

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED CONSTRUCTION OF REDHILL CANCER HOSPITAL FACILITY WITHIN NYARI, NAIROBI COUNTY BY RVL HEALTHCARE ON LR NO 5829/2 (ORIGINALLY NUMBER 3857/2)



ENVIRONMENTAL CONSULTANT

PROPONENT

FIRM OF EXPERTS, NEMA REG NO: 10435

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RVL HEALTHCARE, NAIROBI, KENYA

December 2025

DECLARATION

This Environmental and Social Impact Assessment has been prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 amended in 2015 and the Environmental (Impact Assessment and Audit) Regulations 2003 (amended 2019) for submission to the National Environment Management Authority (NEMA).

Prepared by: -

Matthew O. Were (EIA/EA NEMA registered Lead Expert No 1454)

On behalf of JKH Holding Limited

Signature:



Date:



FIRM OF EXPERTS

JKH Holding Limited
(NEMA Registration No 10435)

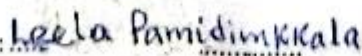
THE PROPONENT

We confirm that this ESIA was prepared and forwarded to NEMA with our authority as the project proponent.

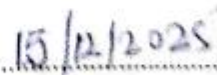
Proponent's Management Representative: -

Designation: - Director

Signature:



Date:



On behalf of RVL Healthcare

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EXECUTIVE SUMMARY

RVL Healthcare is proposing to setup a Cancer Hospital to be located in Nairobi, Kenya. The proposed hospital shall be a self-sufficient campus with State-of-the-art specialty facilities. The primary architectural program will include Hospital, with support facilities. These facilities will be a "The best Cancer Treatment and Research center". The proposed campus will endeavor to provide Center of Excellence" to provide Primary, Secondary, & Tertiary Cancer prevention center. The primary objective is be a "Centre of Excellence" in health research and advancement of Medical Sciences in Nairobi, Kenya. The institutes will facilitate a superb built environment for the national leadership in further educating practicing Physicians, Surgeons, Medical Scientist, and other healthcare providers. The program and "activities of the institutes focus on the providing the highest quality patient care services, medical education in advancing medical research". The project is be designed as "zero charge" campus. All the building shall be energy efficient with optimal space use. In addition, the site strategy will also take into consideration of future expansion.

The projects objective

- Instill confidence in Patients
- Instill confidence in Students, Physicians, and Other Healthcare providers
- Healing through the built environment
- Healing through landscape
- Wait Time: To explore and mediate
- Learning through the built environment
- Learning through landscape
- Study Time: To explore and achieve
- To lead: Facilitate a Place of Excellence for students & Practitioner

Project overview

This study was commissioned by RVL Healthcare in accordance with Section 58 of the Environmental Management and Coordination Amendment Act (2015), CAP 387, and Regulation 10 of the Environmental (Impact Assessment Audit) Regulations 2003 amended in 2016, legal notice No 31 of 2019. Other national policies and legislations relevant to the proposed project were reviewed. The purpose of this study is to establish the potential environmental impacts as a result of the set up and operation activities of the proposed development and thereafter propose possible mitigation measures. This report also provides baseline information of the project that may be used in decision-making during the project's evaluation process and is also expected to form the baseline for future environmental audits and monitoring.

Project location, objective and scope

The proposed project involves the construction and setup a Cancer Hospital to be located in Nairobi County on **LR NO 5829/2 (Originally Number 3857/2)**. The project area will be composed of: a cancer hospital and auxiliary facilities. The proposed development project is estimated to cost **Kshs. 601,223,566**.

