ENVIRONMENTAL IMPACT ASSESSMENT

STUDY REPORT

FOR THE PROPOSED HOSPITAL DEVELOPMENT ON PLOT L.R. NO. THIKA MUNICIPALITY BLOCK 5/669 NEAR NAMPAK IN BIASHARA LOCATION, THIKA SUB-COUNTY, KIAMBU COUNTY

This Environmental Impact Assessment (EIA) Study Report is submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act of 1999, the Environmental (Impact Assessment and Audit) Regulations, 2003 and the Environmental Management and Coordination (Amendment) Act (EMCA), 2015.

PROPONENT:

DR. NELSON MURAYA WACHIRA AND AGNES MWONJORIA MURAYA

P.O. BOX 6249 - 01000

THIKA

April 2022

COMPLIANCE

In carrying out this assignment, the EIA expert endeavors to comply with the legal requirement as contained in the National Environmental Management and Coordination Act of 1999 and other subsequent regulations.

We have applied the required professional standards and practice in carrying out this work.

ASSESSMENT TEAM LEADER

Prof. Joseph G. Wakibia
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Signature: …… Date: ……..…

FOR AND ON BEHALF OF THE PROPONENT

Name: …….. Signature: …….

Date: ……..……

LIST OF ABBREVIATIONS/ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
CGK	County Government of Kiambu
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ERP	Emergency Response Plans
GOK	Government of Kenya
IEA	Initial Environmental Audit
KPLC	Kenya Power and Lighting Company
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Services
LPG	Liquefied Petroleum Gas
MCH	Mean Corpuscular Haemoglobin
MDG's	Millennium Development Goals
MENR	Ministry of Environment and Natural Resources
MSDS	Material Safety Data Sheet
MoMS	Ministry of Medical Services
NEC	National Environment Council
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
NEMA	National Environment Management Authority
NPEP	National Poverty Eradication Plan
OPIM	Other Potentially Infectious Materials
OSHA	Occupation Safety and Health Act
PPE	Personal Protective Equipment
SWM	Solid Waste Management
TOR	Terms of Reference
RMW	Regulated Medical Waste
UNEP	United Nations Environmental Programme
WCC	Waste Collection Centre
WRA	Water Resources Authority

EXECUTIVE SUMMARY

Dr. Nelson Muraya Wachira and Agnes Mwonjoria Muraya herein referred to as the proponent intends to construct a seven storied hospital facility on Plot L.R No. Thika Municipality Block 5/669 in Biashara Location within Thika Sub-county of Kiambu County. As part of the Government's objective through the Constitution of Kenya and the Kenya Vision 2030, the proposed project intends to contribute positively to the welfare issue of the local population within the health sector through implementing policies and programs targeting this sector. This will include improving the health infrastructure, access to quality health care and prompt response to the health care needs in the County.

The proposed site where the proponent intends to construct the proposed hospital development for more improved health services within Thika Town area and the Kiambu County at large is mainly in a residential and industrial area characterized with several high-rise flats and some industries. The plot is not developed and is covered with tall grass, some few plated trees and shrubs.

The proposed project is estimated to create hospital bed capacity of about 150 to 250 patients with numerous spatiality care services, surgical and general wards, Intensive Care Unit, High Dependency Unit, administrative offices and all the necessary amenities needed for smooth operation of the hospital. The hospital is anticipated to offer more affordable, quality and efficient healthcare for the increasing population of Thika Town area and Kiambu County. The hospital will incorporate modern facilities and is also designed to cater for the needs of disabled as well as people with special needs.

The proposed development is a positive investment for the proponent and is in line with the Vision 2030 goal of providing a robust health infrastructure network; and improving the quality of health service delivery to the highest standards within the County. The proponent will help to meet the commitments under Vision 2030 which envisions improvement of the health sector primarily by devolution of health management to the communities and health experts at the County level.

The EIA study report has been prepared in accordance with Section 58 of the Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999 and Environmental Impact Assessment and Audit regulations, 2015 (Amendments) that requires all new enterprises and development projects to undergo an Environmental Impact Assessment (EIA). The purpose of this study report is to predict all possible positive and negative impacts that the project may have on both the natural and human environment and suggest the right applicable mitigation measures for the significant negative impacts before the project is implemented.

The scope of the report is designed to describe the project, document all baseline information, assess both the positive and negative impacts and develop mitigation measures for negative impacts including designing environmental management plan for the project.

The following potential impacts are included in the E.I.A study report:

- Waste water management and disposal
- Hazardous waste management
- Increased water demand
- Increased power demand
- Oil spills during construction
- Dust emissions
- Increased traffic along the main roads
- Air pollution
- Health and safety of workers
- Accessibility to the existing road network
- Soil compaction, erosion and pollution
- Safety concerns
- Noise and vibrations
- Population density
- Creation of job opportunities
- Improvement of health services
- Improving growth of the economy

Project Activities

The project will consist of four distinct stages:

- **Pre-construction stage:** The pre-construction phase will involve the preparation of Architectural and structural drawings by professional consultants. This will be followed by other approvals from relevant lead agencies such as the Kiambu County Government, National Environment Management Authority, among others.
- **Construction stage:** This will commence with hoarding at the project site. A masonry perimeter wall will be constructed to surround the site to boost security at the site. The excavation of the ground, laying of the foundations and construction to completion of the hospital development.
- **Operation stage:** The proposed project scope of works as contained in the project components include construction of a seven storied hospital with a mandate of offering specialized health care while maintaining the highest standards of health care as required.
- **Decommissioning:** The decommissioning of the project will be determined at the expiry of its economic use estimated at between 100 years from commissioning. This will involve changing of the current use to other uses depending on the needs at that time by the planning regulations and planning authority/authorities.

CONCLUSIONS AND RECOMMENDATIONS: It is evident from this EIA study report that the construction and operation of the proposed hospital at Thika Town area within Kiambu County will bring positive effects in the project area including;- creation of employment, availability of social

amenities, improved infrastructure, improved medical services and increase in government revenue among others. Although the project will come with various positive impacts, negative impacts will also be experienced hence the need to establish an effective mitigation plan.

The negative impacts of this project will include: - increased generation of biomedical waste, pressure on available infrastructural facilities and services such as water, electricity and road network, noise and dust during construction phase, environmental degradation among others. On the basis of the above and taking cognizance of the fact that the proponent will source adequate funds and has proved to be environmentally credible. It is our recommendation that the project be allowed to go on provided the mitigation measures outlined in this report are adhered to and the Environmental Management Plan (EMP) is implemented to the letter.

The proposed project is well conceived and is in line with the country's sustainability strategy in adhering to Sustainable Development Goals (SDGs) and the Kenya Vision 2030. The proponent has incorporated environmental management concepts in the project and all adverse impacts have adequate mitigation measures. The proposed hospital project is therefore recommended for implementation subject to fulfillment of mitigation measures, the EMP, the adherence to the entire National and County Government Regulations as well as the NEMA imposed conditions.

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CHAPTER ONE INTRODUCTION

1.0 Background information

The current demographic trends in Kenya indicate that the country has a population of approximately 47.6 million people where nearly 80% lives in rural areas although by the year 2030, the Country is expected to be a predominantly urban centre. Consequently there is need to improve the overall livelihood of Kenyans. The government intends to revitalize community health centers to promote preventive health care as opposed to curative interventions and by promoting healthy individual lifestyles. The country's health institutions have significantly improved primarily by devolution of health management to communities and health experts at sub-county, county and national levels. This will make the country become the regional service provider of choice for highly specialized health care, thus opening Kenya to health tourism as quality medical providers.

Health systems decisions in Kenya have, traditionally, been taken at the central government level through top-down decision making and resource allocation. Centralized health systems have been criticized for regional and provincial discrepancies in the health service distribution and disparities in allocation of resources and inequitable access to quality health care services. However, gradual reforms have been implemented with a commitment to decentralize the health management system through devolution to County governments. This aims at providing an efficient and high quality healthcare system which will significantly reduce health inequalities and improve key areas where Kenya is lagging behind especially in lowering infant and maternal mortality.

Specific strategies will involve provision of a robust health infrastructure network; improving the quality of health service delivery and promotion of partnerships with the private sector. The proponent will help to meet the commitments under the Kenya Vision 2030 and the Sustainable Development Goals (SDGs). The project is a proposed construction of a hospital on Plot L.R No. Thika Municipality Block 5/669, at Thika Town area in Thika Sub-County, owned and managed by the proponent - Dr. Nelson Muraya Wachira and Agnes Mwonjoria Muraya. The construction site is located near Nampak along the Factory Street within Thika Town area of Thika Sub-County in Kiambu County.

The proponent will ensure that they obtain all the necessary authorization from the relevant authorities before proceeding with any operations as required by law. All effluents from the premises will be channeled to a convectional sewerage system serving the entire project area. Solid wastes will be disposed in accordance with the Waste Management Regulations of 2006.

1.2 Project objectives

The principal objective of the project is to ensure adequate identification of potentially negative environmental impacts, propose workable mitigation measures and propose an environmental management and monitoring plan for the project. The summary of these objectives is as follows:

- To identify the potential environmental impacts resulting from the proposed development.
- To assess the significance of these impacts.
- To assess the alternative plan, design and site of proposed project.
- To propose the mitigation measures against the potential negative effects.
- To generate baseline data on how mitigation and evaluation measures are carried out during implementation of the project.
- To present information on environmental impacts of proposed alternatives.
- To prepare an environmental management and monitoring plans for the proposed project.
- To assess the compliance of the project with provisions of legal, institutional frameworks as provided in EMCA 2015 (amendments).
- To suggest measures to prevent health and safety hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies. This encompasses prevention and management of the foreseeable accidents and hazards during both the construction and occupational phases.

1.3 Scope of the report

The report covers the following aspects:

- Description of the project;
- Documentation of all baseline information;
- A socio-economic study will be done to get the views of different stake holders using
    1) Questionnaires.
    2) Interviews.
    3) Photography.
- Identification of sources of conflicts and make relevant recommendations;
- Assessment of both the positive and negative impacts;
- Examination of the project phases, stages and activities; and
- Development of an Environmental Management Plan (EMP).

1.4 Terms of Reference

This EIA study report has been undertaken in accordance with provisions of EMCA 1999 and the requirements of the Environmental (Impact Assessment and Audit) (Amendment)

Regulations, 2019 Legal Notice No. 31 and 32, and all relevant national and international regulations/ protocols. It has addressed environmental and associated occupational health and safety issues that are the direct responsibility of the proponent during all phases of the project implementation.

The terms of reference of the EIA study are as follows:-

- The proposed location of the hospital and scope of works.
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the proposed project.
- The technology procedures and processes to be used, in the implementation of the project.
- The products, by-products and waste to be generated by the project.
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative irreversible, short-term and long-term effects anticipated.
- To recommend a specific environmentally sound and affordable wastewater management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- An Environmental Management Plan (EMP) proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the visitors, employees and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.
- An economic and social analysis of the project and such other matters as the authority may require

1.5 Methodology of the EIA study

In undertaking the EIA study, the consultant employed a participatory approach that entailed a range of methods that included:

1) Environment screening in which the project is identified as among those requiring Environmental Impact Assessment under Schedule 2 of EMCA, 2015 (Amendments).
2) Physical inspection of the site and its environs.
3) Desk top studies, consultations, questionnaires and interviews with the proponent, his/her consultants, Neighbors among others.
4) Preliminary assessment (reconnaissance survey) of the general property. Through this, the development was therefore identified as being among those that needed environmental impact assessment; as provided under schedule 2 of Environmental Management and Coordination Act (EMCA), 2015. During the field investigations, information on biophysical and socio-economic environment of the proposed development area and its environs were collected.
5) The environmental scoping was then done relative to the construction operations and activities. This provided significant environmental issues to be considered during the assessment. To ensure comprehensiveness on the assessment, desktop studies and interviews were held. This involved various stakeholders including public officers, area residents, and the proponent among others.
6) Relevant studies and reports on the construction including design works and other related sources of information were critically reviewed.

CHAPTER TWO PROJECT DESCRIPTION, DESIGN AND CONSTRUCTION

2.1 Introduction

Dr. Nelson Muraya Wachira and Agnes Mwonjoria Muraya (the proponent) intends to construct a private hospital at Thika Town area so as to offer quality and affordable health care services to residents of Kiambu County and the entire country at large. This EIA study report is based on information provided by the proponent and his consultants, observations made during site visits and information collected during the public participation process.

2.2 Brief history and functions of the proposed hospital

The proposed hospital will be constructed and managed by the proponent. The facility is located at Thika Town area near Nampak in Thika Sub-county, Kiambu County. This facility will serve as a health care facility for Thika Town and its environs. The proposed project is one among the many private hospitals within the vicinity of the project area and its environs.

The proponent proposes to set up a modern hospital with a bed capacity of about 150 to 250 patients which will offer high quality and diverse health services to the growing population of Kiambu County and other neighboring regions.

