THE NAIROBI HOSPITAL

ENVIRONMENTAL IMPACT ASSESSMENT FULL STUDY REPORT FOR THE PROPOSED NAIROBI HOSPITAL EXPANSION PROJECT(PHASE 2) ON LR. NO. 209/4209 AND 209/644/1, NAIROBI COUNTY

GPS CORDINATES -1.2956698S and 36.8034324

May 2016

EarthCare Services Limited
for the posterity of resources and development

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In accordance with
Environmental Management and Coordination Act (EMCA), 1999, EIA/EA Regulations 2003
and
Environmental Management and Coordination (Amendment) Act (EMCA), 2015

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Many thanks to The Nairobi Hospital, and Karago and Associates Architects Limited for availing the necessary documentation and information to enable the experts effectively carry out the ESIA.

EXECUTIVE SUMMARY

Background

The Kenya Hospital Association, herein referred to as the proponent, and known by the name" The Nairobi Hospital" is an advanced diagnostic, treatment and referral centre with expansive investment in latest technology and medical equipment which has enabled them establish leadership in medical procedures both in Kenya and outside. The proposed project site is on LR. No. 209/4209 and 209/644/1 along Argwings Kodhek Road on coordinates -1.2956698S and 36.8034324 and measures about 23 acres.

The proponent proposes to expand it's the capacity of the hospital to make quality health care more accessible in the region. With that regard, the proponent and a multi-displinary team led by Karago and Associates Architects Limited developed a master plan to guide the long term expansion strategy "The Nairobi Hospital Master plan". The Master Plan focuses on the existing Nairobi Hospital 23 acre site and proposes a phased development within a period of 7-10 years. The Hospital has already implemented two phases; Enabling works phase and Phase 1.

The proponent commissioned the Environment and Social Impact Assessment (ESIA) process for phase 2 of the proposed development by appointing Earthcare Services Limited, a firm of Experts. ESL was tasked with the responsibility to undertake the EIA in compliance with section 58 of the Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999 and Environment Impact Assessment and Audit regulations (2003) that requires all new enterprises and projects to undergo Environment Impact Assessment (EIA).

EIA Scope and Rationale

The ESIA full study report has been prepared pursuant to the recommendations by the National Environment Management Authority in a letter dated 24th April, 2016 to undertake in depth evaluation of potential impacts and to materialize harmony with the affected and interested stakeholders. The report will further guide the proponent in environmental protection through the Environmental &Social Management and Monitoring Plan (ESMMP) prepared and lastly, assists NEMA in making an informed decision while approving the proposed project.

The scope of the report is to describe the project, document all baseline information, legal and regulatory frame work associated with the project, describe the project alternatives, assess both the positive and negative impacts and develop mitigation measures for negative impacts including designing Environmental and Social Management and Monitoring Plan (ESMMP) for the project.

Project objective

The project is geared towards expansion of the hospital in order to make quality healthcare more accessible to more people by:

1. Increasing inpatient bed capacity from 355 to 750 beds;
2. Providing adequate parking spaces for clients, visitors and staff;
3. Providing more room for family outpatient and inpatient clinics, diagnostic, therapeutic centres and specialist referral centres;
4. Providing a learning centre within the hospital; and
5. Providing quality water by setting up a water treatment plant to be used to treat borehole water and to disinfect both borehole water and Nairobi City Water and Sewerage Company.

Project description and Cost

The project's Phase 2 comprises of:

a) **Phase 2a comprising of:**
- Clinical Core - 14 storey specialized Centre of Excellence;
- Parking silo of 7 Storey with1,100 Car Parking facility;
- Temporary parking and driveways;
- Temporary Doctors Suites in Existing Building Blocks on LR. No.209/644/1
- Water purification plant; and
- Demolitions of Existing laundry /boiler /Doctors' offices.

b) **Phase 2b comprising of**
- Main Entrance Specialty Block - 9 storeys; and
- Doctors Plaza - 8 storey block

c) **Phase 2c comprising of:**
- A Centre of Excellence -14 storeys; and
- University education Block - 8 Storeys

The proposed project cost is approximately **Ksh.5, 704,850,432.00** (Five billion, seven hundred four million, eight hundred fifty thousand, and four hundred and thirty-two only).

Project Justification

With increased demand for health care in the region, there is need to make quality healthcare more accessible. While there exists an option to build new hospitals, such options are often capital intensive and take a long time to materialise. A cheaper and faster option includes expansion of the few existing hospitals such as The Nairobi Hospital, and equipping the for high quality health care services. This is to provide additional capacity with specialized referral centres and associated enabling infrastructure. More importantly, it is vital to optimally utilize existing land within such premises given that the land mass in Nairobi area is rapidly dwindling. Nairobi Hospital occupies 23 acres of land. The proposed projects will occupy about 6.5 acres which have not been utilised so far.

EIA process and report

The ESIA full study report has been prepared pursuant to section 58 of the Environmental Management And Coordination Act (EMCA), 1999 and in accordance with part II of the Environmental (Impact Assessment and Audit) Regulation, 2003, legal notice No. 101. The EIA team carried out the ESIA study using a combination of methods including ground surveys, questionnaires and interviews with stakeholders. Existing statutory requirements was also reviewed.

Policy and legal framework

Key legal framework includes the Environmental Management and Co-ordination Act, 1999 and Environment Management and Coordination (Amendment) Act, 2015 which provide a legal and institutional framework for the protection and conservation of the environment, environmental impact assessment, environmental auditing and monitoring. The regulations under it namely; EMCA (Environmental Impact Assessment and audit) regulations 2003, EMCA (Water Quality) Regulations 2006, and the EMCA (Waste management) Regulations, 2006 reiterate EMCA on the need for an EIA study. They advocate for sound environmental management practices, and propose penalties in case of failure to adhere to requirements.

Above all, the Constitution of Kenya, 2010 is the overarching framework which provides for the care and management of the environment. It asserts the right of every person to a clean and healthy environment.

International safeguards such as the World Bank Group Environmental, Health, and Safety Guidelines General EHS Guidelines, 2007 have been reviewed. They will be useful during implementation of the project in all project phases.

Anticipated Environmental and Social Impacts

Both positive and negative impacts are anticipated to be associated with the proposed project development during the ground preparation, construction phase, operation phase and decommissioning phase. The ESIA full study established the following significant Impacts:

Positive Impacts

- Improve capacity to provide specialized health care services;
- Support training and capacity building at the proposed centers of excellence;
- Optimal land use;
- Creation of employment opportunities during all project phases;
- Revenue to National and County governments amongst others; and
- Creation of market supply for building materials

A summary of potential significant environmental impacts and mitigation measures is provided in table1 below

Table 1: Summary Negative Impacts and their proposed mitigation measures

Nature of Negative environmental/ social Impacts	Mitigation Measures
Noise and Excessive Vibration	• Notify the public of any activities that may be perceived of as noisy and intrusive prior to starting. • Establish means for the public to contact the engineers-in-charge (i.e., provide telephone number, email, etc.) and methods to handle complaints. • The use of hearing protection gears by workers when exposed to noise levels above 85 dB(A). • Ensure that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level. • Use modern construction equipment, which produces the least noise; and • Use of noise shielding screens should be used and the operation of such machinery restricted to when it is actually required.
Airborne emissions	• Motorised equipment be maintained in good operating condition to reduce exhaust emissions; • Construction sites, transportation routes, diversions and materials handling sites to be water-sprayed on dry and windy days to contain dust; • Haulage trucks to be covered or the aggregates sprayed with water before loading; • The project area will be cordoned off to minimize dust migration to nearby facilities by wind; • Staff working in dust generating activities e.g. site preparation, excavation, concrete mixing, stone dressing should be provided with personal protective equipment (PPE) the use of PPE shall be enforced; and

Nature of Negative environmental/ social Impacts	Mitigation Measures
	• Avoiding open burning of solid wastes.
Soil and water pollution	• Open stockpiles of onsite construction materials should be covered with tarpaulin or similar fabric during rainy season; • Prevention of the washing away of construction materials, soil, silt or debris into any drainage system; • All machinery and equipment be regularly maintained and serviced to avoid leak oils; • Maintenance and servicing of vehicle, machinery and equipment must be carried out in a designated area (protected service bays); • Oil products and materials should be stored in site stores or in the contractor's yard; • Oil interceptors shall be installed along the drainage channels leading from such areas; • All applicable national laws, regulations and standards for the safe use, handling, storage and disposal of hazardous waste to be followed; and • Implementation of erosion and sediment control measures such as silt fences
Solid waste Management	• Selective demolition option as far as practicable; and • Practice waste minimization segregation and proper disposal according to EMCA (Waste Management) Regulations, 2006 and the Nairobi County Government by – laws.
Increased Safety and Health Risks	• Regular supervision of works to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work; • Develop evacuation procedures to handle emergency situations; • Controlled entry and exit from the premises; • Post in prominent places informative signage to inform of safety hazards and controls; • Provision of appropriate Personal Protective Equipment and enforce the use; • Hire qualified personnel in all project phases; and • Adhere to provisions of OSHA,2007 and rules under it
Traffic Snarl up along Valley road and adjoining roads	• Delivery of materials to be done during non-peak travel periods to the maximum extent practicable; • Warning signs to provide notice of road hazards and other pertinent information to motorists and the general public; • Temporary manual traffic control should be used when service vehicles are entering and leaving the site through Valley road gate along Valley road; • Adhere to Nairobi County Government Traffic By-Laws and National Traffic Laws; • Kenya Urban Roads Authority is in the process of improvements of Argwings Kodhek road, Ralph Bunche road and Woodlands road. The improvements target ease of traffic flow in the area; and • Designation of vehicle registration and checkpoint inside the premise to avert unnecessary traffic snarl up along adjacent roads • A traffic impact assessment report on the proposed expansion is in place.
Waste water management	• Pre- treatment of operation process water before flushing into the sewage system; • The treated effluent being discharged to the sewer line should conform to the limits as provided for under EMC (Water Quality) Regulations, 2006; Standards for effluent discharge into public sewers- Schedule five; • Minimize entry of solid waste into the waste water stream by collecting separately urine, faeces, blood,

Nature of Negative environmental/ social Impacts	Mitigation Measures
	and vomit from patients treated with genotoxic drugs to avoid their entry into the wastewater stream; and • Ensure that sewerage discharge pipes are not blocked or damaged.
Water Management	• Obtain WRMA permit and NEMA license for the proposed borehole; • Implement water saving devices for domestic water use e.g. dual flush toilets, automatic shut-off taps, etc.; • Cleaning methods utilised for the cleaning of vehicles, floors, containers, yards etc. must aim to minimise water use; • Practice rain water harvesting; • Conducting of regular audits of water systems to identify and rectify any possible water leakages; and Implementing a system for the proper metering and measurement of water use to enable proper performance review and management; • Regularly test the water through accredited laboratories to ensure the biological and chemical components are as per the EMCA (Water Quality) Regulations 2006.
Increased Surface/Storm Runoff Generation	• No surface water shall be directed into the sewer system to avoid overloading the sewerage system; and • Harvest rainwater from roof for non-portable uses e.g. cleaning and watering plants
Influx of people and increased demand for infrastructure	• Provide adequate social and other infrastructure to meet needs of the tenants, visitors and customers

Conclusion and Recommendation

It is quite evident that the proposed project will pioneer development and bring positive effects in the project area. However, negative impacts will also be experienced, hence the need to mitigate them in order to reduce their adverse effects to the environment. Considering these positive socio-economic and environmental benefits which will accrue as a result of the development, and the ESIA project report having found no major significant impacts to arise from the development. It is our recommendation that the project should be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental and Social Management and monitoring Plan (ESMMP) to the letter.

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ACRONYMS AND ABBREVIATIONS

CPP	Consultation and Public Participation
Db(A)	A-weighted decibels
DOSHS	Directorate of Occupational Safety and Health Services
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ERP	Emergency Response Plan
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental &Social Management and Monitoring Plan
GOK	Government of Kenya
HCW	Health Care Waste
IPC	Infection Prevention Control
KBS	Kenya Bureau of Standards
KHA	Kenya Hospital Association
KPLC	Kenya Power and Lighting Company
LR.NO	Land Registration Number
NCWSC	Nairobi City Water and Sewerage Company
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
SDG	Sustainable Development Goal
TNHCC	The Nairobi Hospital Oncology and Cancer Centre
TOR	Terms of Reference
WB EHS	World Bank Environment, Health and Safety
WBG	World Bank Group
WHO	World Health Organization
WRMA	Water Resources Management Authority

1.0 INTRODUCTION

1.1 Project Background

Access to affordable and quality healthcare is one of the most essential human requirements. As Sustainable Development Goal (SDG) 3 notes, ensuring healthy lives and promoting the well-being for all, at all ages is essential for the sustainable development of any country, Kenya included.

In Kenya, healthcare is a collegial responsibility of both the Government and the private sector. More so in the past 3 decades, Kenya has developed one of the most developed and dynamic private health care sector in Sub-Saharan Africa, thereby supplementing government efforts towards the provision of quality healthcare in a bid to transform the sector for enhanced efficiency and sustainability. It is estimated that by 2010, the private health sector owned and managed almost two-thirds of all Kenya's health facilities. Other analysts argue that by 2013, 49% of health facilities in Kenya were privately owned and managed. A study by Open Capital Advisors Limited showed that that even the poorest Kenyan consumers can and do spend on private health care, findings supported by another study which showed that 47 percent of the poorest quintile of Kenyans use a private facility when a child is sick.

The Nairobi hospital - opened in 1954 - is one of the oldest and most reliable hospitals in Nairobi, having excelled in medical expertise and services provision, and thus deservedly earning recognition throughout the East African region. The vision of The Nairobi Hospital is to be the leading healthcare institution in the country, providing world class treatment and service. It seeks to expand its reach and make quality healthcare more accessible to Kenyans and other citizens of the region, offering services that include in and outpatient services, ambulance, laboratory, nursing, pharmacy and radiology. In addition, the hospitals runs specialist clinics such as The Nairobi Hospital Oncology and Cancer Center (TNHCC), the International Patient Centre, The Physical Medical Centre, Maternity, Chest and Diabetes clinics, among others. However, the demand for the services provided by the Hospital in the recent past has begun to outstrip some of the existing physical capacity as evidenced by outpatient numbers, inpatient occupancy levels, demand for theatre availability and inadequate parking. This leads to a dire need for the Hospital to increase its capacity.

Owing to further increasing demand for specialist services and physical capacity, the Nairobi Hospital as the proponent seeks to increase its capacity from a 200 bed hospital to a 355 bed hospital. Thus, a multi-disciplinary team lead by Karago and Associates Architects Limited was appointed by the proponent (Kenya Hospital Association) to formulate a master plan to guide future development over a period of 7-10 years. The aim was to adopt a strategy that efficiently combines the existing hospital and providing for new specialist centres and increasing capacity.

It is from the Master plan, that the team appraised the site's potential, and arising out of it resulted in a series of well-defined building blocks making up the Family Healthcare facilities (inpatient – 400 beds), Family outpatient clinics, Parking silos, Diagnostic and therapeutic centres, Specialist referral centres, Site Circulation-vehicular and pedestrian access. Moving forward, the master plan sought to combine the current hospital with the proposed aspects. It was agreed that land will be better utilised if any future development went high rise, enabling more uses on a smaller foot print and creating spaces that allow for more than one function.

The master plan implementation has been phased. Phase 1 entailed the enabling works and which is ongoing with some projects under it completed. A separate Environmental Impact Assessment (EIA) was undertaken for this and

an EIA license (number 0017118) granted. Whereas the proposed developments which we are an undertaking an EIA study are under phase 2.

Due to numerous environmental challenges, resulting from unsustainable implementation of development programs and projects, the Kenyan government harmonized environmental laws under the Environmental Management and Coordination Act (EMCA), 1999 and its 2015 amendment, for the purposes of coordinating environmental management. EMCA 1999 and the 2015 amendment makes Environmental Impact Assessment (EIA) mandatory for all the projects specified in the Second Schedule of the Act. It is in pursuit of this piece of legislation that the project proponent commissioned this EIA process for the implementation of Phase 2.

1.2 Justification of the proposed project

With increasing demand for private health care in the region, there is need to make quality healthcare more accessible. While there exists an option to invest in building new hospitals, such options are often capital intensive and take a long time to materialise. A better option, especially where land already exists within current locations of existing hospitals, is the expansion of the few existing hospitals such as The Nairobi Hospital, equipping them with high quality health care services. This is to provide additional capacity with specialized referral centres and associated enabling infrastructure. Of utmost importance, it is vital to optimally utilize existing land within such premises given that the land mass in Nairobi area is rapidly dwindling. Nairobi Hospital occupies 23 acres of land. The proposed projects will occupy about 6.5 acres which have not been utilised so far.

1.3 Project Objectives

The project objectives include, to:

1. Increase inpatient bed capacity from 355 to 750 beds;
2. Provide adequate parking space for clients, visitors and hospital staff;
3. Provide more room for family outpatient and inpatient clinics, diagnostic, therapeutic centres and specialist referral centres;
4. Provide a learning centre within the hospital; and to
5. Provide safe and quality drinking water by establishing a water treatment plant to be used to treat borehole water and disinfect both borehole water and from Nairobi City Water and Sewerage Company

1.4 EIA Objectives

The EIA objectives are:

- To identify and assess all significant impacts of the proposed project on the biophysical and socio- economic environment;
- To draw an environmental management and monitoring plan with suitable mitigation measures;
- To ensure environmental factors are considered in the decision-making process; and
- To inform the public and seek their views and concerns on the proposed project.

1.5 Terms of Reference (ToRs) For the ESIA.

The Terms of Reference (ToRs) for this report are in accordance with NEMAs' Environmental (Impact Assessment and Audit) regulations, 2003 under the Environmental Management and Co-ordination Act (EMCA - 1999) these are, to:

1. Describe location/site, objectives, scope, nature of the proposed project;
2. Describe the proposed project activities during the proposed project cycle; construction, operation, decommissioning phases;

3. Establish the suitability of the proposed project in the proposed location;
4. Review and establish all relevant baseline information as will be required by NEMA (Physical, Biological and Social Cultural and Economic) and identify any information gaps;
5. Describe and analysis the policy,, legal and institutional framework including but not limited to Kenyan policies, laws, regulation and guidelines; international guidelines related to the proposed project, which have a bearing on the proposed project and will also serve as benchmarks for monitoring and evaluation, and future environmental audits;
6. Undertake an in-depth description of the proposed project and associated works together with the requirements for carrying out the works;
7. Analyse the efficacy of the designs, technology, procedures and processes to be used, in the implementation of the works;
8. Carry out Consultation and Public Participation (CPP): Identify key stakeholders and affected persons**;** hold a public meeting(as need be) and provide /collect written evidence i.e. minutes/questionnaires
9. Identify and analyse proposed project alternatives including but not limited to Project site alternatives, no project alternatives, design alternatives, material alternatives and technologies alternatives;
10. Identify, predict and carry out in-depth analysis all actual potential and significant impacts on flora, fauna, soils, air, water, the social, cultural and community settings; the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated to be generated by the proposed project, both positive and negative throughout the project cycle;
11. Recommend sufficient mitigation measures for all the potential negative impacts identified and analysed;
12. Analyse materials to be used in the construction and implementation of the project, and wastes to be generated proposing alternative/appropriate options/technologies;
13. Analyse occupational health and safety issues associated with the proposed project;
14. Develop an Environmental Management and Monitoring Plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures;
15. Prepare a comprehensive ESIA study report in accordance with EMCA 1999 and EMCA (amendment) 2015 and legislation under it;
16. Submit a draft ESIA Study report to the client for review;
17. Incorporate comments into the ESIA study report after review by client into a final ESIA study report;
18. Submit 7 hard copies and one soft copy of the ESIA study report to NEMA for the purposes of seeking a NEMA license that will approve the proposed project;
19. Submit to the client one copy of NEMA referenced ESIA study report, one soft copy of the ESIA study report and acknowledgment letter from NEMA;

1.6 Methodology of the EIA full study

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

1.6.1 Desk Review

This involved desk studies and review of all relevant available documents on the project activities and components from the client. The team also reviewed all the available and relevant national and international legal environmental documents, standards and guidelines. In addition, national and county level (planning) documents (such as Vision 2030, the Second Medium Term Plan, County Integrated Development Plan) relevant to the project area were reviewed.

