ENVIRONMENTAL IMPACT ASSESSMENT FULL STUDY FOR THE PROPOSED CONSTRUCTION OF AN ORTHOPEDIC CLINIC ON PLOT L.R. 209/22300 (ORIGINAL NUMBER 209/17/8) 3RD AVENUE, PARKLANDS NAIROBI COUNTY.

PROJECT PROPONENT:
SPRINGFIELD DEVELOPERS LIMITED.

P.O. BOX 27151-00100

NAIROBI.

CONSULTANTS

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SUBMISSION

This Environmental Impact Assessment (EIA) Full Study Report has been prepared and is submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003. We, the undersigned, wish to certify that the particulars in this report are correct and true to the best of our knowledge.

PROPONENT: SPRINGFIELD DEVELOPERS LIMITED.

Designation: .....

Name: .....

Signature: .....

Date: .....

EIA/EA LEAD EXPERT

JUDY WANJIRU KAGWI

NEMA Reg. No.: 6794

Signature: .....

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EIA/EA ASSOCIATE EXPERT

WILLIAM NYAGA KINUTHIA

NEMA Reg. No.: 9514

Signature: .....

Date: .....

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ACRONYMS

EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
L.R. No.	Land Registration Number
NWSC	Nairobi Water and Sewerage Company
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
NLC	National Land Commission
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Act
PAYE	Pay as You Earn
PPE	Personal Protective Equipment
VAT	Value Added Tax

EXECUTIVE SUMMARY

There are numerous challenges to the environment in Kenya today. This has occurred as a result of unsustainable development projects, many of which have led to environmental degradation.

In an effort to address this problem the Kenya Government came up with legislation enshrined in the Environmental Management and Coordination Act (EMCA), 1999. EMCA's main role is to advocate, oversee and enforce environmental management. Under EMCA, it is a mandatory requirement that all projects are economically viable, socially acceptable and environmentally sound. For this reason, all new development projects are required to undergo an Environmental Impact Assessment (EIA). EIA assesses the ecological and socio-economic impacts of a project before it is implemented.

According to section 58 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 Second Schedule 9 (1), and Environmental (Impact Assessment and Audit) Regulations (2003), new projects are required to undergo an EIA. The report of the same must be submitted to National Environment Management Authority (NEMA) for approval and issuance of a license. This is necessary as many forms of development activities cause damage to the environment. It is in accordance with this piece of legislation that the Project Proponent(s) - the developers- undertook to prepare this EIA project report.

The proposed development site for which this report has been conducted is located in 3RD Parklands Avenue, next to Doctors Park, Nairobi County. The area enjoys a mix of suburban setting with diversity in developments ranging from commercial, residential to institutional facilities. The project being proposed will sit on a piece of land that measures approximately 0.1186 hectares. The L. R. No. for the plot to be developed is 209/22300 (Original number 209/17/1/8. The Proponent applied for and has obtained approval for amalgamation of the two plots. The Proponent would like to develop an orthopedic clinic which shall consist of well equipped operational theatres, laboratories, triage, pharmacy, offices, utility rooms and a parking spaces.

Scope, Objective and Criteria of the Environmental Impact Assessment

The scope of the assessment covered construction works of the proposed development which included ground preparation, masonry and installation of service lines, as well as the utilities required for the proposed project. The output of this work is this comprehensive EIA project report for the purposes of applying for an EIA license.

The general objective of the project report is to ensure that the Proponents observe environmental concerns in all development activities in order to contribute to sustainable development.

Specific Objectives

- To determine the compatibility of the proposed development with the local environmental setting.

- To identify and evaluate the significant environmental impacts of the proposed project.
- To assess the environmental costs and benefits of the proposed project to the local and national economy.
- To propose mitigation measures for the negative environmental impacts.
- To incorporate Environmental Management Plans (EMP) and monitoring mechanisms during implementation, operation and decommissioning phases of the project.
- To inform the public about the proposed project and get their views (public participation).

The EIA Consultant, on behalf of the Proponent(s), conducted this EIA project report whose **Terms of Reference** were as follows: -

- To provide a detailed description of the proposed development project in terms of location, objectives, design, activities, material inputs, outputs, products and waste.
- To provide a detailed description of the baseline environmental and socio-economic conditions of the project site.
- To review the relevant legal, policy and institutional framework applicable in the implementation of the proposed project.
- To provide a detailed description of the potentially affected environment.
- To identify, predict and analyze the environmental and social impacts of the project, including seeking neighbors' and public views and concerns.
- To provide an analysis of project alternatives in terms of site, design and implementation technologies and provide reasons for preferred options.
- To provide a detailed EMP proposing measures for mitigating negative environmental impacts, including the cost, timeframe, responsibility and monitoring indicators to implement the measures.
- To provide an action plan for management of health, safety, security and prevention of accidents and emergencies and hazardous activities.

Methodology Outline

The general steps followed during the assessment were as follows: -

- Environmental screening, during which the project was identified as among those requiring EIA under Schedule 2 of EMCA (2015).
- A site reconnaissance and visual survey to determine the baseline information of the project area.
- Comparative study of the project with existing land uses in the neighbourhood.
- Discussion with the Project Proponent and consultants.
- Seeking public views via the use of questionnaires and through a public baraza.
- Proposal of mitigation measures to minimize any negative impacts.
- Preparation and submission of the report to NEMA for purposes of seeking an EIA approval and license.

Potential Positive Impacts of the proposed project
The positive benefits associated with the proposed project include the following: -

- Creation of a readily available market for the raw materials used during construction.
- Economic investment hence increases in wealth for the project Proponent.
- Provision of employment opportunities during construction of the proposed project.
- To contribute towards the improvement of health infrastructure, health services and opportunities in Kenya and the East African region.

Potential Negative Impacts Associated with the Proposed Project

The potential negative impacts associated with the proposed project include the following: -

- Increase in solid waste load
- Impact during transportation of construction materials and products and traffic implications along the roads leading into the area
- Impacts on human health and safety. The health and safety of workers may be an issue during the construction phase
- Air pollution as a result of dust particles emanating from excavation and construction activities

In order to alleviate the negative impacts associated with the project, the Proponent(s) shall take several measures, as indicated in the summarized EMP (Table 1).

Environmental Management Plan (EMP)

Table 1: Summarized EMP for the proposed development

Possible Environmental Impacts	**Suggested Mitigation Measures**
Air pollution,dust generation And noise pollution	❖ Sprinkle water during construction work ❖ Control of speed and movement of construction vehicles ❖ Use of low-sulphur diesel for diesel-operated machinery ❖ Use of ear protection aids by construction workers ❖ Construction to take place only during the day ❖ Use of attenuated equipment ❖ No unnecessary hooting by project vehicles ❖ Installation of sound barriers ❖ Temporarily fencing off of noisy machinery such as vibrators ❖ Switch off machines when necessary
Clearing of vegetation	❖ Planting grass to cover open/bare grounds ❖ Maintaining trees in areas not affected ❖ Proper landscaping ❖ Use specialized equipment to minimize damage to tree roots ❖ If possible, plant new trees on approved public land to replace the trees cut down at the project site ❖ Establishment of flower gardens and lawns around project site
Disturbance of soil structure	❖ Put soil traps around perimeter fence and on steep areas ❖ Landscaping with trees, shrubs and grass ❖ Maintaining specified routes for construction vehicles ❖ Control earthworks ❖ Use of light machinery and equipment
Destruction of habitat	❖ Maintaining trees and plants in areas not affected ❖ Control of earthworks
Generation of solid waste	❖ Provision of waste collection bins ❖ Re-use of soil, construction debris and other reusable waste ❖ Proper containment and disposal of solid waste ❖ Contracting a licensed waste collection and disposal company ❖ Creation of awareness on proper solid waste disposal

	methods ❖ Re-use of timber off-cuts and wooden support for fuel or in other construction projects
Generation of Bio-medical waste	❖ Provision of waste collection bins designed to hold bio-medical waste and hazardous waste. ❖ Contracting a licensed waste collection and disposal company specialized in handling bio-medical and hazardous waste ❖ Proper containment and disposal of the bio-medical waste. ❖ Creation of awareness on proper bio-medical waste collection and disposal methods to the staff.
Increased demand for water and electricity	❖ Conservative use of water and electricity ❖ Provision of adequate water storage facilities ❖ Installation of waste water recycling systems ❖ Installation of rainwater harvesting structures ❖ Re-use of water where possible, especially during the construction phase ❖ Explore additional sources of water such as boreholes ❖ Utilize alternative and renewable sources of energy such as installation of solar panels ❖ Use of energy saving and efficient appliances
Occupational health and safety risks	❖ Use of suitable personal protective equipment (PPE) ❖ Site to be sprinkled with water to minimize dust ❖ Use of stable ladders and other climbing/support structures ❖ Sensitize workers on construction safety measures ❖ Cleanliness and organization at the construction site ❖ Fencing or covering of risky areas such as deep pits ❖ Safety signage ❖ Use of permit-to-work authorizer for risky jobs ❖ Engagement of skilled labourers ❖ Insurance for workers if possible
Fire hazards and accidents	❖ Acquire firefighting facilities/equipment ❖ Sensitize workers in fire safety ❖ Avoid storage of flammable substances on the project site ❖ Keep well stocked first aid kits ❖ Proper handling and use of tools and machinery
Security	❖ Guarding of site by a reputable security firm ❖ Constant site patrol ❖ Adequate screening of visitors to the site ❖ Collaboration with existing security machinery

	❖ Partnership with neighbours and police in community policing
Generation of waste water	❖ Proper connection of waste water and sewerage system to existing city council system as per approved design ❖ Provision of storm water drains ❖ Proper decommissioning of waste water and sewerage system ❖ Proper maintenance of the drainage system
Public health and safety Increase in traffic flow	❖ Proper handling and disposal of solid waste ❖ Operation of noisy machinery in daytime only ❖ Control of visitors to the site ❖ Installation of adequate water supply ❖ Controlled developments around the facility ❖ Adequate road warning signs to traffic regulations ❖ Set driving speed limits and erection of road bumps ❖ Put acceleration and deceleration lanes to and from the main road ❖ Choice of access routes during construction phase should ensure minimum disturbance to the neighbours ❖ Develop a traffic plan to minimize traffic flow interference from construction activities e.g. schedule transport activities affecting traffic for off-peak hours
Storm water run off	❖ Establish a storm water drainage system ❖ Proper maintenance of the drainage system ❖ Surface run-off and discharge should be controlled to prevent soil erosion

Conclusion and Recommendations

It is worth noting that the construction and operation of the proposed development will bring positive impacts in the project area, as well as negative impacts as outlined above. However, the positive impacts outweigh the negative impacts.

It is our recommendation that the Proponent and the Contractor adhere to the mitigation measures outlined in this report and that the EMP is implemented as prescribed. The Proponent needs to continue complying with the relevant legal and policy requirements that affect this project. It will be in the interest of all stakeholders if NEMA issues an EIA license to the Project Proponent to ensure the full realization of benefits accruing from this project.

CHAPTER ONE: INTRODUCTION

1-1 Background and rationale for Environment Impact Assessment

The proponent has proposed to construct an orthopedic clinic to facilitate easy access to quality health care which has been elusive to the less privileged in society in most African countries. The proposed project is anticipated to be the only specialized orthopedic clinic in Kenya having all the modern equipment and latest information on the type of treatment and prosthetics required by any individual who will visit the clinic. This will be in line with meeting the goals and deadline for the U.N Charter Millennium Development Goals. The proposed clinic is to be constructed on 3rd parklands Road; on an approximately 0.1186 ha piece of land.

For a long time, many development projects worldwide did not consider the effects of the projects on the environment. This led to many environmental problems some of which have been irreversible and costly. In Kenya for instance, the policies and strategies that were pursued to achieve development since independence were not only disjointed, but hardly addressed environmental problems. A comprehensive environmental policy was therefore needed to address the environment in a holistic way. This was achieved through the passing of the Environmental Management and Coordination Bill into Law (EMCA, 1999). EMCA stipulates that EIA be carried out on all development projects likely to cause significant impacts on the environment. This environmental legislation has led to significant achievements in environmental conservation and protection in the recent past. It is in this response that this project report has been prepared.

1-2 Objectives of the Proposed Project

The main objective is to develop an orthopedic clinic which will offer quality and affordable services to people within Nairobi County as well as the country at large whilst maintaining the highest environmental standards in accordance with ISO.

1-2.1 Specific Objectives

- To put the land at the project site to optimal use
- Boost the economy by providing a market for suppliers of goods for construction and related services
- Maximize returns on investment for the Proponent while taking due consideration of policy, legal and administrative procedures governing the operations of a facility of this nature
- To ensure that the fears and hopes of the neighbouring community in this serene environment are captured and addressed in all stages of the project cycle
- Ensure that implementation of the project does not in any way interfere with the environmental sustainability of the area in question giving due consideration to: -
    - Neighbouring population and land uses
    - Facilities and infrastructure within the project area

- Put in place mitigation measures that will ensure that any potential negative impacts resulting from project activities are taken care of at the earliest opportunity to obviate any harmful effect to the neighboring populations and the environment

1-3 Key Findings

The proposed site is currently vacant there are no structures in place. A scaffolding net has been installed on the southern side bordering the CGHU Secondary school. This will minimize as practically reasonable dust pollution. Only on tree will be cut to pave way for the construction of the clinic the others will be maintained. There is an already existing gate at the fronting access road.

1.4 Data Collection Procedures

The Consultant undertook environmental screening and scoping to avoid collecting unnecessary data. Data collection was carried out through questionnaires, visual observation, photography, site visits and desktop environmental studies, where necessary in the manner specified in Part V (Section 31-41) of the Environmental (Impact Assessment and Audit) Regulations (2003).

1.5 Reporting and Documentation

The EIA project report was compiled and prepared in accordance with the guidelines issued by NEMA for such works. The report is to be submitted by the Proponent for consideration of approval and licensing. The Consultant ensured constant briefing of the client during the exercise. Description plans and sketches showing various activities are part of the Appendices.

1.6 Responsibilities and Undertaking

The Consultant undertook to meet all logistical costs relating to the assignment, including those of production of the report and any other relevant material. The consultant arranged for own transport and travel during the exercise. On the site of the proposed project, the Proponent provided a contact person to provide information required by the consultant. The Proponent also provided site plan(s) showing buildings layout, a list of raw materials that will go into the project, operation permits and land ownership documents. The output of the process is this detailed EIA project report.