2.3 Ownership and location of the project

The Proposed hospital is located at Thika Town near Nampak along the Factory Street on plot L.R No. Thika Municipality Block 5/669 in Thika Sub-county area of Kiambu County. The proposed plot size area is approximately 0.3584Ha and it was registered under Nelson Muraya Wachira and Agnes Mwonjoria Muraya as per the Land Act (Chapter 300) on 11th February, 2021. The proposed project is located on GPS Coordinates 1°02'45.6"S 37°05'54.9"E (-1.046002, 37.098592).

The magnitude of the project will blend well with the existing and upcoming developments in the neighborhood which is mainly characterized with high-rise flats and industrial activities within an urban setup.

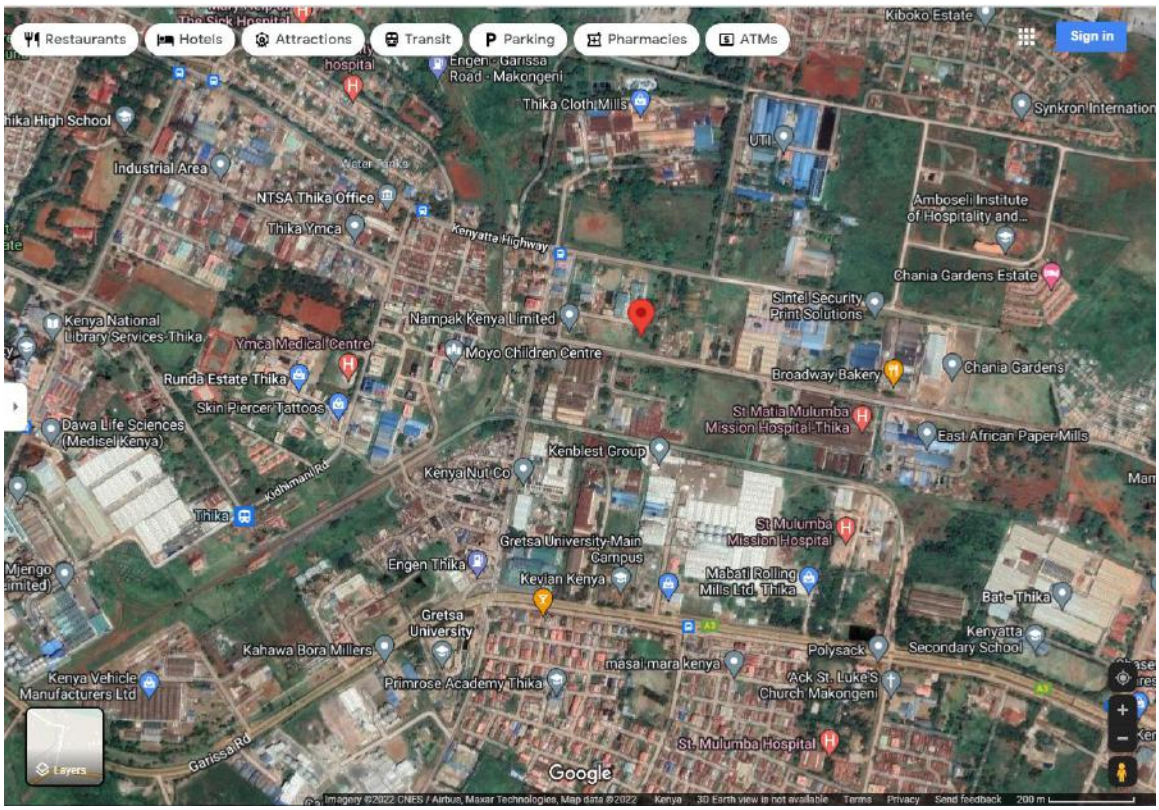

Figure 1: Project site location **Source: Google Maps**

2.4 Planning concept of the proposed project

The Kiambu County's population is growing fast with the current population consisting of 1,230,454 female, 1,187,146 male a total of 2,417,735 people (according to the Population and Housing census/survey, 2019). With this high and increasing population, there is an increasing demand in health facilities and associated services within the County and adjacent Counties such as Nairobi. The Thika Township being within the Nairobi Metropolitan area experiences a high influx of residents especially due to its proximity to Nairobi CBD. The overall objective of this project is to avail specialized, easily accessible and affordable medical health services for the population of Kiambu County. The project will also create positive impacts such as employment opportunities, infrastructural and commercial development of the area as people tend to settle in areas with close proximity to such essential services.

2.5 Project description

The proposed development will comprise construction of a seven story hospital development with the following facilities:-

Floor	Details
Basement floor	Parking, maintenance workshop, maintenance office, security office and a store.

Ground floor	Laboratory, morgue, recovery room, emergency operating room, doctor's on call restroom, canteen with a cold store, cafeteria, staff lounge, physiotherapy, chapel, public relations office, pharmacy, cashier, reception, consultation rooms, emergency lobby, ultra sound, ladies and gents changing room and washrooms.
1st floor	Ladies and gents changing room, washrooms, nephrologist, optical, ophthalmology, psychiatry, E.N.T, orthopaedic, gastroenterology, nutrition and dietics, maternal healthcare unit, obstetrics and gynaecology, paediatric unit, cardiology, oncology, general physician, dental unit and dialysis, .
2nd floor	Antenatal ward, labour ward, delivery room, recovery room, operating room, postnatal ward, newborn unit, consultation room, private labour wing and washrooms.
3rd floor	Paediatric surgical ward, women's surgical ward, two operating rooms, I.C.U, H.D.U, endoscopy and coronoscopy operating room, laparascopy operating room and men's surgical ward
4th floor	Women's general ward, paediatric general ward, men's general ward, men's private wing with two executive suits, and women's private wing with also two executive suits
5th floor	Central sterilization unit, store, cold and dry store, office, food and catering with a kitchen, matron, medical records, I.T office, account office, finace director, chief nursing officer, human resource, C.O.O, administrator, boardroom, C.E.O and an area of future expansion
6th floor	Dhobi, laundry, dirty utility, cold water storage tanks, clean utility and a roof terrace
	Total bed capacity of 150 to 200

There are service ducts in place and the floors are connected by a lift and a common staircase. The hospital development will also be connected to the existing convectional sewerage system serving the entire project area. Pretreatment of some effluent before discharge will also take place within the project site as required.

2.6 Current zoning regulations

The project area is currently zoned for the development of single-dwelling family houses that are surrounded by high-rise residential flats and some industries. The proponent has however obtained a change of user approval from single-dwelling to hospital (and other auxiliary services) from the county Government of Kiambu in accordance with the Planning Regulations. The plot on which the project will be located is therefore suitable for that particular purpose. The proponent has complied with all the conditions required in accordance with such a development.

(*A copy of change of user approval is annexed).*

2.7 Project justifications

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

1. **Road Network:** The proposed site is located at a strategic area in Thika Town and is easily accessible using the Factory road and thus accessibility to the site is guaranteed.
2. **Electricity and telecommunication infrastructure:** The area is well covered by country's electricity supplier, Kenya Power Company. The area is also well covered by all the mobile phone communication networks and other radio signals were well sensed during the site visit. Street light are available along the Factory Street.
3. **Solid waste disposal:** The area is served by Kiambu County Government and private garbage collection companies in solid waste management. The contractor will make use of proper waste management practices by recycling any reusable materials, decommissioned structures and excavations. The management of the hospital will contract a NEMA Licensed Hazardous/Medical waste handler for disposal purposes during the occupational phase of the proposed project.
4. **Water:** Water supply in the area is reliable and efficient. The area has its water source from the Thika Water and Sewerage Company that supplies the water to the residents of the area. The proponent also intends to set up water storage tanks and employ water harvesting techniques onsite to be used during the operational phase of the proposed project to cater for the high water demand. The proponent may also opt to sink a borehole where necessary.
5. **Wastewater:** The proposed hospital development will be connected to the convectional sewerage system serving the entire project area and managed by the Thika Water and Sewerage Company. Where pretreatment of waste water will be required, the proponent will install a waste water treatment plant onsite as required.

2.8 Project specifications

The following are specific descriptions of the project;

- The proposed site is located at Thika Town in Thika sub-county area, Kiambu County.
- There are electric poles, drainage channels, sewerage facilities within the proposed site and therefore the area has easy access to all these infrastructural facilities.
- The architect has made sure that the final design of the project and constructions will follow details as given by the engineer on site.

- More/fine details for the development and specifications for the features of the proposed project have been given in the copies of the architectural drawings attached in the annex.
- In addition to the specialty care services the proposed project will also have a body holding unit that will temporally hold dead bodies within the facility before they are transported conveniently to the nearby mortuaries.

Project site overview

At the neighborhood of the proposed site there exists the following;

- Financial institutions such as Equity Bank, National Bank, Family Bank, Kenya Commercial Bank.
- Community facilities such as the Methodist Church, Deliverance Church and Catholic Church.
- Schools such as Thika High school, Bishop Njuguna Academy Primary School, among others.
- Others include the Thika Level 5 Hospital, Mary Help of the Sick Hospital, Thika Cloth Mills, Mount Kenya University, Gretsa University, Amboseli Institute of Hospitality. There also exist shops, groceries, chemist, residential developments and other services at Thika town.

Project activities

Pre-construction stage

Project approvals

This stage involves designing and drawing of Architectural plans and application for the various permits and licenses including County Government's approval of the project. The preconstruction has also involved getting to collaborative agreements with key stakeholders including project manager, architects, quantity surveyors, engineers / contractors (structural, mechanical, electrical), material suppliers, financiers and landscapers.

The proposed hospital development architectural drawings have been submitted to the Kiambu County Government for approval. The proponent has also obtained a change of user approval from single-dwelling to hospital (and other auxiliary services) as required by the physical planning regulations and has also commissioned this EIA to obtain an EIA license in accordance with EMCA, 1999.

Construction and civil works stage

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

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

Construction activities will include the following

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

In addition the proponent has hired qualified and registered consultants. During the construction phase of the project, the project's sign board must be erected to make the public aware of the development and to keep away intruders, which will indicate the following:

- A pictorial impression of the proposed building
- The developer's name and address
- The local authority approval number
- The architects and engineers details
- Quantity surveyors

- NEMA approval number
- Other professionals involved in the project.

Operations

Once the construction of the hospital is complete, the hospital will be opened for access by the general public. The facility will be used for the provision of affordable, accessible and specialized health care to the public. Activities associated with the premises will lead to generation of greater volumes of domestic waste, medical and commercial wastes.

- **Solid Waste Management:** The main type of wastes that will be generated from the construction site during the construction and operation phase of the project will consist of both the biodegradable and non-biodegradable wastes. The non-biodegradable waste will mainly be generated during the construction phase of the project and this will include the construction byproducts. The project proponent/ contractor will provide facilities for handling solid waste generated within the facility through the engagement of proper and environmentally friendly solid waste management techniques during the construction and operational phases. These will include dustbins/skips for temporarily holding waste within the premises before final disposal at the designated dumping site.

  In the operation phase, the proponent will be required to contract a registered biomedical waste handler to collect and dispose all the medical wastes from the facility. The proponent is advised to adopt an integrated waste management technique as indicated in the Environmental Management Plan upon completion of the project.
- **Effluent management:** Sewage generated from the hospital will be discharged to the sewer-line that serves the entire project area while storm water from the project site will be channeled into the surface drainage system. A waste water treatment plant can be installed on site to pre-treat effluent before final disposal where necessary in accordance with the Water Quality Regulations.
- **Cleaning:** The proponent will be responsible for ensuring regular washing and cleaning of the building, pavements, drainage channels, the passages and the compound in general. Cleaning operations will involve the use of substantial amounts of water, disinfectants, detergents and rugs, all of which must be compliant with the Public Health standards.
- **General repairs and maintenance:** The buildings, equipment and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, repair of the doors, gate and regular paintings among others.

De-commissioning stage

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

- **Demolition works**

Upon decommissioning, the project components including buildings, pavements, drainage systems, parking areas and perimeter fence if any will be demolished. This will produce a lot of solid waste, which will be reused for other construction works or if not reusable, disposed off appropriately by a licensed waste disposal company to a designated site.

- **Dismantling of equipment and fixtures**

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

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

- **Site restoration**

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and the necessary landscaping activities carried out to restore the land to its original condition.

Project budget

The budget for the whole proposed project is approximated at about Ksh. 100, 000, 000 where direct labor option may be adopted. The proponent is hereby advised not to pay any official fees since it was scrapped absolutely by NEMA as per the presidential directives to help boost economical developments in the country.

