iii. Install smoke detectors in kitchens.

iv. Installation of firefighting equipment following County Fire requirements.

v. Conduct regular firefighting drills within the site.

vi. Develop and adapt an (fire) emergency response plan for the project during and occupation stage.

vii. Ensure that all firefighting equipment are regularly maintained and serviced.

viii. Provide fire hazard signs such as 'No Smoking' sign, Direction to exit in case of any fire incidence and emergency numbers.

7.4.2.4 Increased energy demand

There will be increased use of energy during the construction stage (fuel for running machinery

and other equipment) and during operation phase (electricity used by the occupants of the housing project). Energy conservation is thus fundamental.

Energy conservation involves optimum use of petroleum products (diesel and gasoline), electrical appliances (equipment), lighting systems and other electric machinery as used for different purposes. It also includes use of renewable energy sources.

Potential Mitigation measures

i. Turn off machinery and equipment when not in use.

ii. Put off all lights immediately when not in use or are not needed.

iii. Use energy conserving electric lamps for general lighting.

iv. Make use of alternative source of energy such as solar power. Solar panels proposed in the project should be fully utilized and timely repaired in case of damage.

7.4.2.5 Increased Water demand

Water is an integral material for construction hence during this phase, a high amount of water will be required. During the occupation phase, the demand for water will also be high; mostly for domestic use. Lack of adequate water during occupation phase may result to dirty surfaces exposing the residents to disease.

The subject plot is not served by the conventional water supply system. The proponent will buy water from vendors and drill a borehole within the site.

Potential Mitigation measures

i. Drill a borehole to supply water for the development in both construction and occupation phase (all necessary approvals from WRMA and NEMA have been sought and granted).

ii. The contractor should use water bowsers and tankers to bring in water for construction activities i.e. during periods of high water demand (i.e. during slab formation). Water fetching should however be subject to authorization by the local water authority.

iii. Recycling of treated grey water from the Waste Water Treatment Plant.

iv. Install water conserving taps that turn-off automatically when water is not in use.

v. Encourage water reuse/recycling during construction and occupation phases.

vi. Roof catchments of building blocks should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance collection and storage of the resulting run-off. Such water can be used in watering flower gardens, general cleaning etc

vii. Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. 'Keep/Leave the Tap Closed', etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management

7.4.2.6 Traffic Density

The proposed project will come along with increased (vehicle) traffic along the connecting routes especially during construction phase. The effect may not be felt during occupation phase.

Potential Mitigation measures

i. Notify the motorists about the proposed development once implementation is started. It is important that warning/ informative signs (bill boards) be erected at the site. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.

ii. The traffic along the connecting roads should be controlled especially during construction phase and mostly when trucks are turning into the site, say when delivering of materials.

iii. Employ traffic marshals to control traffic along the adjacent roads and in and out of the site.

iv. Rehabilitate the access road leading to the property. In case the major road is damaged by the heavy trucks and machinery, the proponent should embark on repair after completion of construction phase.

CHAPTER 8: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN-EMP

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

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

8.1 EMP FOR THE CONSTRUCTION PHASE

Table 2: Environmental management and monitoring plan during construction phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
De-vegetation resulting from site clearance	• Ensure proper demarcation and delineation of the project area to be affected by construction works. • Apply for tree cutting permit from relevant authorities before cutting of any tree • Preserve trees located at the boundary of the plot	Proponent Contractor Engineer Architect Workers	Routine inspection	50,000
Soil erosion	• Ensure management of excavation activities • Control activities especially during rainy seasons • Provide soil erosion control and conservation structures where necessary. • Compact loose soils to minimize wind erosion	Proponent Contractor Workers NEMA inspectors	Routine inspection	50,000
Air pollution	• Dust suppression with water-sprays during the construction phase on dusty areas • Careful screening of construction site to contain and arrest construction-related dust.	Proponent Contractor County Public Health Officer	Daily inspection routine maintenance	100,000

	• Exposed stockpiles of e.g. sand, will be enclosed, covered, and watered daily. • Ensure construction machinery and equipment are well maintained to reduce exhaust gas emission • All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. • Drivers of construction including bulldozers, earth-movers etc. will be under strict instructions to minimize unnecessary trips and minimize idling of engines.	Workers NEMA inspectors		
Noise pollution	• Construction activities to be restricted to daytime i.e. 8am to 5pm • Use of Suppressors on noisy equipment or noise shields for instance corrugated iron sheet structures • Sensitize drivers of construction machinery on effects of noise • Trucks used at construction site shall be routed away from noise sensitive areas where feasible. • Maintain plant equipment to suppress frictional noise • Workers in the vicinity or involved in high-level noise to wear PPE • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Proponent Contractor County Public Health Officer Workers NEMA inspectors	Random inspection Routine maintenance	100,000
Oil pollution	• Proper storage, handling and disposal of new oil and used oil and related wastes • Maintain construction machinery and equipment to avoid leaks • Maintenance of construction vehicles to be carried out in the contractors yard (off the site) • Provide oil interceptors along the drains leading from car wash and service bays	Contractor Workers	Daily inspection Routine maintenance	50,000
Storm water drainage	• Proper installation of drainage structures/facility • Install cascades to break the impact of water flowing in the drains • Ensure efficiency of drainage structures through proper design and maintenance • Provide gratings to the drainage channels	Contractor	Routine inspection and maintenance	75,000