1.6.2 Field Study

A major element of the study is primary research - both qualitative and quantitative among relevant stakeholders. The environmental assessment team conducted reconnaissance and field visits to the proposed project sites in Industrial Area, to obtain further data and consult the stakeholders. This established the nature of the surroundings which included existing infrastructure, economic and social set up of the local communities whose normal daily activities will be and/or likely to be affected by` the implementation of the proposed Phase 2 projects under the master plan. In addition, questionnaires were administered to all the project neighbours to seek their views on the proposed project and its impacts.

Similarly, observations entailed documentation on the physical characteristics of the area including the biological environment.

1.6.3 Data Synthesis

The data collected was used to prepare a comprehensive Environmental and Social Management and Monitoring Plan (ESMMP) encompassing the potential impacts, mitigation measures and monitoring indicators which form part of this report.

1.6.4 Reporting

The main output is an ESIA full study report comprising of executive summary, assessment methodology, project description, study area, legal and institutional framework, anticipated impacts, an Environmental and Social Management and Monitoring Plan (ESMMP), and Emergency Response Plans (ERP).

1.7 EIA Team Members

The ESIA team members are covered in table 2 below.

Table 2: Team Members

Name	Position	NEMA EIA/Audit expert registration number
Winnie Wairimu	EIA/EA Lead expert/Sociologist	7629
John Kuloba	EIA/EA Lead expert	1018
Hellen Mwende	EIA/EA Associate expert	6534

2.0 PROJECT DESCRIPTION

2.1 Project site and layout

The proposed development will be located on LR. NO 209/4209, the current premises of The Nairobi Hospital and 209/644/1 location of Cecily Mc Dowell School. The development is along Argwings Kodhek road, upper hill in the west of Nairobi Central Business District. The land is owned by the hospital. Their 23 acres of land is bounded by Argwings Kodhek road, Ralph Bunche road to the East, Ngong road to the South and Valley road to the West (see Figure 1 below).

Figure 1: Nairobi Hospital location

The total area of the proposed entire development site measures approximately 6.5 acres of the 23 acres belonging to Kenya Hospital Association. The proposed project ***site title deed is attached in Annexe 1***.

Water and electricity are available within the project site. The site is already in use as a hospital therefore the proposed developments are in line with the current use.

The proposed sites are currently in use as parking spaces save for Cecily Mc. Dowell School on LR. No 209/644/1 which was formerly used accommodation area and lecture rooms before relocation to the new Anderson Centre constructed as part of phase 1 of the master plan.

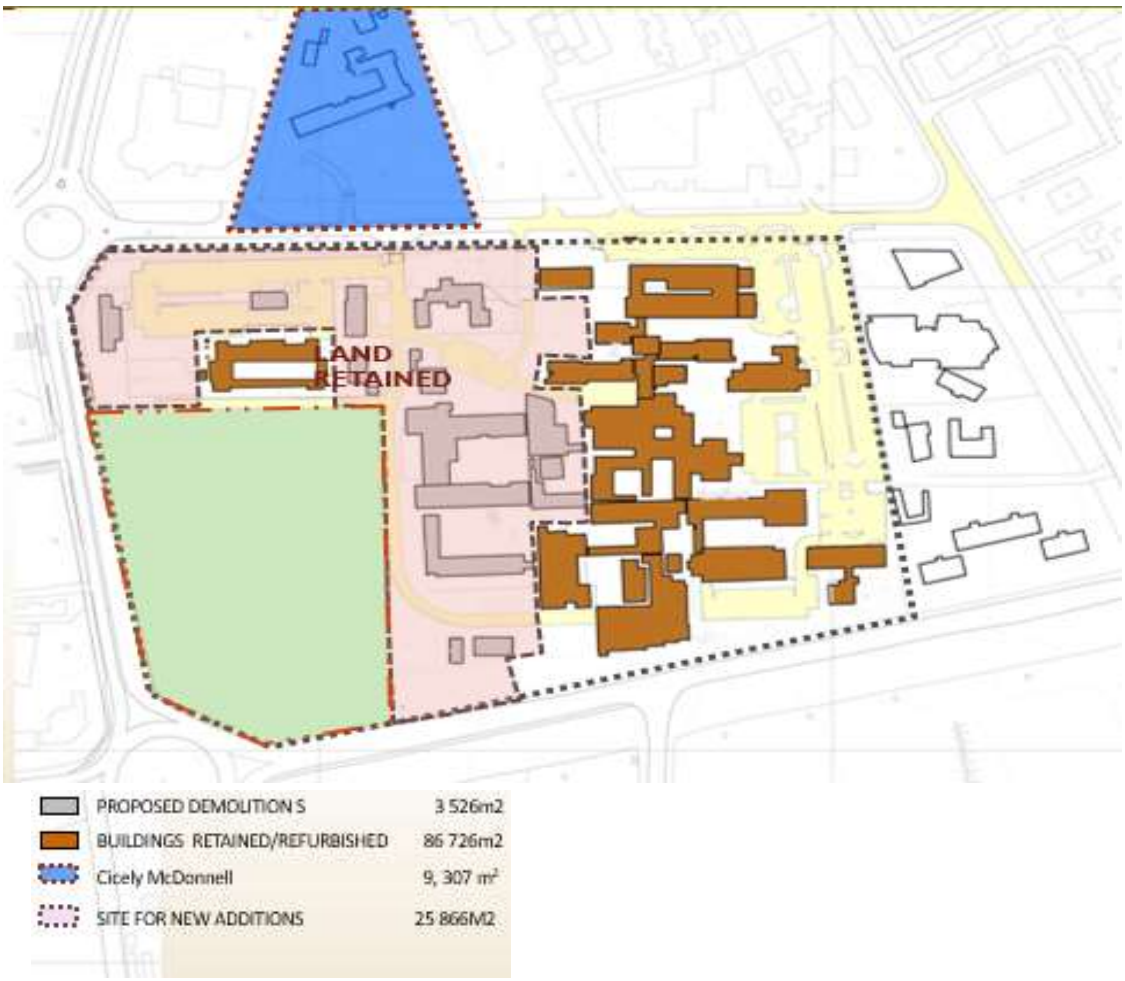

Figure 2: Site Layout. Source: Nairobi Hospital Master plan)

2.2 Project Components

As highlighted earlier, the Nairobi hospital master plan's implementation is undertaken in phases, as Figure 3 below shows. Phase one is ongoing, with some components complete. This report covers phase 2 implementation, which will be undertaken in three smaller stages and components.

Figure 3: Overall Projects Phases Source Nairobi Hospital Master plan

2.2.1 Phase 2A

Phase 2A entails:

a) Clinical Core

This will be a 14 storey building. It entail the construction of a specialized Centre for urgent clinical services, outpatients departments, diagnostic center, inpatients ward, operating theatre department, critical care center and center for nephrology, renal and urology.

b) Parking silo

This will be a 6 storey building with a ground floor and basement.

The basement will provide128 bays reserved for hospital staff only. The ground floor will provide 125 bays. The other 6 additional floors will each carry 128 bays.

Thus in total, the parking silo will entail 1,021 parking bays.

c) Temporary parking and driveways.

d) Temporary Doctors Suites in existing Building Blocks on LR. No.209/644/1

Doctors will be housed temporarily in a building formerly used for accommodation and lecture rooms at Cecily Mc Dowell nursing school. The building shall be repartitioned to meet the required space specifications for a doctor's suite. Currently, the building has a ground and upper floor with 14 rooms each floor. After new partitions, there will be 6 and 7 doctors consulting rooms on the ground and upper floor respectively.

e) Water purification plant

The size will be 8mX10m

The plant has a capacity to treat 45m^3 of water per hour.

Borehole water will be treated and disinfected in this plant whereas NCWSC water will be disinfected only.

f) Demolitions

There are old buildings which have been decommissioned to create space for new structures. These are the existing laundry, boiler and Doctors' offices.

The demolition works had already commenced at the time of the assessment. A Noise permit for demolition works had been acquired from NEMA.

2.2.2 Phase 2B

Phase 2B entails:

a) Main Entrance Specialty Block

This will comprise of 9 floors.

b) Doctors Plaza

The new Doctors Plaza will be an 8 storey block.

2.2.3 Phase 2C

Phase 2C will consist of:

a) Centre of Excellence

This will be 14 Storeys.

b) University education

This is a block of 8 Storeys.

See attached architectural designs at Annex 2

2.3 Sustainable design elements of the proposed project

Sustainable architecture or design elements refer to conscious and deliberate efforts to energy and ecological conservation in the design of the built environment. It seeks to minimize the negative environmental and health impact of buildings, which is achieved through enhancing efficiency and moderation in the use of materials, energy, and development space.

2.3.1 Landscape and ecology

The design considers the following:

1. Maximization of open space design whereby, even though the proponent has enough space to accommodate the proposed buildings spread out; the expansions have been planned by creating high rise buildings, enabling more uses on a smaller foot print and creating spaces that allow for more than one function. This design has seen the hospital retain a land bank of about five (5) acres for future development as a green open space in the meantime.
2. Structured Parking: The proposed parking silos are aimed at providing compact and structured parking, thus replacing most of the existing surface parking in order to open up land for more green space and future building construction.
3. Soft landscaping will be introduced in the few areas where surface parking is still in use. These changes are intended to reduce the heat island effect, achieve cleaner air quality through the planting of shade trees, promote efficient management of storm water runoff, and to improve visual aesthetics.

2.3.2 Green Spaces

The Nairobi Hospital Master Plan considers creation of new and quality open spaces, as well as renovation of existing spaces.

The proposed open spaces will complement and enhance the hospitals facilities, including, but not limited to:

- Well-planned outdoor spaces where visitors, staff and students can mix and interact; and
- Open areas specifically designed to serve patients and their visitors

Figure 4: Green Spaces. Source Nairobi Hospital Master Plan

2.3.3 Natural Lighting

The design of the buildings is to take advantage of natural lighting. Where light level will be below 500 lux, low energy consumption bulbs will be used to provide recommended light level.

2.4 Fire protection

The design of the proposed development incorporates firefighting equipment and exits to be installed in all the project components as per the recommendations by the Nairobi City County Development Control Section.

2.5 Waste Generation

This section describes various categories and types of wastes associated with implementation of the project.

2.5.1 Categories of Wastes

a) Construction wastes

Top soil, subsurface rock from the foundations, cement bags, sand ballast, and steel pieces remains, remains from dressing of stones, metal bar pieces and wooden posts remains

Waste water, twisted bars and steel/rods off cuts wire remains, timber and iron cuttings, nail remains, soft board remains, broken glass, remains of varnish and paints and containers tiles pieces, offcuts of conduits and other electric cables. Construction wastes are expected during construction and demolition phases.

b) Healthcare Wastes

During operation there are two broad waste categories which will be generated:

- **Non-hazardous domestic waste:** includes all the waste that has not been infected like general office waste, packaging or left over food. These represent between 75% and 90% of the total amount of healthcare generated by medical institutions.
- **Hazardous biomedical and health-care waste**
    - **Human anatomical waste**- This category of waste comprises non-infectious human body parts, organs and tissues and blood bags. Examples of such wastes**:** tissue waste, removed organs, amputated body parts, placentas, etc.
    - **Waste sharps**: Sharps are all objects and materials that are closely linked with health-care activities and pose a potential risk of injury and infection due to their puncture or cut property. For this reason, sharps are considered as one of the most hazardous waste generated in the HCF and they must be managed with the utmost care. Examples of such wastes: all types of needles, broken glassware, ampoules, scalpel blades, lancets, vials without content
    - **Pharmaceutical waste:** This category of waste comprises expired pharmaceuticals or pharmaceuticals that are unusable for other reasons.
    - **Blood and body fluids waste:** It includes wastes that are not categorized as infectious waste but are contaminated with human or animal blood, secretions and excretions. It is warranted to assume that these wastes might be contaminated with pathogens. Examples of such wastes: Dressing material, swabs, syringes without needle, infusion equipment without spike, bandages
    - **Infectious waste:** It includes: Discarded materials or equipment contaminated with blood and its derivatives, other body fluids or excreta from clinically confirmed infected patients or animals with hazardous communicable diseases. Contaminated waste from patients known to have blood-borne infections undergoing haemodialysis (e.g. dialysis equipment such as tubing and filters, disposable sheets, linen, aprons, gloves or laboratory coats contaminated with blood); Examples of such wastes: *Blood* from patients contaminated with HIV, viral hepatitis etc.
    - **Genotoxic/cytotoxic waste:** It includes liquids, gases and solids which have mutagenic or carcinogenic properties such waste typically arises from the faeces, vomit and urine of patients receiving cytostatic drugs, and from treatment with chemicals and radioactive materials. Cytotoxic drugs are commonly used in oncology and radiology departments as part of cancer treatments.

2.6 Energy

The power grid in this area has adequate capacity to serve the proposed project. The Nairobi Hospital has an existing power centre to facilitate distribution and supply of the electric power to the new phase. A Standby generator shall be used to serve key utilities. Low energy consumption bulbs, maximization of natural lighting and ventilation are all additional strategies factored in the project design to promote energy saving.

2.7 Water supply

The area relies on piped water supply from NCWSC. There are two different mains connected to the hospital piped water supply. The hospital also has an onsite borehole and onsite water storage tanks. In addition, there is a proposal to sink another borehole to augment the current water supply. At the time of assessment, the proponent was in the process of preparing a hydrogeological survey in a bid to obtain approvals from (WRMA).

2.8 Construction activities and inputs

Construction activities will entail:

2.8.1 Demolition

The proponent will demolish decommissioned buildings on site. These buildings include: the old nurses accommodation, old laundry, boiler room among others.

Demolition works will involve pulling down all the roofing, walls, structural formwork and fittings thereon. Demolition activities were ongoing at the time of assessment since formal go ahead had been given by NEMA - Nairobi County Office. A noise permit for demolition works had been issued to that effect.

2.8.2 Construction Phase Activities.

a) Pre- construction stage

This involves:

- Design and drawing of specific architectural plans for specific projects and applying for the various permits and licenses including the Nairobi City County Development Control Section approvals of the specific projects.
- Environmental and Social Impact Assessment and approvals by NEMA;
- Getting into collaborative agreements with key stakeholders including project manager, architects, quantity surveyors, engineers/contractors (structural, mechanical, electrical), material suppliers, landscapers, and financiers.

b) Establishment of Site Office Materials, storage and handling

- The contractors shall construct temporary site offices to run and manage all activities at different phases. This will also include connection of the utility services such as water, electricity which will be crucial for the construction activities.
- **Non-hazardous materials:** Materials to be stored in the site store shall include samples for review / testing by consultants and or inspectors.
- **Hazardous materials:** These shall include paints, oil, grease, vehicle fuel etc. The store for these materials shall have iron sheet walling and roof and a waterproof concrete floor to contain spills. Storage and handling of all hazardous chemicals shall be in accordance with manufacturer's instructions as outlined on the material safety data sheets.
- **Bulk construction materials:** These include: sand, ballast, stones, cement, quarry chips, steel and timber. It is recommended that the project contractors should plan for material to be delivered in small quantities in order to avoid any form of deposit, which will impede site activities, induce safety hazards and create a nuisance to the neighbourhood.

c) Site clearance and fencing.

The proposed project site shall be fenced to help control right of entry to the site for purposes of safety and security. The enclosure will also aid to reducing the amount of dust and other solid waste that have a potential of getting into and out of the site. Site clearance will include removal of top soil, vegetation and debris.

d) Excavations

This involves excavating for the various unit foundation works. The bulk of the excavated material should be carried away from site by the contractor(s) to approved dumpsite in accordance with the EMCA (Waste Management) Regulations, 2006.

e) Civil works activities

Includes:

- Masonry, concrete work and related activities
- Superstructure- include construction of support pillars and stone walling
- Structural reinforcement
- Plumbing and drainage: Plumbing and drainage will include both underground water mains and drainage systems and above ground internal water service installation. It will also include testing and inspection of the system. Installation of pipe work for water supply and distribution will be carried out within the buildings and associated facilities. In addition, pipe work will be done to connect tubing to storage tanks, hot water cylinders and sanitation fittings, connect sewage from the premises to the waste water treatment plant, and for drainage of storm water, plumbing activities will include installation of sanitary appliances, construction of manholes, metal and plastic cutting, the use of adhesives, metal grinding and wall drilling.
- Electrical works: The electrical supply shall be derived from Kenya Power Company limited. Electrical work during construction of the premises will include wiring, installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets fluorescent fittings, lamps etc. in addition, there will be other activities involving the use of electricity such as welding and metal cutting. This will also entail street lighting with installation of lighting. It will also include testing and inspection of the system.
- Roofing work
- Other internal installations: including the doors windows, stairways, ventilations tiling.
- Landscaping and recreational zones: to include beautification both natural (Trees, grasses, flowers and ornamental plants) and artificial (Cabro designs work).
- Security feature: This will include construction of gates to manage the sites access, installation of security lighting, emergency response appliance e.g. fire fighting appliances, first aid boxes etc.

2.9 Project Budget

The estimated project cost is Ksh.5, 704,850,432.00 (five billion, seven hundred four million, eight hundred fifty thousand, four hundred and thirty-two only. ***See cost breakdown at Annexe 3***.

0.1% of this amount has been paid to NEMA and a receipt obtained.

3.0 STUDY AREA

3.1 Project Location

Administratively, the site is in Kilimani ward, Dagoretti North Sub-county of Nairobi County. The hospital is specifically located in Upper Hill, West of Nairobi Central Business District.

Immediate neighbours opposite the project site along Argwings Kodhek Road is Silver Springs Hotel, University of Nairobi School of Dental Sciences and Landmark plaza. On the side of Valley Road, it neighbours Total petrol station and Daystar University-Nairobi Campus, whereas on the side of Ngong road it neighbours Kenyatta National Hospital Nairobi University Hostels and Kenya Medical Training College.

The project lies GPS Coordinates -1.2956698S and 36.8034324 site and be accessed through Argwings Kodhek road.

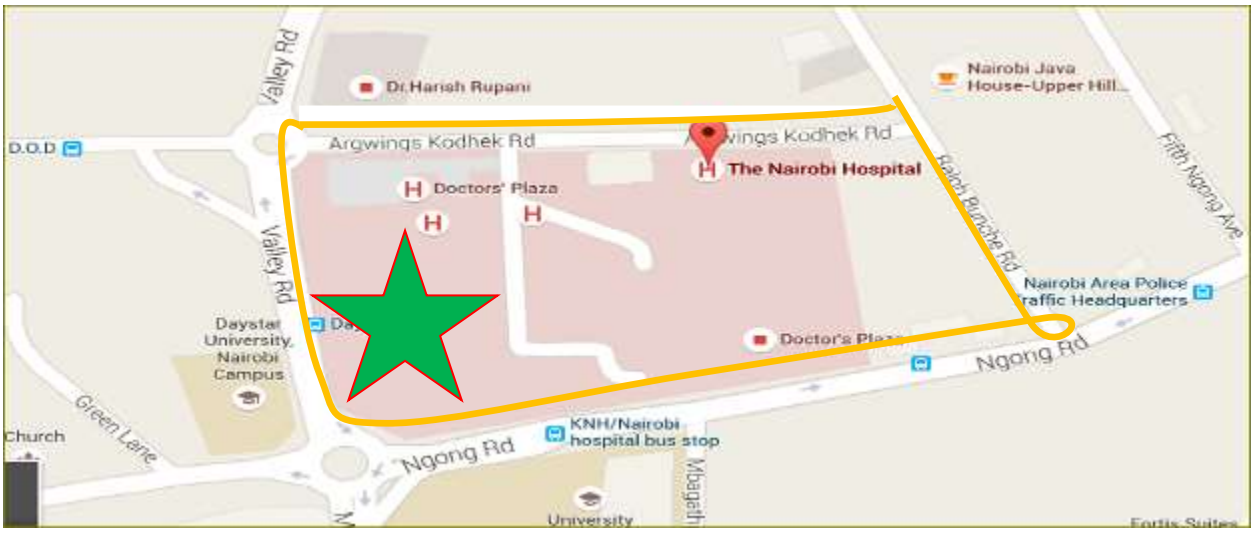

Figure 5: Project neighbours

Project site

3.2 Physical environment

- **Topography**: the land is relatively flat; it slopes gently to the east with Altitude of 1750m.
- **Hydrology and hydrogeology:** The closest river to the project site is Ngong river tributary, at a distance of about 500metres. This is the nearest surface water. There is an onsite borehole already with a production rate 4m3/hr at depth of about 200m bgl.
- **Geology:** The site is underlain by rocks of the upper, middle and lower Kirichwa tuff series which are characterised by thin grey, brown agglomerate sand welded tuffs.
- **Soils:** The soils are generally shallow, well drained and in some sections stony.