CHAPTER THREE METHODOLOGY AND BASELINE INFORMATION

3.1 Methodology

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

3.1.1 Questionnaires

Questionnaires were administered to the locals randomly to seek their opinion on the proposed hospital development. The questions to the respondents, contained in the questionnaire, were asked and responses recorded by the interviewer *(See annex at the end of this report).*

3.1.2 Observations

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

3.1.3 Photography

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

3.1.4 Secondary data

Various literatures were used in aiding the successful completion of this study report and include: The Kenya Gazettes supplement Acts 2000, Environmental Management and Coordination Act No.8 of 2015, The Government printer, Physical Planning Act, 1999, Kenya Gazette supplement No.56, Environmental Impact Assessment Audit regulations 2003, Nairobi District Development Plan, Environmental Management and Coordination (Waste Management) regulations, 2006 Legal Notice No.12, the Public Health Act, Cap 242, the Factories and other places of Work Act and Water Act 2016, Draft of the Wetlands Policy 2008, among others.

3.2 Baseline Information

The proposed project site is on plot L.R No. Thika Municipality Block 5/669 which is in Thika Town area of Thika Sub-County, Kiambu County, near Nampak and along the

Factory Street. The area is under the governance of the Kiambu County Government and therefore it is within the coverage of the proposed Nairobi metropolitan region. The project site is in a peri-urban setup characterized with some undeveloped plots that are covered with trees and tall grass and some high rise residential cum commercial developments. No fragile environmental ecosystem was noted in the project area during our site investigations and the proposed development was found to blend well with the existing and upcoming projects in the area.

3.2.1 Climate

The proposed project site is situated within Thika Town in Kiambu County and is close to the City of Nairobi, which enjoys a double (Bi-modal) seasonal rainfall pattern. The Kiambu plateau is cooler and wetter as opposed to the Nairobi plains to the south-east that are drier and hotter. The area receives high rainfall season between the months of April to May and moderate rainfall season between the months of November to December.

The rainfall peaks during the month of April and November annually. The average rainfall is normally above the range of 1000mm per annum and the distribution is fair and reliable. The coolest months include June, July and August, while the hottest moths are between the months of December, January and February with temperatures oscillating between 15^0C and 35^0C.

3.2.2 Topography

The project site is situated on the North Western side of the Nairobi City. Generally, the geography of this area is dominated by low lying terrain of undulating ridges and shallow stream valleys with an eastern gently sloping ground which characterize the project site topography. The micro topography of the upcoming hospital project site is generally flat with a gently slope towards the Factory Street direction.

3.2.3 Soils

The major soil type in Kiambu area includes vertisols and lithosols derived from the weathering of volcanic rocks underlying the area. The Kiambu County area has three broad categories of soil types. These are soils found on high – level uplands, soils found on volcanic footbridges and soils covering the plateau terrains.

The proposed site falls in soil category of volcanic plateaus; these are soils of moderate to high fertility and are also found in parts of Githunguri and Kiambaa Sub-counties as well as some parts of Kikuyu Sub- county. These are well drained soils, extremely deep, grey/red in colour with dark brown friable clays deposits. These soils cover the coffee zones (UM2 and UM3) where the major cash crops like coffee and tea are grown. Other

food crops such as maize, potatoes, cabbage, tomatoes and beans are also grown in the area alongside dairy farming.

3.2.4 Water resources

The two principal water sources in the County are surface and sub – surface water resources. The surface water comprises many permanent rivers, streams and springs. There are also several boreholes and wells which have been sunk in the area to supplement the surface running streams.

The reliability of both surface and sub-surface water is very high in the area as most of the rivers and springs are permanent. Most of the boreholes sunk in the area have high yield and may be used for domestic and other commercial activities.

The main source of water supply to the Thika Town residents is through boreholes and shallow wells owned by organizations or individuals in the area. The other residents' of the area are supplied with water either through water vendors or by Thika Water and Sewage Company.

3.2.5 Flora and fauna

Human interference and particularly agriculture and urbanization have greatly modified the original floral and faunal status of the project area. There is no significant vegetation on the project site that will be affected with the implementation of the proposed project, since the project site is in a built-up area that is located within Thika Town. The proponent will however only clear the vegetation on areas that will be occupied with the proposed hospital development.

Some of the undeveloped pieces of land in the project area are mainly under agricultural use where crops such as maize, beans, potatoes and cabbages are grown. Farm and domestic animals are also reared by the area residents for agricultural and livestock productivity as well as some as pets.

3.2.6 Energy and Telecommunications

The national electricity grid passes through almost all corners of the area within Thika Town. The proposed development site has the electricity main line passing right outside its boundaries. The area is also well served with telecommunication networks with both landline and mobile service providers (Airtel, Telkom and Safaricom etc) present. This has brought very strong positive impact on the socio – economic development activities of the area.

3.2.7 Population density

The proposed development site is located on an accessible and undeveloped piece of land that is served with two access roads that the proponent can utilize. The site is currently located in a relatively sparsely populated area. However there are already, several commercial cum residential buildings that are coming up in the area which will automatically change the population density of the location. The nearness of the area to Thika Township center will also change the population pattern of the project area. The proposed project development will provide medical services for the fast growing population of area and the larger Nairobi Metropolitan City and environs at large

3.2.8 Social-cultural and economic environment

Kiambu County is predominantly an agricultural County and average farm holdings are generally small but vary between the highlands areas, the middle zone and the low areas. Human settlements are evenly distributed across the County but with a majority of the people concentrated in the peripheral areas of the major towns. The farmers mostly engage in subsistence production and therefore realize little incomes to support modest livelihood. The main cash crops in Kiambu and its surroundings are tea, coffee and macadamia nuts. Farmers in Kiambu have also found banana farming commercially viable after seasons of low maize harvesting. Subsistence crops include maize, beans and potatoes; while horticultural farming is practiced on French beans, pineapple, tomatoes, passion fruit and mangoes.

3.2.9 Administrative and social amenities

The area is well served with Administration and social amenities especially due to its strategic location within Thika Town. There are hospitals, schools, churches and financial institutions. There also exist shops, groceries, chemist, and other services at Thika town. Other amenities within the Thika Sub-County include:

- General convenience stores
- Industries
- Medium hotels, bars and restaurants.
- Hospitals and private clinics/dispensing chemists
- Petrol Stations.
- Hair dresser and barber shops
- Furniture shops.

3.3 Infrastructure

The zone where this project is located has adequate infrastructural facilities since it is located within Thika Town. The access road to the site is in good condition but the feeder roads need to be upgraded to an all-weather road status to serve the area residents

efficiently during rainy seasons. Power lines and communication masts are available in the project site area.

3.4 Sewer system

The project area is served by a convectional sewerage system, thereby necessitating an appropriate sewer handling system. The design of the proposed project includes connection to the existing sewer-line to dispose of the effluents from sanitation facilities. A waste water treatment plant can be installed on site to pre-treat effluent before final disposal where necessary in accordance with the Water Quality Regulations.

CHAPTER FOUR POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 Introduction

Over the course of the twentieth century, growing recognition of the environment and public health issues associated with anthropogenic activities has prompted the development and application of methods and technologies to reduce the effects of environmental pollution. In this context, governments have adopted regulatory and other policy interventions to minimize negative effects and to ensure environmental quality standards are achieved. Under this EIA, the proposed development is liable to the following key statutory Acts and subsidiary legislations, and policies:

4.2 Policy Framework

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

Among the key objectives of the policy paper on Environment and Sustainable Development (Sessional paper No.6 of 1999) are to ensure that from the onset, all development policies, programs and projects take environmental considerations into account and to ensure that an immediate environmental impact assessment (EIA) report is prepared for all kinds of developments before implementation. Under this paper, broad categories of development issues among them the human settlement sector, have been covered that require sustainable approach. The policy recommends the need for enhanced re use/recycle of residues including wastewater, use of low non-waste technologies, increased public awareness and appreciation of clean environment. It also encourages participation of stake holders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

As required by this paper, the proponent has initialized the undertaking of this EIA study report

4.2.2 National Policy on Water Resources Management and Development

The National Policy on Water Resources Management and development (1999) enhances a systematic development of water facilities in all sectors for the promotion of the country's socio-economic progress. It also recognizes the by-products of these processes as waste water. It therefore calls for the development of appropriate sanitation systems to

protect people's health and water resources from pollution. Projects therefore, should be accompanied by corresponding waste management systems to handle the waste water and other wastes emanating there from. The same policy requires such projects should undergo comprehensive Environmental Impact Assessment.

The project area is covered with a convectional sewerage system and therefore the proponent will connect to it for containment of all waste water from the facility. There will be enough sanitation facilities within the proposed site that will always be kept clean. Where necessary, the proponent will also install a waste water treatment plant on site to pre-treat effluent before final disposal to the sewerage system.

4.2.3 The Kenya Vision 2030

Kenya Vision 2030 is the current national development blueprint for period 2008 to 2030 and was developed following on the successful implementation of the Economic Recovery Strategy for Wealth and Employment Creation which saw the country's economy back on the path to rapid growth since 2002. The objective of the vision 2030 is to transform Kenya into a middle income country with a consistent annual growth of 10 % by the year 2030". The 2030 goal for urban areas is to achieve "a well-housed population living in an environmentally-secure urban environment." This will be achieved by bringing basic infrastructure and services namely roads, street lights, water and sanitation facilities, storm water drains, footpaths, and others.

The implementation of the proposed hospital development will ensure that the residents of the greater Kiambu County get quality medical care appropriately and when necessary.

4.3 Legal and Administrative Framework

4.3.1 The Constitution of Kenya

This is the principal guiding law in the country from which all the subsidiary laws are drawn from. Article 42 of the Bill of Rights of the Constitution grants every person the right to a clean and healthy environment and thus forming a basis for this report.

4.3.2 The Environmental Management and Coordination Act (EMCA), 1999

This is an Act of parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto.

Section 3 (i) of part II of EMCA 1999 entitles every person in Kenya to clean and healthy environment and states that one has a duty to safeguard and enhance the environment.

Section 58 (1) states that "notwithstanding any approval, permit or license under this Act, a proponent of a project, shall before financing, commencing, proceeding with, carrying out, or executing submit a project report to the authority, in the prescribed form and giving the prescribed information.

Section 3 of EMCA provides remedies for any Kenyan who may wish to seek redress for an environmental nuisance. Indeed EMCA states very clearly that "If a person alleges that the entitlement conferred under subsection (1) has been, is being or is likely to be contravened in relation to him, then without prejudice to any other action with respect to the same matter which is lawfully available, that person may apply to the High Court for redress and the High Court may make such orders, issue writs or give such directions as it may deem appropriate to:

a) Remedy of injunction to stop environmental nuisance,
b) Remedy of compulsion to compel a public officer to stop environmental nuisance,
c) Remedy of restoration to compel polluters to restore abused environment and
d) Remedy of compensation or subjecting actions to environmental audit and impact assessment, as long as the complainant is not vexatious, frivolous, prejudicing or abusing a court process.

It is therefore mandatory that an Environmental Impact Assessment must be undertaken for all proposed projects of this nature to ensure that the activities at their premises comply with all legal and institutional frameworks that are in place to safeguard the environment, health and safety of the workers, teachers, students and the area residents.

In compliance with this, the proponent has commissioned a registered EIA/EA expert to carry out an EIA for the proposed development and submit the report to NEMA offices for review and licensing.

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

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

An Environmental Impact Assessment has been conducted in conformity with these regulations and EMCA, 1999 by NEMA registered experts.

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

The Waste Management Regulation sets out standards for handling, transportation and disposal of various types of wastes from industries and other places of works. The regulation stipulates the need for facilities to resort to waste minimization or cleaner production, waste segregation, recycling or composting.

Regarding transportation, licensed persons shall operate transportation vehicles approved by National Environment Management Authority (NEMA) and will collect waste from designated areas and deliver to designated disposal sites.

1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

2) A waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations.

5 (1) A waste generator shall minimize the waste generated by adopting the following cleaner production methods:

a) Improvement of production process through

i) Conserving raw materials and energy
ii) Eliminating the use of toxic raw materials; and
iii) Reducing toxic emissions and waste

b) Monitoring the products cycle from beginning to end by-

i) Identifying and eliminating potential negative impacts of the product;
ii) Enabling the recovery and re-use of the product where possible; and
iii) Reclamation and recycling; and

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

The proponent should engage NEMA registered waste handlers that should collect the wastes and dispose them in designated sites during all phases of the project implementation.

4.3.5 The Water Act, 2002

The Water Act rests all rights of all water to the state and the power for the control of bodies with the ministries. It provides for the management and development of water resources and water supply and sewerage development, with the objective of conserving, protecting available water resources and allocate in a suitable, national and economic manner as well as supplying in a good quick and in sufficient quantities to meet the various water needs while ensuring safe disposal of waste. The Act guides development of a responsive and effective water sector and makes it an offence to pollute water resources and create water catchment boards.

Part II, Section 18, of the Water Act 2002 provides for national monitoring and information systems on water resources. Following on this, sub-section 3 allows the Water Resources Authority (WRA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to the authority.