Flood risk	• Construct gabions on the lower part of the plot • Construct drainages on the property to direct surface run-off to landscaped areas. • Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface. • Semi permeable materials should be used for construction of pavements. • Comprehensive landscaping on the riparian reserve and open areas.	Proponent Occupants	Routine Inspection	250,000
Solid waste and liquid waste	• Segregate the waste at the site • Ensure proper disposal of construction waste (pieces of wood, glass etc) in the contractor's yard (off the site). • Engage services of a registered NEMA waste handler to dispose the waste at designated disposal sites • During transportation of building materials and waste, trucks should be covered to prevent them from falling along the roads • Sensitize workers on the reuse of materials where appropriate. • As provided for by the Building Code, a portable toilet will be provided on site to be used by construction workers	Contractor Proponent Workers	Weekly checks	50,000
Increased water demand	• Drill a borehole (all necessary approvals from WRMA and NEMA have been sought and granted) • Employ services of waters vendors to supplement water supply • Recycling of treated grey water from WWTP • Sensitize workers to reduce water wastage	Contractor Proponent WRMA Workers	Daily inspection	4,000,000
Traffic congestion	• Enforce speed limits for construction vehicles especially along the roads leading to the site • Provide bill boards at the site/entrance to notify motorists and general public about the development • Ensure that the vehicles comply with axle load limits • Ferry building materials during off-peak hours • Employ traffic marshals to control traffic in and out of site • Employ well trained and experienced drivers	Proponent Contractor NEMA inspectors Workers	Daily observation	75,000

Health and safety of workers	• All workers will be sensitized before construction begins, on how to control accidents related to construction. • A comprehensive contingency plan will be prepared before construction begins, on accident response. • Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance • Accordingly, adherence to safety procedures will be enforced. • Provide first aid kits at strategic places in the site • All workers to wear protective gear during construction e.g. helmets. • Provide clean water and food to the workers. • Construction work will be limited to daytime only • Workers to be adequately insured against accidents. • Ensure that the workers are registered with NHIF and NSSF and remits appropriate fee	Contractor County public health officer Workers Proponent NEMA inspectors NHIF and NSSF officials	Random checks	100,000
Insecurity	• Provide security guards during construction period for both day and night • Construct temporary barrier (iron sheet) around the site before commencement of construction • Keep records of all movement in and out of the construction site	Contractor Proponent	Daily observation	50,000
Re-vegetation	• Design and implement an appropriate landscaping and tree planting program to help in re-vegetation of part of the project area after construction. • Introduction and maintenance of vegetation (trees and grass) on open spaces and around the site	Proponent Workers	Routine inspection	100,000

8.2 EMP FOR THE OPERATION PHASE

Table 3: Environmental management and monitoring plan during Operation phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
Sewage/waste water spillage	• Regular inspection and maintenance of the Waste Water Treatment Plant and internal sewer system. • Residents should report any incidence of blockages in their units immediately they occur	Proponent Occupants County public health officer	Periodic checks	100,000
Solid waste generation	• Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures • Encourage segregation of waste (organic and inorganic) and provide for clearly marked dustbins to serve the specified use. • A private NEMA licensed company to be contracted to handle solid waste	Proponent Occupants County public health officer	Periodic Checks	50,000
Air pollution	• Cabro-paving on exposed areas • Gardening of landscaped areas • Watering of uncovered areas • Periodic maintenance of generator and water pumps	Proponent NEMA inspectors	Weekly checks Routine maintenance	50,000
Noise and vibration Pollution	• Installation of silencers on the generators and transformer rooms • Do annual noise measurements. • Sensitize residents on minimal permissible noise levels • Comply with L.N. 25:Noise prevention and control rules, 2005 and L.N. 61: Noise and vibration pollution regulation, 2009	Proponent Workers NEMA inspectors Residents	Periodic checks	75,000
Storm water drainage	• Proper maintenance of drainage structures • Inspection and maintenance of water harvesting gutters and storage tanks	Proponent	Routine inspection and maintenance	100,000
Increased water use	• Harvest rain-water • Install water conserving taps that turn off automatically when not in use • Use recycled water from Waste Water Treatment plant to water flowers and grass.	Proponent Occupants	Daily Inspection Routine maintenance	50,000