1.7 Methodology Outline

- Environmental screening, during which the project was identified as among those requiring EIA under EMCA (2015).
- Environmental scoping that provided the key environmental issues.
- A site reconnaissance and visual survey to determine the baseline information of the project area.

- Comparative study of the project with existing land uses in the neighbourhood.
- Discussion with the Project Proponent.
- Desktop studies.
- Seeking public views via the use of questionnaires and public baraza.
- Preparation and submission of the EIA report to NEMA for purposes of seeking an EIA approval and license.

Environmental screening was applied to determine whether an EIA was required and what level of assessment was necessary. This was done in reference to requirements of EMCA, (2015). Issues considered included the physical location, sensitive issues and nature of anticipated impacts.

Environmental scoping process helped focus the project report towards the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological, social, economic and cultural aspects.

Site visits were meant for physical inspection of the location of the project, and to gain a better understanding of the characteristics and the environmental status of the surrounding areas to determine the anticipated impacts. To ensure adequate public participation in the EIA process, questionnaires were administered to the neighbours within a one kilometre radius, a public baraza was also held on site which the area Chief moderated and minutes taken. The information gathered was subsequently synthesized and incorporated in to the EIA project report.

Desktop studies included documentary review of the nature of the proposed activities, project documents, designs, policy and legislative framework as well as the environmental setting of the area, among others.

1-8 Economic Importance of the Proposed Project to the Construction Industry

The construction industry plays a very important role in the economy. Indeed the construction index is one of the indicators of overall economic performance. Construction plays an important role in the economy, in that it is a labour intensive activity that utilizes both skilled and unskilled labour.
It also makes use of locally available materials both from the formal industry (cement, timber) and informal/Jua Kali industry (fabrications). For that matter it creates a lot of forward and backward linkages. It also means that moneys spent in a construction project circulates in the local economy.

CHAPTER TWO: LOCATION AND BACKGROUND INFORMATION

2-1 Property Location

The proposed site is located along 3rd Parklands Avenue, Nairobi Kenya. The neighborhood character is mainly commercial and institutional. Exams include Doctors Park in the immediate neighborhood and CGHU Parklands Secondary School. The proposed development will therefore blend. ***See attached location map.***

Plate 1: Proposed site.

2-2 Project Proponent/Developer

The parcel of land on which the subject development is proposed is registered under section 30 of the Registered Land Act, Chapter 300 as L. R No 209/22300 (Original number 209/17/1/8) 3rd Avenue, parklands, Nairobi County. It is registered under the name Springfield Developers Limited, the project proponent, who is hereby seeking EIA licence for the proposed project - *see a copy of the title deed in the annex.*

2-3 Plot Size

The site for the proposed project covers 0.1186 hectares or thereabout of land or approximately 0.29307 acres. (See ownership documents)

2-4 Plot Registration

The Plot L.R. NO. 209/22300 (Original number 209/17/1/8), is registered under the Registration of Titles Act Cap 281. The registered owners are Springfield Developer Limited. A Copy of the ownership documents has been attached. ***Appendix A.***

Figure 1-1

SITE LOCATION MAP

PROPOSED SITE PLOT L.R. 209/22300 (ORIGINAL NUMBER 209/17/8) 3RD AVENUE, PARKLANDS

Proposed Location for the Orthopedic Clinic.

2.5 Project design

The proposed development which is estimated to cost **Kshs. 484,608,000.00** million entails the construction and operation of an orthopedic clinic. The actual proposed project design will have the following facilities: -

- Ground plus 8no. Floors. Ground floor and floors 1-2 will be acting as parking spaces. Each floor with a capacity of 25 parking spaces.
- Floor No. 3 will consist of offices, waiting area, training room, nurse station, treatment bay, physiotherapy gym, washrooms, sluice room, utility room hydrotherapy pool room.
- Floor No. 4 will consist of offices, nurse station, MIR lobby and procedure room, X ray control and procedure room, equipment rooms and waiting area.
- Floor no. 5 will consist of a cafeteria and kitchen, waiting area and nurse station, washrooms, fire escape, laboratory, orthopedic clinic, Triage 1&2, pharmacy and orthopedic rooms.
- Floor No.6 will consist of Surgical and clinical rooms, theatre and offices, washrooms, 5No. post operation cubicles, waiting area, utility room, pre-operation cubicles, operating theatres.
- Floor No. 7 will consist of washrooms, set of rooms with central partition and two beds for patients rest areas, a laboratory, and utility rooms.
- Floor No. 8 will consist of waiting areas and open rooms, 13no. single rooms with attached toilets and waiting areas.
- Floor No.9 consists of conference hall, offices, nursing stations, washrooms.

The proposed development has an atrium that is covered with transparent glass to bring ample light to all the central areas of all floors. Roof level has storage water tanks (6) with 10,000 liters capacity. Also, a bank of nine solar panels is provided to boost when power outage occurs. Provision of a standby generator to cushion usage of electricity.

The development will be constructed with a facade design to enhance aesthetics. In general, the project will essentially optimize the use of the best available technology to prevent or minimize potentially significant environmental impacts associated with the project. The proposed development will highly consider maximum use of natural light and best use of natural ventilation. Water efficiency, conservation, harvesting and storage will also be considered.

2.6 Electricity/Power supply

The site is connected to the electricity main Kenya Power line, which will be used in all phases of the project. Necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. Provision has also been made for installation of backup generator to cushion excessive consumption of electricity.

2.7 Water supply

Water supply for consumption will be supplied by the Nairobi Water and Sewerage Company (NWSC). Other supplies will include harvested rain water and recycled water. Water storage tanks will be installed to increase water capacity at the project site to the required amount. During the operation phase of the project, rain water will be harvested and stored.

The proponent also proposes to drill a borehole on the project site and applications of the approval by WRMA has been made. This means the proposed development will have sufficient water throughout.

2.8 Waste water and sewerage

The proposed project site is on sewered area. The proponent will therefore apply for a license to connect to the existing sewer line. A water treatment plant shall be constructed to treat waste water before releasing it. The water treatment plant will be installed by a specialist. Waste water treated using this technology will meet the set water quality standards outlined below.

Table 2: Guideline values for discharge of treated effluent into the environment

Parameter	**Guide value**
Ph.	6.5 – 8.5
Biological Oxygen Demand (5 days at 20 ° C)	30 (mg/L) max
Chemical Oxygen Demand	50 (mg/L) max
Suspended solids	30 (mg/L) max
Ammonia $–NH_4^+$ Nitrate-NO_3^+ Nitrite-NO_2	100 (mg/L) max
Total Dissolved Solids	1200 (mg/L) max

Source: Environmental Management and Co-ordination (water quality) regulations, 2006. Sixth schedule

Table 3: Microbiological quality guidelines for wastewater use in irrigation

Re-use Conditions	**Exposed group**	**Intestinal nematodes (MPN/L)***	**Coliforms (MPN/100 ml)**
Unrestricted irrigation (crops likely to be eaten uncooked, sports field, public parks)	Workers, consumers, public	< 1	< 1000 **
Restricted irrigation (cereal crops, industrial crops, fodder crops, pastures and trees) ***	Workers	< 1	No standards recommended

Source: Environmental Management and Co-ordination (water quality) regulations, 2006. Eighth schedule

Ascaris lumbricoides, Trichuris trichiula and human hookworms

** A more stringent guideline (< 200 coliform group of bacteria per 100 ml) is appropriate for public lawns, such as hotel lawns, with which the public may come into direct contact

*** In the case of fruit trees, irrigation should cease two weeks before fruit is picked and fruit should be picked off the ground. Overhead irrigation should not be used.

Table 4: Standards for Irrigation water

Parameters	Permissible Level
Ph.	6.5-8.5
Aluminium	5 (mg/L)
Arsenic	0.1 (mg/L)
Boron	0.1 (mg/L)
Cadmium	0.5 (mg/L)
Chloride	0.01 (mg/L)
Chromium	1.5(mg/L)
Cobalt	0.1 (mg/L)
Copper	0.05 (mg/L)
E-coli	Nil/100 ml
Fluoride	1.0 (mg/L)
Iron	1 (mg/L)
Lead	5 (mg/L)
Selenium	0.19 (mg/L)
Sodium Absorption Ration (SAR)	6 (mg/L)
Total Dissolved Solids	1200 (mg/L)
Zink	2 (mg/L)

Source: Environmental Management and Co-ordination (water quality) regulations, 2006. Ninth schedule

Table 5: Quality standards for recreational waters

PARAMETER	MAXIMUM PERMISSIBLE LEVEL
Arsenic (mg/l)	0.05
Faecal coliform (Counts/100 ml)	Nil
Total coliform (Counts/100 ml)	500
Cadmium	0.01
Chromium	0.1
Colour (True Colour Units)	100
Light Penetration (meters)	1.2
Mercury (mg/L)	0.001
Odour (Threshold Odour Number, TON)	16
Oil and Grease (mg/L)	5
Ph.	6 – 9
Radiation, Total (Bq/L)	0.37
Surfactant, MBAs (mg/L)	2
Temperature (° C)	30
Turbidity (NTU)	50

Source: Environmental Management and Co-ordination (water quality) regulations, 2006. Tenth schedule

2.9 Storm water/run off

Storm water from a construction site can be a major cause of water pollution. Pollution in storm water can include:

- Soil Sand
- Construction debris: (cement, woodchips, metal scraps etc.)
- Natural debris: (leaves, grass etc.)
- Chemicals: (paints, fuel, lubricants and oils etc.)

Storm water drainage system will be put in place to collect all the storm water and to make sure that there is no stagnant water at the site.

2.10 Solid and Bio-medical waste

Solid waste management will consist of dustbins stored in enclosed area to be protected from rain. The waste will then be collected by a reputable NEMA approved waste collection and disposal company. The bio-medical waste management will also be collected special designed bins stored in an enclosed area. The waste will then be collected by a reputable NEMA approved bio-medical waste collection and disposal company. It is recommended that the proponent separate different types of solid waste to make recycling and re-use easier. Waste containers for example can be provided for glass, plastics, tins/metal, paper, biodegradables etc. and the colour of the containers for each type of waste can be different to encourage and make recycling easier and efficient.

CHAPTER THREE: PROJECT ACTIVITIES

3.0 Description of the project construction activities

Construction activities include site preparation by clearing the vegetation, excavations work, foundations work and building of floors and walls. The construction will be carried out by a registered NCA class A contractor.

3.1 Excavation and foundation work

Excavation will be carried out to prepare the site for construction of foundations, pavements and drainage systems.

3.2 Material handling and storage

Building materials will be stored on site. Bulky materials such as rough stones, ballast, sand and steel will be carefully piled on site. Sand, soil and any other dusty material should be covered to prevent and reduce air pollution and fugitive dust at the site and its surroundings.
Construction materials and equipment if not handled with care can cause hazard to the environment and injuries to the workers. For safe working environment during the construction phase, it is recommended that:

- Stockpiles be removed as soon as practicable and materials placed in a way so as not to obstruct waterways.
- Stockpiles of soils, pre-mixed aggregate and asphalt binder should be covered especially during rainy and windy events.
- Potential water pollutants e.g. chemicals, solvents, paints, etc., should be stored in isolated place where they will not cause run-off pollution. They should be stored according to manufacturers' guidelines.
- Great care should be taken to prevent spillage.
- Containers should not be washed in or near streams or storm water drainage system. A plastic mat, tar paper or other impervious materials should be placed on any areas where toxic liquids are to be opened and stored to protect soil and groundwater pollution.
- Construction workers must take appropriate precautions by use of protective clothing during construction activities.
- No materials are to be stored in unstable or high-risk areas.
- Material stockpiles must be stable and well secured to avoid collapse and possible injury to workers or visitors at the site.
- Deliveries should be planned to keep the amount of materials on site to a minimum.

3.3 Masonry, concrete work and related activities

The construction of the building walls, foundations, floors, drainage systems and perimeter fence, among other components of the project, involves a lot of masonry work and related activities. General masonry and related activities include stone shaping, concrete mixing, plastering, slab construction, construction of pavilions, and erection of building walls and

curing of fresh concrete surfaces. If concrete and cement will be mixed at the construction site, it is recommended that the mixing be done in an enclosed place.

3.4 Structural steel work

The building will be reinforced with structural steel for stability. Structural steel works involve steel cutting, welding and erection. The workers carrying out this activity must wear appropriate protective clothing/equipment.

3.5 Roofing works

Roofing activities will include raising the roofing materials such as Decra or Armatile roof tiles and structural timber to the roof and fastening the roofing materials to the roof. Reinforced concrete slabs and steel structures are to be used as per the Engineers' detail while the waterproofing is to be laid to follow manufacturers' specification.

3.6 Electrical works

Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus and sockets.

3.7 Plumbing and drainage

Installation of pipe-work for water supply and distribution will be carried out in the development and associated facilities. In addition, pipe-work will be done for waste water and for storm water. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling, among others.

3.8 Landscaping

The site is to be landscaped to plan. Well-landscaped grass and garden lawns will be established at the site. The project designs greatly put in place a lot of landscaping at the proposed site.

3.9 Final Inspection and Occupancy

The final inspection is undertaken to ensure that the project is properly undertaken in accordance to the laid down contract. The inspection team will include the contractor, the structural engineer, and the project architect. This inspection entails the checking in detail the construction and its installed utilities. The team will ensure that everything is functioning as expected and the qualities of the materials used are up to standard. If they are however satisfied with the job, the job shall be declared officially completed and a certificate of occupancy will subsequently be issued. The certificate will be issued based on the health and safety requirements stipulated in legislations such as the Public Health Act. If satisfied, the contractor and the proponent will file a formal notice of completion marking the handing over of the project to the proponent. All required kinds of works will be done and supervised by skilled and registered experts to in conformity with established standard.

3.10 Description of the project operational activities

Once the proposed development is complete, the building will be used for different activities and purposes from wards, doctor's rooms, theatres and clinics to offices. There will be office waste (waste papers, cartons, and containers), biodegradable waste, biomedical waste and waste water generated from the proposed development.

3.11 Solid waste and waste water management

The completion of the project will lead to generation of assorted solid waste including office waste e.g. waste papers, empty cartons, biodegradable waste and waste water. The solid waste generated within the facility will be put in containers within the premises temporarily before the hired/contracted licensed solid waste disposal company has collected the waste for final disposal. Waste segregation will be prioritized and use of bin liners with appropriate color codes used. Biomedical waste shall be incinerated to avoid any possible contamination with the environment.