Section 73 of the Act allows a person with license (licensee) to supply water and to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

The proponent will ensure that no pollutants are discharged into any of the aquifers in the project area. No obstruction, interference, diversion or abstraction of water will be done without prior authorization from WRA.

4.3.6 Water Quality Management Regulations, 2006 (Legal Notice No. 120)

These regulations are drawn under section 147 of the Environmental Management and Coordination Act 1999. In accordance with the regulations, every person shall refrain from acts that could directly or indirectly cause immediate or subsequent water pollution and no one should throw or cause to flow into water resources any materials such as to contaminate the water. The regulation also provides for protection of springs, streams and other water sources from pollution.

No person shall:

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

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

Or

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

The proponent will comply with these regulations by ensuring that there is no any effluent discharge to the environment that can contaminate the soils or the aquifers in the project area. Any effluent from the project activity that is likely to cause pollution to the environment should be pretreated on site before discharge to standards set in the Water Quality Regulations.

The proponent will also ensure that proper storage, handling and disposal of new oil and used oil wastes are exercised in accordance with the environmental laws and regulations. Oil interceptors should be provided along the drains leading from the generator room and the parking area.

4.3.7 Air Quality Regulations

Under the general prohibitions (Part II) of the Air Quality Regulations, Section 5 states that no person shall act in a way that directly or indirectly causes immediate or subsequent air pollution. Among the prohibitions are priority air pollutants (as listed under schedule 2 of the regulations) that include general pollutants, mobile sources and green house gases. Odours are also prohibited under Section 9 of the regulations (offensive emissions). Emissions into controlled areas such as schools, hospitals, residential areas and populated urban centers are also prohibited.

Part VII on occupational air quality limits in section 29 states that an occupier of premises shall ensure that exposure of indoor air pollutants does not exceed the limits stipulated under the Factories and Other Places of Work Rules or under any other law. Other sources are recognized at Sections 32 and 33 are those arising from construction equipments and materials as well as particulate matter from demolitions of structures and buildings as well as stockpiled dry materials.

The proponent will achieve this through ensuring that the machinery being used within the project site are in good working condition (well maintained) to reduce on emissions during operations. Dust shall be contained at the working environment and the use of PPE's will be made mandatory. Considerate speed limit should be observed in the dusty roads by all vehicles entering or leaving the facility to help mitigate on dust menace from over speeding vehicles in the project area.

4.3.8 Public Health Act (Cap. 242)

Under this Act, every local authority or health authority is mandated to take all lawful, necessary and reasonable practicable measures to prevent all injurious conditions in premises, construction condition or manner of use of any trade premises. Nuisances under this Act include any noxious matter or waste water, flowing or discharged from any premises wherever situated, into any public street, or into the gutter or side channel of

any street or water course, or any accumulation or deposit of refuse or other offensive matter. Every council and every urban area council (now County Governments) may make by-laws as to buildings and sanitation.

Part IX section 115 of the Public Health Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Any noxious matter or waste water flowing or discharged into a watercourse is deemed as a nuisance. Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitate the breeding or multiplication of pests shall be deemed nuisances. The Act addresses matters of sanitation, hygiene and general environmental health and safety.

The proponent shall maintain a clean environment by properly disposing any wastes generated during the project operations. Adhering to the Environmental Management Plan developed in this report will help in preventing nuisance during all phases of the project implementation.

4.3.9 The Physical Planning Act Cap 286

The Physical Planning Act has provisions to control development and use of land in particular areas, especially where a project may involve subdivisions or amalgamation of land parcels, or located in an area otherwise reserved for other uses.

As required, the proponent has already obtained a change of user approval from single-dwelling to hospital (and other auxiliary services) from the county Government of Kiambu.

4.3.10 Penal Code Act (Cap.63)

Section 191 of the Penal Code states that any person or institution that voluntarily corrupts or pollutes water from springs or reservoirs rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere to make it noxious to health of person/institution is dwelling on any premises in the neighborhoods or those passing along public way, commit an offence.

The proponent will be guided by the EMP developed in this EIA full study report to ensure that his operations do not cause any form of environmental pollution.

4.3.11 Noise and Excessive Vibration Pollution Control Regulations, 2009

Under this Act, except as otherwise provided in these regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys,

disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

Part II section 3(I) of these 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 and section 3(2) states that in determining whether noise is loud, unreasonable, unnecessary or unusual. Part II Section 4 also states that: except as otherwise provided in these Regulations, no person shall (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5cm per second beyond any source property boundary or 30m from any moving source.

Part III, Section 11(1) states that any person wishing to (a) operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or (b) engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence. 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. These purposes include emergencies, those of a domestic nature and /or public utility construction.

Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying sites, and states that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose requirements 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 proponent will comply with these regulations by abiding to the EMP developed in this report. A noise or excessive vibration license will be obtained from the relevant authorities when necessary.

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

This is an Act of parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes.

Appropriate PPEs will be provided by the proponent to all the employees working within the premises. Well equipped first aid kits should be provided and placed strategically within the facility for use in case of an accident.

4.3.13 National Environnemental Action Plan (NEAP)

According to the Kenya National Environmental Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from industrial, economic and social development programs that disregarded environmental sustainability. Established in 1990, the plan's effort was to integrate environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of societal decision making. Under the NEAP process EIA was introduced and among the key participants identified were the industrialists, business community and local authorities.

4.3.14 The Energy (Energy Management) Regulations, 2012

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

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

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

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

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

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

6. (1) The owner or occupier shall cause an energy audit of the facility to be undertaken by a licensed energy auditor at least once every three years. (3) The owner or occupier

shall submit the report of the audit to the Commission in a manner approved by the Commission, within six months from the end of the financial year in which the audit is undertaken.

The proponent will put in place measures that will ensure the facility complies with this Act.

4.3.15 Occupational Safety and Health 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.

According to Subsection 6 (1), every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace. Section **7** also requires that the occupier develops a safety policy for the workplace and ensure that all workers have knowledge of it therefore the proponent shall ensure that a safety policy is in place during all phases of the project implementation.

According to Subsection 44 (1), before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises by sending to the Director a written notice containing the particulars set out in the Fourth Schedule. The proponent should ensure that the construction site for the proposed development is registered with the Directorate of Occupational Health and Safety.

The proponent will provide the required PPEs and ensure their use during all phases of the project implementation. The proponent will also develop a safety policy to help him ensure the safety and health of all the employees and patients.

4.3.16 Biodiversity Regulations

Part II of the Biodiversity Regulations, Section 4 states that no person shall engage in any activity that may have adverse impacts on ecosystems, lead to introduction of exotic species or lead to unsustainable use of natural resources without an EIA license. The regulation puts in place measures to control and regulate access and utilization of biological diversity that include among others banning and restricting access to threatened species for regeneration purposes. It also provides for protection of land, sea, lake or river declared to be a protected natural environmental system in accordance to section 54 of EMCA, 1999.

There will be notable destruction of vegetation in the project area through cutting down of trees/shrubs and removal of ground cover. The proponent is therefore hereby advised

to establish a tree nursery with native species that will enable him rehabilitate the site as the project continues or at the decommissioning stage.

4.3.17 Factories and Other Places of Work Act

The Factories Act, Cap 514, is an Act of Parliament to make provision for the health, safety and welfare of person employed in factories and other places of work. It was amended in 1990. The amended Act prohibits emission of "dust", fumes, or impurities into the atmosphere without undergoing treatment to prevent air pollution or other ill effects to life and property" (Section 57). These provisions require that all practicable measures be taken to protect persons employed in a factory and other places of work from air emissions or impurities originating from any process within the facility. The provisions of the Act are also relevant to the management of hazardous and non-hazardous wastes, which may arise from the implementation of the proposed development. Health, safety and welfare of workers are covered under Part VII of the Act.

Section 53 of Factories Act requires that workers employed in a process involving exposure to wet or to any injurious or offensive substances, suitable protective clothing and appliances (gloves, footwear, goggles, and head coverage) shall be provided.

Section 4 of Kenya Subsidiary Legislation of 2004, Legal Notice No. 31 of Kenya Gazette Supplement No. 25 of 24th May, 2004 of the Factories Act Cap 514, requires that, all factories or other workplace owners to establish a safety and health committee, which shall consist of safety representatives from the management and the workers. The number of the committee members will range from 3 to 7 depending on the size (number) of employees. The Act also requires the management to appoint a competent person who is a member of the management staff to be responsible for safety, health and welfare in the factory or workplace. Section 13 goes ahead to state that a health and safety audit of the workplace be carried out every twelve months by a registered health and safety adviser. If the owner(s) or management contravenes any of the rules, he/she shall be guilty of an offence.

Personal protective gears shall be provided by the proponent and used at all times as the law requires, to safeguard the safety and health of the employees, patients and the visitors visiting the hospital development. The management of the facility should also display strategically within their work environment the abstract of the Factory Act.

4.3.18 Local Government Act Cap 265

The sections of the Local Government Act that are relevant to this project include making by-laws in respect of suppression of nuisances, imposing fees for any license or permit

issued in respect of trade or charges for any services. Local authorities are given power to control or prohibit all developments which, by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighborhoods, and to prescribe the conditions subject to which such developments shall be carried on.

The local authority shall be responsible for the enforcement of this Act and the proponent shall comply with any conditions issued during all phases of the project implementation.

4.3.19 The County Governments Act, No. 17 of 2012

This an Act of Parliament to give effect to Chapter Eleven of the Constitution of Kenya (2010); to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Under Section 134, the official repeal of Cap. 265 i.e. The Local Government Act shall occur upon the final announcement of all the results of the first elections held under the Constitution. This therefore grants the powers previously held by the Town, Municipal and City Councils to the County Governments including approvals of development and the related monitoring activities.

The architectural drawings for the proposed hospital development have been submitted for approval by the County Government of Kiambu. The proponent has also obtained a change of user approval from single-dwelling to hospital (and other auxiliary services) from the County Government.

4.3.20 The Workman's Compensation Act (Cap. 236)

In its Third Schedule, the Act Specifies the nature of occupations and the diseases they may be caused by their usage. The Act lists a number of chemicals, which are likely to cause diseases. The list has been found to be too restrictive in light of the fact that presently there are literally thousands of chemicals; hence, the list should be substituted with a more comprehensive one. Furthermore, the Act is insufficient in giving levels of concentrations, which could be injurious.

None of the mentioned chemicals in the Act will be used in the proposed hospital development and therefore the site is assumed compliant to the Act.

4.3.21 The Employment Act (No.1 of 2007)

This Act states on restriction in employing child of between thirteen and sixteen years of age to attend machinery.
According to Section 58

(1) No person shall employ a child of between thirteen and sixteen years of age, other than one serving under a contract of apprenticeship or indentured learnership in

accordance with the provisions of the Industrial Training Act, in an industrial undertaking to attend to machinery.

(2) No person shall employ a child in any opencast workings or sub-surface workings that are entered by means of a shaft or adit.

The proponent will ensure that persons below the age of 18 years are not employed at the facility during all phases of the project implementation.

4.3.22 HIV/AIDS Prevention and Control Act No. 14 of 2006

This Act prohibits various forms of sexual violence offences committed against men and women. These include rape, attempted rape, sexual assault, indecent acts, defilement, gang rapes, sexual harassment, child pornography, child prostitution, child sex tourism, exploitation of prostitution, incest, deliberate transmission of HIV and AIDS including other life threatening sexually transmitted diseases, and cultural and religious offences.

According to section 4 (1) the Government shall promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS through a comprehensive nationwide educational and information campaign conducted by the Government through its various Ministries, Departments, authorities and other agencies. Pursuant to subsection (2), the educational and information campaign referred to in subsection (1) shall-

(a) Employ scientifically proven approaches;
(b) Focus on the family as the basic social unit;
(c) Encourage testing of individuals; and
(d) be carried out in schools and other institutions of learning, all prisons, remand homes and other places of confinement, amongst the disciplined forces, at all places of work and in all communities throughout Kenya.

Subsection (3) provides that in conducting the educational and information campaign referred to in this section, the Government shall collaborate with relevant stakeholders to ensure the involvement and participation of individuals and groups infected and affected by HIV and AIDS, including persons with disabilities.

Section 31 (1) provides that, no person shall be-

(a) Denied access to any employment for which he is qualified; or
(b) Transferred, denied promotion or have his employment terminated, on the ground only of his actual or suspected HIV status.

The proponent will endeavor to promote educational and informational campaigns and organize for Voluntary Counseling and Testing throughout the project cycle. In addition,

the proponent shall ensure that there is no discrimination of workers on the basis of their HIV status.

4.3.23 The Way Leave Act

The areas zoned for communication line, sewer lines, power lines, water pipes etc. are known as way leaves. The Way Leave Act prohibits development of any kind in these designated areas. Thus any developer is bound by this Act and he, in consultation with the project architect, must see to it that no development takes place in these areas.