	• Place notices at water taps e.g 'TURN OFF TAP AFTER USE' • Provision of roof/ underground tanks for water storage • Maintenance of water components			
Increased energy use	• Switch off electrical appliances when not in use. • Switch off all lights immediately when not in use or are not needed. • Use energy conserving bulbs e.g. LED bulbs for general lighting. • Maintenance of electrical components.	Proponent Occupant	Observation Routine maintenance	100,000
Fire	• Install fire fighting equipment • Sensitize the residents on fire risks i.e. conduct regular fire drills • Adapt effective emergency response plan • Maintain fire fighting equipment regularly • Provide emergency numbers at strategic points	Proponent Residents	Routine inspection	100,000
Insecurity	• Engage services of security guards • Install CCTV cameras • Place hotline numbers on strategic places • Sensitize residents on security precautions	Proponent	Periodic and surprise checks	50,000
Traffic	• Provide warning lights and other signs to reduce risk of accidents • Provision of adequate on-site parking bays	Proponent	Routine maintenance	15,000

8.3 EMP FOR THE DECOMMISSIONING PHASE

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

Table 4: Environmental management and monitoring plan during Decommissioning phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring means	Recommended frequency of monitoring	Estimated Cost (KShs)
Demolition of existing structures	▪ Apply for demolition permit from relevant authorities before commencing the demolition ▪ Engage a registered private contractor to carry out the demolition ▪ Provide workers with Personal Protective Equipment (PPEs) ▪ The demolition exercise to be limited at day time only ▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Project proponent Contractor NEMA inspectors	Inspection	Daily during the demolition process	250,000
Air pollution	▪ Dust suppression with water sprays on dusty areas ▪ Careful screening of construction site to contain and arrest construction related dust ▪ Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission	Proponent Contractor NEMA inspectors	Inspection Routine maintenance	Daily	150,000
Noise pollution	▪ Demolition activities to be restricted to daytime i.e. 8am to 5pm ▪ Use of Suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures ▪ Workers in the vicinity or involved in high level noise to wear respective safety & protective gear. ▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Proponent Contractor Workers NEMA inspectors	Inspection Observation Routine maintenance	Random	100,000
Health and safety	▪ All workers to wear PPEs e.g. helmets.	Contractor	Routine	Daily	150,000

of workers	▪ All workers will be sensitized before demolition begins, on how to control accidents related to construction. ▪ Accordingly, adherence to safety procedures will be enforced. ▪ All workers will be adequately insured against accidents.	Workers Proponent NEMA inspectors	activities checks		
Solid and liquid waste	▪ Ensure proper solid waste disposal and collection facilities ▪ Refuse collection vehicles will be covered to prevent scatter of wastes by wind. ▪ Demolition wastes to be collected by a licensed operator to avoid illegal final dumping at unauthorized sites. ▪ All persons involved in refuse collection shall be in full protective attire.	Contractor Proponent NEMA inspectors Registered/licensed waste management company	Routine Activities checks	Daily	100,000
Re-vegetation and comprehensive landscaping	▪ Implement an appropriate re-vegetation programme to restore the site to its original status ▪ During the re-vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; ▪ Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; ▪ Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	Contractor Proponent	Inspection	Random	150,000

CONCLUSIONS AND RECOMMENDATIONS

The proposed Student Housing shall bring with it numerous positive impacts including increase in the student housing units, creation of employment opportunities, improved businesses in the project area especially for various suppliers, increase in national student housing stock and increase in revenue to both the county and national governments among others has outlined in the report.

The negative environmental impacts that will result from establishment of the project which include air pollution, noise pollution, flooding at the northern part of the property and generation wastes among others which however can be mitigated.

The proponent have committed to put in place various mitigation measures mitigate the negative environmental, safety, health and social impacts associated with the proposed development. It is recommended that in addition to this commitment, the proponent should focus on implementing 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.

It is also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards.

REFERENCES

1. Kenya gazette supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government printer, Nairobi
2. Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. Government printer, Nairobi
3. Kenya gazette supplement Acts, Environmental Management and Coordination (Water Quality) Regulations, 2006. Government printer, Nairobi
4. Kenya gazette supplement Acts, Environmental Management and Coordination (Waste Management) Regulations, 2006. Government printer, Nairobi
5. Kenya gazette supplement Acts, Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) Regulations, 2009. Government printer, Nairobi
6. Kenya gazette supplement Acts Building Code 2000. Government printer, Nairobi
7. Kenya gazette supplement Acts Physical Planning Act, 1999. Government printer, Nairobi
8. Kenya gazette supplement Acts Public Health Act (Cap. 242). Government printer, Nairobi
9. Kenya gazette supplement Acts Water Act, 2002. Government printer, Nairobi
10. The Occupational Safety and Health Act, 2007. Government Printer, Nairobi

ANNEXES

1. Copy of ownership documents
2. Copy of Change of Use (PPA2)
3. Copy of Architectural plans
4. Questionnaires
5. Copy of minutes of the Public Meeting held on 5th of August 2017
6. Copy of invitation letter dated 27th July 2017
7. Copy of the delivery sheet dated 27th July 2017
8. Location map