3.3 Climate

Nairobi County has a fairly cool climate resulting from its high altitude. Temperature ranges from a low of 10^0C to a high of 29^0C. It has a bi-modal rainfall pattern. The long rains season fall between March and May with a mean rainfall of 899 millimetres (mm) while the short rains season falls between October and December with a mean rainfall of 638 mm. The mean annual rainfall is 786.5 mm.

3.4 Biological environment

- **Flora**

The project site is built up in most area. There was however grass in some of the areas that are yet to be built. The compound also has mature exotic trees i.e. ornamental plants.

- **Fauna**

There are no notable animal habitats onsite.

3.5 Land uses

The proposed project site is zoned for hospital use. Neighbouring land uses are mixed use there being: Institutions, hospitals, office use, hotel, petrol station and other commercial uses.

3.6 Infrastructural facilities

- **Energy Sources:** The proposed project area gets the bulk of its energy supply from the Kenya Power and Lighting Company (KPLC). The site is already connected to the national grid. The Hospital has constructed a power centre to facilitate distribution and supply of the electric power. A standby generator shall be used to serve key utilities in times of electricity outage.

- **Water Sources:** The project area is well served with piped water from the Nairobi Water and Sewerage Company. It is currently supplied by two mains lines of piped water supply and has an onsite borehole whose yields is $4m^3$/hour, with a depth of about 200metres. The proposed development will increase water demand therefore the proponent proposes to sink an additional borehole to augment the water supply. A hydrogeological survey had been commissioned at the time of the assessment.

- **Transport and communication: -**

  Roads: The project area is well served by a good road network which is tarmacked. The site is accessed via Argwings Kodhek. Actually, the Nairobi Hospital is bounded by Argwings Kodhek road, Ralph Bunche road to the East, Ngong road to the South and Valley road to the West. There are road networks covering the area. There are also ongoing internal road links within the hospital.

  The proponent is already increasing accessibility to the hospital by creating an entry through Valley road and Ngong road. Ngong road access will be strictly for ambulance use/emergency. The proponent has received the necessary approvals from Kenya Urban Roads Authority (KURA) as part of Phase One implementation of the Master plan.

  Communication: The area is well covered by all mobile service providers (Safaricom, Airtel, Orange and YU) and Telkom Kenya (Land line).

- ***Sanitation:*** The project area has a sewer line served by the Nairobi City Water and Sewerage Company. Nairobi Hospital is already connected. New buildings shall be connected.

4.0 LEGAL, POLICY FRAMEWORK AND GUIDELINES

This section of the report considers the relevant Government of Kenya (GOK) legislation, policies and plans as well as relevant international safeguards such as the World Bank Guidelines and Safeguard Policies that also frame the approach towards environmental and social impacts of projects, and how they should be mitigated.

The relevant national and international legislations, policies and guidelines are presented in this section, and the relevant and applicable sections or subsections identified. This is done to ensure that adequate mitigation measures are put in place to deal with the negative impacts on the project affected persons, and that all project related activities are in conformity with the existing laws, and regulations, and international best practices.

4.1 Legal framework

Kenya has several provisions under the Constitution as well as various Acts that protect the environment and human health. These include:

4.1.1 The Constitution of Kenya, 2010

The Constitution of Kenya 2010 acts as the overarching legal framework for matters on environment. It recognizes the environment as part of the country's heritage, and which must be safeguarded for future generations. It provides for the right to a clean and healthy environment for every person in Article 42, obligating the state to enact legislation to protect that right as well as to establish systems of environmental impact assessment, environmental audit and monitoring of the environment in Article 69.

Article 69 imposes on the State, other obligations including, to:

- Ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Encourage public participation in the management, protection and conservation of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and
- Utilize the environment and natural resources for the benefit of the people of Kenya.

Article 69 (2) similarly poses a conservation obligation on parties such as the Kenya Hospital Association. The proponent is thus obligated to cooperate with State organs and other persons to protect and conserve the environment.

4.1.2 Environmental Management and Co-ordination Act, 1999 and Environment Management and Coordination (Amendment) Act, 2015

EMCA, 1999 and its 2015 Amendment provides a legal and institutional framework for the protection and conservation of the environment (in line with Article 42 of the constitution), as well as providing the necessary mechanism to monitor that, which include environmental impact assessment, environmental auditing and monitoring as prescribed by Article 69 of the Constitution.

In Section 58.(1) of EMCA 1999, the Act requires that "Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a proponent of a project, shall, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee". The project report should be conducted or prepared by individual experts or a firm of experts authorized by NEMA, which maintains a register of all experts authorized to carry out environmental impact assessment studies and reports as Section 58(5) stipulates. The report shall be accompanied by the prescribed fee.

The proponent therefore by engaging Earthcare Services Limited, undertakes this project report in fulfilment of the above requirement.
Section 60 of EMCA gives power to NEMA to require lead agencies to comment on an EIA Report. Considering the nature of the Project, NEMA may require relevant bodies/agencies such as the ministry of health, lands and planning under Nairobi County government to comment on the EIA Report.

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

(i) A brief description of the project;
(ii) The place where the project shall be carried out;
(iii) The place where the EIA Report may be inspected; and
(iv) A time limit not exceeding sixty (60) days for the submission of oral or written comments on the EIA Report.

Part VII on environmental audit and monitoring empowers NEMA to enter any premises for purposes of monitoring whether ongoing project activities conform to the statements made in EIA study report. The proponent is required to submit annual audit reports to NEMA, describing how far the project conforms in operation with the statements made in the EIA report.

4.1.3 EMCA Related Regulations

To provide guidelines on how to actualize EMCA and its amendment, the government has published a host of regulations. These provide specific requirements as related to water, air, waste,

Environmental (Impact Assessment and Audit) Regulations, 2003

These reiterate EMCA on the need for concluding and approval of an environmental impact assessment project report before project undertaking. The minimum requirements set for the content of such a project include:

- the nature of the project;
- the location of the project including the physical area that may be affected by the project's activities;
- the activities that shall be undertaken during the project construction, operation and decommissioning phases;
- the design of the project;
- the materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal;
- the potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project;
- an action plan for the prevention and management of possible accidents during the project cycle; a plan to ensure the health and safety of the workers and neighbouring communities;
- the economic and socio-cultural impacts to the local community and the nation in general;
- the project budget

This project report conforms to the above requirements.

EMCA (Water Quality) Regulations 2006

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. These regulations apply to water used for a variety of purposes, including water used for domestic purposes, industrial, purposes, agricultural purposes etc. They protect lakes, rivers, streams, springs, wells and other water sources whereby contravening the regulations is an offence that attracts a fine not exceeding five hundred thousand shillings.

Of immediate relevance to the proposed project is Part II Sections 4-6 as well as Part V Section 24.

- Part II Section 4 inhibits acts which directly or indirectly, immediate or subsequently cause water pollution.
- Part II section 6 criminalize discharge of water from sewage treatment works, industry or other point sources into the aquatic environment without a valid effluent discharge license.
- Part V Section 24 prohibits discharge or application of any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants, into water meant for fisheries, wildlife, recreational purposes or any other uses.

All waste water shall therefore be channelled into the sewer line to avoid ground and surface water pollution, and if a pollution incidence occurs the contractor/proponent shall notify the authority immediately. The contractor/proponent will handle hazardous substances in a manner that is not likely to cause water pollution.

EMCA (Waste Management) Regulation, 2006

The Waste Management Regulations (2006) are contained in the Kenya Gazette No. 69, Legal Notice No. 121. The Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source. The regulation requires licensing of transporters of wastes and operators of disposal site (sections 7 and 10 respectively). Of immediate relevance to proposed development for the purposes of this project study report is Part II Sections 4(1-2), 5 and 6.

- Section 4 (1) states that "No person shall dispose of any waste on a public highway, street, road, recreational area or any other public place except in a designated waste receptacle". Section 4(2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority.

- Section 5 provides method of cleaner production (so as to minimise waste generation) which includes the improvement of production processes through conserving raw materials and energy.

- Section 11 provides that any operator of a disposal site or plant shall apply the relevant provisions on waste treatment under the local government act and regulations to ensure that such waste does not present any imminent and substantial danger to the public health, the environment and natural resources.

Part VI Section 38, 39 and 40 are relevant as far as biomedical waste segregation, packaging and treatment is concerned.

- Section 38 states that any person who generates biomedical waste shall at the point of generation and at all stages thereafter segregate the waste in accordance with the categories provided under the Seventh Schedule to these Regulations.

- Section 39 states that all biomedical waste shall be securely packaged in biohazard containers which shall be labelled with the symbols set out in Part I and II of the Eighth Schedule to these Regulations.

- While section 40 states that any person who generates waste shall treat or cause to be treated all biomedical waste in the manner set out in the Ninth Schedule to these Regulations, before such biomedical waste is stored or disposed of.

The Proponent (and by extension the developer/contractor appointed by the proponent) is expected to take all responsibility to ensure that solid waste (both hazardous and non-hazardous) is properly handled, stored, transported and disposed as per the procedures provided in these regulations, as well as the various documented management plans and guidelines on health care waste management such as the National Health Care Waste Management Plan 2015-2020 and the WHO National Guidelines on Safe Disposal of Pharmaceutical Waste. The waste must be transported by licensed transporter and disposed in waste treatment facility that is approved by the authority.

EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These Regulations require that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

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

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

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

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

Part III Section 2 (1) states that any person wishing to a) operate or repair any machinery, motor vehicle, construction equipment, pump, fun, 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 provided in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence.

Noise is expected during construction phase therefore, contractor is required to implement the provisions of the ESMMP, to ensure noise reduction. In addition, he shall be required to adhere to the provisions of maximum permissible levels for construction sites.

Table 3: Second Schedule– Maximum Permissible Noise Levels for Construction Sites

Maximum permissible Noise levels for construction sites (measurements taken within the facility)		
Facility	Day	Night
i. Health facilities, educational institutions. Homes for disabled etc.	60	35
ii. Residential	60	35
iii. Areas other than those prescribed in (i) and (ii)	75	65

Time frame: Day: 6.01 a.m. – 6.00 p.m. Night: 6.01 p.m. – 6.00 a.m.

Environmental Management and Coordination (Air Quality) Regulations, 2014

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required stipulated under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits).

The contractor and proponent will be guided by provisions of this act, during construction and operation phase respectively. Air quality monitoring will be guided by the standards stipulated thereof.

4.1.4 Other Environment, health and safety, physical planning related laws

Occupational Health and Safety Act, 2007

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

Workers and occupants' safety will be given priority during both construction and operation phases of the project. It shall be the duty of the contractor and proponent respectively in this case to ensure safety and health of workers during construction phase.

The construction sites for different contractors shall be registered as workplace with the directorate of occupational safety and health services under the ministry of labour social security and services. A fire audit, risk assessment and safety and health audit has to be conducted for the sites at least once every year. All provisions of this Act relevant to the project activities shall be adhered to. All plants shall be subjected to periodical examinations as provided by law.

The Physical Planning Act of 1996 CAP 286

The Act provides for the preparation and implementation of physical development plans, and for connected purposes. In part V on control of development, Even though The Nairobi Hospital Expansion master plan has been approved, the proponent will be required to apply for development permission granted by the local authority under section 33 prior to the start of any phased developments. Failure to do so is an offence and shall be liable to a fine not exceeding one hundred thousand shillings or to an imprisonment not exceeding five years or to both. In addition the development, development shall be discontinued.

Any application for development permission for development activities which are likely to have injurious impact on the environment shall be submitted together with an environmental impact assessment report, as stipulated in section 36.

The Penal Code CAP 63

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

Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of the code. It is the responsibility of the contracted licensed waste handler to ensure that all kinds of wastes are disposed appropriately as per the legal provisions. Quite apart from fear of health hazards, the general public is very sensitive about the visual impact of anatomical waste. In no circumstances is it acceptable to dispose of anatomical waste inappropriately, such as on a landfill or together with other bio medical solid wastes.

Public Health Act Cap. 242

The Act makes provisions for securing and maintaining health. Part IX, section 115, of the Act prohibits any person or institution from causing nuisance or a condition likely to cause injury or which might be dangerous to human health. As well, section 116 of the act mandates the relevant departments of the County government of Nairobi to take proceedings at law against any person causing or responsible for the continuance of any nuisance or condition liable to be injurious or dangerous to human health.

This means that the main contractor and the proponent will be required to provide sanitary facilities and solid waste handling containers for use by the construction workers on site during construction and operation phases. A licensed solid waste transporter will also be contracted to collect all solid waste from the site for dumping at approved sites. Waste water from the proposed project developments during the operational phase will be channelled to the sewer line. The final effluent must meet the stipulated standard for disposal into the sewer line

Radiation Protection Act, Cap 243

The Radiation Protection Act, Chapter 243, aims to control the import, export, possession and use of radioactive substances and irradiating apparatus. Under this Act in section 9, a license is required to handle any radioactive substances or irradiating apparatus from the National Radiation Protection Board. Handling here includes the method of disposing of radioactive waste products, transportation of radioactive materials, storage, use and maximum working hours that employees are expected to work with radioactive materials. Under this Act also, institutions generating this category of waste shall be expected to apply for a license from the same board.

The provisions of this act will guide the proponent on the use of radiation and its control, if there will be use of any radiation apparatus.

The Standards Act Cap 496

This Act promotes the standardisation of the specification of commodities, and provides for the standardisation of commodities and codes of practice to ensure public health and safety. It establishes the Kenya Bureau of Standards (KBS) and defines its functions as related to:

- promotion of standardization in industry and commerce; and
- Making arrangements or provision of facilities for the testing and calibration of precision instruments, gauges and scientific apparatus, for the determination of their degree of accuracy by comparison with standards

approved by the Minister on the recommendation of the Council, and for the issue of certificates in regard thereto.

This means the Proponent has to ensure all materials and equipment in use during construction as well as operation of the facility adheres to the highest standards and do not pose any human health and safety risk.

4.2 National Guidelines and policies

4.2.1 Health Care Waste Management Strategic Plan 2015-2020

The National Health Care Waste Management Plan of Action is a document intended for use by health managers and programme officers across the health sector (including those in the private health sector). The purpose of developing this plan was to provide a tool that gives health managers guidance in planning, implementing and monitoring the activities of health care waste management in health facilities.

This plan describes the situation of health care waste management on the basis of a survey which was conducted in order to document the situation of waste management in Kenya. A holistic approach has been recommended to include, clear delineation of responsibilities, occupational health and safety programmes, waste minimization and segregation. This document is designed to provide viable options to address the challenges encountered in planning for health care waste management in Kenya.

4.2.2 National Infection Prevention and Control Guidelines for Health Care Services in Kenya, 2010

These guidelines were formulated by the Ministry of Medical Services and Ministry of Public Health and Sanitation to provide comprehensive and standardized information regarding the prevention and control of transmissible infections. These guidelines are intended to act as a central reference for all health care facilities and healthcare workers. Additionally, these guidelines are intended to provide administrators and Health Care Workers with the necessary information and procedures to implement Infection Prevention Control (IPC) core activities effectively within their work environment in order to protect themselves and others from the transmission of infections. They provide information on the following topics:

- The infrastructure, equipment, and supplies that are necessary to implement standard and
- additional (transmission-based) precautions for IPC
- Procedures for cleaning, disinfecting, and reprocessing reusable equipment
- Managing health care waste
- Protecting health care workers from transmissible infections
- IPC practices in special situations

4.3 Relevant international safeguards

4.3.1 WHO National Guidelines on Safe Disposal of Pharmaceutical Waste, 2001

The provisions of these guidelines describe a series of steps that need to be followed in order to dispose waste and or expired pharmaceuticals. The steps required include identification of pharmaceutical waste, sorting of pharmaceutical waste by category, filling the relevant forms to seek authority from the authorities in charge of disposing such waste. Upon obtaining all the relevant approvals, the disposal of the pharmaceutical waste shall be effected under the supervision of the local pharmaceutical waste disposal team or the Waste Management Team

The recommended methods for disposing of unwanted pharmaceuticals include:

- The use of either medium temperatures incineration at a minimum of 850°C or high temperature incineration exceeding 1200°C with two chamber incinerator for solids, semisolids and powders for controlled substances e.g. anti-neoplastics.
- Engineered sanitary landfill to be used for disposal of expired or unwanted pharmaceuticals.
- Sewer disposal for diluted liquids, syrups, intravenous fluids, small quantities of diluted disinfectants and antiseptics.

These guidelines are relevant in informing the generator of pharmaceutical wastes on safe disposal methods. The proponent shall however contract a licensed waste handler who disposes the pharmaceutical wastes in the manner provided by the Kenya legal framework and the best international practice and guidelines.

4.3.2 World Bank Group (WBG) Guidelines: Environmental, Health, and Safety Guidelines General EHS Guidelines, 2007

The Environment, Health and Safety (EHS) Guidelines contain performance levels and measures for development of industrial projects that are considered to be achievable in new facilities at reasonable costs by existing technology.

Under these guidelines, the World Bank has several guidelines many of which are applicable to various components of the proposed project namely:

- EHS Guidelines - Air Emissions and Ambient Air Quality
- EHS Guidelines - Waste Management
- EHS Guidelines - Health Care Facilities
- EHS Guidelines - Hazardous Materials Management
- EHS Guidelines - Construction and Decommissioning

WBG EHS Guidelines: Air emissions and ambient air quality

These guidelines are meant for all types of projects with "significant'' emissions, sources of air emissions, and potential for significant impacts to ambient air quality to prevent or minimize impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards. They require the application of national legislated standard, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources. Kenya currently has Environmental Management and Coordination (Air Quality) Regulations, 2014 applicable to this project.

In this project, there will be fugitive air emissions which are expected during construction and operation phases of the project. These guidelines are useful as they give control and monitoring measures.

WBG EHS Guidelines: Waste Management

The guidance applies to the management of non-hazardous and hazardous waste. This project is will be a major generator of both hazardous and non-hazardous waste. These guidelines provide categories of various wastes and a summary of treatment and disposal options. These guidelines provide good guidance on waste on-site handling, collection, treatment and disposal for both the proponent and the contractors during construction and operation phases respectively. This report greatly adopts the guidance while formulating the environmental management plan.

WBG EHS Guidelines: Noise

This section addresses impacts of noise beyond the property boundary of the facilities. These guidelines are applicable during construction phase whereby construction equipment and activities are expected to emit noise. Our local regulations, EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009 give permissible levels

during construction works. The proponent therefore has adequate guidance to ensure noise levels are maintained as low as reasonably practicable.

WBG EHS Guidelines: Occupational Safety and Health

These guidelines guide employers and supervisors in fulfilling their obligation to implement all reasonable precautions to protect the health and safety of workers. The guidelines provide guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities. The guidelines also describe how facility operation workplace design should be undertaken to prevent occupational health and safety risks and hazards. The guidelines also give examples of internationally published exposure guidelines which may be used to measure occupational health and safety performance examples, to include the Threshold Limit Value, occupational exposure guidelines and Biological Exposure Indices published by American Conference of Governmental Industrial Hygienists , the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety ,Permissible Exposure Limits published by the Occupational Safety and Health Administration of the United States, Indicative Occupational Exposure Limit Values

WBG EHS Guidelines: Construction and decommissioning

These provide additional and specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities.

4.3.3 WHO: Safety in Healthcare Laboratories, 1997

This is a manual intended for healthcare laboratories workers and those responsible for laboratory administration and planning. It provides key guidelines for health and safety in the laboratory activities. It offers a pragmatic approach to problems encountered in routine practice. These guidelines will be useful during operation phase of the project

5.0 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION

In this section, prediction and analysis of possible positive and negative impacts of construction, operation and decommissioning of the proposed project is discussed. Prediction of impacts technically characterizes the causes and effects of impacts, and their secondary and synergistic consequences to the environment and the local community. Since the proposed site is within an already established hospital, most of the social and environmental impacts associated with this project will be direct in nature and mostly result from construction activities.

The magnitude of each impact is described in terms of being:

- Significance (minor or major)
- Temporary or permanent,
- Short-term or long term,
- Specific (localized) or widespread,
- Reversible or irreversible,

The process of determining the various impacts was done through stakeholder participation, discussion with proponent's technical team, review of the facility specifications *etc.*

The prediction and analysis of the environmental impacts of the proposed project is based on:

i. Compliance with the relevant Kenyan legislation and standards on environment, health and safety and the World Bank Safeguards as well as World Bank's Environment, Health and Safety guidelines.
ii. Professional judgment.