4.3.24 The Land Planning Act (Cap. 303)

Section 9 of the subsidiary legislation development and use of land regulations 1961, under this Act requires that before authorities submit any plans to the minister for approval, steps should be taken as may be necessary to acquaint the owner of any land affected by such plans. Particulars of comment and objections made by the landowner should also be submitted. This is intended to reduce conflict with other interest such as settlement and other social and economic activities.

The proponent has followed the due process to obtain a change of user approval from single-dwelling to hospital (and other auxiliary services) from the County Government of Kiambu.

4.3.25 Building Code

This gives general guidelines as to the construction of building and safety measures such as installation of firefighting appliances, fire escapes etc. It equally recognizes the County Government as lead planning agencies and requires every developer to submit building plans to the relevant authorities for approval. After approval of building plans the developer is to invite the local authorities for site inspection before construction. On completion of the building the County Government is to issue a certificate of occupation to the developer before occupation of the building.

The architectural drawings have to be approved by the County Government of Kiambu and the proponent will also ensure that the necessary appliances are installed within the facility as required.

4.3.26 Radiation Protection Act, Chapter 243

An Act of Parliament to provide for the protection of the public and radiation workers from the dangers arising from the use of devices or material capable of producing ionizing radiation e.g. X- ray machines and for other connected purposes.

Compliance with this act will be the main objective by the proponent to ensure proper use of radiation emitting equipment and therefore protect patients and other employees from the harmful effects occurring from overexposure to radiation.

4.3.27 The Nurses Act, Chapter 257

This is an Act of Parliament that makes provision for the training, registration, enrolment and licensing of nurses, to regulate their conduct and to ensure their maximum participation in the health care of the community and for connected purposes.

The proponent shall comply with the same in order to achieve the required set standards when it comes to the provision of medical care.

4.3.28 The Medical Practitioners and Dentists Act, Chapter 253

An Act of Parliament to consolidate and amend the law to make provision for the registration of medical practitioners and dentists and for purposes connected therewith and incidental thereto.

This A*ct should act as guidance to the proponent on the requirements of hiring of doctors to avoid cases of mal-practice.*

CHAPTER FIVE ENVIRONMENTAL IMPACTS, ISSUES OF CONCERN AND MITIGATION MEASURES

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

5.1 Positive impacts

The proposed development will have positive impacts to the society and the environment in general.

Some of benefits include the following:

- Improved access to quality health care services
- Contribution of the project towards attainment of Vision 2030
- Through construction of the proposed development, the project will ensure optimal use of the land to the great benefit of the country and its people with land being a scarce resource in Kenya.
- The proposed development will provide the necessary health facilities for providing adequate healthcare services to Thika Town residents and Kiambu County at large.
- Creation of market for goods and services and especially construction inputs which include raw materials, construction machinery and labor. Secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
- Massive job opportunities for Kenyans both during planning, construction and operational phases. They include building contractors, architectures, structural engineers, mechanical engineers, surveyors, environmentalists, security agents, transporters, construction workers, site managers and foremen, doctors, nurses and hospital administrators.
- Revenue to the County and National Government from taxation.
- Development of area through increased business opportunities and infrastructural development.

5.2 Potential adverse environmental impacts

Against the background of the above positive impacts, there will be negative impacts emanating from the establishment and operation of the facility throughout the project cycle i.e. at construction, operation and possible decommissioning phase.

Once the environmental impacts were identified, mitigating measures are then prescribed and subsequently an Environmental Management Plan (EMP) has been formulated for the project. The environmental impacts of the project and the mitigation measures of the negative impacts are listed below:

5.2.1 Soil erosion

Ground surface alterations during the project site preparation and the transportation of construction materials and equipment, using heavy trucks will disturb the soil surface, making it highly susceptible to soil erosion occurrence. The disturbed soil could easily be transported by surface runoff, causing clogging of nearby drains and sewer pipes. This is likely to be temporary impacts, ceasing after the project construction stage is completed. It is anticipated that the proposed project will not have a significant soil erosion impact if preventive measures are undertaken during the project design and construction stages.

Mitigation measures:

The soil erosion problem will be addressed during the project design and construction stages when the necessary control measures would be considered and incorporated in the project design and implementation. The soil on site will be investigated prior to site preparation for building construction and appropriate safety procedures developed to reduce the occurrence of increased soil erosion.

Measures taken to control erosion will include:

- Avoid unnecessary movement of soil materials from the site.
- Provide soil conservation structures on the areas prone to soil erosion mostly to reduce impact by the run-off.
- Control construction activities especially during rainy conditions.
- Re-surface open areas after completion of the project and introduce appropriate vegetation.
- Provide suitable storm water drainage channels to effectively discharge water to safe areas. Channels need to be regularly maintained and repaired to avoid point discharge in case of breakages or blockages.
- Excavated soil to be used for landscaping or to be disposed in designated sites.

5.2.2 Land/soil pollution

Land pollution is likely to occur due to accumulation of solid waste during the project construction stage that will mainly be composed of debris containing bits of wood, bricks, stone and metal pieces, replaced machinery parts; plastics, broken glass, and ceramics. The waste could also contain hazardous lead-based paint residues, paints and solvents, cement, diesel fuel and oil, heavy metals, and other products that could be

considered as hazardous waste material such as from the site backup generator containing spillages of fuel and oil.
Site pollution could also occur during the project operation stage, due to the generation and accumulation of hazardous medical waste containing used bandages, tested medical specimens, expired drugs, used syringes and needles and human waste.

Mitigation measures:

- The management of hazardous waste materials will be done in accordance with Compliance of solid waste management legal notice No. 121 safety guidelines. This includes identifying, labeling, keeping datasheets, knowing the exact location, proper storage, and using recommended safe work practices to handle hazardous waste.
- Also, fuel storage systems will be placed within concrete containment areas so that any oil spills would be contained. A lined containment basin should be constructed for the generator to sit in, so that the released oil does not leak into the ground to cause pollution of underground water resources.
- In addition, any hazardous waste material will be safely stored until proper disposal can be done by registered biomedical waste handlers.3

5.2.3 Hydrology and water resources impact

Site construction activities will cause increased surface run-off, since the area surrounding the hospital building structure will be paved, causing changes in local drainage characteristics and possible flooding in nearby areas. This is likely to increase the transportation of pollutants from the hospital surroundings to surface and underground water resources. During the project operation stage, there will be considerable increase in local volume of sewage discharge because of the additional quantity of sewage effluent that will be placed into the existing Thika Water and Sewerage Company System.

Mitigation measures:

- Storm water will be managed according to guidelines for surface runoff controls that include having construction site draining system connected to the existing storm water control structures, allowing for cross drainage diversion structures and a site-specific drainage plan for the new project construction.
- The potential increase in local volume of sewage discharge will be investigated thoroughly during the project planning and design phase so that necessary changes in the existing sewage system design could be incorporated during the project construction stage to prevent any leakage of sewage when the project becomes operational.

5.2.4 Impact on biodiversity (flora and fauna)

The proposed project site has a very limited value as wildlife habitat and vegetation cover is minimal. The area around the proposed site has been developed for some time and is frequently disturbed by human activity. There are no threatened or endangered biodiversity (flora and fauna) species that are known to exist within the affected areas, and there are no protected areas within the project site. For these reasons it is expected that any activities for vegetation removal, ground excavations and leveling are likely to cause minimal or no biodiversity impacts in the proposed project site.

Mitigation measures:

- Measures taken to control loss of biodiversity will include clearing and grading the ground surface within approved work limits, stripping the top soil layer from the subsoil, stockpiling the removed soil in approved areas to be retrievable for landscaping and site restoration around the building structure and replanting the original vegetation after construction is completed.
- The soil removed from the building site will be used in landscaping around the paved areas for enhancement of environmental quality.
- The surrounding areas will be replanted with grass and flowers, and other suitable plants. The hospital administration staff will be required to monitor the recovery of the planted natural vegetation.

5.2.5 Traffic obstruction

The transportation of building construction materials and equipment along the highway and feeder roads will temporarily impede traffic movements causing traffic jams. Any traffic obstructions caused by construction activities would be temporary and conditions would return to normal once the proposed project action is completed.

Mitigation measures:

- Enforce speed limits for construction and operation vehicles especially along the roads leading to the site.
- Provide bill boards at the site/entrance to notify motorists and general public about the development to reduce risk of accidents.
- Ensure that the vehicles comply with axle load limits to avoid overloading.
- Employ well trained and experienced drivers.
- Observe traffic rules.
- Provision of adequate on-site parking bays.
- Prohibit the use of drugs and alcohol.
- Respect other road users.

- Use alternative access road that is less busy when necessary to avoid build up of traffic.

5.2.6 Air pollution

Project construction activities involving ground excavations and leveling are likely to generate dust and gaseous emissions due to the operation of heavy construction machinery that could cause breathing problems to the project personnel and nearby residents. Also, occasional odors resulting from construction activities (welding, hot roofing, paving, etc.) and odors caused by possible accumulation of medical waste during project operation could contribute to air pollution. These impacts would cease after the project construction activities are completed, and after the proper disposal of generated medical waste to designated sites.

Mitigation measures:

- A part of the contractors plan will be to provide protective equipment, such as gas masks, to the project personnel. The construction material should be handled in a way that minimizes the occurrence of fugitive dust to the extent possible. The population density around the project area ranges from low to moderate, and most residential premises are located far away from the project construction site.
- Appropriate dust control measures, such as minimizing the amount of ground disturbance, material handling, and water use for dust suppression will be used to reduce the amount of dust and particulate matter produced during the construction activities.
- Also, a registered biomedical waste handler shall be contracted to collect and dispose solid medical waste to designated sites to reduce impacts associated with open burning such as smoke.
- Any effluent from the project activity that is likely to cause pollution to the environment should be pretreated on site before discharge to standards set in the Water Quality Regulations

5.2.7 Noise pollution impact

The project construction activities involving operation of heavy equipment for ground preparation, construction of building structure and movement of heavy machinery during the transportation of construction materials and medical equipment will cause temporary increase of noise levels in the project site. During the project construction stage the noise levels at the project site and adjacent areas would be expected to be higher than those normally occurring in the project area. The noise levels in the area should return to the normal level after completion of project construction activities.

Mitigation measures:

- Machinery should be maintained regularly to reduce noise resulting from friction.
- There should not be unnecessary horning of the involved machinery.
- Sensitize drivers of construction machinery on effects of noise.
- Maintain operation equipment.
- Operation activities to be restricted to day time (0800hrs to 1700hrs on weekdays and 0800hrs – 1300hrs on Saturdays).
- Workers in the vicinity of high-level noise to wear safety and protective gears
- Provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- The proponent should endeavor to comply with Noise Regulations (Legal Notice No. 61 of 2009).
- The proponent should register the site as a workplace with the Directorate of Occupational Health and Safety (DOHS).
- Insulation against noise should be applied where applicable.
- Locate noisy machineries away from residential areas.
- Use of noise barriers where appropriate.

5.2.8 Human health and safety impact

The construction, operational and decommissioning activities of the project has the potential to compromise with the health and safety of both the employees and the patients within the hospital development and the neighboring residents.

Mitigation measures:

- The project construction personnel will be issued with personal safety equipment including steel toed boots, impermeable coveralls and gloves, safety hats, dust and gas masks.
- First aid kits will be included in every project office and vehicle.
- The Ministry of Medical Services will be requested to assist in the storage of hazardous waste until it can be safely disposed of in an environmentally sound manner. This will be done in accordance with the Compliance of solid waste management Legal Notice No. 121 guidelines for handling and disposal of hazardous waste.

5.2.9 Solid medical waste generation

During the project operation stage the hospital is likely to generate large amounts of hazardous solid medical waste (used cotton and bandages, tested medical specimens, expired drugs, used syringes and needles, human waste, etc) and soil contamination due to accidental chemical spills.

Mitigation measures:

- The proper procedures for handling hazardous medical waste will include identifying, labeling, keeping data sheets, knowing the exact location, proper storage, and using recommended safe work practices for handling hazardous medical waste material.
- The waste material should be stored safely before it is disposed of in a safe manner to prevent potential harm to the neighboring residents.
- The hospital administration will organize to have the facility for safe management and disposal of hazardous medical waste in accordance to WHO standards.

5.3 Prediction of negative impacts and proposed mitigation measures during the operation phase of the hospital development.

Major impacts are associated with hospitals as a result of dealing with the sick, handling of corpses and the use of preservation chemicals. The human body is host to various organisms, most of which are pathogenic. There is a risk of disease spread from the patients to the employees and to persons attending the hospital thus appropriate measures should be taken to avoid these. Death is inevitable especially in hospitals which constantly handle sick people. When the body dies, the environment in which the pathogens live can no longer sustain them. However, this does not happen immediately, and transmission of infectious agents from a corpse to a living person may occur. Infectious hazards for individuals who routinely handle corpses include tuberculosis, gastroenteritis, transmissible spongiform, Hepatitis B, Hepatitis C, HIV infection and possibly meningitis and septicemia (especially meningococcal).