Table 6: Color Codes system used in Kenya

Type of waste	**Colour of container and markings**	**Type of container**
Sharps	Yellow (Marked 'Sharps')	Puncture proof
Infectious	Yellow	Strong leak proof plastic bag with biohazard symbol
Highly infectious	Red (Marked Highly Infectious)	Containers capable of being autoclaved
Non-Infectious/ non-hazardous (non-clinical)	Black	Plastic Bag or container.
Chemical and Pharmaceutical	Brown	Plastic bag or Container
Radioactive waste	Yellow with black radioactive symbol	Lead Box

The following are recommendations for storage facilities for health care waste.

- ❖ The storage area should have an impermeable, hard-standing floor with good drainage; it should be easy to clean and disinfect.
- ❖ There should be a water supply for cleaning purposes.
- ❖ The storage area should afford easy access for staff in charge of handling waste.
- ❖ It should be possible to lock the store to prevent access by unauthorized persons.
- ❖ Easy access for waste-collection vehicles is essential.
- ❖ There should be protection from the sun.
- ❖ The storage area should be inaccessible to animals, insects, and birds.
- ❖ There should be good lighting and at least passive ventilation.
- ❖ The storage area should not be located close to patient areas, or to fresh food stores or food preparation areas.
- ❖ A supply of clean equipment, protective clothing, and waste bags or containers should be located conveniently close to the storage areas.

Cytotoxic waste should be stored separately from other health care waste in a designated secure location. Radioactive waste should be stored in containers that prevent dispersion, behind lead shielding. Waste that is stored during radioactive decay should be labeled with the type of radionuclide, the date, and details of required storage conditions

Care must be taken to ensure that waste water is handled well to avoid contamination of any water body. Sewage generated will be collected and channeled into the drainage/ sewage system at the site.

3.12 General repairs and maintenance

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

3.13 Description of the project decommissioning activities

Should there be need for eventual decommissioning of the proposed project, in which case the development would have to be demolished and land put to alternative use, different measures will be considered.

Decommissioning will produce a lot of solid waste, which will be reused for other construction works or if not reusable, disposed appropriately by a licensed waste disposal company.

All equipment including electrical installations, furniture, finishing fixtures partitions, pipe-work and sinks, among others, will be dismantled and removed from the site on decommissioning of the project. If the equipment is in good state 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 to schools, churches and charitable institutions.

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the top soil and re-vegetation using indigenous plant species. It is recommended that a separate EIA report be carried out in case of decommissioning of the proposed project.

CHAPTER THREE: BASELINE INFORMATION

This section describes the area where the proposed project is to be established. It will describe in detail the biological, physical and socio-economic environment of the project area.

3.1 Site Location

The proposed site is located along 3rd Parklands Avenue, Nairobi Kenya. The neighborhood character is mainly commercial and institutional. Exams include Doctors Park in the immediate neighborhood and CGHU Parklands Secondary School. The proposed development will therefore blend.

3.2 Physical Environment

Climate

The climate of the proposed project site in 3rd Parklands Avenue area identifies with that of the wider City of Nairobi. Below is a summary of the climatic conditions of Nairobi where the proposed development is located:

i) Sunshine and Solar Radiation

Nairobi experiences a total of about 2,500 hours of bright sunshine per annum, which is equivalent to annual mean of approximately 6.8 hours of sunshine per day. July and August are characterized by cloudiness and during these months the average daily sunshine in Nairobi is 4 hours. Frequently there are several days in succession when the sun fails to penetrate the thick stratocumulus cover, although on other days the cloud does break to a greater or lesser extent for a short period.

There is about 30% more sunshine in the afternoon than in the morning and it follows that westerly exposures receive more isolation than easterly ones.

ii) Rainfall

- Nairobi has a bimodal rainfall pattern, in which the maxima occur in March-April (long rains) and November-December (short rains). The simple rainfall regime is complicated by the uncertainty of rainfall from year to year.
- Average annual rainfall is 875mm, which may actually vary from 500mm to more than 1500mm.
- Thunderstorms may occur, nearly always during the afternoon or evening, during most months of the year but they are rare during the period June/ August.
- Hail is comparatively rare in Nairobi City, being reported at any station on average less than once a year unlike other areas such as western part of Kenya.

iii) Wind Patterns

A significant feature of the climate of Nairobi is the frequency with which the wind comes from the North East and to a somewhat lesser degree to the South East. These are the North East and South East Monsoon, which blow very steadily but without high intensity. Both wind run and mean wind speed are at a maximum in December. Winds also remain high during January, February and March which coincides with the period of higher potential evaporation.

The strongest winds occur during the dry season just prior to the "Long Rains" when speeds of 20 to 2miles per hour are not uncommon from mid-morning to early afternoon; at other times of the year winds speeds are usually 10 to 15 miles per hour. During the night the wind is usually light. In the squalls sometimes associated with thunderstorms, short-lived of up to 70 miles per hour have been known to occur.

iv) Evaporation

The annual variation of evaporation is as expected from consideration of temperature and sunshine factors. The mean annual evaporation as measured by the pan is seen slightly to exceed the mean rainfall at the altitude of Nairobi but it would be expected that at higher altitudes this position would be reversed. Evaporation data is only available in Nairobi's Dagoretti Corner Station. The peak evaporation values are during March, followed by January, February and October. The mean yearly evaporation is 1720mm. The highest annual evaporation is 1951 mm while the lowest is 1519 mm.

v) Temperature

Average daily temperature varies from 17^{o} C in July/August, to 28^{o} C in March. The maximum daily range of temperature is quite large 10 ^{o} C to 30 ^{o} C in May and February respectively.

vi) Smog

Smog is common during the rainy season most common hazards to flying occur over this period. This is mostly associated with the development of towering cumulus and cumulonimbus clouds. A further hazard common in Nairobi is the formation of low stratus clouds during the early morning.

vii) Heat Balance

On hot sunny days, when the wind is light, considerable turbulence is experienced in the first few 100 feet above the ground due to differential heating of the surface, and dangerous down droughts frequently occur in areas where the configuration of the

ground is uneven. Such conditions occurring in the vicinity of an airfield will affect the performance of the aircraft with low power to weight ratio.

3-3 Physiography

i) Relief

The formation of the Rift valley has strongly influenced the geology and geomorphology of the Nairobi area. Nairobi region falls from the edge of the Rift Valley to the west with an elevation of 2,300 meters (7500ft) to 1,500meters (5,000ft) to the east of the city, with the centre itself at 1,700meters (5,500ft).

Nairobi experiences long rains between mid-March to May followed by a cold season usually with drizzles and frost during June to August and the short rains between mid-Octobers to December. The average rainfall received by the county in general is 1,000 mm.

The mean temperature in Nairobi is 26°C with temperatures ranging from 7°C in the upper highlands to 34°C in the lower midlands. July and August are the months during which the lowest temperatures are experienced whereas January to March is the hottest months.

Figure 1: ***Temperature graph of Nairobi***

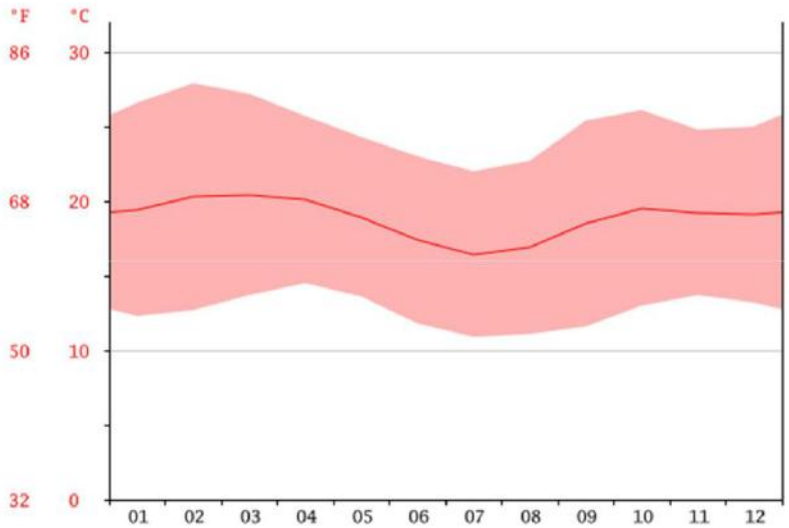
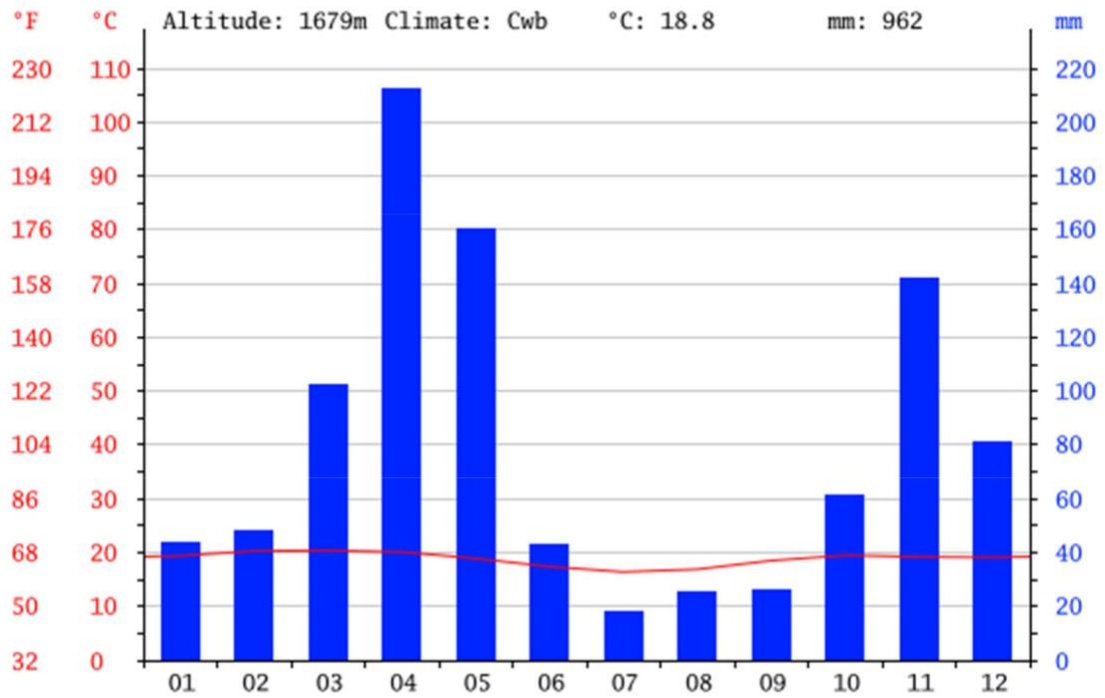


Figure 2***: Climate graph of Nairobi***



The general climate in Nairobi is warm and temperate.

Figure 3: **Climate table of Nairobi**

month	1	2	3	4	5	6	7	8	9	10	11	12
mm	44	48	102	212	160	43	18	25	26	61	142	81
°C	19.4	20.3	20.4	20.1	18.9	17.4	16.4	16.9	18.5	19.5	19.2	19.1
°C (min)	12.3	12.7	13.7	14.5	13.6	11.8	10.9	11.1	11.6	13.0	13.7	13.2
°C (max)	26.6	27.9	27.2	25.7	24.3	23.0	22.0	22.7	25.4	26.1	24.8	25.0
°F	66.9	68.5	68.7	68.2	66.0	63.3	61.5	62.4	65.3	67.1	66.6	66.4
°F (min)	54.1	54.9	56.7	58.1	56.5	53.2	51.6	52.0	52.9	55.4	56.7	55.8
°F (max)	79.9	82.2	81.0	78.3	75.7	73.4	71.6	72.9	77.7	79.0	76.6	77.0

Source: www.nairobicity.go.ke and www.worldtravels.com

3.4 Biological Environment

3.4.1 Flora and Fauna

There are only four trees on site. One of the tree will be cut down to pave way for construction. The rest will remain on site. Natural Resident fauna on site include small mammals such as rodents and various bird species, herperto-fauna such as frogs, and lizards.

3.5 Infrastructure

Nairobi County is generally well served by infrastructure such as roads and other services such as electricity, schools and health centers. Piped water supply is also connected to several parts of the county. Medical care in Kenya is unfortunately still the preserve of the higher income bracket. A percentage of the population is fortunate to have employers who are legally obliged to provide some form of medical cover. However, an even larger percentage have no medical cover and access medical care from the public hospitals or seek traditional healers, whilst a number resort to being treated by unqualified or unlicensed practitioners. Generally, the proposed project area is secure with easy access to public transportation networks.

3.6 Roads

The site will be accessed from the fronting access road 3rd parklands Avenue. The site is located in an area that is served by major road networks making it accessible to everyone.

Plate 2: Access road.

3.7 Water

Water supply for consumption will be supplied by the Nairobi Water and Sewerage Company (NWSC). Other supplies will include harvested rain water and recycled water. Water storage tanks will be installed to increase water capacity at the project site to the required amount. During the operation phase of the project, rain water will be harvested and stored.

The proponent also proposes to drill a borehole on the project site and applications of the approval by WRMA has been made. This means the proposed development will have sufficient water throughout.

A combination of one or more of these factors directly influence urban development, and are a prerequisite to site analysis and planning.

3.8 Electricity

The area is served by a 3-phase electric power supply from the Kenya Power main line. The area is adequately served with telecommunication facilities.

3.9 Security

Security in the area is generally good. The proposed development will be secured by use of CCTVs, screening of individuals and cars, a perimeter fence and by hiring a reputable security firm.

3.10 Refuse disposal

There was no dumping site identified in the area and therefore it is assumed that neighbouring establishments manage their own waste or engage the services of private waste handlers. The proponent shall use the services of a private registered solid waste collection company to collect and dump all the solid waste generated from the proposed site. Temporal solid waste handling containers shall be provided on site which will collect solid waste before it is dumped at the council's designated dumpsite.

3.11 Sewerage

The proposed project site is on sewered area. The proponent will therefore apply for a license to connect to the existing sewer line. A water treatment plant shall be constructed to treat waste water before releasing it. The water treatment plant will be installed by a specialist.