Summary of key findings

The following information was derived from the assessment of the proposed project. The project assessment identified some potential adverse impacts on the physical and socio-economic environment. The impacts that were further investigated and analysed were:

Positive:

- Increased income to the proponent
- Optimal use of land area
- Improved aesthetics
- Increased tax revenue to county and national government
- Creation of employment opportunities and on-job training to locals
- Increased support for development of local community through organization's CSR programme
- Improvement of local economy
- Increased availability of a cancer treatment facility
- Creation of market for goods and services
- Improved security

Negative:

Various negative impacts are foreseen in the lifecycle of the project and include:

- Generation of dust and air pollution during construction
- Possible accidents amongst workers
- Solid and liquid Waste generation and its disposal or management
- Noise generation and vibrations that may increase ambient noise levels
- Increase in soil erosion and change in soil structure resulting from excavation
- Increase in storm water runoff due to increase in paved areas
- Fire outbreaks
- Increased traffic along the main and feeder roads

Some other potential impacts are short term and of low significance. These will be ameliorated through proposed mitigation measures which includes: -

- Ensuring construction work is undertaken during the day
- Erection of a temporary barrier to condone the area from unauthorized trespassers.
- Collection and appropriate disposal of solid waste from the construction works and operational works of the facility.
- Provision and enforcement of protective gears to the workers.
- Enhanced monitoring and control of vehicular movement
- Training and awareness of construction workers and staff on safety precautions.
- Transport and storage of materials in bulk.
- Signage to alert general public
- Provide fire extinguishers and alarms in areas which are probable source of fires
- Landscaping and replanting of vegetation after all setup and construction is done to form a green belt.

Summary of mitigation measures

Mitigation measures have been developed in respect of the significant negative Environmental and Social Impacts. It is also from these impacts that a comprehensive management plan is developed. The mitigation measures are summarized below.

Potential negative impact	Mitigation measures
CONSTRUCTION PHASE	
Disruption of existing natural environment and Modification of microclimate.	<ul style="list-style-type: none"> • Development to be restricted to approved density, building line, land coverage, land ratio and zoning plan. • Careful layout and orientation of structures to respect wind and sun direction • Adequate provision of green and open spaces planted with grass, shrub and tree cover • Minimum use of reflective building material and finishes for roof, walls and pavements • The flow of storm water to be harmonized with neighborhood and directed to well-designed drainage channels
Waste generation	<ul style="list-style-type: none"> • Contract a NEMA licensed waste handler and dispose offsite at county designated dumpsite. • Develop appropriate and adequate waste collection measures and facilities. • Provide for waste segregation into organics, metals, plastics at source for efficient management. • Maintain waste disposal records. • Manage materials responsibly to recover, reuse, recycle as appropriate. • Develop clean-up plans for wastes and spills.
Biodiversity and Vegetation Loss	<ul style="list-style-type: none"> • Do not site project in environmentally sensitive area e.g. watershed, wetland and riparian land. • Clear vegetation only when and where necessary. • Comply with land use plans and approved designs. • Resurface and re – vegetate exposed bare areas preferably by using natural indigenous vegetation. Scientific evidence should be put in consideration to avoid introduction of invasive species. • Have a green belt once construction is done. • Use manual labor rather than machinery
Noise pollution	<ul style="list-style-type: none"> • Maintain regular servicing of machines to produce less noise. • Construction and installation work undertaken during day hours • Workers to wear PPEs. • Use of human labor where appropriate rather than machines. • Switch off machines not in use. • Use of noise mufflers for noise attenuation.

	<ul style="list-style-type: none"> • Fence off the construction area from unauthorized persons • Develop and implement a comprehensive noise conservation programme that includes training, equipment maintenance, engineering controls, use of PPEs, noise measurements among others. Ensure the construction site is secured by appropriate noise attenuators
Air emissions	<ul style="list-style-type: none"> • Service and maintain machinery and vehicles regularly according to schedule. • Switch off machines when not in use. • Use standard fuel and lubricants • Ensure water sprinkling on bare surface including access roads to arrest dust emission. • Provide all construction staff with appropriate personal protective equipment (PPEs) such as dust masks, overalls, helmet, dust coats, safety boots and goggles. • Ensure that all construction workers make proper use of the PPEs provided at all the time they are on site. • Clean access routes in surrounding area on a daily basis to prevent dust. • Collect and hold cleaning wastes (e.g. rags) in appropriate containers. • Workers who may unavoidably have to work in dusty workplaces should be provided with nose and ear masks to protect them from excessive dust. • Carry out regular inspection and maintenance of equipment to reduce levels of Green House Gas (GHGs) emissions into the environment.
Health, Safety and Security Concerns	<ul style="list-style-type: none"> • Provide appropriate PPEs to the construction workers. • Maintain updated firefighting and detecting infrastructure. • Awareness training to construction and installation workers and staff on safety precautions. • Secure the construction area from unauthorized persons by ensuring that access is confined to restricted work sites (including those with operation of mechanical and electric equipment) to persons with permits. • Maintain a first Aid kit on site and train the workers on its use • Implement appropriate traffic plans with the help of local police when (partial) closure of roads is required. • Put up appropriate safety signage.
Occupational health and safety	<ul style="list-style-type: none"> • Ensure that work sites (especially excavation works), especially have proper protection with