This section discusses all the significant impacts, both positive and negative.

5.1 Construction Phase Impacts

Table 4: Summary of Construction Phase Impacts

No	Impact	Type of Impact
1.	Employment Creation	Major Positive, Short- term, Reversible, localized
2.	Income generation to material and equipment suppliers and contractors	Major Positive short-term, reversible, widespread
3.	Noise generation	Major Negative, short-term, irreversible, localized
4.	Airborne Emissions	Minor Negative, Short-term, Irreversible, localized
5.	Soil and Water Pollution	Minor negative, Short-term, Irreversible, localized
6.	Increased generation of solid waste	Major Negative, Long-term, Reversible, localized
7.	Temporary scenic blight	Minor Negative, Short-Term, Temporary, Localized
8.	Occupational Safety and Health Risks	Minor Negative, Short-term, Irreversible, Localized
9.	Traffic Snarl-up along Valley road and Adjoining roads	Major Negative, Short-term, Reversible, Localized

5.1.1 Positive Impacts

Employment Creation

One of the main positive impacts during the project's construction phase will be the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled and skilled

labour will be used in construction hence economic production. Several workers including casual labourers such as masons, carpenters, joiners, electricians and plumbers are expected to work on the site for the period from the start of the project to the end. Apart from casual labour, semi-skilled and unskilled labour, formal employees are also expected to obtain gainful employment during the period of construction. Other indirect sources of employment will also arise.

Enhancement measure

- Wherever possible, local people from the neighboring areas should be considered for job opportunities matching their level of skills. Adequate occupational safety and health principles and standards should be provided to ensure the work environment is conducive.

Income Generation to material and equipment suppliers, contractors, and others

During project implementation, the proponent will hire contractors who will in turn appoint suppliers for various goods and services, as needed. There will be civil works thus necessitating materials such as sand, ballast, stones, cement, quarry chips, steel and timber. Construction equipment such as excavators, mixers, cranes are also often hired during construction.

Formal and informal businesses will benefit from the works. Informally, those who provide services to the workers on site e.g. catering businesses will experience an upsurge in business. Similarly, businesses that provide services such as waste management will also greatly benefit from increased sales.

Enhancement measure

- Earth materials needed for construction, for example, stones and sand are obtained from quarry operations. Therefore, the contractor should be conscious of the sources of these materials, as supplies from unlicensed operations indirectly promotes environmental degradation at illegal quarry sites and can cause medium- to long-term negative impacts. In this regard the contractor shall enter into contractual agreements during procurement with all suppliers to procure construction materials from quarries legitimately licensed by the respective local government authorities.
- The contractor shall also ensure food vendors conform to hygiene standards related to food handling and are licensed by the respective local government departments to supply food materials.

5.1.2 Negative Environmental Impacts

Noise and Excessive Vibration

Noise will be one of the most undesirable consequences of the construction phase. Somewhat high noise levels are expected in the area during the construction phase. Significant levels of noise and vibrations will mainly result from use of heavy equipment including bulldozers, graders and dump trucks during site preparation and construction activities.

Disturbance or discomfort resulting from construction noise cannot be ruled out given that the proposed site is located in the vicinity of other hospital units and a learning institution. Key receptors include hospital staff, patients and their attendants, students and lecturers etc.

Though the level of discomfort caused by noise is subjective, the most commonly reported impacts of increased noise levels are interference in oral communication and disturbance in sleep or during resting time.

Mitigation Measures

- Machinery and equipment in use to be serviced regularly to ensure that they are in good condition to minimize excessive noise;
- Use piling system with lowest sound generation;
- Movable sound attenuating curtains or shrouds should be used on pile driving hammers, pumps, trucks, generators, and other noisy equipment to reduce noise when operating in close proximity to existing operational hospital components and neighbouring establishments;
- Notify the public of construction activities that may be perceived of as noisy and intrusive prior to starting construction;
- Establish means for the public to contact the engineers-in-charge (i.e., provide telephone number, email, etc.) and methods to handle complaints;
- The use of hearing protection gears by workers when exposed to noise levels above 85 dB(A;)
- Ensure that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level;
- Construction work should strictly be undertaken between permissible time periods as stipulated in the second Schedule– Maximum Permissible Noise Levels for Construction Sites of EMCA(Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
- Care when selecting equipment to avoid use of time worn or damaged machinery with high level of noise emissions that would have a negative impact in the environment.

Airborne emissions

Air pollution from dust particles is a potential environmental impact from the construction of the project. This can be caused by demolition of structures / buildings, removal of the surface layers of the soil, excavation activities, vehicle movement and materials handling. Uncovered stock piles and mortar mixing plant operations are another source of dust. The generated dust particles can pollute the atmosphere and if inhaled can lead to related health hazards for workers and the surrounding people at close proximity to the sites. Furthermore, the dust particles will cause dirt on the surrounding buildings and may cause further destruction to machines and equipment such as computers if the dust settles on the equipment.

Emissions from the vehicle exhausts such as sulphur dioxide, carbon monoxides and hydrocarbons can also affect air quality. The main component of diesel exhaust that has been identified as having an adverse effect on human health is fine particulate matter.

Mitigation measures

- Construction equipment will be maintained in good operating condition to reduce exhaust emissions;
- Construction sites, transportation routes, diversions and materials handling sites to be water-sprayed on dry and windy days, especially if near sensitive receptors, such as the area opposite Daystar University;
- Haulage trucks must be covered or the aggregates sprayed with water before loading the haulage trucks;
- All diesel fuel in use should be ultra-low sulphur diesel;
- The project area will be cordoned off to minimise dust migration to nearby facilities by wind;
- Speed controls by temporary speed bumps on diversions where necessary within the construction site
- Staff working in dust generating activities e.g. site preparation, excavation, concrete mixing, stone dressing should be provided with personal protective equipment (PPE) the use of PPE shall be enforced.
- Avoiding open burning of solid wastes;

Soil and water pollution

The proposed construction activities impact on water and soil quality may arise from spills and poor management of oil, fuel and lubricants at the contractor's campsites, vehicle maintenance garages and fuelling areas, which may lead to contamination of soil, underground water through leaching and ground water if it joins the storm drains.

During this phase, excavation works will also loosen the soil and expose it to erosive elements of air and water.

To minimize the impact on surface water and groundwater quality, the following mitigation should be adopted.

Mitigation measures

- Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on site should be covered with tarpaulin or similar fabric during rainy season;
- Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system;
- All machinery and equipment be regularly maintained and serviced to avoid leak oils;
- Maintenance and servicing of vehicle, machinery and equipment must be carried out in a designated area (protected service bays) and where oils are completely restrained from reaching the ground. Such areas should be covered to avoid storm water from carrying away oils into the soil or water systems. Waste water/ wash water from these areas should be properly disposed;
- Oil products and materials should be stored in site stores or in the contractor's yard. They should be handled appropriately to avoid spills and leak;
- Car wash areas and other places handling oil activities within the site must be well managed and the drains from these areas controlled. Oil interceptors must be installed along the drainage channels leading from such areas;
- There should be no flooding within the site at all to prevent seepage of contaminated water into underground water sources;
- All applicable national laws, regulations and standards for the safe use, handling, storage and disposal of hazardous waste to be followed;
- Storage sites for petroleum products to be secured and signs to be posted which include hazard warnings, who to contact in case of a release (spill), access restrictions and under whose authority the access is restricted will be posted;
- If stored outside, containers to be labelled and products stored in weather-proof containers on spill containment pallets and under a weather-proof tarp, the contractor/spill response coordinator will monitor periodically for leaks, and check to ensure that labels are still present and legible;
- Once the exact areas where spillage shall occur are identified, subsurface investigations of the areas to be disturbed should be conducted. The investigations should involve the collection of subsurface soil and groundwater samples for laboratory analysis;
- Areas dedicated for hazardous material storage shall provide spill containment and facilitate clean up through measures such as dedicated spill response equipment.

Increased generation of solid waste

Solid waste will be generated at the site during site preparation and construction phases. The waste may consist of timber or metal cuttings, excavated materials, paper/cement bags, empty paint and solvent containers, broken glass among others.

Some of the waste materials such as paints, cement, adhesives and cleaning solvents contain hazardous substances, while others include metal cuttings and plastic containers that are not biodegradable and can have long-

term and cumulative effects on the environment. Such are often a menace, impacting on the environment through blockage of drainage systems and negative impacts on human health.
Other wastes which will be generated by non-construction activities because of the presence of the workers at the site include food debris, contaminated water from washing, cleaning equipment, construction tools and vehicles.

Unfit disposal of construction waste or spoil could have medium or long-term environmental and public health impact. Extent of this impact will be local to areas where waste is dumped or their immediate neighborhoods.

Mitigation measures

- Waste, including excavated soil and debris should be properly disposed of by backfilling and landscaping. During decommissioning of existing buildings at the site, the contractor should adopt the method of selective demolition as far as practicable. This will enable the removal of wastes of the same category one at a time thus facilitating recycling of wastes for beneficial reuse and minimizing the burden on dumpsites.
- Construction waste should be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, the proponent/contractor should be committed to ensuring construction materials left over at the end of construction will be used in other projects rather than being disposed of. Some of the waste can be sold or donated or recycled/reused by construction companies, local community groups or institutions;
- It is recommended that during the construction phase the contractor and the proponent are expected to ensure that the waste is disposed of according to EMCA (Waste Management) Regulations, 2006 and the Nairobi County Government by – laws;
- Contracted waste handlers should be licensed to transport and dispose waste at approved dumpsites only.
- During transportation of waste, it should be covered to avert dispersion along the way.
- Hazardous waste will not be mixed with other solid waste generated and should be managed by way of incineration or land-filling.

Temporary scenic blight

Construction activities will require material, equipment and barriers at the construction sites. Since the main hospital and Doctor's plaza will remain open for access by public, presence of these activities and materials thereof will cause temporary visual blight at the construction site. Presence of construction activities will alter visual impressions accustomed to. The duration of visual impact will be short-term only lasting through the construction phase.

Mitigation Measures

- The contractor shall ensure minimal footprint of construction activities.

5.1.3 Negative Social Impact

Safety and Health Risks

Construction activities have potential to pose occupational risks, some of which could be life-threatening, for example, fatal falls if workers do not use safety harness when working at heights. Working with high voltage and hot works pose a risk of electrocution. In addition, falling debris could injure workers if personal protective equipment (PPE) are not provided or properly used. Back injury could occur if workers lift heavy objects using inappropriate body posture. Other potential hazards might be; driving equipment with improper brake system, lack of concentration while working and exposure to hazardous wastes such as paints, cement, adhesives and cleaning solvents. This impact is expected to be short term.

Mitigation Measures

- Regular drills shall constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep workers alert and ensure response mechanism in the case of incidences are improved.
- Use signage to warn staff and/ or visitors that are not involved in construction activities.
- Restrict non-essential staff from the construction sites.
- Strict instructions shall be given for drivers of heavy equipment.
- Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work
- Develop evacuation procedures to handle emergency situations.
- Truck drivers should maintain a speed limit of not more than 20Km/hr.
- Speed controls by temporary speed bumps where necessary within the construction site.
- Compliance to all international, national and local health and safety standards that may exist.
- Clear marking of work site hazards and training in recognition of hazard symbols.
- Training of all personnel in fire prevention and protection.
- Regular inspection, testing and maintenance of equipment and machinery.
- Provide full first aid kits at the construction yard.
- Use of water sprays to arrest dust.
- Containment of hazardous materials.
- Provide adequate protective gear to construction workers.
- Adhere to provisions of Occupational Safety and Health Act of 2007 and the rules formulated under it.

The guide below shall be useful:

Table 5: Basic Protective gear guide for use during construction phase

Hearing (Over 80 Decibels for 8 hours a day requires hearing protection)

- Ear Muffs: One size fits all, comfortable, less ear infection risk
- Ear Plugs: Small, lightweight, can get dirty and cause infection

Face/Eye (Working with any chemical or using any mechanical equipment)

- Face Shield: Protect face from splashing and particles
- Safety Glasses: Protection from solids (cutting, sanding, grinding)
- Safety Goggles: Protects eyes from splashing

Hand (Use correct gloves for the job)

- Chemical Gloves: (Nitrile, Latex, PVC)
- Gloves for other use: special gloves for cutting prevent burning, abrasions/ blisters

Body

- Overalls: protect against dust, vapors and splashes

Foot Protection

- If electrical hazard present ensure boots offer protection

- Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists
- Water/Chemical Resistant Boots: Use in a spill situation
- Non-slip boots for working on wet/slippery floors.

Traffic snarl up along Valley road and adjoining roads

Automobile traffic will be impacted during the construction. The heavy commercial vehicles to the construction site through valley road gate will cause traffic snarl up along Valley road, which will have a widespread impact to all roads adjoining Valley road.

Proposed Mitigation Measures

- Construction activities that might substantially disrupt traffic e.g. delivery of materials should not be performed during peak travel periods to the maximum extent practicable.
- Warning signs should be used as appropriate to provide notice of road hazards and other pertinent information to motorists and the general public.
- Signage and barricades should be used as part of the typical construction traffic controls.
- Temporary manual traffic control should be used when construction occurs at the site entrance (Gate C) along Valley road.
- It is recommended that to further mitigate the negative impacts due to traffic, the contractor and the proponent are expected to adhere to Nairobi County Government Traffic By-Laws and Kenya Traffic Laws.

5.2 Operation Phase Impacts

Table 6: Operation phase Impacts

No.	Significant Impact	Type
1.	Provision of high quality and reliable health care services	Major Positive, Long-term, Widespread
2.	Increase in revenue to the central and county government	Major Positive, Long Term, Widespread
3.	Optimal Land use	Major Positive, Long-term, Localized
4.	Economic investment hence increases in wealth	Major Positive, Long Term
5.	Employment opportunities	Major Positive, Long-term, Widespread
6.	Improper management of waste	Major Negative, Long-term, Localized
7.	Increased Risk of Occupational Health and Safety Incidences	Major Negative, Long term, Localized
8.	Increased Effluent Waste and Surface/Storm Runoff Generation	Minor Negative, long-term, widespread
9.	Increased Water Demand	Minor Negative, long-term, widespread
10.	Increased traffic volume	Major Negative, Long-term, Localized
11.	Gender Inequality	Minor Negative, Short term, Localized

5.2.1 Positive Impacts

Provision of high quality and reliable health care services

The upcoming development will positively impact the health of Kenyans and the East African region through ease of access to specialized services for almost all health conditions. It will help to enhance access to diagnostic services for specialized services and improve capacity to serve many people.

Enhancement measures:

- Appropriate staffing with technical and medical personnel adequately trained in use of newly installed medical equipment.

Employment opportunities

Operation of the specialist medical centers will create additional long-term technical and non-technical job opportunities for medical professionals and other non-medical professionals.

Enhancement measure

- Wherever possible, local qualified people will be considered for job opportunities. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive.

Optimal Land use

This will be beneficial as the proponent pays land rates for the entire parcel of land whereas it's yet to be utilized to full potential.

Increase in revenue to the central and county government

Through payment of relevant taxes, rates and fees to the government and the local authority, the project will contribute towards the national and local revenue earnings.

Economic investment hence increases in wealth

The proponent will receive returns on his investments.

5.2.2 Negative Environment Impacts

Increased solid and liquid waste

As a result of the operation of the proposed medical facility components, it is expected that some waste is generated. Mainly there will be domestic waste and hazardous waste. Since medical procedures involve certain medical examinations, and the use of different sorts of chemicals or reagents, therefore it can be concluded that different types of hazardous wastes shall be generated.

Therefore, improper waste sanitization and disposal can cause public health risks due to environmental pollution: impaired air quality, storm water contamination of water courses and infections when people or children rummage through improperly dumped infectious waste or raw waste stockpiles that can be life-threatening.

Mitigation Measures

- Liquid Waste Management and Disposal
  - ✓ Human Excrement from ablution blocks: The hospital is served by the sewer line, managed by the NCWSC. There is an existing connection n the facility. This means that all sanitation facilities egg toilets have a direct connection to the sewer line.
- Process Wastewater

Contaminated wastewater may result from discharges from medical wards and operating theaters (e.g. body fluids and excreta, anatomical waste), laboratories (e.g. microbiological cultures, stocks of infectious agents), pharmaceutical and chemical stores; cleaning activities (e.g. waste storage rooms), and x-ray development facilities. Wastewater may also result from treatment disposal technologies and techniques, including autoclaving, microwave irradiation, chemical disinfection, and incineration (e.g. treatment of flue gas using wet scrubbers which may contain suspended solids, mercury, other heavy metals, chlorides, and sulfates).

Handling of bio-medical waste water is generally an overwhelming challenge for the health sector in general. However, within the broader theme of bio-medical waste, liquid bio-medical waste is particularly difficult to handle if there is no suitable facility engineering design, training and management guide.

Contaminated waste water poses infection threat to medical staff due to its susceptibility to spilling and splashing. If left untreated it poses a health hazard to everybody. Therefore the proponent, shall:

- Provide a separate holding tank and drainage system leading to the sewer line for process waste water.

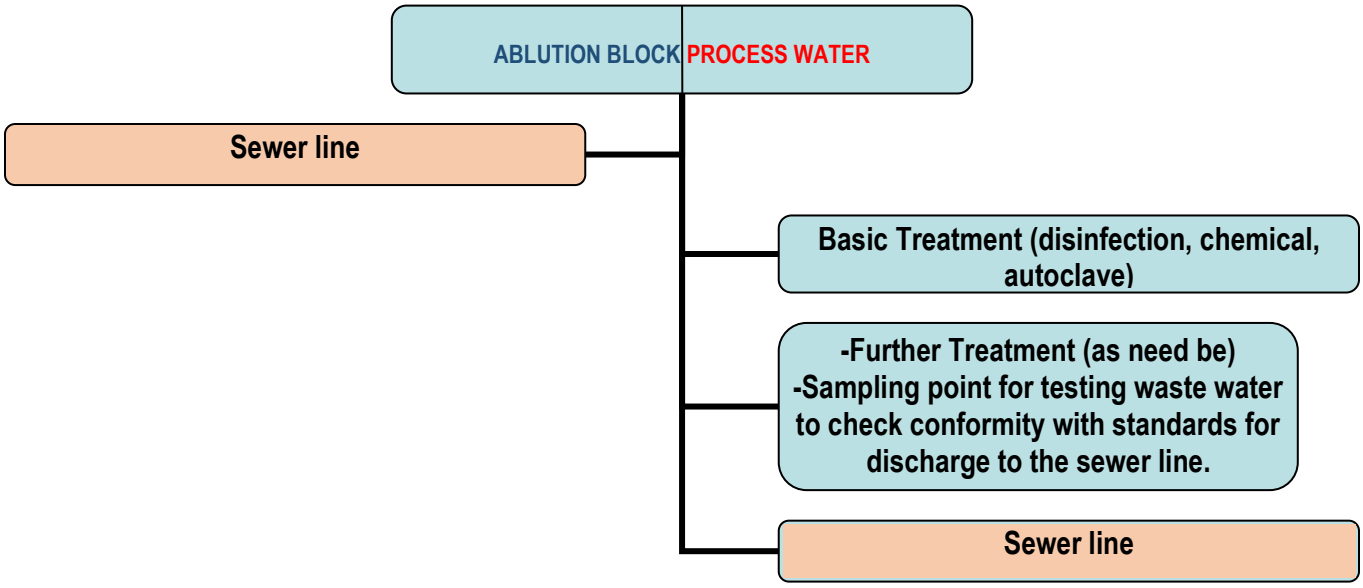

Figure 6: Recommended Healthcare facility waste water management System

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- Process waste water must be treated with chemical disinfectants, neutralised and then flushed into the sewage system.
- Chemical waste should first be neutralised with appropriate reagents and then flushed into the sewer system.
- The treated effluent being discharged to the sewer line should conform to the limits as provided for under Environmental Management Co-ordination (Water Quality) Regulations, 2006; Standards for effluent discharge into public sewers-Schedule five (**See attached at Annex 4**).
- Sewage from health care facilities should never be used for agricultural, aqua-cultural, drinking water, or recreational purposes.
- Additionally, waste segregation measures shall be employed to minimize entry of solid waste into the waste water stream, including procedures and mechanisms for separate collection of urine, faeces, blood, and vomit from patients treated with genotoxic drugs to avoid their entry into the wastewater stream.
- Regular monitoring of pre-treated contaminated process water shall be done quarterly by subjective a sample to accredited laboratory analysis and such results shared with the sewer line providers (NCWSC).