3.12 Socio-economic Environment

3.12.1 Demography

The City of Nairobi is among the key urban areas in Kenya that has continued to experience high rates of demographic transition over time. Nairobi has experienced one of the highest population growth rates of any city in Africa. This is mainly due to the rural-urban migration as well as a natural population increase. Since its beginnings in 1899, Nairobi has grown to become the largest city in East Africa, despite being the youngest city in the region. The growth rate of Nairobi is currently 4.1%.

The project site is adjacent to multiple institutional developments for example, doctors park, CGHU school, Agahkan University hospital.

Plate3: Neighborhood character

3.8.2 Income levels

Parklands is generally occupied by a high-income social class. Proximity to the city centre, decentralisation from the city centre and well-developed infrastructure makes the area a good residential and business area. Generally, the area is secure with easy access to public transportation networks.

3.8.3 Demography

The City of Nairobi is among the key urban areas in Kenya that has continued to experience high rates of demographic transition over time. Nairobi has experienced one of the highest population growth rates of any city in Africa. This is mainly due to the rural-urban migration as well as a natural population increase. Since its foundation in 1899, Nairobi has grown to become the largest city in East Africa, despite being the youngest city in the region. The growth rate of Nairobi is currently 4.1%.

The project site is adjacent to multiple developments both to the East and to the West. The population in the area has increased in the recent past owing to the increase in physical development.

The table below shows the projected population for Nairobi ranging from 1999 to 2020.

Table 7:Projected Population for Nairobi (1999-2020)

Year	1999	2005	2010	2015	2020
Total Population	2,143,254	2,855,792	3,627,472	4,607,671	4,734,881

Source: *1999 Census Survey used as a basis of projection*

CHAPTER FOUR: LEGISLATIVE AND REGULATORY FRAMEWORK

EIA is an instrument for environmental management and development control. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition that all developers conduct EIAs on the development projects.

EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed development with a view of taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on EIAs are contained in section 58 to 67 of the Act. According to section 68 of the EMCA CAP 387, the authority shall be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

There are a number of policies, laws and regulations that govern the protection, conservation and exploitation of the natural resources coupled with provisions for environmental management. These national policies, laws and regulations cover infrastructure, water, agriculture, forestry and health just to mention a few. The national environment action plan documents cover policy directions regarding integration of environmental concerns including EIA into development planning process.

Some of the key national laws, policies and regulations that govern the management of environmental resources in the country are discussed herein.

4.1 Relevant National Policies

The following national policies are of relevance to the proposed project:

4.1.1 The National Environmental Action Plan (NEAP)

The NEAP was a deliberate policy effort to integrate environmental considerations into the country's economic and social development initiatives/plans. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision making. As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process, EIAs were introduced targeting the industrialists, business community and local authorities (now the county governments).

The project shall be implemented and operated based on these guidelines

4.1.2 National Policy on Water Resources Management and Development (1999)

While the National Policy on water resources management and development (1999) enhances a systematic development of water facilities in all sectors for promotion of the country's socio- economic progress, it also recognizes the by-products of this process as wastewater. It therefore calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. The same policy also requires that such projects undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighborhood and further downstream are not negatively impacted by the emissions.

4.1.3 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 8 – Decent work and economic growth

Targets achieved:

4.1.3.1 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor- intensive sectors by providing conducive working environment.

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

4.2 Legal framework

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 and Monitoring Plan provided in this report to ensure the occupants and general public's right to a clean and safe environment is not infringed.

4.2.2 Environment Management and Coordination Act, EMCA, Cap 387.

In EMCA states in section 3 (1) and (2) that "Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment and that the entitlement to a clean and healthy environment under subsection (1) includes the access by any person in Kenya to the various public elements or segments of the environment for recreational, educational, health, spiritual and cultural purposes.

Part VI Section 58 (2) of the Act states the proponent of any project specified in the Second Schedule shall undertake a full environmental impact assessment study and submit an EIA Study report to the Authority prior to being issued with the EIA license. Section 58 (5) states that EIA studies and reports required under the Act shall be conducted or prepared respectively by individual experts or a firm of experts authorized in that behalf by the Authority. The Authority shall maintain a register of all individual experts or firms of all experts duly authorized by it to conduct or prepare environmental impact assessment studies and reports respectively. The register shall be a public document and may be inspected at reasonable hours by any person on the payment of a prescribed fee. Subsection (7) further states that EIA shall be conducted in accordance with the EIA regulations, guidelines and procedures issued under this Act.

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

4.2.2.1 a summary description of the project;

4.2.2.2 the place where the project is to be carried out;

4.2.2.3 the place where the environmental impact assessment study, evaluation or review report may be inspected; and

4.2.2.4 a time limit of not exceeding ninety days for the submission of oral or written comments by any member of the public on the environmental impact assessment study, evaluation or review report.

Subsection (2) and (3) of 59 states that the Authority may, on application by any person extend the period stipulated in sub-paragraph (d) so as to afford reasonable opportunity for such person to submit oral or written comments on the EIA report and the Authority shall ensure that its website contains a summary of the report referred to in subsection (1).

The proponent has engaged the services of the environmental experts to conduct the EIA Report in line with the provisions of this Act. The environmental experts conducted the EIA in line with the regulations, guidelines and procedures issued under the Act.

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

These regulations stipulate how an EIA study report should be prepared and specifies all the requirements that must be complied with. It highlights the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the EIA Study Report making process.

Section 4 (1) states that no proponent shall implement a project likely to have a negative environmental impact or for which an EIA is required under the Act or these Regulations unless an EIA has been concluded and approved in accordance with these Regulations.

Section 11 (1) states that an EIA study shall be conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority. Section 13 (1) and (2) further states that proponent shall, on the approval of the terms of reference under regulation 11, submit to the Authority the names and qualifications of the impact assessment experts appointed to undertake the EIA study and authorized so to do in accordance with section 58 (5) of the Act and that every EIA study shall be carried out by a lead expert qualified in accordance with the criteria of listing of experts specified in the Fourth Schedule to these Regulations.

Section 17 (l) stipulates that during the process of conducting an EIA study under these Regulations, the proponent shall in consultation with the Authority, seek the views of persons who may be affected by the project.

Part IV of the regulations states how an EIA Study Report is conducted, contents and information required, submission, timelines and review process.

The proponent and consultant have undertaken this EIA Study report in line with all the provisions set out in these regulations. Administration of questionnaires and interview were conducted to seek views of persons who may be affected by the project in line with these regulations.

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

The Regulations apply to drinking water, water used for industrial purposes, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife, and water used for any other purposes.

Part II Section 4 (1) states that "Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act. Subsection (2) further states that "No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit"

Part IV Section 24 states that "No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses".

According to these regulations, "Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act".

All wastewater shall be channeled to the sewer system so as not to pollute the ground and surface water and if a pollution incidence occurs the contractor/proponent shall notify the authority immediately.

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

The regulations are contained in the Kenya Gazette No. 69, Legal Notice No. 121. Section 4 (1) states that "No person shall dispose of any waste on a public highway, street, road, recreational area or any other public place except in a designated waste receptacle".

Section 4 (1) and (2) states that "No person shall dispose any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle and that any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these Regulations"

Section 6 (1) stipulates that "Any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles:

i. improvement of production process through conserving raw materials and energy, eliminating the use of toxic raw materials within such time as may be prescribed by the Authority and reducing toxic emissions and wastes,

ii. monitoring the product cycle from beginning to end by identifying and eliminating potential negative impacts of the product, enabling the recovery and re-use of the product where possible and reclamation and recycling,

iii. Incorporating environmental concerns in the design, process and disposal of a product. Section 9 states that "Any person licensed to transport waste shall collect waste from the designated area of operations or storage areas and shall deliver such waste to the designated storage site, disposal site or plant"

The proponent shall engage the services of a licensed waste handler to collect, transport and dispose of wastes to the designated areas.

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

Section 3 (1) and (2) of the regulations states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment except as otherwise provided in the Regulations. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and ,
- Whether the noise can be controlled without much effort or expense to the person making the noise.

These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise.

Part II Section 4 states that: except as otherwise provided in these Regulations, no person shall

a. Make or cause to be made excessive vibrations annoys, disturbs, injures or endangers the comfort, response, health or safety of others and the environment; or
b. Cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.

Section 13 (1) states that no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations except for the purposes in sub- Regulation (2) hereunder. These purposes include emergencies, those of domestic nature and/or public utility construction.

Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying site, and state that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work is to be carried out including but not limited to requirements regarding a) machinery that may be used, and b) the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

The contractor shall ensure that all construction activities are carried out between 0800hrs and 1700hrs on weekdays to ensure that the neighbors are not disturbed. The contractor shall also ensure that all machineries are in good working condition to reduce noise.

4.2.7 The Environmental Management and Co-Ordination (Air Quality) Regulations, 2014

The objective of these Regulations is to provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. Section 5 states that no person shall act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution; or emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the first Schedule.

Further, clause 6 stipulates that no person shall cause or allow emission of the priority air pollutants prescribed in the second schedule to cause the ambient air quality limits prescribed in the first schedule to be exceeded.

Clause 25 (1) states that no person shall cause or allow the emission of visible air pollutants from a stationary or mobile vehicle in excess of the limits set out under the prescribed Standard.

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

Clause 35 states that no person shall cause or allow stockpiling or other storage of material in a manner likely to cause ambient air quality levels set out under the First Schedule to be exceeded. Clause 38 stipulates that no person shall cause or allow emissions of priority air pollutants set out under the Second Schedule from disposal of medical waste, domestic waste, plastics, tyres, industrial waste or other waste by open burning.

The proponent shall comply with these regulations and implement all mitigation measures provided in the EMMP to prevent air pollution during the project cycle

4.2.8 The Water Act, 2016

This Act of Parliament provides for the regulation, management and development of water resources, water and sewerage services.

Part II section 9 of this Act states that every person has a right to access water resources, whose administration is the function of the national government. Part III section 11 states the establishment of the Water Resources Authority (WRA) whose functions are stipulated in section 12 and include but not limited to receiving water permits applications for water abstraction, collection of water permit fees and water use charges.

Section 63 of the act states that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution.

Section 143 states that a person shall not, without authority conferred under this Act;

a) willfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or
b) Throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.

The proponent shall ensure that all provisions stated in the act and under any regulations are observed and that the EMMP is implemented.

4.2.9 Water Quality Regulations (2006)

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings. In addition, of immediate relevance to the proposed project for the purpose of this Project Report is Part II Sections 4-5 as well as Part V Section24 Part II Section IV states that ―Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution. Part IV Section 24 states that ―No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses. According to these regulations, ―Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act.

Relevance

All waste water shall be channeled to the sewer line so as not to pollute the ground and surface water and if pollution incidence occurs the contractor/proponent shall notify the authority immediately.

Table 8: quality standards for domestic water

Parameter	Guide Value (max allowable)
pH	6.5 – 8.5
Suspended solids	30 (mg/L)
Nitrate-NO3	10 (mg/L)
Ammonia –NH3	0.5 (mg/L)
Nitrite –NO2	3 (mg/L)
Total Dissolved Solids	1200 (mg/L)
Scientific name (E.coli)	Nil/100 ml
Fluoride	1.5 (mg/L)
Phenols	Nil (mg/L)
Arsenic	0.01 (mg/L)
Cadmium	0.01 (mg/L)
Lead	0.05 (mg/L)
Selenium	0.01 (mg/L)
Copper	0.05 (mg/L)
Zinc	1.5 (mg/L)
Alkyl benzyl sulphonates	0.5 (mg/L)
Permanganate value (PV)	1.0 (mg/L)

Nil means less than limit of detection using prescribed sampling and analytical methods and equipment as determined by the Authority. And any other parameters as may be prescribed by the Authority from time to time.

Table 9: Quality Standards for recreational Water

PARAMETER	MAXIMUM PERMISSIBLE LEVEL
Arsenic (mg/l)	0.05
Fecal coliform (Counts/100 ml)	Nil
Total coliform (Counts/100 ml)	500
Cadmium	0.01
Chromium	0.1
Colour (True Colour Units)	100
Light Penetration (meters)	1.2
Mercury (mg/L)	0.001
Odour (Threshold Odour Number, TON)	16
Oil and Grease (mg/L)	5
pH	6 – 9
Radiation, Total (Bq/L)	0.37
Surfactant, MBAs (mg/L)	2
Temperature (^{0}C)	30
Turbidity (NTU)	50

And any other parameters as may be prescribed by the Authority from time to time.

4.2.10 EMCA (Wetlands, riverbanks, lakeshores and Sea shore management) regulations, 2009

PART III – MANAGEMENT OF RIVER BANKS, LAKE SHORES AND SEA SHORE

General Principles.

The following principles shall be observed in the management and conservation of river banks, lake shores and the seashore; (a) Resources on the river banks, lake shores and the sea shore shall be utilized in a sustainable manner; (b) Environmental impact assessment as required under the Act shall be mandatory for all major activities on river banks, lake shores and the seashore; and (c) Special measures, including prevention of soil erosion, siltation and water pollution are essential for the protection of river banks, lake shores and the seashore.

4-2.11 The World Commission on Environment and Development

The Commission commonly referred to here is "the Brutland Commission" which focused on the environmental aspects of development, in particular, the emphasis on sustainable development that produces no lasting damage to biosphere, and to particular ecosystems. In addition, environmental sustainability there is the economic and social sustainability. Economic sustainability refers to development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainability aims to maintain the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement.

4-2.12 The Rio Declaration on Environment and Development

Agenda 21 – a programme of action for sustainable development worldwide, the Rio Declaration on Environment and Development was adopted by more than 178 governments at the United Nations Conference on Environment and Development, known as the Earth Summit, held in Rio de Janeiro, Brazil from 3rd to 14th June 1992. Principle No. 10 of the declaration underscored that environmental issues are best handled with participation of all concerned citizens at all the relevant levels. At the national level, each individual shall have appropriate access to information that is concerning environment that is held by public authorities. All states shall encourage and facilitate public participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy shall be provided.

The foregoing discussion is relevant to the proposed development because EMCA demands that the public must be involved before any development project that is likely to have adverse impacts to the environment is initiated by a proponent. The Act has further established Public Complaints Committee (PCC) where the issues raised by the public in regard to any proposed development can be addressed.

4-2-13 World Heritage Convention

Environmental Sustainability 14.