	<p>clear marking of safety borders and signals and fence off all dangerous areas.</p> <ul style="list-style-type: none"> • Carry out training of staff in EH&S monitoring and evaluation. • The contractor should recruit H&S person during construction. • All construction workers to first be trained on the appropriate use of the provided personal protective equipment. • Project proponent to ensure each construction worker and visitors to the construction site also use the provided personal protective equipment. • The project proponent to ensure that tools and equipment provided for use at the proposed construction site are well serviced and maintained. • Project proponent to ensure that the construction site is free of hazards. • The project proponent to ensure that among the construction workers are trained first aiders. • Project proponent to ensure there is a fully equipped first aid station at the proposed project site. • The contractor will ensure clear human resources policy against sexual harassment that is aligned with national law
Traffic related impacts	<ul style="list-style-type: none"> • Use reflective signature to direct traffic to designated areas. • Sensitize drivers to observe speed limits • Develop and implement a traffic marshal plan for the construction site • Provide sufficient parking/ holding area for traffic delivering and collecting materials from the construction site.
OPERATION PHASE	
Waste generation	<ul style="list-style-type: none"> • Manage materials responsibly by applying principle of reuse, recover and recycle. • Segregate the waste at source • Maintain waste disposal records. • Contract a NEMA licensed waste handler. • Dispose waste in designated County government dumpsite by licensed NEMA waste handler • The Proponent should prepare a Solid Waste Management Plan, which should contain an inventory of the types and quantities of waste to be produced. • The most appropriate waste management approach for each type of waste including details on (temporary) storage, transport and

	<p>final destination of the waste should be adopted.</p> <ul style="list-style-type: none"> • Ensure all waste generated during operational phase is managed and disposed as per the provisions of the Environmental Management and Coordination (Waste Management) Regulations, 2006 and The Sustainable Waste Management Act 2022
Increased water and energy demands	<ul style="list-style-type: none"> • Proponent will ensure that usage avoids wastage • The proponent will purpose to use the most readily available water at the site without compromising availability to other water users in the area • Provide adequate water storage tanks on site to store water from roof catchment from the extensive roofs of the building during rainy season. • The proponent will liaise with KPLC to power the facility appropriately. • The proponent should consider supplementing electrical supply from the national grid with renewable energy such as solar to power the lighting system of the facility. • The proponent will ensure installation of generators and ensure they are in good working order to maximize fuel use efficiency.
Noise pollution	<ul style="list-style-type: none"> • Carry out baseline noise mapping • Adhere to the national standards set out by the EMCA noise and vibration regulations (legal notice No. 61 of 2009 amended 2015) • Provide appropriate PPEs
Traffic related impacts	<ul style="list-style-type: none"> • Develop and implement a traffic marshal plan for the operational phase • Provide sufficient parking/ holding area for traffic within the facility
Labour Influx	<ul style="list-style-type: none"> • The Proponent should prepare Labour and Recruitment Plan • The Proponent should prepare a "code of conduct for workers". This code of conduct will be signed and followed by all workers involved in the project.
DECOMMISSIONING PHASE	<ul style="list-style-type: none"> • Constitute a decommissioning team and inform relevant authorities • A due diligence decommissioning survey (audit) will be undertaken and submitted to NEMA for approval at least three months prior to the exercise. • Dispose of all wastes responsibly • Rehabilitate the degraded soil and natural flora. • Recycle, reuse or recover demolition materials where appropriate