5.3.1 Handling the dead

The occupational risks for medical staff that routinely get into contact with dead bodies are well known. The most likely types of infections are those produced by blood borne viruses, enteric pathogens and *Mycobacterium tuberculosis.* The hospital has been designed to have a morgue for temporarily keeping bodies in case of an eventuality. In case of death, the hospital will make necessary arrangements in handling and transporting dead bodies to other registered mortuary facilities. Staff should also be trained on how to handle dead bodies in case of such eventuality.

5.3.2 Blood borne viruses

The risk of infection from blood borne viruses depends on the infection status of the victim (similar to the general population), likelihood and mode of exposure, and in the case of Hepatitis B, the vaccination status of the exposed individual. Exposure to blood borne viruses can occur due to direct contact with non-intact skin, injury from bone fragments and needles, and mucous membrane exposure from splashes of blood or body

fluid to the eyes, nose or mouth. Infectious HIV can survive in corpses for a considerable amount of time (up to 16days after death, if stored at 20^0C).

5.4 Mitigation measures to be adhered to by the staff

5.4.1 Work place controls

5.4.1.1 Practice universal precautions

- Treat all human blood and Other Potentially Infectious Materials (OPIM) as if contaminated with blood-borne pathogens.
- Wear appropriate Personal Protective Equipment (PPE).
- Wash hands and skin with warm water and soap immediately after;
  - Any contact with blood or OPIM.
  - Removing gloves, even if gloves appear to be intact.
- Use waterless antiseptic hand cleansers when hand washing facilities are not available, and wash hands immediately when warm water and soap do become available.

5.4.1.2 Manage sharps properly

- Be alert for sharp objects, such as bones, broken glass, metal, knives, etc.
- Store reusable sharps in a manner to prevent lacerations or puncture wounds.
- Use mechanical means to clean up broken glass and other sharp objects.

5.4.1.3 Disinfect contaminated equipment, environment and working surfaces

- Use protective covers on equipment and work surfaces that are difficult to decontaminate.
- Disinfect all interior and exterior surfaces of reusable equipment and Regulated Medical Waste (RMW) containers between uses.
- Maintain a cleaning schedule, which requires the cleaning of work surfaces, equipment surfaces and waste containers:
  - After completion of procedures,
  - Immediately or as soon as possible when surfaces become overtly contaminated,
  - After any spill of blood or OPIM,
  - At the end of the work shifts.

5.4.1.4 Contain and confine blood and OPIM

- Place human remains and disassociated portions in plastic burial pouches or zip lock bags.
- Avoid, or at least keep to a minimum, splashing, splattering, and generation of aerosols.

5.4.1.5 Handling of contaminated PPEs and clothing

- Wear protective gloves and other appropriate PPE, including gowns, aprons, eye protection, disposable head covers, disposable shoe covers as needed to prevent exposure when handling contaminated PPE.
- Never wear contaminated PPE and clothing outside of the work area.
- Remove and replace PPE and replace underlying clothing immediately or as soon as possible when they become damaged or penetrated by blood or OPIM.
- Remove contaminated PPE and clothing in a manner to avoid contact with skin, mucous membranes, and underlying clothing.
- Place contaminated reusable PPE and clothing into leak-resistant bags or containers immediately upon removing the articles.
- Use bags and containers that are either color-coded red or labeled with the fluorescent orange or orange-red biohazard warning symbol.
- Never wash contaminated PPE and clothing with personal laundry.
- Wash and dry reusable PPE and clothing according to the instructions on their labels, in hot water at least 1600^0F and detergent for 25minutes, or with chemicals at the proper concentration for low temperature washing.
- Place contaminated disposable PPE and clothing that is saturated, dripping or caked with dried blood into a RMW container.
- Use an approved disinfectant to decontaminate reusable gloves, protective eyewear, face shields and similar PPE. Follow the manufacturer's recommendations for disinfectant concentrations and contact times.
- Brush-scrub contaminated boots and leather goods with soap and hot water.

5.4.1.6 Clean up spills of potentially infectious materials

- Clean up spills immediately.
  - Remove visible material with absorbent disposable towels.
  - Decontaminate the area using clean towels and an appropriate disinfectant.
  - Allow area to dry.
  - Dispose of absorbed towels and other waste in an appropriate RMW container.
- Wear appropriate PPE
  - Wear disposable latex, Polyvinyl chloride (PVC) or vinyl gloves.

  - Wear face and eye protection, and an impervious gown or apron if splashing is likely.
  - Wear shoe covers when cleaning up large spills.
- Keep a commercial or domestic spill kit available, containing;
  - One pair of splash-proof safety goggles,
  - One disposable face mask,
  - Two pairs of disposable latex gloves,
  - One disposable apron,
  - One pair of disposable shoe covers,
  - Absorbent disposable towels,
  - Disinfectant (and its material safety data sheet),
  - Two red plastic bags with twist ties,
  - A scoop or scraper,
  - Waterless antiseptic hand cleanser.

5.4.1.7 Practice good personal hygiene

- Never consume food or beverages in areas where exposure to blood or OPIM exists
- Never store food and beverages in an area where they or their containers may become contaminated with blood or OPIM
- Refrain from handling personal items, such as pens and combs, to prevent soiling or contamination.

5.4.1.8 Use chemicals safely

- Follow the chemical manufacturer's directions on the chemical's warning label and material safety data sheet for safe handling, storage and use.

N/B Supervisors must:-

- Whenever possible, provide hand washing facilities stocked with soap, tepid water and paper towels
- Make provisions for laundering contaminated clothing and disinfecting PPE
- Ensure adequate supplies such as RMW container, laundry bags, disposable PPE, disinfectants and spill clean-up materials are readily available.
- Oversee that personnel adhere to recommended safe work practices.

5.4.1.9 Decontamination procedures for chemical disinfectants

Chemical Disinfection

- Always wear appropriate personal protective equipment (PPE) to avoid contact with hands, eyes, face e.t.c when using a chemical disinfectant.
- Use disinfectants in well-ventilated areas.

- Thoroughly remove visible contamination (blood, body fluids, and other potentially infectious materials) with soap and water before using a chemical disinfectant.
- Select disinfectants most suited to the activity and always read the disinfectant's label and Material Safety Data Sheet (MSDS).
- Follow the manufactures' directions on the disinfectant's warning label and MSDS for safe handling , storage and use
- Open, disassemble and completely submerge instruments to ensure direct contact between all surfaces and disinfectant.
- Thoroughly rinse and dry all items after disinfecting, taking care not to re-contaminate items.

5.4.1.10 Personal Protective Equipments (PPEs)

Select PPE types and characteristics based on;

- The procedures that will be performed
- The type of exposure anticipated
- The quality of blood or other potentially infectious materials (OPIM) anticipated to be encountered, and
- Other safety and health hazards that may pose a risk to personnel.

5.4.1.11 Body protection

- Wear impervious disposable gowns, aprons which will prevent blood or OPIM from penetrating and contaminating the PPE's inner surfaces and subsequently underlying clothing and skin
- Keep an extra change of work clothing on hand at all times.

5.4.1.12 Hand protection

- Wear polyvinyl chloride (PVC) or vinyl gloves when handling corpses.
- Select gloves that fit tightly around the wrists to prevent contamination of the hands for situations where large amounts of blood or other contaminants are likely to be encountered.

5.4.1.13 Eye and face protection

- Wear a surgical mask (unless respiratory protection is required, then substitute with required respirator) and safety glasses or a face shield where there is potential for splashing or spattering of blood or OPIM or for the generation of airborne particles from dried blood.
- Wear a face shield or splash-resistant goggles over eye glasses.

5.4.1.14 Foot protection

- Wear rubber boots or appropriate shoe covers where there is potential for footwear to become grossly contaminated.

5.4.1.15 Head protection

- Wear head covers when contact with large quantities of blood or OPIM is anticipated.

5.4.1.16 Respiratory protection

- Respiratory protection may be worn to protect personnel from bio-hazardous materials.
- Wear a surgical mask or respirator.
- Work in well ventilated environments.

5.4.1.17 Repair and replacement

Supervisor's must:-

- Provide all PPE that is expected to be needed. PPE must be:
  - Readily accessible
  - Appropriate for the specific tasks or procedures
  - Available in the correct sizes and
  - Durable under normal conditions of use
- Require all exposed personnel to use and wear appropriate PPE and to repair or replace PPE as needed to maintain its effectiveness.
- Define work area boundaries and require personnel to remove PPE before leaving the work area
- Provide designated areas or containers for the storage of contaminated PPE.
- Permit only trained personnel to handle contaminated PPE

Personnel must:-

- Remove PPE and underlying clothing immediately or as soon as possible when PPE is penetrated by blood or OPIM.
- Repair or replace damaged PPE as needed to maintain its effectiveness.

5.4.1.18 Standard immunization

Immunization for medical affairs personnel should include, as a minimum –

- Hepatitis b which is 70% to 80% effective within one week of exposure
- Tetanus

5.4.1.19 Medical surveillance for staff

The medical surveillance practices include;

- Screening for tuberculosis by tuberculin skin test
- Screening and testing for other communicable diseases and offering the right treatment

5.4.1.20 Handling waste

Place waste in containers or plastic bags;

- Place sharps in sealable, puncture resistant leak proof containers, replace sharp containers when they are ¾ full.
- Place blood soaked, dripping, blood caked disposable PPE and waste materials in leak proof bags or impervious containers.
- Close and seal containers and bags prior to removal or replacement to prevent spillage or protrusion of contents during handling, transport, or storage.
- Place containers of bio-medical waste in secondary bags or containers if contamination of outside surfaces occur or if there is potential for leakage.
- Avoid excessive or rough handling to prevent rapture of containers and bags.

5.4.1.21 Storage and handling of biomedical waste

Type of biomedical waste	**Color of container and markings**	**Type of containers**
Infectious	Yellow	Strong leak proof plastic bag with biohazard symbol
Pathological	Yellow	Strong leak proof plastic bag with biohazard symbol
Sharps	Yellow-marked sharps	Puncture proof
Chemical and Pharmaceutical	Brown	Plastic bag/container
Non-infectious/Nonhazardous	Black	Plastic bag/container
Radioactive waste		Lead box marked with radioactive symbol

5.4.1.22 Treatment methods of bio-medical wastes

Waste category	**Treatment method**
Contaminated bedding/patient care waste	Steam sterilization or Incineration
Cultures and stock	Steam sterilization

Contaminated small equipment	Steam sterilization or incineration
Contaminated large equipment	Formaldehyde decontamination
Waste biological	Steam sterilization or incineration
Surgery waste	Steam sterilization or incineration
Human blood	Steam sterilization or incineration
Human blood products	Steam sterilization or incineration
Contaminated laboratory waste	Steam sterilization
Pathological waste	Steam sterilization or incineration/Grinding
Contaminated and unused sharps	Steam sterilization or incineration
Pharmaceutical waste	Steam sterilization or incineration/Grinding

With the absence of an incinerator within the hospital development, the proponent shall engage the services of a registered biomedical waste handler to dispose the medical wastes in designated sites only as required.

CHAPTER SIX PUBLIC PARTICIPATION

6.1 Introduction

In recognition of the fact that any project would have both direct and indirect effects to the human population whether it is in a positive or negative way, public consultation and public participation was carried out to help identify the key issues and impacts that the proposed hospital development in Thika Town may have on the environment.

The objective of the consultation and public participation exercise was to:

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

Public participation exercise for the project was carried out through key informant interviews and discussions. The key informants were mainly neighboring residents and local business owners (***See attached annex 2***).

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

In general, the following steps were followed in carrying out the entire Public Participation process:-

- Identification of institutions and individuals interested in the process- database of the interested and affected parties.
- Invitation of the neighbors for a public baraza
- Administration of questionnaires to the different target groups and local community members along the proposed project Site.

6.2 Background

From the field work, it was apparent that the majority of the stakeholders had no objection to the proposed project as long as the resulting impacts would be duly mitigated. The proposed construction of the hospital was received with positivity by the community as they anticipated numerous positive impacts from the project. The local communities and major stakeholders independently gave their views, opinions, and suggestions of the projects impacts and how to mitigate the negative impacts.

6.3 Issues raised

This Sub-Section covers the views and opinions of the key stake holders (local residents, organizations, interested persons or groups). It highlights both positive and negative socio-economic and environmental impacts anticipated during the construction and operational phases of the project. This is followed by suggested mitigation measures that the developer should incorporate to minimize environmental degradation and promote sustainable development.