The World Heritage Convention promotes sustainable development, and in particular environmental sustainability, by valuing and conserving places of outstanding natural heritage value, containing exceptional biodiversity, geodiversity or other exceptional natural features, which are essential for human well-being. A concern for environmental

sustainability, however, should equally apply to cultural and mixed World Heritage properties, including cultural landscapes. In implementing the Convention, States Parties should therefore promote environmental sustainability more generally to all World Heritage properties to ensure policy coherence and mutual supportiveness with other multilateral environmental agreements. This involves a responsible interaction with the environment in both cultural and natural properties, to avoid depletion or degradation of natural resources, ensuring long-term environmental quality and the strengthening of resilience to disasters and climate change

4-2-14 Protecting biological and cultural diversity and ecosystem services and benefits

15.

States Parties should ensure that biological and cultural diversity, as well as ecosystem services and benefits for people that contribute to environmental sustainability, are protected and enhanced within World Heritage properties, their buffer zones and their wider settings10. To this end, States Parties should:

i. Integrate consideration for biological and cultural diversity as well as ecosystem services and benefits within the conservation and management of all World Heritage properties, including mixed and cultural ones,

ii. Avoid, and if not possible mitigate, all negative impacts on the environment and cultural diversity when conserving and managing World Heritage properties and their wider settings. This can be achieved by promoting environmental, social and cultural impact assessment tools when undertaking planning in sectors such as urban development, transport, and infrastructure, mining and waste management - as well as by applying sustainable consumption and production patterns and promoting the use of renewable energy sources.

4-2-15 Occupational Health and Safety Act, 2007

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The key areas addressed by the Act include:

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

The proponent shall ensure that safety measures are implemented in use of tools and machinery within site and that protection of the workers and general public with any form of interaction with the construction sites is given priority.

4-2-16 The Physical Planning Act of 1996 CAP 286

This Act is aimed at enhancing and promoting the integrated physical development of socioeconomic activities. The act requires that any activity that constitutes development needs to be approved by the relevant local authority. It has made specific provisions in respect to the mandate of local authorities (now County Governments) in development control and planning Part V - Control of development

30. (1) 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.

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand shillings or to an imprisonment not exceeding five years or to both.
(3) Any dealing in connection with any development in respect of which an offence is committed under this section shall be null and void and such development shall be discontinued.
(4) Notwithstanding the provisions of subsection (2);

(a) The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days;
(b) If on the expiry of the ninety days' notice given to the developer such restoration has not been affected, the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.
31. Any person requiring development permission shall make an application in the form prescribed in the Fourth Schedule, to the clerk of the local authority responsible for the area in which the land concerned is situated. The application shall be accompanied by such plans and particulars as are necessary to indicate the purposes of the development, and in particular shall show the proposed use and density, and the land which the applicant intends to surrender for;

a. Purposes of principal and secondary means of access to any subdivisions within the area included in the application and to adjoining land;
b. Public purposes consequent upon the proposed development.

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

This Act provides for order in terms of development execution.

This Act provides for order in terms of development execution. This development should therefore comply with all the provisions of this law including land use zoning requirements.

4-2-17 Public Health Act Cap 242

Part IX section 115 of the Act states that No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.

Section 116 requires that the local authorities (county governments) take all lawful, necessary and reasonably practicable measures for maintaining its district (counties) at all times in clean and sanitary condition, and for preventing the occurrence therein of, or for remedying or causing to be remedied, any nuisance or condition liable to be injurious or dangerous to health, and to take proceedings at law against any person causing or responsible for the continuance of any such nuisance or condition.

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act. Section 138 states that no person shall within a township permit any premises or lands owned or occupied by him or over which he has control to become overgrown with bush or long grass of such a nature as, in the opinion of the medical officer of health, to be likely to harbour mosquitoes.

The proponent shall contract a licensed waste handler to collect all waste from the site to disposal at approved dumping site. Sewage from the site shall be channeled to the proposed septic tank.

4.2.18 The Health Act (No. 21 of 2017)

The Health Act, Section 88 (XIII) indicates that The Cabinet Secretary shall pursue strategies that are conducive to the development and regulation of private health services and their atonement to the needs of the population. Furthermore, the act stresses that the public and private health services and facilities shall complement each other in the provision of comprehensive and accessible health care to the people. It is therefore law that private entities shall be permitted to operate licensing of private hospitals, clinics, laboratories and other institutions in the health sector, subject to licensing by the appropriate regulatory bodies. The first schedule of the act states that a quality health centre should provide out-patient care, provision of limited emergency care, maternity for normal deliveries, laboratories, oral health and referral services, provision of preventive and promotive services and in-patient observations. To achieve the requirements of the heath act, the proposed project architectural plans have been designed to be in line with the requirements of the health act as they cover all the provisions of a health centre as stated in the Act.

4.2.19 Medical Examination Rules (Legal Notice No. 24 of 2005)

This is a subsidiary legislation to the Factories and Other Places of Work Act, CAP 514 of the Laws of Kenya. These rules were made in early 2005 by the Minister for Labour and Human Resource Development. These rules apply to factories and other workplaces where workers are exposed to hazardous substances and processes. The categories of workers who require medical examinations is given in section 45 (B) of the Factories and Other Places of Work Act of 1990. The category of workers to be examined is also given in the first schedule of Legal Notice No. 24.

According to this Legal Notice, the type of examination required for workers is dependent on the hazards that one is exposed to. Examples of work deemed hazardous include spray painting, sanding, and handling used oil or grease. Such workers must also undergo skin tests in accordance with these regulations.

4.2.20 The Food, Drugs and Chemical Substances Act (Cap 254)

This act relates to any representation by any means whatsoever for the purpose of promoting directly or indirectly the sale or disposal of any food, drug, cosmetic, device or chemical substance. The act also states that any person who labels, packages, treats, processes, sells or advertises any drug in contravention of any regulations made under this Act, or in a manner that is false, misleading or deceptive as regards its character, constitution, value, potency, quality, composition, merit or safety, shall be guilty of an offence. Additionally, any person who sells, prepares, preserves, packages, stores or conveys for sale any drug under insanitary conditions shall be guilty of an offence. It is therefore recommended that the proponent shall adhere to the law in the process of providing treatment and medication in form of drugs to patients. This will be achieved through the proponent employing quality medical staff and ensuring that drugs and medical equipment are kept as per the heath laws and policies.

4.2.21 The Bio Safety Act (No 2 of 2009)

It is of paramount importance to ensure avoidance of risk to human health and safety, and the conservation of the environment, as a result of the use of genetically modified organisms and tissues more so in hospitals. This includes ensuring that the physical factors of the surroundings of human beings, including land, water, atmosphere, soil, vegetation, climate, sound, odour, aesthetics, fish and wildlife are not infected from harmful genetically modified organisms or tissues. The objective of the bio safety Act is to facilitate responsible research into, and minimize the risks that may be posed by, genetically modified organisms, to ensure an adequate level of protection for the safe transfer, handling and use of genetically modified organisms that may have an adverse effect on the health of the people and the environment; and to establish a transparent, science-based and predictable process for reviewing and making decisions on the transfer, handling and use of genetically modified organisms and related activities. The project proponent will therefore have to procure quality services from a NEMA approved bio-medical waste handling company that will be responsible for disposing all the waste tissues and other genetically modified waste that may be generated.

4.2.22 Environmental Management and Coordination (Water Quality) Regulations 2006

The Water Quality Regulations provide for the protection of lakes, rivers, streams, springs, wells, and other water sources. The Regulations provide that no person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit any person to dump or discharge such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards set out in the regulations.

These regulations set the standards of domestic water and waste water. The regulations are meant for pollution control and prevention and provides for protection of water sources. The proposed project will connect to the NWSC supply, while waste water shall be directed to the waste water treatment system which will be constructed and the proponent shall take appropriate measures as provided in the regulations. However, there is great need for the proponent strictly adheres to all the provisions of the regulations for the purposes of enhancing the environment. The sewerage system in particular must be sound to prevent

leaks and blockages and the efficiency and adequacy of the treatment system must always be monitored.

4.2.23 Environmental Management and Coordination (Waste Management) Regulations 2006

The Waste Management Regulations sets out standards for handling, transportation and disposal of various types of waste. The regulations stipulate the need for facilities to undertake, in order of preference, waste minimisation or cleaner production, waste segregation, recycling or composting. These regulations provide guidelines on how to store, transport and dispose any waste generated during the construction and operation phases of the proposed project. Some of the waste to be generated such as used oils and bio-medical waste may fall under the hazardous waste category and thus require particular disposal arrangements. The proponent shall adhere to the regulations and proposes to contract a NEMA registered waste transporter.

Requirement for Environmental Impact Assessment from bio-medical waste generator

No person shall own or operate any institution that generates bio-medical waste without a valid EIA licence issued by the Authority under the provisions of the Act.

Approval of biomedical waste generating facility

Any person who generates biomedical waste shall ensure that the generating facility has been approved by the appropriate lead agency and Local Authority.

Segregation of biomedical waste

Any person who generates biomedical waste shall at the point of generation and at all stages thereafter segregate the waste in accordance with the categories provided under the Seventh Schedule to these Regulations.*Securing and packaging of bio-medical waste.*

All biomedical waste shall be securely packaged in biohazard containers which shall be labelled with the symbols set out in Part I and II of the Eighth Schedule to these Regulations.

Treatment of biomedical waste

Any person who generates waste shall treat or cause to be treated all biomedical waste in the manner set out in the Ninth Schedule to these Regulations, before such biomedical waste is stored or disposed of.

Storage of biomedical waste.

No person shall store biomedical waste above 0º C for more than seven days without the written approval of the relevant lead agency, provided that untreated pathological waste shall be disposed of within 48 hours.

4-2-24 County Government Act, 2012

The main purpose of the enactment of this Act was to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Functions which were carried out by local governments were effectively transferred to the county governments. The Act gives county

the responsibility of planning and co-coordinating all developments within their areas of jurisdiction. Part XI (sections 102-115) of the Act provides for planning principles and responsibilities of the county governments. The land use and building plans provided for in the Act are binding on all public entities and private citizens operating within the particular county. The proposed project is within the Nairobi City Government and thus there will be need of working in liaison with the County Government. The plans for the proposed project must be approved by the County Government and the County government may also issue directives and authorizations on various aspects e.g. waste management and fire emergency preparedness among others.

The proponent shall work in liaison with County Government and in particular the Water, Energy, Environment and Natural Resources Sector.

4-2.25 Energy Act, Cap 314.

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

4-2-26 National Construction Authority Act, 2011

The act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contactors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they certify they are in Kenya for that specific time. The foreign contractors must also produce a certificate of compliance. Furthermore they must lodge an affidavit with the NCA that once the project they have been licensed is over, they shall wind up their business. This prevents them from engaging in any other construction in the country.

4-2-27 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 enough

information that complies with the relevant by-laws. Any developer who intends to erect a building, such as a retail and office block, must also give the concerned local authority a notice of inspection before the erection of the proposed structure.

After erecting the building, a notice of completion shall be issued to the local authority to facilitate final inspection/approval. No person shall therefore occupy a building whose certificate of completion has not been issued by the local authority. As a precaution against fire breakout, the by-law states that the walls of any premise shall be non-

combustible throughout. Similarly, in every building which comprises more than one story, other than a small house, shall have fire resistance.

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

4-2-28 The Penal Code CAP 63

Chapter XVII on "Nuisances and offences against health and convenience" contained in the penal code strictly prohibits the release of foul air into the environment which affects the health of the persons. It states "Any person who voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighborhood or passing along a public way is guilty of a misdemeanor"

Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of this code.

4-2-29 Land Registration Act, 2012

According to section 26 subsection (1) states that the certificate of title issued by the Registrar upon registration, or to a purchaser of land upon a transfer or transmission by the proprietor shall be taken by all courts as prima facie evidence that the person named as proprietor of the land is the absolute and indefeasible owner, subject to the encumbrances, easements, restrictions and conditions contained or endorsed in the certificate, and the title of that proprietor shall not be subject to challenge, except on the ground of fraud or misrepresentation to which the person is proved to be a party; or where the certificate of title has been acquired illegally, unprocedurally or through a corrupt scheme. A certified copy of any registered instrument, signed by the Registrar and sealed with the Seal of the Registrar, shall be received in evidence in the same manner as the original.

Copy of land ownership documents is attached to this Report.

4-2-30 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.

4.2.31 Neighbourhood Associations and/or General Public

The proposed construction of the orthopedic clinic project is likely to attract the interests of the area's neighbourhood association(s)/general public. An extensive public participation process will hence form a major component of the study. From the foregoing, particular reference is made to Section 17 of the Environmental (Impact Assessment and Audit) Regulations, 2003, which states that:-

".....The Proponent shall in consultation with the authority seek the views of persons who

may be affected by the project.....”

The above expression clearly underscores the concept of participatory environmental planning and management in the context of urban development. Questionnaires were distributed to members of public/neighbours for public participation and the feedback is appended to this report.

4-3 Institutional Framework

4-3-1 National Environment 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 is mandated to 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 and 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.

The EIA Study report is submitted to the authority for review and licensing. The proponent shall work in liaison with the authority in complying with the provisions of EMCA and any other subsidiary legislation under the Act.

4-3-2 National Environmental Tribunal (NET)

This tribunal was established under section 125 of EMCA, Cap 387 with the main mandate of giving guidelines on handling of causes 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 Conclusions

The proposed project will be undertaken in adherence to the aforementioned relevant Laws and Legislation. The institutions guided by relevant policies and legislations must regulate urban development and planning projects. The above expression is envisioned as a basic principle component of coordinated and harmonious development in urban areas, and is one of the core pillars for attaining sustainable development. These provisions will therefore guide the proposed project.

CHAPTER FIVE: MATERIALS, PRODUCTS AND BY PRODUCTS

This section examines the materials to be used, products and by-products including waste to be generated by the project and attempts to outline the method of disposal. The table below gives a summary.

Table 10: Materials Waste Generated and Disposal Methods.

Project phase	Materials to be used	Waste/by-products generated	Disposal Method
Excavation/Earthwork	-Excavating equipments	-soil and fragmented rocks. -black cotton soil will be removed from site	-disposed off the project site.
Building works	-Machine cut stones -Steel -Cement -Paving slabs -Timber -Nails, Galvanized Iron sheets -Gravel, sand -Tiles -Glass e.t.c	-Building debris -Used timber -broken tiles	-Reused for landscaping & Filling. -Timber used for firewood etc.
Electrical & mechanical installations	-Electrical gadgets (Pipes, switches, electrical-wire, Lamps etc) -Plumbing gadgets, Storage tanks.	-Accidental breakage's and usable parts	-Contractors to dispose off site.
Occupation.	-furniture -waste paper -Water	- Waste water	-Collected by a private contractor for final disposal. -drained to sewer drainage.