Health Care Solid Waste

The main categories of Biomedical Waste as per EMCA (Waste Management) Regulations, 2006, include:

- ✓ **Infections Waste**: Waste suspected to contain pathogens e.g. laboratory cultures, waste from isolation wards, tissues (swabs), materials, or equipment that have been in contact with tubing's, catheters, IGS toxins, live or attenuated vaccines, soiled plaster costs and other materials contaminated with blood infected patients, excreta.
- ✓ **Pathological waste**: Human and animal tissues or fluids. e.g. body parts blood and other body fluids, fetuses, animal carcasses.
- ✓ **Sharps:** Sharp waste. e.g. needles, infusion sets, scalpels, knives, blades, broken glass that may cause puncture and cuts. This includes both used and unused sharps.
- ✓ **Pharmaceutical waste**: Waste containing pharmaceutical e.g. pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals (bottles, boxes).
- ✓ **Genotoxic Waste**: Waste containing substances with genotoxic properties. e.g. waste containing cytostatic drug (often used in cancer therapy), genotoxic chemicals.
- ✓ **Chemical waste:** Waste containing chemical substances e.g. laboratory reagents; film developer, disinfectants,(disinfectants) that are expired or no longer needed solvents
- ✓ **Waste with high content of heavy metals**: Batteries, broken thermometers, blood-pressures gauges, etc.
- ✓ **Pressurized containers**: Gas cylinders, gas cartridges, aerosol cans.
- ✓ **Radioactive waste**: Waste containing radioactive substances e.g. unused liquids from radiotherapy or laboratory research, contaminated glassware, packages, or absorbent paper, urine and excreta from patients treated or tested with unsealed radionuclides, sealed sources.
- ✓ **General solid waste**: Waste generated from offices, kitchens, packaging material from stores.
- ✓ **Microorganisms**: Any biological entity, cellular or non-cellular capable of replication or of transferring genetic material

These constitute a grave risk, if they are not properly treated or disposed, or are allowed to mix with other municipal waste. See below Health Care Solid Waste Management and Disposal guidelines Adopted from World Bank Group, Environmental, Health, and Safety Guidelines for Health Facilities, 2007.

Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal.

Table 7: Health Care Solid Waste Management and Disposal plan

Component	Actions/recommendations
Waste Minimization, Reuse, and Recycling	Consider practices and procedures to minimize waste generation without sacrificing patient hygiene and safety considerations Use of efficient stock management practices and monitoring E.g. • For chemical and pharmaceutical stocks; Small / frequent orders for products that spoil quickly and strict monitoring of expiry dates • Complete use of old product before new stock is used • Maximization of safe equipment reuse practices, including: Reuse of equipment following sterilization and disinfection (e.g. sharps containers)
Waste Segregation	Waste should be identified and segregated at the point of generation. • ***Non-hazardous waste***, such as paper and cardboard, glass, aluminium and plastic, should be collected separately and recycled. Food waste should be segregated for composting. • ***Infectious and / or hazardous wastes*** should be identified and segregated according to its category using a color-coded system ***See Annex 5- EMCA (Waste management) Regulations, 2006 eight schedule: Colour code for Biomedical adopted from the WHO colour code.*** • Other segregation considerations include the following:· Avoid mixing general health care waste with hazardous health care waste to reduce disposal costs; Segregate waste containing mercury for special disposal. Aerosol cans and other gas containers should be segregated to avoid disposal via incineration and related explosion hazard; Segregate health care products containing Polyvinyl chloride to avoid disposal via incineration and subsequent harmful air emissions
On-site Handling, Collection, Transport and Storage	• Seal and replace waste bags and containers when they are approximately three quarters full. Full bags and containers should be replaced immediately; • Identify and label waste bags and containers properly prior to removal; • Transport waste to storage areas on designated trolleys / carts, which should be cleaned and disinfected regularly; Waste storage areas should be located within the facility and sized to the quantities of waste generated, with the following design considerations: ✓ Hard, impermeable floor with drainage, and designed for cleaning / disinfection with available water supply ; ✓ Secured by locks with restricted access; ✓ Designed for access and regular cleaning by authorized cleaning staff and vehicles; ✓ Protected from sun, and inaccessible to animals / rodents; ✓ Equipped with appropriate lighting and ventilation; ✓ Segregated from food supplies and preparation areas; ✓ Equipped with supplies of protective clothing, and spare bags / containers • Store mercury separately in sealed and impermeable containers in a secure location;

	• Store cytotoxic waste separately from other waste in a secure location; • Store radioactive waste in containers to limit dispersion, and secure behind lead shields.
Transport to external facilities for treatment	The proponent does not have an onsite waste treatment facility at the moment, therefore during operation, solid waste segregation, collection, and storage shall be the responsibility of the hospital, whereas waste transportation to treatment facility and treatment shall be the work of a contracted biomedical waste handler. Therefore the proponent shall: • Appoint a waste handler who is licensed by NEMA and permitted by the local government to handle, transport and treat biomedical wastes at approved treatment sites using recommended treatment procedures given by the legal framework and respective government agencies. • The contractor shall transport waste destined for off-site treatment facilities according to the guidelines for transport of hazardous wastes / biomedical wastes in EMCA(Waste Management) Regulations, 2006; • Packaging for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste; • Packaging containers for sharps should be puncture-proof; • Waste should be labeled appropriately, noting the substance class, packaging symbol (e.g. infectious waste, radioactive waste), waste category, mass / volume, place of origin within hospital, and final destination; • Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.

Increased Water demand

Increased water usage is anticipated after the expansion of the Nairobi Hospital and it's therefore important to adopt water conservation best practices. The Hospital is connected to piped water by NCWSC and is supplemented by a borehole on site whose yield is 4m^3/hr. The proponent has proposed to sink another borehole on site to meet the expected water demand without straining the NCWSC water supply.

Mitigation measures

- Borehole water abstractions should be as per the Water Resources Management Authority (WRMA) permit;
- Conduct an EIA for the proposed borehole and acquire a WRMA permit to abstract;
- Conduct a hydrogeological survey for the proposed borehole;
- Implement water saving devices for domestic water use e.g. dual flush toilets, automatic shut-off taps, etc.;
- Portable water should not be used for irrigation purposes and landscapes must be designed to absorb rainwater run-off rather than having to carry it off-site in storm water drains;
- Indigenous vegetation to be used for landscaping to minimise watering requirements;
- Cleaning methods utilised for the cleaning of vehicles, floors, containers, yards etc. must aim to minimise water use;
- Maintenance of proper pressure within fire water systems to limit water use;
- Practice rain water harvesting;
- Conducting of regular audits of water systems to identify and rectify any possible water leakages; and
- Implementing a system for the proper metering and measurement of water use to enable proper performance review and management.

Increased Effluent Waste and Surface/Storm Runoff Generation

The proposed project will definitely lead to increased demand for sewage disposal. The surface runoff from the building roof and paved ground will lead to increased volume and velocity of storm water or run-off flowing from the proposed project site. This will in turn lead to increased amounts of storm water entering the drainage system potentially resulting to additional flow.

Mitigation measures

- Ensure that sewerage discharge pipes are not blocked or damaged since this can lead to release of the effluent, resulting in land and water contamination. This will be done through continuous and regular inspection and maintenance of the system. Blockage or damages will be fixed expeditiously;
- Ensure that no surface wastewater is directed into the sewer system to avoid overloading the sewerage system;
- Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated;
- Harvest rainwater from roof for non-portable uses e.g. cleaning and watering plants.

5.2.3 Negative Social Impacts

Increased Risk to Safety and Health

Health service workers engaged in different areas or activities are exposed to different types of risk from infection. Risk areas include but are not limited to operating theatres, acute medicine, Intensive care units, emergency and ambulance services, dialysis, laboratories, especially where there is exposure to blood and blood products, potentially, hazardous devices and instruments, or handling of aggressive patients and pathology.

- Medical related activities posing risk of infection include:
  - ✓ Clinical examination of humans;

- ✓ Taking specimens of blood, body fluids or other clinical specimens e. g. smears;
- ✓ Surgical procedures;
- ✓ Dressing/treatment of wounds;
- ✓ Care of patients incapable of looking after themselves;
- ✓ Cleaning, disinfection, repair and maintenance work as well as transport and disposal;
- ✓ Working in contaminated areas and/or with contaminated equipment and objects;
- ✓ Contact with areas where infection is suspected, e.g. contaminated materials in laundries (soiled laundry zone);
- ✓ Handling/moving of cleaning or disinfection apparatus; and
- ✓ Handling pointed or sharp instruments or equipment.

Other sources of OSH risk are

- Inadequate lighting and ventilation in workplaces
- Lack of safe access
- Lack of adequate training (or neglect of safety precautions/ guidelines) in use of equipment and handling of samples
- Misuse of equipment and materials for functions they are not designed
- Lack of safety signage in specific areas
- Electrical hazard
- Eye hazards such as splashes
- Fire hazards
- Physical hazards
- Radiation hazards

Mitigation Measures

The primary measure to mitigate occupational safety and health impacts is prevention which entails identification of risks and instituting pro-active measures to avoid them. This can be achieved by following national guidelines and international best practices. For unavoidable risks, rated Personal Protective Equipment (PPE) should be provided to workers.

- Conduct basic occupational training programs and specialty courses as needed, to ensure that workers are oriented to the specific hazards of individual work assignments. Training should generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards;
- Conduct statutory assessments i.e. risk assessments, fire safety audits and Occupational Safety and Health audits annually through licensed advisors and auditors by the Directorate of Occupational Safety and Health Services (DOSHS);
- Conduct statutory trainings under OSHA, 2007 and Rules under it. i.e. basic first aid, fire safety training, and Occupational Safety and Health committee training through approved training institutions by the Directorate of Occupational Safety and Health Services (DOSHS);
- Provide adequate lighting in all workrooms;
- Passageways for pedestrians and vehicles within and outside buildings should be provided segregated and for easy, safe, and appropriate access;
- Provision of fire fighting equipment in strategic and well labelled sites;
- Conduct drills at reasonable intervals to test the disaster preparedness level at the workplace, using the results to improve the response mechanisms;

- Eye-wash stations and/or emergency showers should be provided close to all workstations where immediate flushing with water is the recommended first-aid response;
- Materials handling operations should follow the instructions of use given by the manufacturer(Material Safety Data Sheets);
- Train workers on safe work practices, and provide appropriate PPE;
- Enforcement of use of PPE such as gloves, dustcoats, nose masks in all workrooms requiring use;
- Restriction of access to high risk areas to authorised personnel only i.e. radiation rooms, surgery rooms.
- Operate places with radiations in accordance with in accordance with the radiation protection Act Cap 243 Radiation Protection (Standards) Regulations, 1986 and recognized international safety standards and guidelines on radiation;
- Orient all staff on safe work practices and guidelines, and ensure these are adhered to;
- Train staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences;
- Regular safety drills to constantly follow on various possible incidences;
- Use signage to warn staff and/ or visitors of dangerous places. The signage must be visible and placed strategically; and
- Develop evacuation procedures to handle emergency situations.

Increased traffic volume

During operation, the hospital will experience an upsurge in clients and visitors. This means an increased number of vehicles accessing the facility. This in turn may have undesirable effect on traffic flow within the area.

Mitigation Measures

- Kenya Urban Roads Authority is in the process of improvement of Argwings Kodhek road, Ralph Bunche road and Woodlands road. The improvements target ease of traffic flow.
- Designate vehicle registration and checkpoints inside the premise to avert unnecessary traffic snarl up along adjacent roads caused by vehicles waiting to access the hospital.
- Parking strategy: there will be 2 parking silos in the project that will provide for 1500 cars as per requirement of the 750 bed
- There will be an internal ring road that shall address the movement and accessibility within the hospital compass
- The master plan is in tandem with greater Ngong road expansion plan. Argwings Khodek Road is also to be expanded and made one way. Liaison has been made with KURA and the Nairobi City County on the same.
- There are dedicated exits and entries; one gate on Ngong road with a dedicated emergency route/ lane dedicated for emergencies and ambulance access only; two gates on Argwings khodek road for access both exit and entry by visitors, patients and general hospital users and one gate on Valley road dedicated for service vehicles and hospital users

  (***See attached traffic impact assessment report at annex 10***)

Influx of people and increased demand for infrastructure

Enhancement measure

Provide adequate social and other infrastructure to meet needs of the tenants, visitors and customers.

Gender Inequality

There is need to promote gender equality in all aspects of economic development. Women's roles in road

infrastructure construction are mainly confined to supply of unskilled labour and vending of foodstuffs to the construction workers.

Mitigation measures

- Give equal employment opportunities for both men and women, and encourage women to apply for jobs that match their skills, including those they can be good at;
- Expose and involve women in construction and maintenance activities in an effort to transfer required skills to them;
- Involve women groups in activities that they are good at such as tree planting and bush clearing;
- Enhance gender sensitivity and reduce gender discrimination in construction activities.

5.3 Decommissioning Phase Impacts

Table 8: Summary of Decommissioning Impacts

Impact	Type
Site Rehabilitation	Major Positive, localized Long term
Employment	Major positive, Short-Term, Localized
Livelihoods and Economic Loss	Major negative, short term, widespread
Solid waste generation	Major Negative, short term, localized
Excessive Noise and Vibration pollution	Major Negative, short-term Localized
Occupational /Public Health and Safety Hazards	Minor negative, short term ,localized
Displacement of patients, tenants &workers	Minor negative, short term ,localized
Dust and exhaust emissions	Minor negative, short term ,localized, irreversible
Accidental spills	Minor negative, short term ,localized, irreversible

5.3.1 Positive Impacts

Rehabilitation-Site restoration

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to near to its' original state or better.

Employment Opportunities

For decommissioning to take place properly and in good time, several people will be involved. As a result, several employment opportunities will be created for the demolition.

5.3.2 Negative Impacts

Livelihoods and Economic Loss

The establishment and operation of the project will bring about a lot of positive changes to the lives of the people around it and also to the surrounding economy. Decommissioning of the project will thus mean a reverse of some of these gains, whereby many people will lose their source of livelihood from jobs to business ventures hence directly leading to a decline of the area economic stature and a drawback to the economy at large.

Mitigation measures

- Businesses associated with the development should be notified of intention of decommissioning in good time, so as to adjust;
- Redeployment of the affected workers where feasible.

Solid Waste Generation

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

Mitigation measures

- All solid waste to be collected at a central location, and be stored temporarily until removal by a licensed solid waste handler;
- Contractor should adopt the method of selective demolition as far as practicable to enable the removal of wastes of the same category one at a time thus facilitating recycling of wastes for beneficial reuse and minimizing the burden on dumpsites;
- No dumping within the surrounding area is to be permitted. Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal. General waste is to be collected either by the County Government or via a licensed waste disposal contractor. The frequency of collections should be such that waste containment receptacles do not overflow;
- Waste generated at the site should be categorised by the contractor and disposed of in a suitable manner into different waste streams (including general and hazardous waste). Wherever possible recycling should be carried out;
- Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites;
- All rubble must be removed from the site to an approved disposal site as approved by the Engineer. Burying rubble on the site is prohibited;
- Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties during or after the decommissioning period of the project. These have to be disposed of at dumping site as approved by the County government.

Excessive Noise and Vibration pollution

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

Mitigation measures

- Construction machinery shall be kept in good condition e.g. greasing to reduce noise generation from friction of movable parts;
- Generators and heavy duty equipment be insulated or placed in enclosures to minimize noise levels during demolition works;
- Obtain special permit from NEMA to undertake demolitions works;
- Ensure that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level.

Dust and Exhaust Emissions

Large quantities of dust will be generated during demolition works. Particulate matter pollution is likely to occur during demolition and transportation of the construction waste. There is possibility of suspended and settle-able particles affecting the site workers and the surrounding neighbours' health. Exhaust emissions are likely to be generated

during the demolition period by the various machinery and equipment to be used as well as motor vehicles used for the exercise.

Proposed mitigation measures

- Strict enforcement of onsite speed controls as well as limiting unnecessary traffic within the demolition site;
- Demolition site will be fenced off using tarpaulins;
- Friable loads of construction debris being transported must be watered to reduce dust;
- All areas disturbed during closure of the site that are not required for a specific activity must be re-vegetated;
- Diesel exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimised by regular checks and servicing of vehicles. Any construction vehicle found to be emitting excessive smoke should be withdrawn from the operations and accorded the necessary mechanical attention before it can continue.

Occupational /Public Health and Safety Hazards

Demolition works will inevitably expose workers and the public to occupational health and public safety risks. In particular, working with heavy equipment, handling and use of tools provoke certain risks. The construction workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, falling objects, and injuries from hand tools and other equipment.

Proposed mitigation measures

- Decommissioning works workers be issued with appropriate PPEs and the decommissioning contractor to enforce their use;
- Restrict onlookers/scavengers from site;
- Develop safe work procedures for demolition works.

Displacement of patients, tenants &workers

The decommissioning of the project will result into displacement of the tenants, patients, students, workers and persons making business out the health care facility.

Mitigation measures

- Adequate notices on the impending decommissioning should be given to Interested and Affected Parties (IAP) to enable them make alternative arrangements.

Accidental spills

These may originate from equipment's and removal of installations containing hazardous substances e.g. Laundry chemical storage containers, fuel storage containers

Mitigation Measures

- Ensure employees are aware of the procedure for dealing with spills and leaks;
- The source of the spill should be isolated and the spillage contained using sand berms, sandbags, sawdust and/or absorbent material;
- The area should be cordoned off and secured;
- Notify the relevant authorities of any spills that occur;
- Ensure that the necessary materials and equipment for dealing with the spills and leaks is available on site at all times.

6.0 PUBLIC CONSULTATION AND PARTICIPATION

6.1 Introduction

Public consultation and participation is a fundamental principle of the EIA process. It largely contributes to the successful design, implementation, operation and management of proposed projects.
This process involved consultations with relevant project-affected persons/groups/businesses and concerned government authorities, documenting their concerns, assessing potential impacts, and exploring avoidance and mitigation options. The methodology entailed mainly public consultation exercises by use of open ended questionnaires and interviews with the concerned stakeholders.

The aim of this exercise was to disseminate information to interested and affected parties (stakeholders), solicit their views and consult on sensitive issues, in order to add value to the project design considerations. Public consultation has also been highly useful for gathering environmental and socio economic data, understanding likely impacts, determining institutions and individual preferences, selecting project alternatives and designing viable and sustainable mitigation measures.

6.2 Objectives of Public Consultation and Participation

a) To provide clear and accurate information about the project to the affected communities;
b) To obtain the main concerns and perceptions of the population and their representatives regarding the proposed project;
c) To obtain opinions and suggestions directly from the affected communities on their preferred mitigation measures;
d) To identify local leaders through whom further dialogue can be continued in subsequent stages of the project;
e) To improve project design and, thereby, minimize conflicts and delays in implementation;
f) To reduce conflict through the early identification of contentious issues;
g) To provide an opportunity for the public to influence project design in a positive manner thereby creating a sense of ownership of the project; and
h) To reduce problems of institutional co-ordination.

6.3 Public Consultation Methodology

Public participation was mainly achieved through direct interviews, observations and questionnaire administration. The following is a discussion of the public consultation methodology used by the EIA team.

6.3.1 Direct Interviews

Direct interviews were used to get responses from the project architects whose comments were sought through engaging them in discussions about the proposed project designs, waste management, alternative technology and sites, among other related issues.

The project site neighbours were also interviewed to enlighten the experts about the area and any existing issues that should be put into consideration.

6.3.2 Questionnaire administration

Open ended questionnaires were prepared and administered individually to collect the views of various stakeholders. Respondents were selected among the neighbours of the proposed project. These comprised of

institutions and individuals working in the neighbouring businesses and facilities (See table9 below). ***Sample consultation questionnaires administered are attached at Annex 6.***

The questionnaires were used to capture the interviewees' views in terms of the positive and negative impacts that anticipated from the project as well as possible mitigation measures. They were also requested to provide information about the area, focusing on aspects such as sensitive ecosystems, provision of various infrastructure facilities and socioeconomic impacts of the project in the area, amongst other issues.

The recommendations from the public consultations have been incorporated in the mitigation measures proposed in this report.