6.3.1 Positive issues

1. **Improving growth of the economy**

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

2. **Improved medical care services and accessibility by community**

The public strongly felt that the hospital project will improve medical care services to the general public hence they welcomed the development of the project anticipating affordable and accessible medical services. Most of the private hospitals in the area charge high prices making them unaffordable especially to the poor hence this facility come as a blessing to them since it will offer quality healthcare at affordable rates.

3. **Creation of employment**

The local community was optimistic that the construction phase of the proposed project will open up new fields of employment. Despite the fact that most of the project will need skilled labor force, the people expressed hope that they will be able to access employment once the project commences mostly as casual workers. Kiambu faces high unemployment rates especially the youth leading to rising cases of insecurity, drug/alcohol abuse and poverty. During the construction and operational phase many people will be employed resulting to economic empowerment and poverty reduction.

4. **Improved security of the area**

The local residents were optimistic that the establishment of the project will lead to improved security situation in the neighborhood. This is due to improved security around the hospital in the area which will attract other stakeholders to improve on the

infrastructure such as the street lights. The improved medical facility is also anticipated to attract increased security personnel in the area.

5. **Increased business opportunities**

Those with businesses along and around the area were optimistic that the project in the area will result in an increased business volume and the quality of business will be increased by way of this project coming up in the area. According to them, the number of customers will increase from the construction workers, the security and maintenance personnel including the workers, individuals, visitors and organizations who will be within the premise during the operation phase. Other stakeholders especially those with interest in establishing relevant businesses in the area, expressed their joy since there will be a major customer base for their products and services.

6. **Improved infrastructure through access roads**

There was a general agreement from the respondents that development in an area usually attracts the local council and their development strategy such as improvement of access roads and other infrastructure.

6.3.2 Negative issues

1. **Dust emissions**

The people expressed concern over possibility of generation of large amount of dust and fumes within the project site and surrounding areas as a result of the construction activities The proponent shall ensure that dust levels at the site are minimized through sprinkling water in areas being excavated and along the tracks used by the transport trucks and diversions within the site. Additional mitigation measures presented within the EMP will be fully implemented to minimize the impacts of dust generation.

2. **Noise pollution**

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

3. **Vibrations**

The residents expressed opinions over vibration produced by the construction machines and other moving machines in the construction site and this has likely effects on the strength of the buildings nearby and causing general nuisance. The proponent intends to use light machinery which are technically sound

4. Waste generation

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paints and solvent containers, broken glass among others. Solid wastes if not well managed have a potential of causing accidents and disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. The major vulnerable groups are children who could be exposed to these conditions.

Some of the excavation material will be rendered unusable and thus will have to be disposed off. This also applies to some of the soil/rocks which may not be reusable after excavation processes are complete. All these materials need to be collected, transported and disposed of appropriately in approved designated areas.

It is encouraged that other alternative uses of these materials should be found e.g. filling excavated areas at the site. The people interviewed also raised concerns that during the operation phase more medical waste will be generated. The proponent will contract a private and registered company to handle all their biomedical wastes when necessary.

5. Increased water and electricity demand

It was evident from the interviews that the project shall lead to increased water consumption from the local water authority and generation of effluent. Both the workers and the construction works will create additional demand for water in addition to the existing demand. Water will be mostly used in the preparation of concrete for construction works and for wetting surfaces, curing or even cleaning completed structures. This implies that more water and sewage services need to be provided by the county government to cater for the project's needs. If the existing water supply will not be sufficient for the hospital operations then the proponent may decide to sink a borehole. The project will consume fossil fuels (mainly diesel) to run transport vehicles, generator and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. The project will also use electricity supplied by Kenya Power (KPLC). Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. In this regard, there will be need to use alternative sources of energy such as solar energy and conservation of electricity since high consumption of electricity negatively impacts on these natural resources and their sustainability.

6. Destruction of existing vegetation

The construction process will involve clearing of the existing vegetation cover. The developer intends to replace this with planting of many indigenous and other useful firewood and fodder trees and grass in all the gardens and strategic green areas.

7. Population influx within the area

It is anticipated that due to the presence of the improved hospital, it will attract many people into the vicinity some of whom may be a threat to the harmony and peace within the area. This will be addressed through enhanced security in the area.

CHAPTER SEVEN ANALYSIS OF PROJECT ALTERNATIVE

7.1 Introduction

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

7.2 Relocation option

The above land is legally owned by Dr. Nelson Muraya Wachira and Agnes Mwonjoria Muraya and was set aside in anticipation for the hospital development. Relocation calls for the proponent to look for a different plot to establish the proposed development. Bearing in mind that the proponent has been granted a change of user and the necessary approvals from Kiambu County Government and it is a key point where Thika Town residents can obtain their medical services; this means that the proponent can only do the construction of the hospital at the proposed site. Searching for land to accommodate the space and size of the project and completing official transaction may take a long time although there is no guarantee that such land could be available.

Project design and planning before the stage of implementation will cost the developer a large sum of money. Whatever has been done and paid up to this level will be counted as a loss to the developer, bearing in mind the building plans are about to be approved by the Kiambu County Government. Assuming the proposed project will be given a positive response by the relevant authorities including NEMA, the project would have been delayed for about two year's period before implementation. This is a delay that the proponent can ill afford. This would also lead to a situation like no other project alternative option; the other consequences of this would be a discouragement to local/private investors especially in this sector that has been shunned by many public and private investors already aggrieving our critical business premises shortage.

From the above statements relocation of the project to different site is not viable hence it's ruled out.

7.3 No project alternative

The NO project alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from the extreme environmental perspective as it ensures non-interference with the existing conditions. Under no project alternative, the proponent's proposal would not receive the necessary approval from NEMA, the proposed hospital would not be constructed and there would be no demand for the development. This option will however, involve several losses both to the land owner, various stakeholders and the community as a whole. The community

will continue seeking for medical services from the existing facilities which are insufficient.

The no project option is the least preferred from the socio-economic and partly environmental perspective due to the following factors;

- Discouragement for investors
- No construction of the modern hospital
- Highly specialized healthcare and quality medical provision will not be achieved.
- No employment opportunities will be created for Kenyans bearing in mind that the proposed project will have employment opportunities both directly or indirectly during construction and operations phases and thus improve lifestyles and livelihoods.
- Local skills would remain under utilized
- Development of infrastructural facilities (roads, electrical etc. will not be undertaken).
- Vision 2030 will be far from implementation bearing in mind that this is one of the first projects gearing towards realization of vision 2030.

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

7.4 Analyses of alternative construction materials and technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. Heavy use of timber during construction is discouraged because of massive destruction of forests. The exotic species would be preferred to indigenous species in the construction where need will arise. However, this housing methods and technologies to be used will require very little timber.

7.5 Domestic waste water management alternatives

Five locally available technologies are discussed below:

7.5.1 Waste water treatment plant/ bio-digester

This involves the construction of a plant and use of chemicals to treat the effluents to locally accepted environmental standards before it is discharged into the river nearby. It is usually expensive to construct and maintain but it is the most reliable, efficient and cost effective in the long term. The sludge obtained can be composted and used for agricultural and gardening purposes. Since there exist a sewer line in the project site, this option is not preferred.

7.5.2 Use of stabilization ponds/lagoons

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

7.5.3 Use of constructed/artificial wetland

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

7.5.4 Use of septic tanks

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

7.6 Solid waste management

The proposed project will generate massive solid wastes both during construction and operational phases. An integrated solid waste management system is recommendable. The proponent will give priority to reduction at source of the materials. This option will demand a solid waste management awareness program. Secondly, recycling, reuse and composing of waste will be an alternative in priority. This calls for a source separation program to be put in place. The recyclables will be sold to waste buyers within Thika Town and surrounding areas. The third priority in the hierarchy of options is combustion of the waste that is not recyclable in order to produce energy. Finally, sanitary land filling will be the last option for the proponent to consider.

CHAPTER EIGHT ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 Introduction

The objectives of the Environmental Management Plan (EMP) are:

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

8.2 Costing

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

8.3 Plan period

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

8.4 Environmental Management Plan (EMP)

Table 2: Environmental Management Plan during construction, operation and decommissioning phases of the proposed hospital development on plot L.R No. Thika Municipality Block 5/669 at Thika Town area, Kiambu County.

A. CONSTRUCTION PHASE EMP

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Estimated Cost per year (Kshs.)
1. Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High demand of raw material	• Source building materials from local suppliers who use environmentally friendly processes in their operations. • Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered. • Ensure that damage or loss of materials at the construction site is kept minimal through proper storage. • Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Proponent, Contractor & Engineer	Throughout construction period	To be determined
2. Reduce storm-water, runoff and soil erosion				
Increased storm water, runoff and soil erosion	• Surface runoff and roof water shall be harvested and stored in reservoir for reuse. • Proper installation of drainage structures/facilities	Civil Engineer, Mechanical Engineer & Proponent	Throughout construction period	150,000

	• Ensure efficiency of drainage structures through proper design and maintenance • Provide gratings to the drainage channels • Ensure management of excavation activities • Control activities especially during rainy seasons • Provide soil erosion control and conservation structures where necessary • Install cascades to break the impact of water flowing in the drains • Compact loose soils to minimize wind erosion • A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.			
3. Minimize solid and liquid waste generation and ensure efficient solid and liquid waste management during construction				
Increased solid waste and liquid waste generation	• Segregate the waste at the site • Construct different waste disposal pits for biodegradable organic waste and another for non biodegradable waste with appropriate shed/cover to prevent accumulation of rain/flood water • Ensure proper disposal and separation of construction waste (pieces of wood, glass etc) in the contractor‘s yard (off the site) • Engage services of a registered NEMA waste handler to dispose the waste at designated disposal sites • During transportation of building materials and waste, trucks should be covered to prevent them from	Proponent, Contractor, Workers & NEMA Inspectors	Throughout construction period	75,000

	falling along the roads • Sensitize workers on the reuse of materials where appropriate • Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials. • Ensure that construction materials left over at the end of construction work will be used in other projects rather than being disposed of. • Ensure that damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects • Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or home owners. • Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time. • Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements. • Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste.			

	• As provided for by the Building Code, a portable toilet/pit latrine will be provided on site to be used by construction workers			
4. Reduce dust emissions				
Dust emission	• Ensure strict enforcement of on-site speed limit regulations • Dust suppression with water-sprays during the construction phase on dusty areas • Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles • Careful screening of construction site to contain and arrest construction-related dust. • Personal Protective Equipments to be worn at all times • Construction materials on site to be covered to prevent them from being blown off by wind	Proponent, Contractor, Engineer, Public Health Officer & NEMA Inspector	Throughout construction period	100,000
5. Minimization of exhaust emissions				
Exhaust emission	• Vehicle idling time shall be minimized • Alternatively fuelled construction equipment shall be used where feasible. • Equipment shall be properly tuned and maintained • Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle	Proponent, Contractor & Workers	Throughout construction period	To be determined

	engines at these points			
6. Minimization of noise and vibration				
Noise and vibration	• Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used. • Sensitize construction drivers to avoid gunning of vehicle engines or unnecessary hooting especially when passing through sensitive areas such as churches, residential areas and schools • Ensure that construction machinery are kept in good condition to reduce noise generation • Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. • The noisy construction works will entirely be planned to be during day time i.e. 8am to 5pm. • Use of suppressors on noisy equipment or noise shields for instance corrugated iron sheet structures • Sensitize drivers of construction machinery on effects of noise • Trucks used at construction site shall be routed away from noise sensitive areas where feasible. • Workers in the vicinity or involved in high-level noise to wear PPE • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Proponent, Contractor, NEMA Inspectors & Workers	Throughout construction period	100,000
7. Minimization of energy consumption				

Increased energy consumption	• Ensure electrical equipment, appliances and lights are switched off when not being used • Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy • Use renewable energy were appropriate e.g. solar energy for lighting	Proponent, Contractor & Workers	Throughout construction period	45,000
8. Minimize water consumption and ensure more efficient and safe water use				
High water demand	• Drill a borehole (all necessary approvals from WRA and NEMA have to be obtained first) • Install a raised and large capacity water storage tank • Install a water purification plant at the site if the water from the borehole is found to be salty/unsuitable for direct consumption • Provide portable water with water bowsers from the project area • Promptly detect and repair water pipe and tank leaks • Ensure taps are not running when not in use • Install a discharge meter at water outlets to determine and monitor total water usage • Proper recycling of water from other uses for sprinkling dusty pavements • Sensitize workers to reduce water wastage	Proponent, Contractor, Workers & WRA	Throughout construction period	4,000,000

9. Minimize occupational health and safety risks				
Personal Protective Equipments (PPE), health and safety impacts, first aid and fire protection	• Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the proposed site. • Construction of a perimeter wall around the facility • Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc should be made available and construction personnel must be trained to use the equipment • Implement all necessary measures to ensure health and safety of workers and the general public during the construction phase as stipulated in OSHA, 2007 • Well stocked first aid box which is easily available and accessible should be provided within the premises • Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body. • Firefighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas. • Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance • Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained	Proponent, Contractor, NEMA Inspectors & Workers	Throughout construction period	100,000