CHAPTER SIX: CONSULTATION AND PUBLIC PARTICIPATION

This chapter describes the process of the public consultation that was followed to identify the key issues and impacts of the proposed development of Orthopedic clinic in 3rd Parklands Avenue, Nairobi County. Views from the general public, and neighbours, who in one way or the other would be affected by the proposed project, were sought through oral interviews, barazas and administering of questionnaires as stipulated in the Environment Management and Coordination Act, 1999.

A number of site visits were made to the site to interview the residents. One of the key information sources used during the Environmental Impact Assessment exercise was a public participation exercise. The exercise was conducted by a team of experienced registered environmental experts and associates via administration of pre-designed questionnaires and by interviewing neighbours surrounding the proposed project site. The neighbours were left with the forms to fill independently and at their own time. They were later collected by the EIA Consultant. (The forms are appended to the end of this document).

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other issues which may bring conflicts in the event that project implementation proceeds as planned. The residents participated freely by giving some of their views and concerns.

While conducting the EIA, the Consultants widely consulted and involved various project stakeholders and members of the public. The aim was to inform stakeholders about the proposed project, gain local views and concerns and take account of public inputs. The process of consultation and public participation was also aimed at obtaining local knowledge, increasing public confidence and reducing conflicts.

6.1 Public Meeting

Public participation during the EIA process took the form of an open public meeting (Baraza) with residential neighbours, business neighbours around the project site, the project proponent, the structural engineers, the project architect and the environmental consultant. Invitation letters were forwarded to different stakeholders and neighbours notifying them of the public baraza. A notice was also placed on the gate of the proposed project site two weeks prior to the date of the meeting. The public baraza was conducted on **1st July 2022 from 10:00 to 11:35 am**. This was done to seek the neighbours' views and opinions regarding the proposed development. ***(below are attached photos of the baraza)***

There was good representation among those who attended the meeting, with residential neighbours, business neighbours, project proponents and the majority of project consultants all represented. The project was presented to meeting attendees after which the floor was opened for questions, observations and comments. A wide range of views were expressed which reflected different interests and positions in the community. ***(The minutes of the meeting are appended to the end of this document).***

Plate 4:Invitation notice at the gate.

Plate 5: Public baraza meeting.

Plate 6: Chief moderating

6.2 Issues raised by the affected community

While carrying out the public participation exercise, neighbours expressed a variety of concerns with regard to the proposed project. Some of the concerns raised were as follows:-

6.2.1 Positive Issues

- Employment opportunities
- Increase in security. The respondents complemented the proposed project in terms of increase in security around the area during operational and construction stages. There will be security guards who will safeguard the materials, machines and equipment during the construction phase and also protect the residents during the operation phase.
- Increased aesthetic value of the area. The residents were positive about the increased aesthetics of structural buildings and their harmony with the environment within the area. The proposed project has designs from experienced engineers and architects who have ensured that the project design is attractive. The overall landscape of the area will have beautiful scenery from the mix of vegetation and the building structures.
- Economic Growth and availability of quality orthopedic services.

6.2.2 Negative Issues

The neighbours raised several concerns that they would wish to be addressed by the proposed project developers. Some of these included: -

- Traffic congestion along 3rd Parklands Avenue
- Insecurity during the construction phase
- Waste water management. The residents were concerned about the measures that will be taken to manage the effluent generated

- Air pollution (Dust during the construction stage by the CGHU secondary school)
- Pressure on the available water supplied by NWSC
- Noise and Vibrations.

6.2.3 Suggestions to the Proponent

Those interviewed and consulted, made the following suggestions to the proponent:-

- Security, during the construction and the operational phase, security should be given the utmost priority
- A proper solid waste management plan to be put in place during the construction and the operational phase
- ensure that the traffic mitigation plans are in line with the County master-plans
- Give priority to local youth in employment opportunities
- They suggested that dust covers be used during the construction and transportation of materials like cement and sand
- Appropriate measures should be taken to reduce pressure on the existing water from NCWSC

With regard to insecurity, the Proponent assured the residents that it was their plan to fit the Orthopedic clinic with modern security features such as CCTVs, LED security lighting, engagement of a reputable security firm and other security measures that will fit in with the neighbourhood. The Experts explained the potential negative impacts from the proposed project. They also outlined the possible mitigation measures. This allayed the neighbours fears and concerns.

Stakeholders expressed mixed reactions about the project because on the one hand it brings a development to the area that would serve the locals well, and on the other hand it will change the character of the neighbourhood. However, there was unanimous support for the proposed project. This was as a result of clear explanation of what is proposed and the way forward in the implementation process. The neighbors understood that the project is feasible in all aspects. The neighbors had no objections towards the project since there are similar projects in the area that have benefitted the residents. **Some neighbours signed letters of no objection.** ***(attached as an appendix)***

Generally, all stakeholders consulted had no objections to the proposed project. They however requested the Proponent to implement the appropriate mitigation measures outlined in the EIA report to minimize the negative impacts of the proposed project. Consequently, the proponent is putting sustainable development into practice as much as possible to ensure minimal air pollution and conservative use of energy and water.

CHAPTER SEVEN: POTENTIAL IMPACTS AND MITIGATION MEASURES

This section highlights the potential impacts that the proposed project may incur to the environment and their necessary mitigation measures for the expected negative impacts of the proposed project. The potential impacts and the possible mitigation measures have herein been analysed under the Construction Phase, Operation Phase and the Decommissioning Phase.

7.1 Construction phase

7.1.1 Employment opportunities and Income generation

One of the main positive impacts during the project construction phase is the gains in local and national economy. Employment opportunities, especially for casual workers and several other specialized workers, are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site from start to end. Apart from casual labour, semi-skilled and unskilled labour and formal employees are also expected to obtain gainful employment during the construction period.

Through the use of locally available materials from the immediate surrounding areas during the construction phase of the project including cement, concrete and tiles, timber, sand, ballast and electrical cables, the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the Government hence increasing Government revenue while the cost of these raw materials will be payable directly to the producers/suppliers.

7.1.2 Economic returns and promotion of secondary business

Economic-investment by the proponent shall increase wealth. The project shall also create market for goods and services and especially construction inputs which include raw materials, construction machinery and labour. There are usually several informal businesses which come up during the construction period of such projects. These include activities such as food vending which benefit directly from the construction workers who buy food and other commodities from the vendors. This will promote the informal sector as it will help them to earn a livelihood. Other businesses will also come up in the proposed education facility when the project is complete that will be serving the institution, especially books supplies, food supply, sanitary services and recyclable products, among others.

7.1.3 Optimal utilization of the land

The proposed site was at the time of study was empty space which was not utilized by the community living in the same area. The proposed project shall accommodate 130 inpatients over plus both basement and surface parking slots.

7.1.4 Noise pollution

Noise is unwanted sound that can affect job performance, safety and health. The construction work on site will most likely be noisy due to moving machines (mixers and tippers), communicating workers, incoming vehicles delivering construction materials and workers to site, and other normal construction activities. This may prove to be a potential source of disturbance to the surrounding neighbours and a health hazard to the workers themselves. According to NEMA Noise regulations as stipulated in the second schedule the maximum permissible noise levels for construction sites in residential areas is 60 dB(A) during the day and 35 dB(A) at night.

Therefore, such noise emissions should be minimized as much as possible from the point of source while workers should be provided with appropriate personal protective wear. It will also affect small animals and bird life. Psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea, and interference with communications when the exposure is severe. During operation, noise will come from vehicles, noise from students and other operations within the site. Production machines generate/produce a lot of noise. Hearing protection is thus essential when noise exposures cannot be controlled at their source.

Mitigation Measures:

- Use of suppressors or silencers on equipment.
- Construction works should be carried out only during day light hours i.e. from 0800 hrs to 1700 hrs; when most of the neighbours will be at work.
- Machineries should be maintained regularly to reduce noise resulting from friction.
- There should be no unnecessary hooting of the involved machinery and vehicles. Provision of bill boards at the construction sites gates notifying of the construction
- activity and timings.
- During celebrations, fireworks should be avoided late into the night to safeguard the interests of the neighbours. The neighbours should also be informed in advance. During games, the noise generated should be controlled. Also seek a license from NEMA (particularly during the operational phase).
- Workers should be provided with relevant personal protective equipment/materials such as earmuffs and earplugs when operating noisy machinery and when in noisy environment. These provide a physical barrier that reduces inner ear noise levels and prevent hearing loss from occurring.

7.1.5 Oil Leaks and Spills

It is important to note that oil/grease spills are prevalent in construction sites and in most areas that make use of petroleum products. Such products contain detrimental elements to the environment. They contain such heavy metals as mercury, lead, and sulphur, among others. Though this may not be common at the site, it is wise to control and observe what could occur especially during maintenance of the involved machinery.

Mitigation Measures:

- ❖ All machinery must be keenly observed not to leak oil on the ground. This can be done through regular maintenance of the machinery.
- ❖ Maintenance must be carried out in a designated area (protected service bays) and where oils are completely restrained from reaching the ground. Such areas should be covered to avoid storm from carrying away oils into the soil or water systems. Waste water/wash water from these areas should be properly disposed.
- ❖ All oil products and materials should be stored in site stores or in the contractor's yard. They should be handled approximately to avoid spills and leaks.

7.1.6 Air pollution (Dust and exhaust emissions)

The construction activities on the site will result to increased dust and gas emissions. Particulate matter pollution is likely to occur during site clearance, excavation and loading and transportation of the construction materials.

Exhaust emissions will be generated during the construction period by the various construction machinery and equipment. Construction machinery and trucks (including small vehicles) generate hazardous exhaust fumes such as Carbon Oxides (COx), Sulphur Oxides (SOx) and Nitrogen Oxides (NOx). However, such exhaust gases are emitted at intervals, are limited to the construction phase, and are unlikely to affect the neighbours.

Mitigation Measures:

- ❖ Provide PPE such as nose masks to the workers on site.
- ❖ Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of noxious gases and other suspended particulate matter.
- ❖ Control over areas generating dust particles. Such areas should be regularly cleaned or sprinkled with water to reduce dust. The areas can be enclosed to mitigate effects of wind on them.
- ❖ Training of the workers on the hazards that may be generated in such work environments.
- ❖ Regular health check-ups for the workers to ascertain their health standards. Enclose the site with dust-proof net during the construction.

7.1.7 Increased water demand

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

Waste water from the proposed project during the construction phase mainly includes cleaning water for the equipment, and water from concrete maintenance/wetting. The quality of this water is insignificant, and poses a small impact on the environment. If necessary, a simplified sedimentation tank can be installed on the construction site where the construction wastewater can be collected and settled. This water can be re-used for site sprinkling to reduce fugitive dust at the construction site.

Mitigation Measures:

- Avoid excessive use of the water
- Roof catchments should be provided with gutters to facilitate collection of the run-off. This water should be stored for general use i.e. cleaning, firefighting, gardening etc.
- Sufficient storage water tanks should be provided.
- Install water conserving taps that turn-off automatically when water is not in use.
- Encourage water reuse/recycling mostly during construction and occupation phases.

7.1.8 Increased pressure on materials and energy

Several building materials will be required for construction of the proposed development and associated facilities. These will include sand, ballast, hard core, timber, cement, clay tiles, metal sheets, electrical gadgets, steel, plumbing materials, glass and paint among others. Most of these materials will be obtained from the surrounding areas.

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

Mitigation Measures:

- Construction materials should be sourced from licensed dealers and suppliers Quality should be thoroughly controlled through regular tests.
- Procurement of the materials should follow specifications by the structural and architectural engineers

7.1.9 Waste generation

Large amounts of solid waste will be generated during the construction phase. These will include scrap metal, rejected materials, surplus materials, excavated materials, paper bags, empty cartons, empty paint and solvent containers and broken glass, among others.

Solid waste, if not well managed, has the potential of causing disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. The major vulnerable groups are children who could be exposed to these conditions. The proposed project site will be enclosed and only the Proponent, Project Consultants and the construction workers will be able to access it easily.

Mitigation Measures:

- The construction workers will need to have proper sanitation facilities on site; portable toilets are recommended rather than pit latrines as these can be carted away after construction. They are also easier to maintain.
- The contractor or proponent should work hand in hand with NEMA approved private refuse handlers to facilitate sound waste handling, and disposal from the site. All waste must be taken to the approved dumpsites.
- Segregation and recycling of waste on site is encouraged i.e. some excavated stone materials can be used as backfills.
- There should be several bins – the bins should have a close fitting cover. The receptacle(s) must be kept in a good condition, and sanitarily clean by frequent washing and disinfecting.
- Train or educate the involved stakeholders on the importance and means of waste (garbage) management and handling especially during operation.
- Explore installation of an incinerator on the site to enhance disposal relevant material through burning. It is not advisable to just burn waste material on open areas.

7.1.10 Increased run-off from new impervious areas

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

Mitigation Measures:

- Storm water generated from roof catchments should be harvested, stored and made use in various activities i.e. general cleaning. This will minimize resultant soil erosion and other associated impacts.

7.1.11 Traffic and Transportation

The transportation of earth material to the site during the construction phase may lead to dust and road spillage. These potential impacts are of a temporary nature. During the operational phase, there will be increased traffic from both the residential and non-residential areas.

Mitigation Measures:

- Ensure that material transported to the site during the construction phase is properly covered and the trucks fitted with tailgates.

7.1.12 Workers accidents and hazards during construction

During construction of the proposed project, it is expected that construction workers are likely to have accidental injuries as a result of poor handling of construction equipment and materials, and lack or neglect of the use of protective wear. All necessary health and safety guidelines should be adhered to so as to avoid such circumstances.

There is also a chance, though slight, that workers may be exposed to disease from contact with potentially harmful building materials. It is therefore recommended that before construction activities, there is need for the materials to be well inspected and harmonized to the occupational health and safety standards.

Mitigation measures:

- Provide properly fitting PPE depending on tasks being performed to avoid injuries and illness including working boots, overalls, helmets, goggles, earmuffs, masks, gloves etc.
- Factories Act abstract should be posted at a strategic point on site. The requirements of the Factories and other places of work Act should be strictly adhered to, the Building code and other relevant regulations. Only specialized machine operators should operate machinery and specialized equipment and all moving parts should be provided within the site. This should be fully equipped at all times and should be managed by qualified persons.
- Adapt effective emergency response plans especially during construction phase. Safety awareness may be gained through regular safety meetings, safety training or personal interest in safety and health. This awareness will increase ability to respond if, some day in future, one is a bystander in an emergency.
- 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.