Table 9: List of Institutions and persons consulted

Name of persons and institutions	Location	Date given questionnaire	Received By	Contact
Daystar University-Vice Chancellors Office	Valley Road-Opposite Project Site	09/05/2016	Mangera Dennis	0726323736
Kenya Medical Training College -Director KMTC	Ngong road-Opposite project Site	09/05/2016	Nassir Aura	0720469667
Silver Springs Hotel-Manager	Argwings Kodhek Road	09/05/2016	Penninah Mbaizi	
University of Nairobi-Dental School	Argwings Kodhek Road-Next to Mc Dowell Nursing School	09/05/2016	Everlyn Arisa	024247298
LandMark Plaza	Argwings Kodhek Road-Opposite Nairobi Hospital	09/05/2016	CareTaker for property managers	0728865714
JFC Centre	Argwings Kodhek	09/05/2016	HR	0723381711
Kenyatta National Hospital	Ngong Road	09/05/2016	Received for CEO	0720904310
Gospel of God Church	Opposite project site Along Valley road	10/05/2016	-	
Raj Pharmacy	Along Argwings Kodhek road	10/05/2016	Evans Ouma Corazon Aquino George Akoth	0711607295
Goodlife Pharmacy	Valley road, at Total petrol station opposite project site	10/05/2016	Everlyne	-

6.4 Summary of major negative concerns raised by respondents

6.4.1 Excess Noise and Vibrations

The respondents anticipate excess noise and vibration levels in the area as a result of construction works. The proponent should ensure that the mitigation measures proposed to minimize noise impacts are undertaken.

6.4.2 Dust Generation

Concerns were raised over the possibility of generation of large amounts of dust within the project site and surrounding areas as a result of transportation of building materials and road diversions. The contractor should ensure that dust levels on roads and open surfaces are minimized through sprinkling water. Additional mitigation measures presented in the Environmental and Social Management and Monitoring Plan (ESMMP) should be fully implemented to minimize the impact of dust generation.

6.4.3 Traffic Snarl-ups

Traffic snarl-ups may emerge as a result of the project construction activities especially access roads due to diversion of traffic and delivery of construction materials especially during traffic peak hours. The contractor should develop a traffic management plan to deal with this issue.

6.5 Summary of major positive contributions

a) Increased access to healthcare services to a large number of Kenyans
b) Improvement of the peoples' welfare both locally and international
c) There will be an income boost to the Nairobi Hospital as more patients will be seeking health services
d) There will be decongestion of vehicles within the hospital as a result of proposed construction of parking silos
e) The project upon completion will enhance quality and provision of medical/healthcare services as more patients will be attended to
f) Development of the facility will contribute to creation of job opportunities for construction workers

7.0 PROJECT ALTERNATIVES

7.1 Introduction

This section examines alternatives to construction of the proposed development in terms of the site, products, materials, technology and waste management. Also, impacts of each alternative are identified, discussed and compared with those of this development proposal. With such information, reviewers have basis for decision making.

7.2 No Project Alternative

This option implies that the existing situation prevails i.e. no construction/development activity to take place. This option is mostly applicable in situations where the proposed project area is in ecologically sensitive areas. The land in which the proposed project is to be constructed is in a stable environment and therefore will not be affected by this development activity. From a socio-economic perspective the "no action" alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realized and the resources in the area would continue to be underutilized since the land lies idle. The 'No Project Option' is the least preferred from the socio-economic and partly environmental perspective, since if the project is not undertaken:

- The economic benefits, especially during construction e.g. provision of jobs for skilled and non-skilled workers will not be realized.
- There will be inadequate capacity in the hospital to handle increasing number of clients. Particularly will be the lack of specialist clinics.
- There will be no generation of income by the developer and the Government.
- No employment opportunities will be created for Kenyans during operation phase.
- Discouragement for investors to produce this level of standard and affordable developments.

From the analysis above, it becomes apparent that the 'No Project Alternative' is not the appropriate alternative for the proponent, Kenyans, and the Government of Kenya. In case the proposed development fails to be implemented, positive impacts associated with the proposed development will not accrue to the stakeholders, the development consultants, contractors and suppliers of materials.

However, from an environmental conservation perspective, this alternative will be beneficial in the sense that any potential negative impacts associated with the project will be avoided.

It is our recommendation that the "No Action Alternative" should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the environmental management plan developed in this report.
In addition, adopting the no action alternative will mean that the existing shortfall of quality health care and more specialized referral centres needs will continue to prevail unabated. This is not viable since the proponent already has land which is not into maximum use and will remain not in use, while there remains capacity to utilise such in the provision of much needed services. If the project is stopped then the aim to have additional capacity with specialized referral centres and associated enabling infrastructure will not be possible. In this respect, the "No project alternative" is deemed inappropriate.

7.3 Proposed Project alternative

The area for the proposed project will see some changes to its environmental attributes (physical). Drainage patterns, groundwater, surface water and soil quality may also be affected. From a Socio-Economic perspective, the proposed

development will contribute significantly to partial national, regional and local income generation. In addition, numerous jobs will be created by the development either directly or indirectly.

7.4 Alternatives to Site

Currently, there is no other alternative site available to the proponent for the proposed development. The proponent owns 23 acres of which 6.5 acres are currently not put into maximum use.

The current location is ideal as it is in close proximity to other related structures within the Nairobi Hospital compound. It also blends well with the current use. Looking for alternative land to accommodate a project of this character and the completion of official transactions on it may take a long period. It would also create a disconnect between the hospital services as often particular departments such as general practitioners as well as referral hospitals should ideally be connected by location – if not creating massive inconvenience for sick clients. In addition, it is not a guarantee that such land would be available at a prime location as this one.

The project design and planning before the stage of implementation would call for costs already incurred in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent. Assuming the project will be given a positive response after (say relocation) by the relevant Authorities including NEMA, it (project) would have been delayed for a long period before implementation.

The other consequence of this is that it would discourage both foreign and local investors especially in the building sector. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option.

7.5 Construction Materials and Technology

There is a wide range of construction and furnishing materials which can be sourced locally and internationally. In this construction, certified raw materials/equipment and modern technology will be used. The concrete walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Kenya Bureau of Standards (KBS) requirements. Alternative sources of energy such as electrical appliances that save energy will be given first priority.

8.0 ENVIRONMENTAL& SOCIAL IMPACTS MANAGEMENT AND MONITORING PLAN (ESMMP)

8.1 Significance of ESMMP

The aim of the Environmental and Social Management and Monitoring plan (ESMMP) is to provide a road map to the proponent on how to address identified significant impacts (environmental and social), requirements for labour specialization (responsibility), frequency of monitoring activities, and estimated cost implications.

Table 10 below provides the ESMMP of the outlined environmental and social impacts.

8.2 ESMMP for Construction and Operation Phase

Table 10: Environmental and Social Management and Monitoring Plan

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
1	**Construction Phase**				
A)	**Environmental Impacts**				
(i)	**Noise and Excessive Vibration**	• Use modern equipment, which produces the least noise. Any unavoidably noisy equipment should be identified and located in an area where it has least impact; • Noise shielding screens should be used and the operation of such machinery restricted to when required; • For mobile equipment, fit efficient silencers and enclose engine compartments in plant vehicles; • For fixed plants, isolate source by enclosure in acoustic structure; • Raise barriers around noisy equipment; • Notify the public of construction activities that may be perceived as noisy and intrusive prior to starting construction; • Establish means for the public to contact the engineers-in-charge (i.e., provide telephone number, email, etc.) and provide methods to handle complaints; • The use of hearing protection gears by workers when exposed to noise levels above 85 dB(A); • Ensure that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level; • Care should be exercised when selecting equipment to avoid use of time worn or damaged machinery with high level of noise emissions that	Contractor / Engineer in charge	-Noise Survey Audit -Permissible noise levels during constructions -No noise Complains	1,000,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		would have a negative impact in the environment.			
(ii)	**Airborne emissions**	• Construction equipment will be maintained in good operating condition to reduce exhaust emissions; • Construction sites, transportation routes, diversions and materials handling sites to be water-sprayed on dry and windy days, especially if near sensitive receptors, such as the area opposite Daystar University; • Haulage trucks must be covered or the aggregates sprayed with water before loading the haulage trucks; • All diesel fuel in use should be ultra-low sulphur diesel; • The project area will be cordoned off to minimize dust migration to nearby facilities by wind; • Speed controls by temporary speed bumps on diversions where necessary within the construction site; • Staff working in dust generating activities e.g. site preparation, excavation, concrete mixing, stone dressing should be provided with personal protective equipment (PPE) the use of PPE shall be enforced; • Avoiding open burning of solid wastes.	Contractor & Engineer in charge	Regular Air quality monitoring -No material spillage on the roads -Number of complaints from neighbours	1,000,000.00
(iii)	**Soil and water pollution**	• Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainy season; • Prevent the washing away of construction materials, soil, silt or debris into any drainage system; • All machinery and equipment should be regularly maintained and serviced to avoid leak oils; • Maintenance and servicing of vehicle, machinery and equipment must be carried out in a designated area (protected service bays) and where oil is completely restrained from reaching the ground;	Contractor & Engineer in charge	Annual Environmental audits Quarterly water quality analysis	900,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		• Oil products and materials should be stored in site stores or in the contractor's yard; • Car wash areas and other places handling oil related activities within the site must be well managed, and the drains from these areas controlled. Oil interceptors must be installed along the drainage channels leading from such areas; • There should be no flooding within the site at all to prevent seepage of contaminated water into underground water sources; • All applicable national laws, regulations and standards for the safe use, handling, storage and disposal of hazardous waste to be followed; • Storage sites for petroleum products should be secured and signage posted, which include hazard warnings, who to contact in case of a release (spill), access restrictions and under whose authority the access is restricted will be posted; • Label products and store in weather-proof containers on spill containment pallets and under a weather-proof tarp. The contractor/spill response coordinator will monitor periodically for leaks, and check to ensure that labels are still present and legible; • Implementation of erosion and sediment control measures such as silt fences; and • Cover open stockpiles of construction materials with tarpaulin or similar fabric during rainstorms.		Soil test analysis in spill occurrence areas	
(iv)	Increased solid waste	• Adopt the method of selective demolition (for existing buildings) to the extent possible; • Waste (such as metal scrap or wood waste) that can be reused/ recycled may be donated to local people; • Segregate waste onsite;	Contractor & Engineer in charge	-Contract licensed waste handlers -Waste disposal at designated	1,500,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		• Ensure that waste is disposed of according to EMCA (Waste Management) Regulations, 2006 and the Nairobi County Government by – laws; • Contracted waste handlers should be licensed to transport and dispose waste at approved dumpsites only • During transportation of waste, it should be covered to avert dispersion along the way; and • Hazardous waste will not be mixed with other solid waste generated and should be managed by way of incineration or land-filling.		sites -No reports of illegal waste dumping	
B)	**Social Impacts**				
(v)	Temporary scenic blight	• Ensure minimal footprint of construction activities. • Project workers and activities restricted to construction site.	Contractor & Engineer in charge	Fenced construction site	-
(vi)	Increased Safety and Health Risks	• Regular drills shall be undertaken to test the response of the involved stakeholders; • Use signage to warn staff and/ or visitors that are not involved in construction activities of areas that pose risk; • Strict instructions shall be given for drivers of heavy equipment; • Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work; • Develop evacuation procedures to handle emergency situations; • Truck drivers should maintain a speed limit of not more than 20Km/hr.; • Speed controls by temporary speed bumps where necessary shall be undertaken within the construction site;	Contractor & Engineer in charge	-OSH training records -Presence of informative signage -Safety and Health audits -Provision of first aid boxes, fire fighting equipment -Maintenance of equipment and plants logs	5,000,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		• Compliance to all international, national and local health and safety standards that may exist; • Clear marking of work site hazards and training in recognition of hazard symbols; • Training of all personnel in fire prevention and protection; • Regular inspection, testing and maintenance of equipment and machinery; • Provide full first aid kits at the construction yard; • Use of water sprays to arrest dust; • Containment of hazardous materials; and • Provide adequate protective gear to construction workers		-Material safety data sheets	
(vii)	**Traffic snarl up along Valley road and adjoining roads**	• Construction activities that might substantially disrupt traffic e.g. delivery of materials should not be performed during peak travel periods to the maximum extent practicable; • Warning signs should be used as appropriate to provide notice of road hazards and other pertinent information to motorists and the general public; • Signage and barricades should be used as part of the typical construction traffic controls; • Temporary manual traffic control should be used when construction vehicles are entering and leaving the site through valley road gate along Valley road; and • Adherence to Nairobi County Government Traffic By-Laws and Kenya Traffic Laws.	Contractor, Engineer in charge	Well flowing traffic Traffic marshal site access by large vehicles likely to obstruct traffic -Logs of traffic offences	1,000,000
(viii)	**Gender Inequality**	• Equal employment opportunities will be provided for both men and women; • Expose and involve women in road construction and maintenance activities in an effort to transfer required skills to them; • Involve women groups in activities that they are good at such as	Contractor,	Gender equality	-

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		landscaping; and • Enhance gender sensitivity and reduce gender discrimination in construction activities.			
2.	**Operation Phase**				
A)	**Environmental Impacts**				
(i)	**Waste water generation**	• Process waste water must be treated with chemical disinfectants, neutralized and then flushed into the sewage system; • Chemical waste should first be neutralized with appropriate reagents and then flushed into the sewer system; • The treated effluent being discharged to the sewer line should conform to the limits as provided for under Environmental Management Co-ordination (Water Quality) Regulations, 2006; Standards for effluent discharge into public sewers-Schedule five; • Sewage from health care facilities should never be used for agricultural, aqua-cultural, drinking water, or recreational purposes; • Minimize entry of solid waste into the waste water stream by collecting separately urine, faeces, blood, and vomit from patients treated with genotoxic drugs to avoid their entry into the wastewater stream; and • Ensure that sewerage discharge pipes are not blocked or damaged.	Kenya Hospital Association	Efficient waste water management Quarterly effluent test results -Waste segregation initiatives	-
(ii)	**Solid Waste Generation**	• Consider waste minimization practices; • Segregate waste at the point of generation; • All waste to be handled and managed in accordance with the EMCA (Waste management) Regulations of 2006; • All waste containers to be labelled/ color-coded depending on waste category; • Waste storage areas to have the following design consideration: Hard, impermeable floor with drainage, and designed for cleaning / disinfection with	Contracted waste handler Kenya Hospital Association	Efficient solid waste management Contractual documents with waste handler	2,000,000

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		available water supply, secured by locks with restricted access, designed for access and regular cleaning by authorized cleaning staff and vehicle, protected from sun, and inaccessible to animals / rodents, equipped with appropriate lighting and ventilation, segregated from food supplies and preparation areas; equipped with supplies of protective clothing, and spare bags / containers; • Appoint a waste handler who is licensed by NEMA and permitted by the local government to handle, transport and treat biomedical wastes at approved treatment sites using recommended treatment procedures laid down by the legal framework and respective government agencies; • Waste destined for off-site treatment facilities should be transported according to the guidelines for transport of hazardous wastes / biomedical wastes in EMCA(Waste Management) Regulations, 2006; • Package for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste; • Packaging containers for sharps should be puncture-proof; • Waste should be labeled appropriately, noting the substance class, packaging symbol (e.g. infectious waste, radioactive waste), waste category, mass / volume, place of origin within hospital, and final destination; and • Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.		Logs of solid waste quantities Waste management training programs	
(iii)	**Increased Water demand**	• Water abstractions should be as per the Water Resources Management Authority (WRMA) permit; • Conduct an EIA for the proposed borehole and acquire a WRMA permit to abstract water; • Conduct a hydrogeological survey for the proposed borehole;	Kenya Hospital Association	Borehole EIA license Water meter readings	500,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		• Monitor water use; • Implement water saving devices for domestic water use e.g. dual flush toilets, automatic shut-off taps, etc.; • Portable water should not be used for irrigation purposes and landscapes must be designed to absorb rainwater run-off rather than having to carry it off-site in storm water drains; • Indigenous vegetation to be used for landscaping to minimise watering requirements; • Cleaning methods utilised for the cleaning of vehicles, floors, containers, yards etc. must aim to minimise water use; • Maintenance of proper pressure within fire water systems to limit water use; • Practice rain water harvesting; • Conducting of regular audits of water systems to identify and rectify any possible water leakages; and • Implementing a system for the proper metering and measurement of water use to enable proper performance review and management		Practice of water saving techniques	
(iv)	**Increased Surface/Storm Runoff Generation**	• Ensure that no surface wastewater is directed into the sewer system to avoid overloading the sewerage system; • Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated; and • Harvest rainwater from roof for non-portable uses e.g. cleaning and watering plants	Kenya Hospital Association	Efficient storm water management Unobstructed drainage Incidences of flooding	800,000.00
B)	**Socio-economic Impacts**				
(i)	**Increased Risk of**	• Conduct basic occupational training programs and specialty courses as	Kenya	Annual	3,500,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
	Occupational Health and Safety Incidences	needed; • Ensure that workers are oriented to the specific hazards of individual work assignments. Training should generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards; • Conduct statutory assessments i.e. risk assessments, fire safety audits and Occupational Safety and Health audits annually through licensed advisors and auditors by the directorate of occupational safety and health services (DOSHS); • Conduct statutory trainings under OSHA, 2007 and Rules under it. i.e. basic first aid, fire safety training, and Occupational Safety and Health committee training through approved training institutions by the Directorate of Occupational Safety and Health Services (DOSHS); • Provide adequate lighting in all workrooms; • Passageways for pedestrians and vehicles within and outside buildings should be segregated and should provide for easy, safe, and appropriate access; • Provision of fire fighting equipment in strategic and well labelled sites; • Conduct drills at reasonable intervals to test the disaster preparedness level at the workplace, using the results to improve the response mechanisms; • Provide eye-wash stations and/or emergency showers should be provided close to all workstations where immediate flushing with water is the recommended first-aid response; • Materials handling operations should follow the instructions of use given by the manufacturer-The "Material Safety Data Sheets)"; • Train workers on safe work practices, and provide appropriate PPE; • Enforcement of use of PPE such as gloves, dustcoats, nose masks in all workrooms requiring use;	Hospital Association	Occupational Safety and Health audits -Annual Fire risk assessments Biosafety, occupational safety and health trainings -Safety and health committees -Incidents monitoring -No Injuries or cross- infections -Safety and health management and monitoring plan	

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		• Restriction of access to high risk areas to authorised personnel only i.e. radiation rooms, surgery rooms; • Operate places with radiations in accordance with in accordance with the radiation protection Act Cap 243 Radiation Protection (Standards) Regulations, 1986 and recognized international safety standards and guidelines on radiation; • Orient all staff on safe work practices and guidelines and ensure that they adhere to them; • Training staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences; • Regular safety drills to constantly follow on various possible incidences; • Use signage to warn staff and/ or visitors of dangerous places. The signage must be visible and placed strategically; • Set up (fire) assembly points; and • Develop evacuation procedures to handle emergency situations.			
(ii)	**Increased Traffic Volume**	• Kenya Urban Roads Authority is in the process of improvement of Argwings Kodhek road, Ralph Bunche road and Woodlands road. The improvements target ease of traffic flow. • Designate vehicle registration and checkpoint inside the premise to avert unnecessary traffic snarl up along adjacent roads caused by vehicles waiting to access the hospital. • There will be 2 parking silos in the project that will provide for 1500 cars as per requirement of the 750 bed • There will be an internal ring road that shall address the movement and accessibility within the hospital compass • The master plan is in tandem with greater Ngong road expansion plan.	Kenya Hospital Association	Well flowing Traffic	500,000.00

No.	Nature of Negative environmental/social Impacts	Mitigation Measures	Responsibility	Performance Indicators Monitoring activity	Cost per year (KES)
		Argwings Khodek Road is also to be expanded and made one way. Liaison has been made with KURA and the Nairobi City County on the same. • There are dedicated exits and entries; one gate on Ngong road with a dedicated emergency route/ lane dedicated for emergencies and ambulance access only; two gates on Argwings khodek road for access both exit and entry by visitors, patients and general hospital users and one gate on Valley road dedicated for service vehicles and hospital users			
(iii)	**Influx of people and increased demand for infrastructure**	• Provide adequate social and other infrastructure to meet needs of the tenants, visitors and customers;	Kenya Hospital Association	No overcrowding Adequate amenities for all	3,000,000

8.3 ESMMP for Decommissioning phase

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
1.	**Generation of solid waste**	• All solid waste to be collected at a central location and stored temporarily until removal by a licensed solid waste handler; • Adopt the method of selective demolition as far as practicable to enable the removal of wastes of the same category one at a time thus facilitating recycling of wastes for beneficial reuse and minimizing the burden on dumpsites; • No dumping within the surrounding area is to be permitted. Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal; • General waste is to be collected either by the County Government or via a licensed waste disposal contractor. The frequency of collections should be such that waste	Contractor, Project Engineer in charge	1,000,000.00