	• Fire escape routes and assembly point to be marked • Provide clean water to the workers. • Construction work will be limited to daytime only • Workers to be adequately insured against accidents. • Ensure that the workers are registered with NHIF and NSSF and remits appropriate fee • Adherence to safety procedures will be enforced. • All workers will be sensitized before construction begins, on how to control accidents related to construction. • A comprehensive contingency plan will be prepared before construction begins, on accident response.			
10. Minimize de-vegetation resulting from site clearance				
Clearing of site vegetation	• Ensure proper demarcation and delineation of the project area to be affected by construction works. • Apply for tree cutting permit from relevant authorities before cutting of any tree • Preserve trees located at the boundary of the plot and inside the plot where possible • Plant appropriate locally adapted species outside the built up areas • Design and implement an appropriate landscaping and tree planting program to help in re-vegetation of part of the project area after construction using potential natural vegetation. • Introduction and maintenance of appropriate vegetation (trees and grass) on open spaces and around the site	Proponent, Contractor, Engineer, Workers & Kenya Forest Service	Throughout construction period	50,000

11. Prevent oil pollution				
Oil spills and leaks	• Proper storage, handling and disposal of new oil and used oil and related wastes • Maintain construction machinery and equipment to avoid leaks • Provide oil interceptors along the drains leading from the generator room and parking area	Contractor, Engineer, Workers, NEMA Inspectors & Public Health Officer	Throughout construction period	50,000
12. Minimize risks of flooding				
Flood risk	• Ensure flood water is properly diverted/prevented from entering the proposed site from the access road • Construct drainage channel on the lower part of the plot • Construct drainages on the property to direct surface run-off to landscaped areas. • Rain water harvesting gutters and storage tanks should be installed to reduce the amount of rainfall reaching the surface. • Semi permeable materials should be used for construction of pavements. • Comprehensive landscaping on the open areas. • Ensure area surrounding the plot is well drained to prevent accumulation of storm water from the site and surrounding areas	Proponent & Engineer	Throughout construction period	250,000
13. Reduce traffic congestion				
Increased traffic jams and accidents along	• Enforce speed limits for construction vehicles especially along the roads leading to the site	Proponent, Contractor,	Throughout construction	25,000

the major roads	• Provide bill boards at the site/entrance to notify motorists and general public about the development • Ensure that the vehicles comply with axle load limits • Employ well trained and experienced drivers • Observe traffic rules	Workers & Traffic Officers	period	
14. Minimize insecurity issues				
Security systems and procedures	• Provide security guards during construction period for both day and night. • Construct temporary barrier (iron sheet) around the site before commencement of construction • Keep records of all movement in and out of the construction site • Construct a perimeter wall around the project site • Install security lights in strategic places around the compound preferably with automatic on/off sensors • Provide emergency contacts for the area police	Contractor, Proponent, Engineer & Security firms/Kenya Police	Throughout construction period	50,000

B. OPERATION PHASE EMP

Expected Negative Impact	Recommended Mitigation Measures	Responsible Party	Time Frame	Estimated Cost (Kshs.)
1. Minimization of solid waste generation and ensuring more efficient solid waste management				
Solid waste generation	• Provide solid waste handling facilities such as waste bins and waste receptacles • Encourage segregation of waste (organic and inorganic) and provide for clearly marked dustbins	Proponent, Hospital management, Public health	Continuous	50,000

	to serve the specified use • Ensure that solid waste generated from the facility is regularly disposed of appropriately at authorized dumping sites • Ensure that the proponent manages waste efficiently through recycling, reuse and proper disposal procedures. • Donate redundant but serviceable equipment to charities and institutions • A private NEMA licensed company to be contracted to handle medical waste • All solid waste from the facility should be disposed in accordance with the Waste Management Regulations, 2006	officer & NEMA inspectors		
2. Minimize risks of sewage release into environment				
Sewage disposal	• Provide adequate and safe means of handling all effluents from the facility by connecting to the convectional sewerage system serving the entire project area. • Install an onsite treatment plant that can pretreat some effluent to recommended standards before final discharge. • Conduct regular inspections and maintenance for drainage pipe blockages or damages and fix appropriately • Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated.	Proponent, Contractor, hospital management& Public health officer	Continuous	100,000

	• The staff and hospital management should report any incidence of blockages in the hospital immediately they occur			
3. Minimize energy consumption				
Energy resource utilization	• Switch off electrical equipment, appliances and lights when not being used • Install occupation sensing lighting at various locations such as storage areas which are not in use all the time • Install energy saving fluorescent tubes at all lighting points within the compound instead of bulbs which consume higher electric energy • Monitor energy use during the operation of the project and set targets for efficient energy use • Encourage the hospital management to use energy efficiently • Use renewable energy sources e.g. solar energy	Proponent, Engineer, hospital management	Continuous	95,000
4. Minimize water consumption and ensure more efficient and safe water use				
Water consumption	• Harvest rain-water • Provision of roof/ underground tanks for water storage • Promptly detect and repair water pipe and tank leaks • Conserve water e.g. by avoiding unnecessary toilet flushing. • Ensure taps are not running when not in use • Install water conserving taps that turn-off automatically when water is not being used • Place notices at water taps e.g. 'TURN OFF TAP	Proponent, WRA, hospital management	Continuous	50,000

	AFTER USE‘ • Install a discharge meter at water outlets to determine and monitor total water usage			
5. Minimization of health and safety impacts				
Personal Protective Equipments (PPE), health and safety impacts, first aid and fire protection	• All workers should be provided with appropriate protective gears. • Place sharps in sealable, puncture resistant leak proof containers, replace sharp containers when they are ¾ full. • Place blood soaked, dripping, blood caked disposable PPE and waste materials in leak proof bags or impervious containers. • Close and seal containers and bags prior to removal or replacement to prevent spillage or protrusion of contents during handling, transport, or storage. • Avoid excessive or rough handling to prevent rapture of containers and bags. • Treat all human blood and Other Potentially Infectious Materials (OPIM) as if contaminated with blood-borne pathogens • Contain and confine blood and OPIM. • Wash hands and skin with warm water and soap immediately after any contact with blood or OPIM and removing gloves, even if gloves appear to be intact. • Use waterless antiseptic hand cleansers when hand washing facilities are not available, and wash hands immediately when warm water and soap do become available.	Proponent, Public health officer, hospital management & NEMA inspectors	Continuous	250,000

	• Maintain a cleaning schedule, which requires the cleaning of work surfaces, equipment surfaces and waste containers • Sensitize hospital management on social issues such as drugs, alcohol, diseases. • Practice good personal hygiene. • First aid kits should be provided within the hospital development. They should be fully equipped at all times and should be managed by qualified persons. • Install firefighting equipment • Maintain firefighting equipment regularly • Provide emergency numbers at strategic points • Adequate sanitary facilities should be provided and standard cleanliness maintained • Regular maintenance of machineries and equipments. • Hospital management should be provided with evacuation procedures in case of fire. • The hospital management should practice fire drills at least once a month to ensure that they have the knowledge to act accordingly in case of fire. • Members of staff to be given the correct tools and equipments for the jobs assigned • Members of staff to be trained in the use of all equipment that they will be required to operate • Provide portable water in sufficient quantities. • The proponent to implement the provisions of the Occupational Safety and Health Act, No. 15 of 2007.			

6. Ensure the general safety and security of the school and surrounding areas				
Insecurity	• Engage services of security guards • Install CCTV cameras • Place hotline numbers on strategic places • Sensitize the staff on security precautions • Install security lights in strategic places around the compound preferably with automatic on/off sensors • Secure the site with a perimeter wall and a metal gate	Proponent, hospital management & Security firm/Kenya Police	Continuous	120,000
7. Air quality/particulate matter (dust)				
Air pollution	• Discourage the use of wood fuel • Encourage the use of renewable energy resources e.g. solar energy • Dust suppression with water-sprays on dusty areas • Sprinkle water on graded access routes when necessary to reduce dust generation by vehicles • Use of appropriate PPEs • Vehicle idling time shall be minimized • Equipments shall be properly tuned and maintained	NEMA inspectors, Public health officer, Proponent & Hospital management	Continuous	170,000
8. Minimize noise and vibration pollution				
Excessive noise and vibrations	• Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. • The noisy operation related works will entirely be planned to be during day time i.e. 8am to 5pm.	Proponent, Staff, Engineer & NEMA inspectors	Continuous	145,000

	• Use of suppressors on noisy equipment or noise shields for instance corrugated iron sheet structures • Sensitize staff on effects of noise • Use of PPEs. • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009			
9. Reduce storm-water, runoff and soil erosion				
Storm water drainage	• Proper maintenance of drainage structures • Inspection and maintenance of water harvesting gutters and storage tanks	Proponent, Engineer & Staff	Continuous	35,000
10. Reduce traffic jams and accidents				
Traffic jams and accidents	• Provide warning lights and other signs to reduce risk of accidents • Provision of adequate on-site parking bays • Observe traffic rules • Respect other road users • Use alternative routes when necessary	Staff, Traffic officers & Proponent	Continuous	15,000

C. DECOMMISSIONING PHASE EMP

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.

Expected Negative impact	Recommended Mitigation Measures	Responsibility for mitigation	Monitoring means	Recommended frequency of monitoring	Estimated Cost (Kshs)
Demolition of existing structures	• Apply for demolition permit from relevant authorities before commencing the demolition • Engage a registered private contractor to carry out the demolition • Provide workers with Personal Protective Equipment (PPEs) • The demolition exercise to be limited at day time only • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Project proponent, Contractor & NEMA inspectors	Inspection	Daily during the demolition process	To be determined
Air pollution	• Dust suppression with water sprays on dusty areas • Careful screening of construction site to contain and arrest construction related dust • Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission	Proponent, Contractor & NEMA inspectors	Inspection Routine maintenance	Daily	To be determined

Noise pollution	• Demolition activities to be restricted to daytime i.e. 8am to 5pm • Use of suppressors on noisy equipment or use of noise shields for instance corrugated iron sheet structures • Workers in the vicinity or involved in high level noise to wear respective safety & protective gear. • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	Proponent, Contractor, Workers & NEMA inspectors	Inspection Observation Routine maintenance	Random	To be determined
Health and safety	• All workers to wear PPEs e.g. helmets.	Contractor	Routine	Daily	To be determined

8.5 Decommissioning

Decommissioning is a controlled process used to safely retire a facility that is no longer needed. During decommissioning, facilities or structures are cleared or secured so that the facility does not pose a risk to public health or the immediate environment.

- Termination of power supply to the development
- Termination of water connections
- All facilities within the development will be decommissioned in an environmentally friendly manner
- Provision of protective gears to the workers who will participate in the demolition exercise
- Waste from the site to be disposed in an environmentally friendly manner that shall be covering and preventing the natural biodiversity
- Landscaping and re-vegetation of all disturbed areas.
- Building materials that cannot be recycled should be disposed of by a registered waste handler recognized by NEMA in accordance with the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 Legal Notice No.121

CHAPTER NINE CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

The proposed project is considered important and beneficial to the proponent, local community, County and National Governments in general. The negative impacts expected to arise during all the phases of the project can be managed to satisfactory levels using the derived EMP and do not warrant significant environmental degradation. The proponent is also committed to implementing the Environmental Management Plan developed for the project and regularly monitor the environmental performance of the proposed development as required.

9.2 Recommendations

It is our recommendation that the project be allowed to go ahead provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be mitigated through close follow-up and implementation of the recommended Environmental Management Plan (EMP). The proponent should also conduct statutory Environmental Audits, Fire Risk Assessments and Occupational Safety and Health Audits annually through licensed advisors during the construction and operation phases of the project.

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ANNEX 1

PROJECT SITE AND PHOTOGRAPHY

SITE PHOTOGRAPHS

PLATE NO:	PHOTOGRAPHY	REMARKS
1. The proposed site		-The proposed hospital development has not commenced. The proponent will only commence with the proposed development once all the necessary approvals from the relevant authorities are obtained.
2. Some of the high-rise residential flats neighboring the proposed site	 	-The design of the hospital will blend well with the existing housing developments in the area -The area residents are in support of the proposed development
3. A section of the access roads serving the proposed site	 	-The most appropriate access roads to the site will be used to ensure the implementation of the proposed development does not cause traffic congestions especially during the operation phase of the hospital

ANNEX 2

PUBLIC CONSULTATIONS

ANNEX 3

LAND OWNERSHIP DOCUMENTS

ANNEX 4

PROPONENTS IDENTIFICATION DOCUMENTS
KRA PIN

ANNEX 5

LEAD EXPERT REGISTRATION/PRACTICING CERTIFICATE

ANNEX 6

ARCHITECTURAL AND STRUCTURAL DRAWINGS