7.1.13 Loss of vegetation

The construction of buildings, recreational facilities and road paths can result in some vegetation loss. However, this can be mitigated as indicated below. The re-grown areas where thickets and small stands of trees are to be found coincide with proposed recreational areas where the existing vegetation would be conserved. If trees have to be selectively felled there would be no loss of rare, threatened or endangered plant species. There would be some loss of habitat for epiphytes, which require larger species for support.

The proponent intends to leave the indigenous flora untouched and will take proper measures to ensure minimal disturbance of the flora. In areas that will be cleared, the proponent intends to re-plant those areas with indigenous tree species.

Mitigation measures:

- Minimal disturbance of vegetation cover in areas designated for picnic, nature reserve, nature trails and orchard.
- Selective cutting in other areas inclusive of the area designated for the golf course.
- For areas of significant loss of vegetation, the developer has the option to replant similar vegetation at other sections of the property
- Conserve the natural forest stands within the premises;
- Avoid unnecessary clearing of vegetation by conserving vegetation not in the sections being built
- Re-vegetate cleared areas with indigenous vegetation as much as possible

7.1.14 Visual Impact

This includes introduction of construction equipment during the construction period and earthworks associated with construction activities at the project site. This impact will be noticeable to the immediate neighbours. However, such an impact is unavoidable in any construction site. This will be temporary, only during the construction period.

Mitigation Measures:

- Ensure compliance with the planning policy and zoning.
- On completing the earthworks, the worked area should be restored through backfilling, levelling and planting of vegetation.
- All solid waste and debris from construction site must be cleared on completion
- The scheme should be blended in a way to merge with existing environment. It should in fact upgrade the quality of the surroundings. Landscaping and planting of vegetation especially trees shall go a long way in mitigating the visual intrusion.

7.2 Operation Phase Impacts

7.2.1 Promotion of social cohesion

The development will bring together people with diverse traditions and culture. It will lead to promotion of cultural interaction especially when the clinicbecomes operational.

7.2.2 Increase Kenya's economic value

"For Kenya to be internationally competitive and economically viable, the Republic of Kenya requires an education system that will produce citizens who are able to engage in lifelong learning, learn new skills quickly, perform more non–routine tasks, capable of more complex problem-solving, take more decisions, understand more about what they are working on, require less supervision, assume more responsibility, have more vital tools, have better reading culture, quantitative analysis, reasoning and expository skills" (Cheserek and Mugalavai, 2012).

This statement forms one of the proponent's key goals to achieve with the proposed project.

7.2.3 Promotion of Development

The proposed project has the potential to influence education facilities and commercial trends in the area in various ways and in the long run the multiplier effect will lead to development and reduction of poverty. The proposed project shall contribute in overcoming the challenges of today's life including strategies for alleviating poverty and promoting sustainable development through wide exposure in reading various books, publications and lecture. The proposed project shall generate various tax revenues (PAYE, VAT form purchases of building materials and through deduction of employees) for the government directly and indirectly. Similarly, there will be creation of market for goods and services and secondary businesses.

The proposed project shall consume various materials during construction such as stones, cement, sand, glass, steel products, wood products, PVC products, ceramic products etc. various professionals have and shall continue giving their services during both the commercial activities in the neighbourhood shall also have their market widened by the occupants and workers.

7.2.4 Operational waste

The Proponent will be responsible for efficient management of all types of waste generated by the project during its operation. In this regard, the Proponent will provide waste handling facilities such as waste bins and skips for temporarily holding waste generated at the site. In addition, the Proponent will ensure that waste is disposed of regularly and appropriately. It is recommended that the Proponent put in place measures to ensure that the waste is efficiently managed through reducing, recycling, re-use and proper disposal procedures. It is recommended that the Proponent segregate solid waste for example glass, paper and biodegradable waste to make recycling and re-use possible.

Mitigation Measures:

- The proponent should provide a number of dustbins strategically on the footpaths of the driveways for the students to throw whatever rubbish instead of scattering them on the road surface or compound. These bins should better be fixed to posts one or two feet above the ground.
- The collection should be made at least once in 24 hours, and it should be done in such a way as to minimize nuisance of smell and dust during filling into carts or vans or any employed (suitable) collection method. All the refuse collected from the educational facility especially kitchen, among others, must be carried away from the storage site to a safe place where it can be suitably disposed.
- Lastly, suitable and most effective method of disposal should be applied.

7.2.5 Increased energy demand

The Proponent shall plan and install an energy-efficient lighting system in the building and maximize on natural lighting. This will contribute immensely to energy conservation during the operational phase of the project. To complement these measures, it will be important to monitor energy use during the operation of the building and set targets for efficient energy use. The Proponent should also utilize other renewable sources of energy.

Mitigation Measures:

- Educate all personnel on the importance of efficient use of energy Use of alternate sources of energy

7.2.6 Increased water demand

The Proponent will install water-conserving automatic taps and flush-wise toilets which are specifically designed to reduce the amount of water used in washing and flushing. They are eco-friendly and the technology reduces water usage up to 60%. Moreover, any water leaks

through damaged pipes and faulty taps will be fixed promptly by qualified staff. In addition, the Proponent is advised to use water efficiently and to install rain water harvesting facilities. All waste water will be treated using the waste-water treatment plant and will be recycled.

The project design should incorporate measures to reduce water consumption, increase water efficiency, re-use water and rain water capture.

7.3 Decommissioning Phase Impacts

7.3.1 Ecological Restoration

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

7.3.2 Employment Opportunities

The decommissioning process will require substantial workforce (manpower) for successful and timely completion. This translates to substantial job opportunities for the unemployed.

7.3.1 Decommissioning phase waste

Demolition of the buildings and related infrastructure would result in small quantities of solid waste. The waste would contain the materials used in construction including concrete, metal, wood, glass, paint, adhesives, sealants and fasteners. Although demolition waste is generally considered less harmful to the environment since it is composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment.

All waste should be handled with care and a licensed company should be contracted for solid waste disposal. Re-use and recycling should be given priority before disposal.

7.3.2 Air pollution (Dust and exhaust emissions)

Small amounts of dust would be generated during demolition works. This would affect demolition staff as well as the neighbours.

Machinery and vehicles that would be used during decommissioning would emit exhaust fumes which would affect the ambient air quality. Demolition staff should wear protective clothes and masks during demolition to eliminate hazards and accidents at the site.

7.3.3 Noise and vibration

Demolition works would lead to significant deterioration of the environment within the project site and the surrounding area. This would be as a result of the noise and vibrations that would be experienced. In the case of demolition, all activities should be carried out during the day and the demolition staff should minimize noise and vibrations as much as possible.

7-4 Summary of impacts

Environmental impacts can be positive or negative, direct or indirect. The magnitude of each impact is described in terms of being significant, minor or negligible, temporary or permanent, long –term or short-term, specific (localized) or widespread, reversible or irreversible. Some impact mitigation have already been addressed in the proactive design and other mitigation can only be guaranteed through active, responsible management, helped by following the guidelines in the project environmental management plan.

These qualities are indicated in the assessment tables as follows:

Table 11: Anticipated Environmental Impacts.

Key	Type of Impact	Key	Type of Impact
++	Major positive impact	+	Minor positive impact
--	Major negative impact	-	Minor negative impact
0	Negligible/zero impact	NC	No change
SP	Specific/localized	W	Widespread
R	Reversible	ir	Irreversible
sh	Short Term	L	Long term
T	Temporary	P	Permanent

On the basis of the information gathered during the field study, potential environmental impacts of the project are tabulated below.

Table 12: Potential Environmental Impacts of the Project

Impacts on or due to	Construction	Occupation	Remarks
Pollution: Air/dust noise	T ir T ir	0 0	During construction air, dust and noise pollution will increase as a result of construction activities. After construction, noise from traffic is not likely to significantly affect the current neighborhood.
Site drainage	0	++	Storm water from the site will drain into the city county storm water drain.
Public Health	-t ir	-	During construction increased dust, noise and air pollution levels could impact on public health, particularly in the direct impact zone. During occupation health and safety guidelines setup will be adhered to.
Disturbance to the public	-t ir	-	Disturbance to the public would occur due to noise and dust during construction and

			traffic movement. After construction, there is likely to be no disturbance from the development.
Sites of Cultural, historic or traditional significance.	0	0	There are no sites of cultural, historic or traditional significance.
Visual Intrusion and Aesthetics of the Area.	-t/p	+P	During construction, visual intrusion is attributed to construction works including construction traffic. After construction the situation visual intrusion will be permanent. However this will be positive as the building will improve the aesthetic value of the neighborhood.
Income generating Opportunities.	+t	++	During construction, there will be employment opportunities available to contractors and consultants. A significant amount of employees will also be employed during occupation e.g. solid waste management staff, guards, caretakers etc.
Construction Materials	+/-	0	Building stone will be required for construction. Other materials will include steel, tiles, pipes, etc. All materials must be sourced from bonafide suppliers, and undesirable, hazardous or otherwise banned materials should not be used.
Solid Wastes	-sh sp	-	Construction waste will be disposed off at approved Machakos County. During occupation, the generated solid wastes will be collected by a private contractor.
Clean up on completion	-sp	0	The contractor should ensure that when works are completed, the site is left clean and tidy.

CHAPTER EIGHT: ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of socio-economic implications, technology, location and environmental implications.

8.1 No Project alternative

The 'No Project' Alternative in respect to the proposed project implies that the status quo be maintained. This means the Proponent would not invest in the proposed project. In general, the No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors: -

The economic status of Kenyans and the local people would remain unchanged.
No employment opportunities would be created for Kenyans who would work in the proposed project area.
Discouragement for investors.
Less industrial development in the region.
From the analysis above, it becomes apparent that the No Project alternative is no alternative to the Proponent, the local people and the Government of Kenya.

8.2 The proposed development alternative

Under the proposed development alternative, the Proponent would commission EIA Consultants to conduct an EIA study for the proposed project. The EIA report would be submitted to NEMA for review and approval. In issuing a license, NEMA would approve the Proponent's proposed project, provided all environmental measures are complied with during the construction period and operation phases. This alternative consists of the applicant's final proposal with the inclusion of mitigation of environmental impacts as stipulated in the EIA regulations to the maximum extent practicable.

This alternative has the following advantages: -

- Creation of jobs to a proportionately large number of Kenyan citizens Industrial development in Kenya.
- Optimal use of land which is a highly valuable but scarce resource in Kenya.

8.3 Alternative project

This will see the Proponent adopting another project idea other than the one currently proposed.

There are a number of alternative options that would be available to the Proponent for this piece of property. Possible alternatives include apartment blocks, office blocks etc. After considering all the possible alternatives, though, the Proponent has settled for the construction of orthopedic clinic.

8.4 Alternative site/location

This would involve relocation of the proposed project to another site other than the present proposed site. Such a move would have several implications both to the Proponent and the recipient environment. Some of the implications may include: -

Cost of purchasing land/lending new premises,

Destruction of the new environment should the alternative site be pristine.

8.5 Analysis of alternative materials and technology

The proposed project will employ the use of locally and internationally accepted materials and equipment to achieve public health, safety, security and environmentally aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors.

8.6 Solid waste management alternatives

The Proponent will give priority to reduction at source of solid waste, followed by recycling, re-use and disposal. This will call for putting in place a source separation programme. Recyclable material will be sold to waste buyers within the surrounding area.

CHAPTER NINE: ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

9-1 Introduction

Environmental management and monitoring involve among others, the putting in place of sustainable environmental mitigation measures and monitoring plans. It is essential that the project is both environmentally friendly and appreciated by local residents.

9-2 Environmental Monitoring and Evaluation

Environmental monitoring and evaluation are essential in the project's lifespan as they are conducted to establish if the project implementation has complied with the set environmental management standards as articulated in the amended Environmental Management and Coordination Act (EMCA) No. 8 of 2015, and its attendant Environmental (Impact Assessment and Audit) Regulations, 2003.

Section 68 (2) of EMCA empowers NEMA to appoint an inspector who may enter any land/premises to determine adherence to the EMP and any other conditions that may have been issued with an EIA license. Section 68 (3) requires the proponent to keep accurate records on the project and make annual audits which should be submitted to NEMA. To this effect the project proponent is hereby advised to make an environmental audit and submit to NEMA once the project is completed. The Lead EIA/EA expert is equally charged with a responsibility to ensure that the EMP is fully implemented and that any unforeseen impacts are mitigated and advice the proponent accordingly.