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
		containment receptacles do not overflow; • Waste generated at the site should be categorised by the contractor and disposed of in a suitable manner into different waste streams (including general and hazardous waste). Wherever possible recycling should be carried out; • Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites; • All rubble must be removed from the site to an approved disposal site as approved by the Engineer. Burying rubble on the site is prohibited; • Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties during or after the decommissioning period of the project are disposed of at dumping site as approved by the County government.		
2.	**Waste Water generation**	• Ensure that any wastewater generated during decommissioning is exhausted by a licensed exhauster; • Storm water should be managed in such a way that no overland flow is possible onto the site from any adjacent area; • Storm water drains in the area should be routinely inspected for solid waste to avoid blockages and associated problems.	Contractor, Engineer in charge, Kenya Hospital Association	1,000,000.00
3.	**Soil erosion**	• Re-vegetate the site with grass and trees of indigenous tree species.	Contractor	800,000.00
4.	**Air pollution**	• Active earth work areas, stockpiles and loads of soil being transported must be watered to reduce dust; • All areas disturbed during closure of the site that are not required for a specific activity must be re-vegetated; • Diesel exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimised by regular checks and servicing of vehicles; and • Any demolition machine found to be emitting excessive smoke should be withdrawn from operation and given mechanical attention.	Contractor	500,000.00

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
5.	**Noise and excess vibrations**	• Use modern equipment, which produces the least noise. Any unavoidably noisy equipment should be identified and located in an area where it has least impact; • Use noise shielding screens. The operation of such machinery restricted to when it is actually required; • For mobile equipment fit efficient silencers and enclose engine compartments in plant vehicles; • For fixed plants, isolate source by enclosure in acoustic structure; • Carefully select fixed plant site for remoteness from sensitive areas; and • Raise barriers around noisy equipment.	Contractor	500,000.00
6.	**Accidental leaks and spillages**	• Ensure employees are aware of the procedure for dealing with spills and leaks; • The source of the spill should be isolated and the spillage contained using sand berms, sandbags, sawdust and/or absorbent material; • Accident areas should be cordoned off and secured; • Notify the relevant authorities of any spills that occur; • Ensure that the necessary materials and equipment for dealing with the spills and leaks are available on site at all times.	Contractor	800,000.00
B	**Social Impacts**			
7.	**Safety and Health risks**	• Decommissioning works workers be issued with appropriate PPEs and the decommissioning contractor to enforce their use; • Restrict onlookers/scavengers from site; • Develop safe work procedures for demolition works; and • Follow mitigations measures given for construction phase in 8.2, table 10-Social Impacts B(vi)	Contractor	-
8.	**Displacement of patients/tenants and workers**	• Adequate notice on the impending decommissioning should be given to Interested and Affected Parties (IAP) to enable them make arrangement for alternative arrangements.	Kenya Hospital Association	300,000.00

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
9.	**Livelihood and economic Loss**	• Businesses associated with the development should be notified of intention of decommissioning in good time to relevant adjustment; and • Redeployment of the affected workers where feasible should be undertaken.	Kenya Hospital Association	

9:0 EMERGENCY RESPONSE PLAN (ERP)

Emergencies and disasters can occur any time without warning. More so construction sites are prone to such, thus it is important for the proponent to prepare for them, and be in a good position to act to minimize panic and confusion when they occur. Emergency Response Plans (ERP) will have to be instituted throughout the project cycle.

The following elements of a conventional emergency response plan are recommended as summarized in table 11 below.

Table 11: Emergency Response Plan

Emergency Response Plan Components	Actions/Requirements	Responsibility
Potential Emergency	• Identification of all potential emergencies associated with the proposed project at the project site, Include, Fires, Accidents & Incidents, Security, and Terrorism ***etc***.	• Contractor during construction and Decommissioning phases. • Proponent during operation phase.
Emergency Operations Coordinator (EOC)	• Designate a primary and secondary contact person.	• Contractor during construction and decommissioning phases. • Proponent during operation phase.
Emergency contact Numbers	• Give & display contact for Fire station, Ambulance, police, Hospitals, and others	• Contractor during construction and decommissioning phases • Proponent during operation phase.
Installation of emergency equipment	• Fire sensors, • Fire alarms, • Fire extinguishers, • Fire hose, • Panic alarm button, • Provision and enforcement of use of PPEs, • Emergency Communication equipment, such as Phone & alarm bells	• Contractor during construction and decommissioning phases. • Proponent during operation phase.
Training for emergency response	• Regular training for emergency response	• Contractor during construction and decommissioning phases. • Proponent ,during operation phase
Trained in the use of emergency equipment	• Employees training in the use of emergency equipment	• Contractor during construction and decommissioning phases. • Proponent during operation phase.
First Aid	• Provision of first aid kits, • First aid management training	• Contractor during construction and decommissioning phases. • Proponent during operation phase.
Signage	• Fire sensors • Signage, action poster, alarm bell/ panic button	• Contractor during construction and decommissioning phases. • Proponent during operation phase.

Emergency Response Plan Components	Actions/Requirements	Responsibility
Procedure for rescue and evacuation	• Evacuation plan, • Warning system, • Assembly site • Shelter in place plan.	• Contractor during construction and decommissioning phases. • Proponent during operation phase.
Occupants emergency contact information	• List of all occupants, residents & their activities	• Proponent during operation phase.
ERP review	• Annual ERP review	• Contractor during construction and decommissioning phases. • Proponent during operation phase.

10.0 CONCLUSION AND RECOMENDATION

The success of the proposed development project will impact positively in regard to provision of quality health care which is accessible and accommodative to all citizens of Kenya and beyond.

From the socioeconomic angle, the project comes with positive impacts. These include job creation, improvement of the local economy and as a source of revenue to the local and national governments. However, at this stage of project development, there are a number of areas that need attention to ensure that the project will meet acceptable environmental performance and acceptability. Most of the issues have been discussed in the earlier sections of this report and should be followed up and implemented.

A comprehensive Environmental and Social Management and Monitoring Plan (ESMMP) has been formulated and sufficient mitigation measures for the predicted negative environmental and social impacts during construction, operation, and decommissioning phases have been proposed therein. It is in this regard that the Lead experts recommend that the project proponent fully implement the ESMMP and that NEMA considers issuing the proponent with an EIA License under condition that the outlined mitigation measures shall be strictly adhered to.

Recommendations

- Adhere to the formulated Environmental and Social Management and Monitoring Plan (ESMMP) to mitigate the predicted negative environmental and social impacts during construction, operation, and decommissioning phases.
- Conduct statutory Environmental audits, Fire risk assessments and Occupational Safety and Health audits annually through licensed advisors during construction and operations phase.
- Before drilling the additional borehole, a hydrogeological survey and an Environmental Impact Assessment should be conducted and approval from WRMA sought.
- Waste, including excavated soil and debris should be properly disposed of by backfilling and landscaping. During decommissioning of existing buildings, the contractor should adopt the method of selective demolition as far as practicable. This will enable the demolition and removal of wastes of the same category one at a time thus facilitate recycling of wastes for beneficial reuse, and minimizing the burden on dumpsites.

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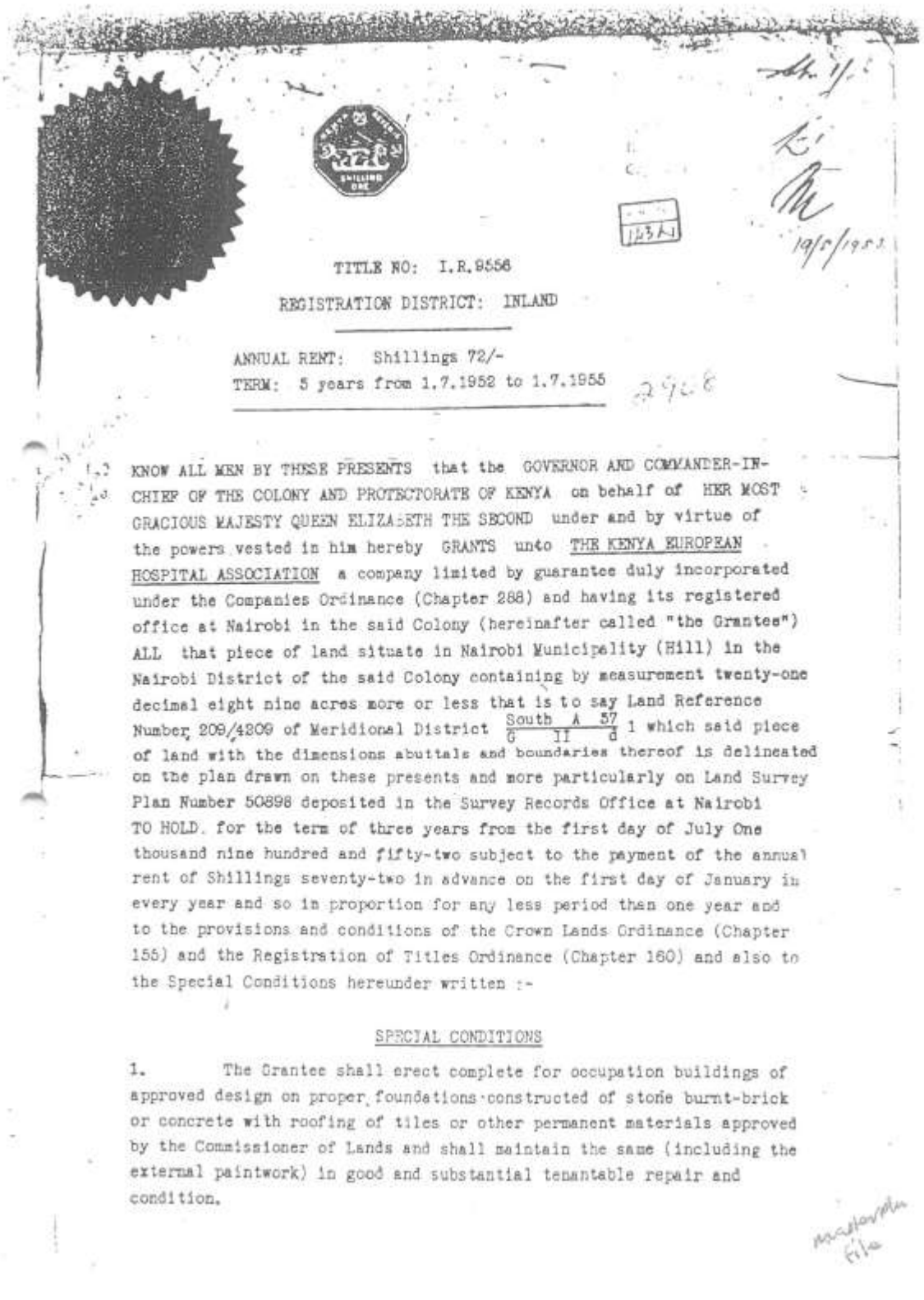
ANNEX 1-9

ANNEX 1: KHA LAND TITLE DEED



TITLE NO: I.R.9556

REGISTRATION DISTRICT: INLAND

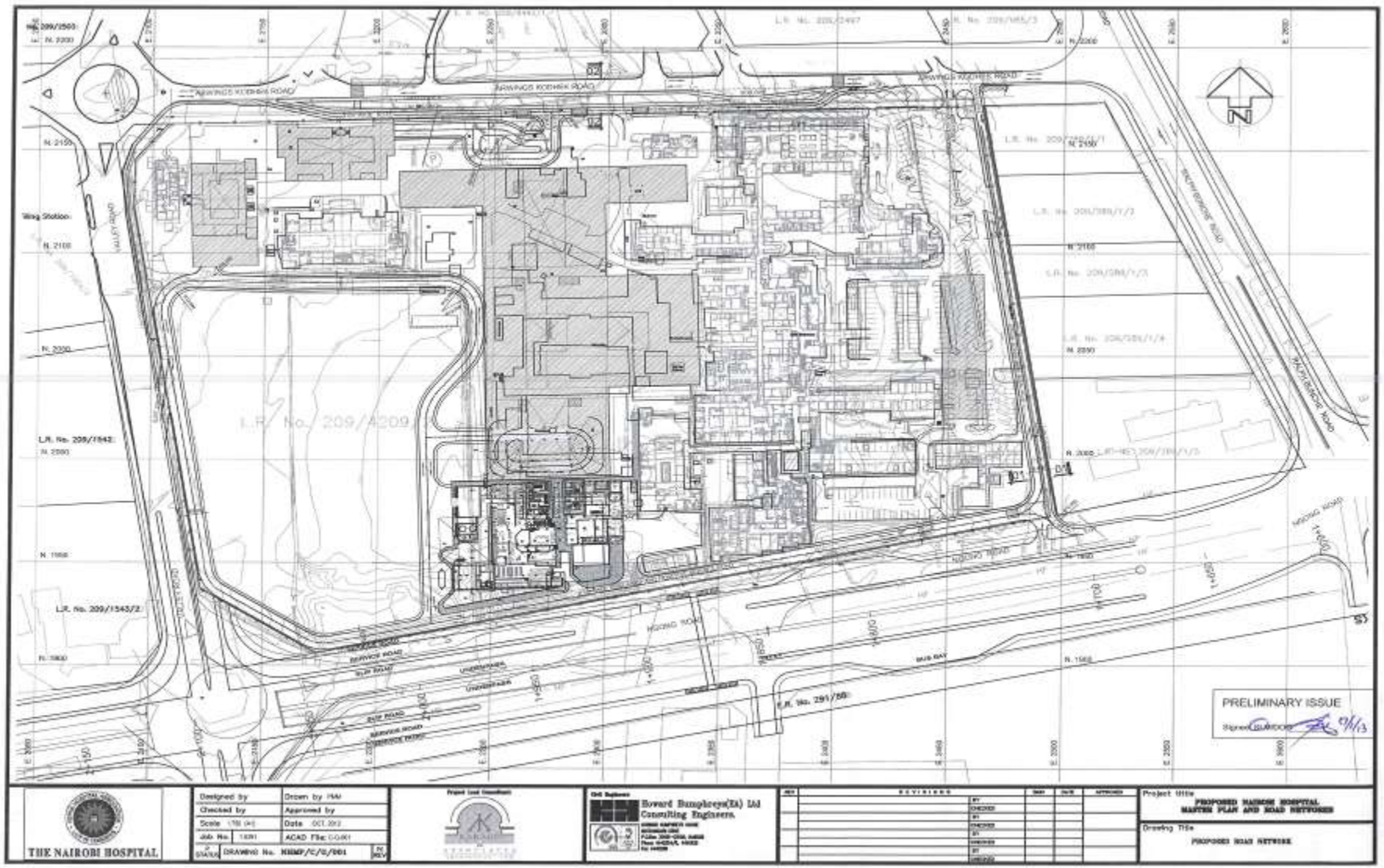
ANNUAL RENT: Shillings 72/-
TERM: 5 years from 1.7.1952 to 1.7.1955

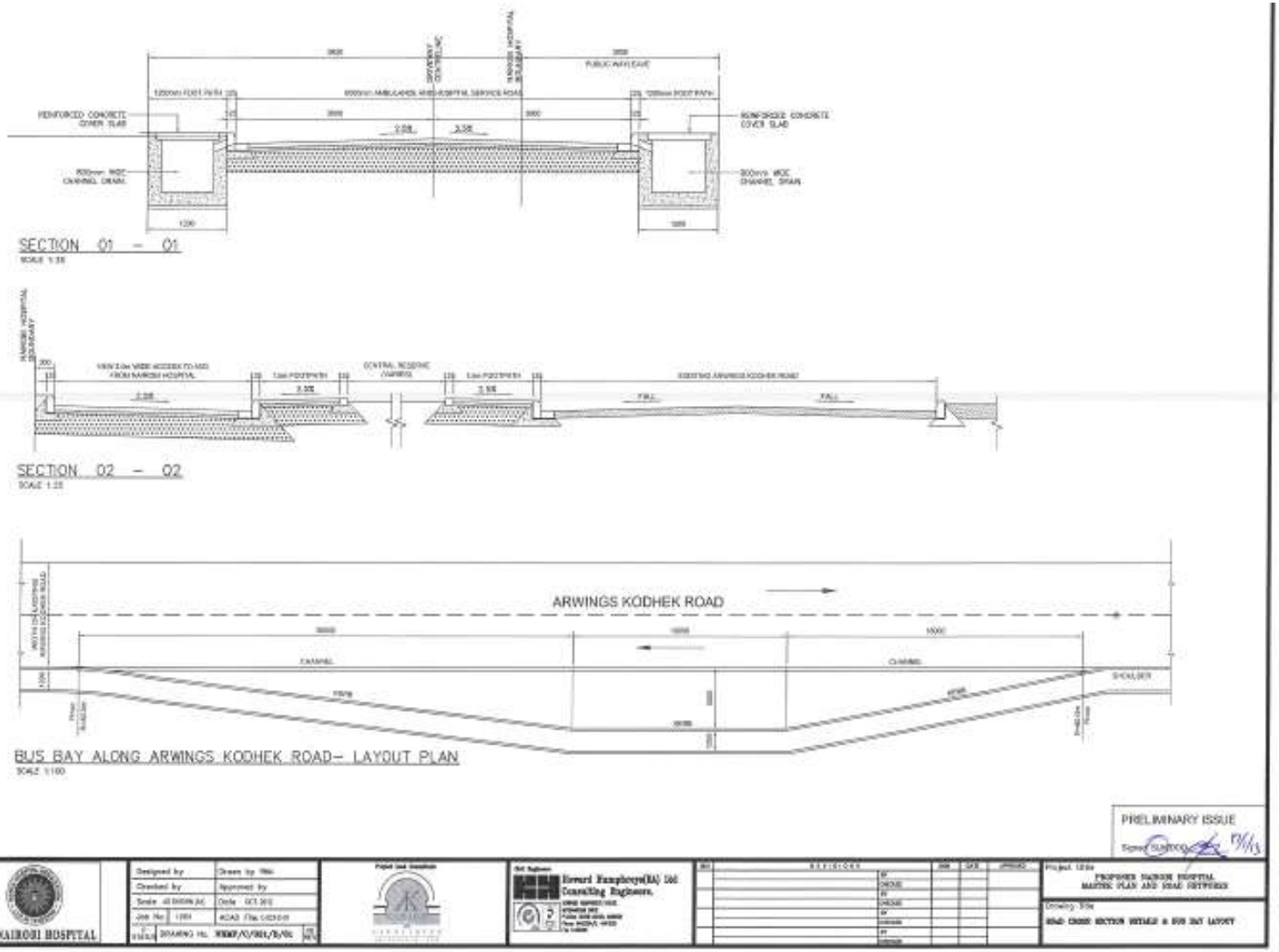
KNOW ALL MEN BY THESE PRESENTS that the GOVERNOR AND COMMANDER-IN-CHIEF OF THE COLONY AND PROTECTORATE OF KENYA on behalf of HER MOST GRACIOUS MAJESTY QUEEN ELIZABETH THE SECOND under and by virtue of the powers vested in him hereby GRANTS unto THE KENYA EUROPEAN HOSPITAL ASSOCIATION a company limited by guarantee duly incorporated under the Companies Ordinance (Chapter 288) and having its registered office at Nairobi in the said Colony (hereinafter called "the Grantee") ALL that piece of land situate in Nairobi Municipality (Hill) in the Nairobi District of the said Colony containing by measurement twenty-one decimal eight nine acres more or less that is to say Land Reference Number 209/4809 of Meridional District $\frac{\text{South}\quad A\quad 57}{G\qquad II\qquad d}$ 1 which said piece of land with the dimensions abuttals and boundaries thereof is delineated on the plan drawn on these presents and more particularly on Land Survey Plan Number 50898 deposited in the Survey Records Office at Nairobi TO HOLD. for the term of three years from the first day of July One thousand nine hundred and fifty-two subject to the payment of the annual rent of Shillings seventy-two in advance on the first day of January in every year and so in proportion for any less period than one year and to the provisions and conditions of the Crown Lands Ordinance (Chapter 155) and the Registration of Titles Ordinance (Chapter 160) and also to the Special Conditions hereunder written :-

SPECIAL CONDITIONS

1. The Grantee shall erect complete for occupation buildings of approved design on proper foundations constructed of stone burnt-brick or concrete with roofing of tiles or other permanent materials approved by the Commissioner of Lands and shall maintain the same (including the external paintwork) in good and substantial tenantable repair and condition.