EMMP FOR THE CONSTRUCTION PHASE Table EMMP during construction phase

Table 13: Environmental Management and Monitoring Plan for the Proposed Orthopedic Clinic

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
Soil erosion	Ensure management of excavation activities Providing soil erosion control structures on the steeper areas of the site & controlling activities during the rainy season. Compact loose soils to minimize wind erosion	- Proponent - Contractor	Routine inspection	100,000
Air pollution	Regular sprinkling of water on dusty areas and access roads Careful screening of construction site to contain and arrest construction related dust. Enclosing, covering and watering of exposed stockpiles e.g. sand Ensure construction machinery and equipment are well maintained to reduce exhaust gas emission Drivers of construction including bulldozers, earth-movers etc. will be under strict instructions to minimize unnecessary trips and minimize idling of engines. Using efficient machines with low emission technologies for the ones that burn fossil fuels. Comply with EMCA (Air quality) Regulations 2014	- Proponent - Contractor - Workers and Drivers	Daily inspection Routine maintenance	200,000

Noise and excessive vibrations	Construction activities to be restricted to daytime i.e. 8am to 5pm Use of suppressors or noise shields on noisy equipment for instance corrugated iron sheet structures Sensitize operators of construction machinery on effects of noise Trucks used at construction site shall be routed away from noise sensitive areas where feasible. Maintain plant equipment to suppress frictional noise Workers in the vicinity or involved in high-level noise to wear PPE Minimize vibrations by using hi-tech equipment that produces lesser vibrations during excavation. Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	- Proponent - Contractor - Workers - Drivers	Random inspection Routine maintenance	200,000
Oil pollution	Proper storage, handling and disposal of new / used oil and related wastes Maintain construction machinery and equipment to avoid leaks Maintenance of construction vehicles to be carried out in the contractors yard (off the site)	- Proponent - Contractor	Routine inspection maintenance	50,000
Storm water drainage	Proper installation of drainage structures/facility Ensure efficiency of drainage structures through proper design and maintenance	- Proponent - Contractor	Routine inspection and maintenance	300,000
Solid waste and liquid waste	Segregate the waste at the site Ensure proper disposal of construction waste to approved sites Engage services of a registered NEMA waste handler to dispose the waste Covering of the trucks during transportation, all the building materials and waste Sensitize workers on the reuse of materials where appropriate. Provision of adequate and appropriate sanitary facilities for the construction workers Proper decommissioning of all the sanitary facilities Comply with EMCA (Waste management) Regulations 2006	- Proponent - Contractor - Workers	Weekly inspection	200,000
Increased water demand	Use water from the borehole to supplement water from NWSC Employ services of waters vendors to supplement water supply. Sensitize occupants and workers to reduce water wastage e.g. by reusing where applicable Install water efficient appliances	- Contractor - Workers	Daily inspection	150,000

Traffic congestion	Employ traffic marshals to control traffic in and out of site Ferry building materials during off-peak hours Provide traffic control signs at the site/entrance to notify motorists and general public about the development Enforce speed limits for construction vehicles especially along the roads leading to the site Ensure that the vehicles comply with axle load limits Employ well trained and experienced drivers	- Proponent - Contractor - Drivers	Daily inspection	200,000
Health and safety of workers	Construction work shall be limited to daytime only Workers to be adequately insured against accidents. All workers will be sensitized before construction begins on how to control accidents related to construction. Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance at strategic points Provide first aid kits at strategic places in the site All workers to wear protective gear during construction e.g. helmets. A comprehensive contingency plan shall be prepared before construction begins on accident response. Provide all Personnel with face masks Soap water or sanitizer dispensers to be provided at each alternate point Social distancing to be maintained where necessary	- Proponent - Contractor - Workers	Weekly inspection	200,000
Insecurity	Provide security guards to monitor movement in and out of the site during construction period for both day and night Install security lights at the site to enhance security.	- Contractor - Proponent	Daily inspection	200,000
Fire	Installation of firefighting facilities following County's Fire Masters requirements approval. Develop and adapt an (fire) emergency response plan for the project Ensure that all firefighting equipment are regularly maintained and serviced. Provide fire hazard signs such as 'No Smoking' sign, Direction to exit in case of any fire incidence and emergency numbers.	- Contractor - Proponent - Workers	Routine inspection and maintenance	100,000
Conflict with neighbors	Establish a grievance redress mechanism that is easy to access for stakeholders to report their concerns as they happen Continuous communication between the developers and the stakeholders on the progress of the project and its effects	- Proponent	Continuous communication	200,000

Table 14: EMMP FOR THE OPERATION PHASE Table EMMP during Operation phase

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
Liquid waste	Regular inspection and maintenance of the septic tank.	Proponent Occupants	Periodic checks Routine Maintenance	100,000
Solid waste generation	Encourage segregation of waste Provide for clearly marked dustbins to serve the specified use. Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures. A private NEMA licensed company to be contracted to handle solid waste and dispose it of in designated dumpsites. Routine cleaning of the waste collection points/cubicles	Proponent Occupants	Periodic inspection	250,000
Air pollution	Regular cleaning of dust prone areas Comply with EMCA (Air Quality regulations) 2014	Proponent Occupants	Routine maintenance	100,000
Noise and vibration Pollution	Do annual noise monitoring, to adhere to acceptable standards Sensitize occupants on minimal permissible noise levels Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Proponent Occupants	Periodic inspection	150,000
Storm water drainage	Proper maintenance of drainage structures Inspection and maintenance of water harvesting facilities Collection of excess storm water for reuse e.g. car washing	- Proponent	Routine inspection and maintenance	100,000
Increased water use	Use water efficient appliances and fittings Reuse of harvested rain-water e.g. cleaning pavements and cars Place notices at water taps e.g. 'TURN OFF TAP AFTER USE' Provision of roof/ underground tanks for water storage Regular maintenance of all water components	Proponent Occupants	Periodic Inspection Routine maintenance	150,000
Increased energy use	Switch off electrical appliances when not in use. Maintenance of electrical components. Use energy efficient electrical appliances and fixtures such as bulbs Use of solar energy as alternative energy supply for the project	Proponent Occupants	Daily Observation Routine maintenance	150,000

Fire	Install firefighting equipment Sensitize the occupants on fire risks i.e. conduct regular fire drills Provide escape routes/emergency exits in the buildings Adapt effective emergency response plan Inspect firefighting equipment regularly Provide emergency numbers at strategic points	Proponent Occupants	Routine inspection	100,000
Insecurity	Engage services of security guards to man the premises day and night Installation of CCTV cameras at strategic points for monitoring and enhancing the security of the property during operation phase. Placing alarms around the project and establishing emergency preparedness and response procedures Place hotline numbers on strategic places Sensitize occupants on security precautions	Proponent Occupants	Periodic inspection Routine maintenance	150,000
Traffic	Provide traffic signs to reduce risk of accidents Provision of adequate on-site parking bays Regular maintenance of the parking bays Provide separate entry and exit points for motorized and non- motorized traffic to ease traffic flow and avoid collisions.	- Proponent	Routine maintenance	100,000

EMMP 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 15: EMMP during Decommissioning phase

Environmental/ Social Impact	**Proposed Mitigation Measures**	**Responsibility for mitigation**	**Recommended frequency of monitoring**	**Estimated Cost (KShs)**

Demolition of existing structures	Apply for demolition permit from relevant authorities before commencing the demolition Engage a registered private contractor to carry out the demolition Provide workers with PPE The demolition exercise to be limited to day time only Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	- Project proponent - Contractor - NEMA inspectors	Daily inspection	2,000,000
Air pollution	Dust suppression with water sprays on dusty areas Careful screening of construction site to contain and arrest construction related dust Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission	- Proponent - Contractor - NEMA inspectors	Daily inspection Routine maintenance	500,000
Noise and excessive vibrations	Demolition activities to be restricted to daytime (8am to 5pm) Use of Suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures Workers in the vicinity or involved in high level noise to wear respective safety & protective gear. Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	- Proponent - Contractor - Workers - NEMA inspectors	Routine inspection and maintenance	150,000
Health and safety of workers	All workers to wear PPEs e.g. helmets, safety boots and ear muffs 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.	- Contractor - Workers - Proponent - NEMA inspectors	Daily monitoring	200,000
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. Dismantling all fixtures and equipment of the internal sewer system	- Contractor - Proponent - NEMA inspectors	Daily monitoring	500,000

Re-vegetation and comprehensive landscaping	Put in place an appropriate re-vegetation programme to restore the site to its original status During the re-vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	- Contractor - Proponent	Random inspection and monitoring	350,000
Total **For all phases.**				**5,150,000.00**

CHAPTER TEN: HEALTH, SAFETY AND ACCIDENT PREVENTION PLAN

10-1 Overview

There are no major peculiar anticipated accidents during the project cycle. However, there could be the common accidents that can occur in any activity of this kind, which are outlined in Table

Table 16: Summary of anticipated accidents and the action plans

TYPE OF POSSIBLE ACCIDENTS	ACTION PLAN
Workers injury during construction	First aid provision Maintenance of all machineries in good condition at all times. Workers compensation Wearing of protective gear by the workers
Fire outbreak (electrical e.t.c.) during construction and occupation	Train staff on safety and precaution measures of fire Avail Firefighting equipment
Robbery	Install alarm systems Contract security firm to keep guard Avail electric security fence after construction
Road Accidents	First aid provision Insurance cover Avail the necessary signs
Drainage blockages	Proper maintenance of drainage systems Responsible disposal of waste

10-2 Plans to ensure the health and safety of workers and the General Public

10-2.1 Noise

During the construction phase, noise will be produced by construction machines such as concrete mixers, grinders, excavators and the movement of construction vehicles to and from the site.

Mitigation measures:

- Sound-attenuated equipment will be used as much as possible
- People participating in the construction activities should be provided with Personal Protective Equipment (PPE) such as ear muffs for ear protection and their use thereof should be enforced.
- The consultants and contractors are requested to guarantee that the works are carried out in a proper manner and planning so as to minimize the impact of the construction in terms of noise.

10-2.2 Air Quality

The proposed development is not expected to emit fumes, dust or odour that it would affect the current air quality of the area.

However fumes Nitrogen Oxides {NOx} and Sulphur Oxides {SOx} generated from vehicles could be a major source of air pollutants, although it is not likely to cause any significant impact on the local air quality. It is however likely that during the construction phase, both the infrastructure and the building works might induce fumes and dust.

Mitigation measures:

- All equipment on site should be properly maintained and in good operating condition so as to emit minimal air pollution.
- Masks to be provided to all personnel in dust generated areas throughout the period of construction.
- The consultants and contractors are requested to guarantee that the works are carried out in a proper manner so as to minimize the impact of the construction on the air quality.
- Proper maintenance of construction vehicles to minimize on air pollution.

10-2.3 Road Safety

Traffic will need to be controlled during construction especially with heavy vehicles turning and by enforcing speed limits for construction vehicles. Warning / caution signs should be erected at the site.

10-2.4 Disturbance to the Public

Noise disturbance to the public would occur during construction works including construction traffic. After construction the impact noise will be insignificant.

- ❖ Warning / information signs should be erected when construction works are about to begin.
- ❖ Construction activities should not be carried out at night.
- ❖ Liaise closely with the immediate neighbours.

10-2.5 Public Health and Occupation Safety

During construction there will be increased dust, noise and air pollution levels, which are considered to be negative impacts, although for the public at large this would be minor. The workforce would be more exposed to these hazards.

- ❖ Emergency Response Plans (ERPs) should be well understood and communicated to all concerned parties including the local inhabitants of the area.
- ❖ Workmen should be provided with suitable protective gear (such as nose masks, ear plugs/muffs, helmets, overalls, institutional boots, etc), and there should be a fully equipped first aid kit on site.
- ❖ The project proponent will avail sanitary facilities to the construction workers
- ❖ Information and education on the operation and management of the facility, including all the environmental aspects should be offered to all concerned for purpose of project responsibility as well as safety.

10-3 Site Organization

To ensure health and safety conditions and prevent accidents on site, efforts will be made to have a clear site organization plan. These include:

- ❖ Developing a clear site organization plan and construction schedule
- ❖ Delivery and storage of material at appropriate locations
- ❖ Right size of staff/workers with clear work schedule and appropriate dress gear

- Control staff and vehicle movement on site and keep out unwanted persons
- Site office with safety kit
- Site toilet
- Adequate water supply for both construction work and worker use.

10-4 Project Team

In order to ensure proper organization of activities during plan, design and construction of the project, there must be appropriate project team. These include;

- Town / physical planner
- Environmental Impact Assessment Expert
- Project Architect
- Structural / Civil Engineer
- Service Engineers
- Quantity Surveyor
- Land Surveyor

10-5 Enforcement of Standards and Legal Requirements

The project must ensure that appropriate standards and legal requirements are met. These include:

- That the building work are in accordance to approved County government drawings and plans
- That building operations to meet the building code specifications
- That requirements of the Factory Workers Act are followed
- That requirements of the Public Health Act are followed
- Those requirements as outlined in the Environmental Action Plan are observed.

10-6 Activities of Workers

The following activities by workers are clearly identified and must be closely monitored and organized to ensure health, safety and accident standards on site:

- Pushing of wheel barrows
- Hand packing of stones on road surface
- Lifting and laying of building material – stone, concrete etc.

- Plastering of walls
- Bending, cutting and laying of reinforcement steel
- Other general building work activities.

10-7 Activities by Machinery and Light Equipment

The activities of machinery and plant must also be properly organized and monitored in order to ensure health and safety conditions and prevents accidents. The machinery and plant to be used on site include –

- Compacting machine
- Vibrators
- Concrete mixer
- Small size hoist machine
- Goods truck
- Tipper

10-8 Insurance

The project proponent and building contractor will take appropriate insurance cover for the various project activities and personnel and/or workers.

CHAPTER ELEVEN: PROJECT BUDGET

11-1 Overview

The total project cost is estimated at KShs.**484,608,000.00**

11-2 Capital Investment Costs

The main capital investment costs relate to: Site Preparation, Building Structure, External works and finishes.

11-3 Professional Fees and Labour Costs

The project involves lawyers, town/physical planners, environmentalists, architects, engineers, quantity surveyors etc. It is estimated that 30% of the project development cost will be allotted for labour charges. A labour force of about 200 persons will also be employed. The total professional fees and labour costs is estimated at KShs **145,388,000.00**

11-4 Cost of Materials

Cost of construction materials is estimated to take 70% of the total development cost. This can be therefore approximated at about Kshs**. 339,219,600.00**

11-5 Project Time Schedule

The whole project cycle from inception, planning and design, and construction is estimated to take 3 years.

11-6 Financing

The proposed project will be financed from both investment returns/savings and fundraising

from the well-wishers.

CHAPTER 12: CONCLUSIONS AND RECOMMENDATIONS

The proposed project will have numerous positive impacts including the growth of the health sector, creation of employment, increased revenue, and industrial growth, among others.

The negative environmental impacts that will result from the proposed project include increased pressure on infrastructure, biodiversity loss, air pollution, and waste generation, among others. Most of these, however, can be mitigated.

The Proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative EHS and social impacts associated with the life cycle of the project. It is recommended that in addition to this commitment, all relevant national and international EHS standards, policies and regulations should govern establishment and operation of such projects.

It is also recommended that the positive impacts that emanate from such activities shall be enhanced 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.

From the detailed environmental and socio-economic analysis of this development, the EIA Consultant is of the opinion that this is a viable project, and hence recommends that NEMA approves it and issues an EIA license.

NEMA and other relevant authorities need to continue raising public awareness on EIA requirements and the importance of public participation.

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Websites:*http://en.climate-data.org/location/5812/*

APPENDICES

1. Ownership Document
2. Certificate of incorporation
3. Pin certificate
4. Invitation to public baraza
5. Minutes of the public baraza and attendance list
6. Returns from public participation
7. Letters of no objection
8. Notification of approval of TORs
9. Architectural drawings
10. Certified bill of quantities
11. Lead Expert practicing license & consultants CV's
12. PPA2