ANNEX 2: ARCHITECTURAL DESIGNS (APPROVED MASTERPLAN) and PHASE 2 ARCHITECTURAL DESIGNS AND (RENDERS)




SECTION 01 - 01
SECTION 02 - 02
ARWINGS KODHEK ROAD
BUS BAY ALONG ARWINGS KODHEK ROAD- LAYOUT PLAN
PRELIMINARY ISSUE
THE NAIROBI HOSPITAL
PROPOSED NAIROBI HOSPITAL
MASTER PLAN AND ROAD IMPROVED
ROAD CROSS SECTION DETAILS & BUS BAY LAYOUT

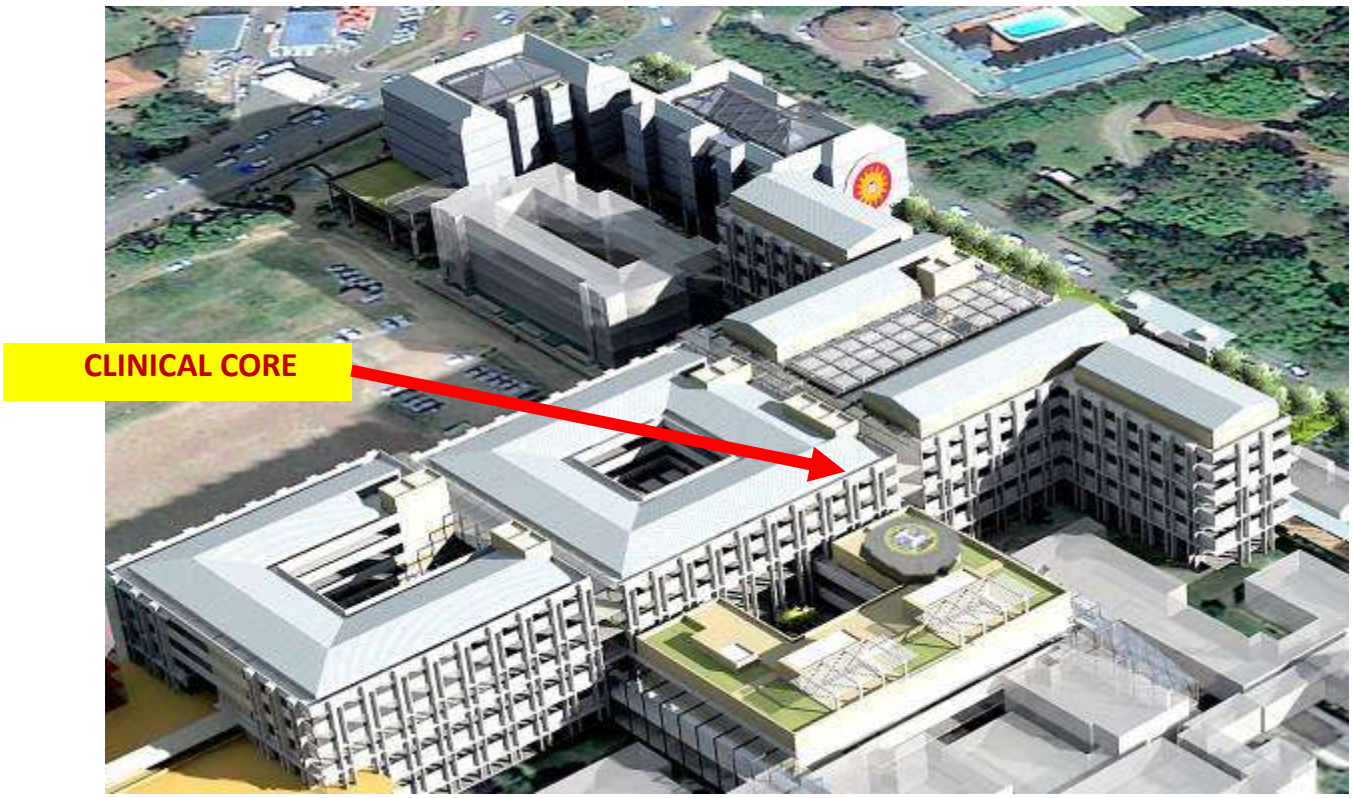


Figure 7: Clinical Core

PARKING SILO

Figure 8: Parking Silo Ground floor

BASEMENT = 128 BAYS [STAFF ONLY]
GROUND FLOOR = 125 BAYS
TYPICAL FLOORS = 128 BAYS X 6 FLOORS
TOTAL = 1021 BAYS

PARKING SILO –TYPICAL FLOORS

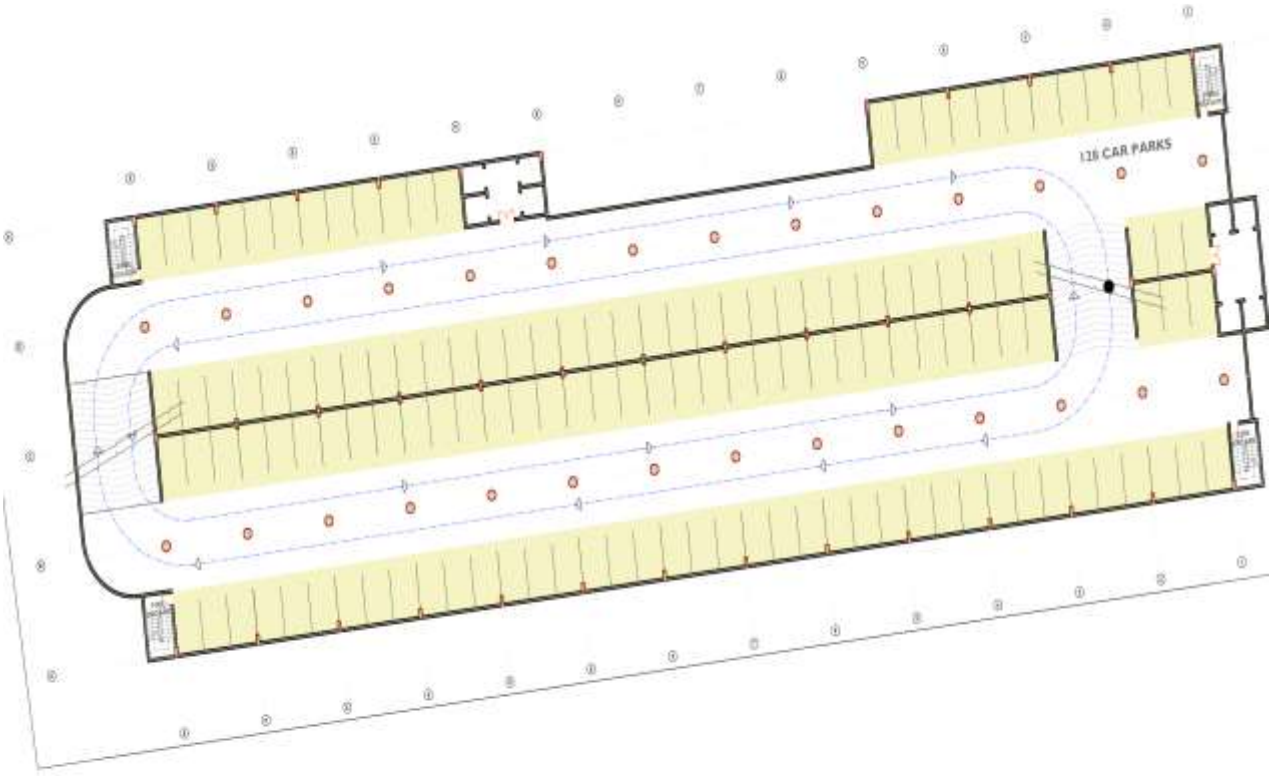


Figure 9: Parking Silo typical floors

Figure 10: Parking Silo presentation

TEMPORARY DOCTORS RELOCATION GROUND FLOOR

- ❑ TOTAL NO. OF EXISTING ROOMS – 14 ROOMS
- ❑ REQUIREMENT PER DOCTORS CONSULTING SUITE 65SQM
- ❑ APPROXIMATE DOCTORS CONSULTING ROOMS

480SQM/ 65SQM = 7 doctors consulting rooms

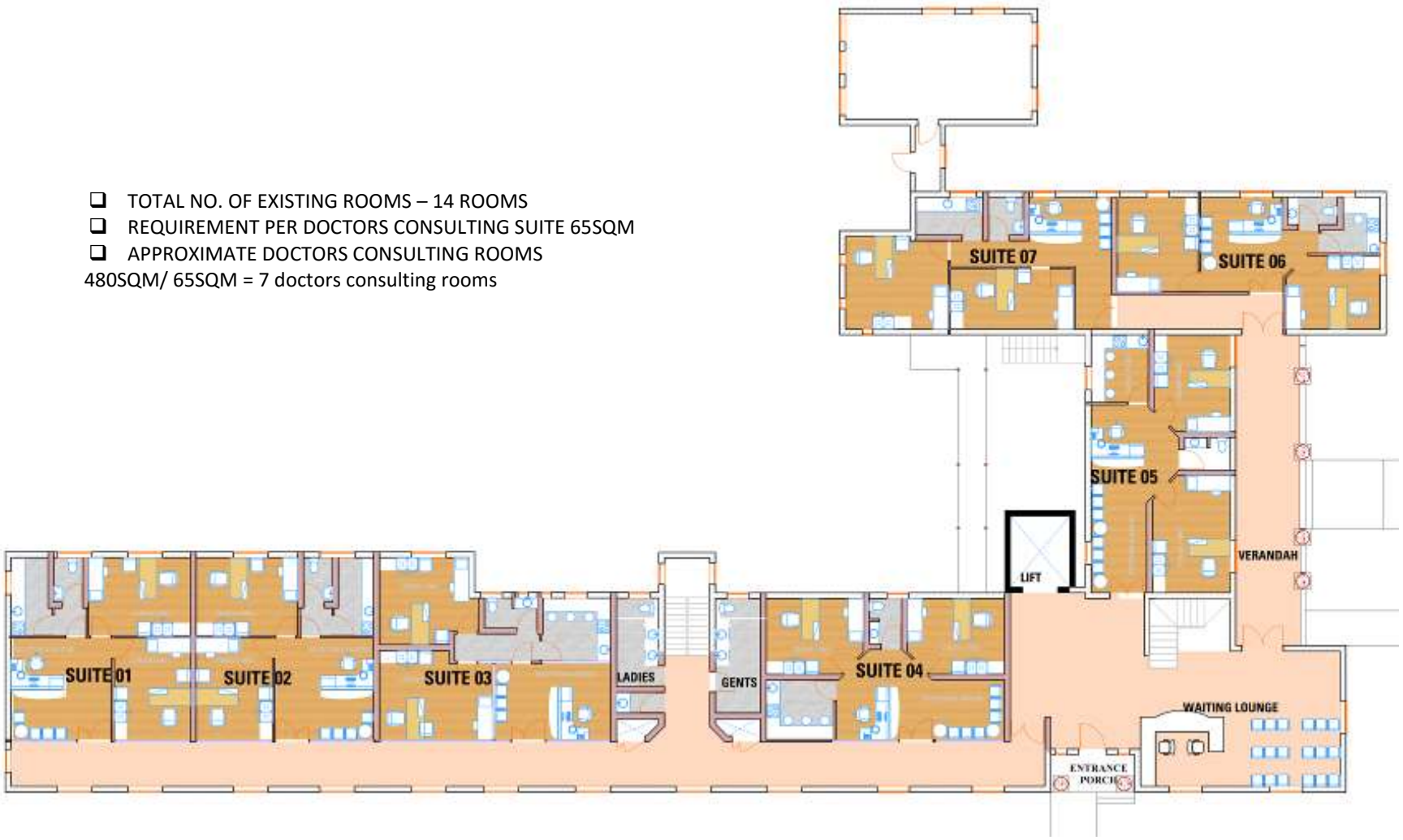


Figure 11: Doctors Temporary relocation Ground floor

TEMPORARY DOCTORS RELOCATION-UPPER FLOOR

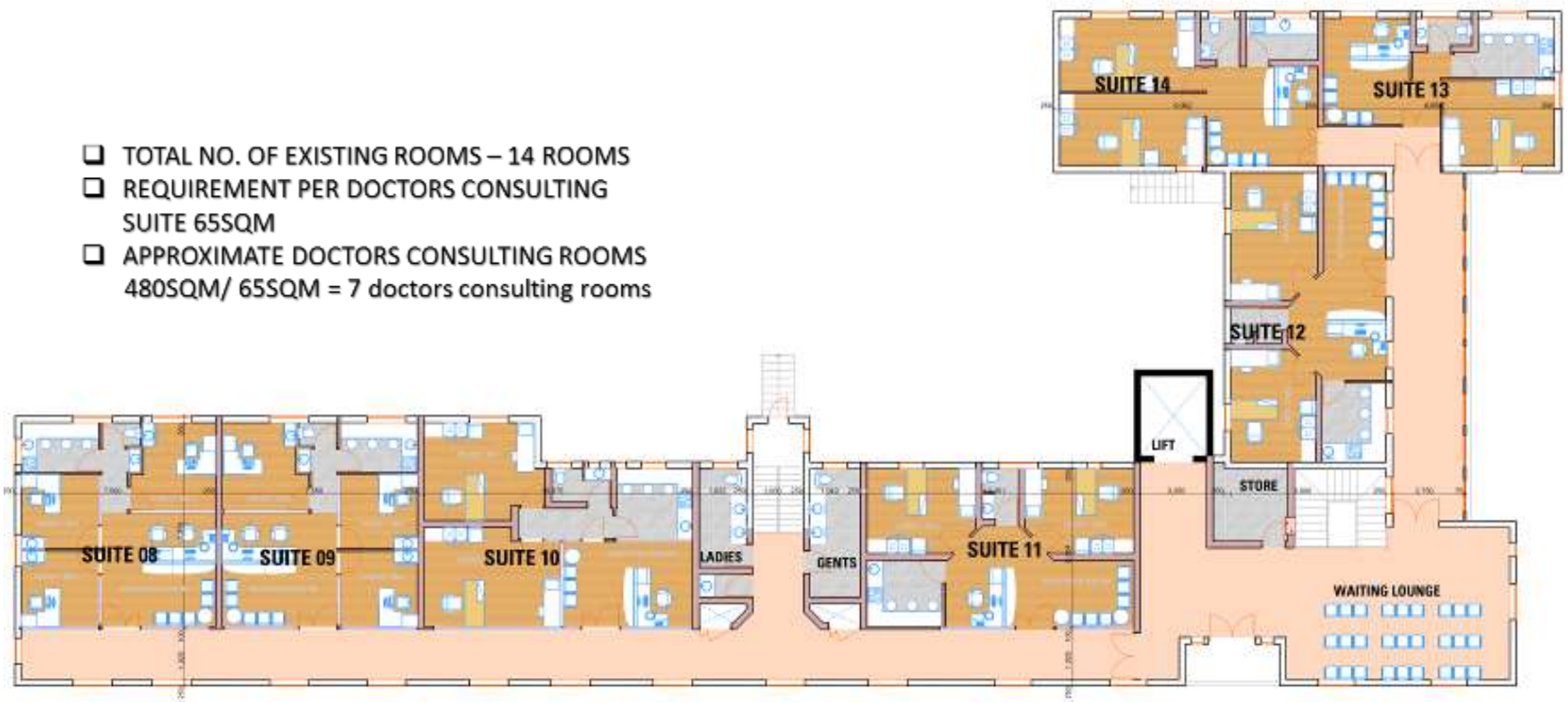


Figure 12: Doctors Temporary relocation upper floor

PHASE 2B

MAIN ENTRANCE BLOCK

Figure 13: Main Entrance Block

Figure 14: New Doctors Plaza

PHASE 2C

UNIVERSITY BLOCK


Specialist Centre

ANNEX 3: PROJECT COST BREAKDOWN

PHASES	Description	Number of floors	Cost estimate in Kenya Shillings
PHASE 2a	CLINICAL CORE	14 Storey specialized centre of excellence	1,754,696,232
	PARKING SILO	7storey of 1,100 car parking facility	
	MINOR WORKS:	Demolitions of Existing laundry /boiler /Doctors' offices. Temporary parking and driveways Temporary Doctors. Suites in Existing Building Blocks on LR. No.209/644/Water purification plant	
PHASE 2b	MAIN ENTRANCE SPECIALITY BLOCK DOCTORS PLAZA	9 storeys 8 Storey	1,311,337,948
PHASE 2c	CENTRE OF EXCELENCE UNIVERSITY EDUCATION BLOCK	14 Storeys 8 Storeys	2,638,816,252
OVERALL			5,704,850,432

ANNEX 4: STANDARDS FOR EFFLUENT DISCHARGE TO PUBLIC SEWERS

PARAMETER	Maximum levels permissible
Suspended solids (mg/L)	250
Total dissolved solids (mg/L)	2000
Temperature ^{0}C	20 - 35
pH	6-9
Oil and Grease (mg/L) -where conventional treatment shall be used	10
Oil and Grease (mg/L)- where ponds is a final treatment method	5
Ammonia Nitrogen (mg/L)	20
Substances with an obnoxious smell	Shall not be discharged into the sewers
Biological Oxygen Demand BOD5 days at 20 ^{o}C (mg/L)	500
Chemical Oxygen Demand COD (mg/L)	1000
Arsenic (mg/L)	0.02
Mercury (mg/L)	0.05
Lead (mg/L)	1.0
Cadmium (mg/L)	0.5
Chromium VI (mg/L)	0.05
Chromium (Total) (mg/L)	2.0
Copper (mg/L)	1.0
Zinc (mg/L)	5.0
Selenium (mg/L)	0.2
Nickel (mg/L)	3.0
Nitrates (mg/L)	20
Phosphates (mg/L)	30
Cyanide Total (mg/L)	2
Sulphide (mg/L)	2
Phenols (mg/L)	10
Detergents (mg/L)	15
Colour	Less than 40 Hazen units
Alkyl Mercury	Not Detectable (nd)
Free and saline Ammonia as N (mg/L)	4.0
Calcium Carbide	Nil
Chloroform	Nil
Inflammable solvents	Nil
Radioactive residues	Nil
Degreasing solvents of mono-di-trichloroethylene type	Nil

ANNEX 5: COLOUR CODE FOR BIOMEDICAL WASTE ADOPTED FROM WHO COLOUR CODE

Colour code for Biomedical adopted from the WHO colour code

	Type of Waste	Colour of Container and Markings	Type of Container
1.	Infectious	Yellow	Strong leak proof-plastic bag with biohazard symbol
2	Pathological	Yellow	Strong leak proof-plastic bag with biohazard symbol
3	Sharps	Yellow – (marked sharps)	Puncture proof
4	Chemical and Pharmaceutical	Brown	Plastic bag or container
5	Non-infectious/non hazardous (Non-clinical)	Black	Plastic bag or container
6	Radioactive waste		Lead box, labeled with radioactive symbol
7	Non-infectious/non hazardous (Non-clinical)	Black	Plastic bag or container

Infectious, Pathological and Sharp waste should also be marked with the international biohazard symbol.

Chemicals should also be marked with the appropriate international chemical hazard symbol

ANNEX 6: SAMPLE CONSULTATION QUESTIONNAIRES

ANNEX 7: EARTHCARE SERVICES LIMITED - NEMA PRACTICING LICENSE

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/3011

Application Reference No: NEMA/EIA/EL/4269

M/S **Eartheare Services Ltd**
(individual or firm) of address

P.O. Box 22433-00100 Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**
registration number **1799**

in accordance with the provision of the Environmental Management and Coordination Act, 1999.

Issued Date: **2/8/2016** Expiry Date: **12/31/2016**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P. T. O.

ISO 9001 : 2008 Certified

ANNEXE9: ENVIRONMENTAL EXPERTS PRACTICING LICENSE

FORM 7 (r.15(2))

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/2903

Application Reference No: NEMA/EIA/EL/4570

M/S **Winnie Wangari Wairimu**
(individual or firm) of address

P.o. Box 22433 - 00100 Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **7629**

in accordance with the provision of the Environmental Management and Coordination Act, 1999.

Issued Date: **1/29/2016** Expiry Date: **12/31/2016**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P. T. O.

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/3009

Application Reference No: NEMA/EIA/EL/4267

M/S **Hellen Mwende**
(individual or firm) of address

p.o Box 95 - 60403,Meru south

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Associate Expert**
registration number **6534**

in accordance with the provision of the Environmental Management and Coordination Act, 1999.

Issued Date: **2/8/2016**

Expiry Date: **12/31/2016**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P. T. O.

ISO 9001 : 2008 Certified