Conclusion

This EIA exercise is intended to inform project planning and implementation processes on issues of significant environmental and social concern. It has determined elements that may not be environmentally compliant and addressed them through the proposed mitigation measures as presented in this Report. After assessing the project impacts, the EIA Expert (s) are of the view that the negative impacts arising out of the proposed project development are manageable and therefore the Proponent should be allowed to proceed with this development as long as the proposed Environmental Management Plan is implemented and complies with all the relevant laws, by-laws and regulations governing hospitals.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Project Proponent

RVL Healthcare is proposing to setup a Cancer Hospital to be located in Nairobi, Kenya. The proposed hospital shall be a self-sufficient campus with State-of-the-art specialty facilities. The primary architectural program will include Hospital, with support facilities. These facilities will be a “The best Cancer Treatment and Research center”. The proposed campus will endeavor to provide Center of Excellence” to provide Primary, Secondary, & Tertiary Cancer prevention center. The primary objective is be a “Centre of Excellence” in health research and advancement of Medical Sciences in Nairobi, Kenya. The institutes will facilitate a superb built environment for the national leadership in further educating practicing Physicians, Surgeons, Medical Scientist, and other healthcare providers. The program and “activities of the institutes focus on the providing the highest quality patient care services, medical education in advancing medical research”. The project is be designed as “zero charge” campus. All the building shall be energy efficient with optimal space use.

1.2 Need of the Project and its Importance to the Country

In Kenya the state of public health poses a severe challenge to health care providers for multiple reasons. One of the main challenges includes Medical Infrastructure for diagnosis of Cancer and treatment. Since couple of years now the cancer management in Kenya has been phenomenally improved and the private health care providers are playing a major role for improves the quality life of cancer patients however, they are still not able to manage the growing numbers of cancer cases in the county. This calls for need for creation of more centers that area able to offer more services than just cancer treatment. The proposed project shall be a self-sufficient campus with State-of-the-art specialty facilities. The primary architectural program will include Hospital, with support facilities. These facilities will be a “The best Cancer Treatment and Research center”. The proposed campus will endeavor to provide Center of Excellence” to provide Primary, Secondary, & Tertiary Cancer prevention center.

1.3 Project Location

The project site is located in Nairobi county on LR NO 5829/2 (Originally Number 3857/2), **GPS Coordinates of the site are 1°13'49" S, 36°46'59" E** and a **Total of 9.3 acres.**



Figure 1: Google earth image of the project site

1.4 Scope of Work

EIA study involves basic components, viz. identification, prediction and evaluation of impacts along with mitigation measures and Environmental Management Plan (EMP). The Terms of Reference (ToR) for the EIA study were prepared and submitted to the National Environment Management Authority (NEMA) for approval. The ToR (**REF: NEMA/TOR/5/2/741**) was approved by NEMA as evidenced by a copy of the ToR approval letter from NEMA (attached in the Annexes). The scope of the EIA study included the following: -

- An intensive reconnaissance and preliminary collection of environmental information to plan field study.
- Field studies to collect preliminary information, particularly on the quality of the physical environment.
- Base line data generation and characterization of air, water, soil, noise and vegetation in the 10 km radius area (impact zone).
- Preparation of Environmental Monitoring Program and to evaluate the effectiveness of mitigation measures.
- Preparation of Environmental Management Plan suggesting suitable methods for mitigating and controlling the pollution levels.
- To suggest the formation of a core group responsible for implementation of environmental control and protective measures and monitoring of such implementation.
- To suggest feedback mechanism enabling to make mid-course corrections.

1.5 Applicable Environmental Regulatory Framework

The proposed project will abide and function under the purview of the following Acts, Rules & Regulations which are formulated by the govt. of Kenya to protect the environment and development in a sustainable way.

- The Constitution of Kenya 2010;
- National Environmental Action Plan (NEAP 2009-2013);
- The National Environment Policy (Sessional Paper 10, 2014);
- The Kenya Vision 2030;

- National Climate Change Response Strategy, 2010;
- The Environment Management and Coordination Act (EMCA), 1999 and Environment Management Coordination (Amendment) Act, 2015;
- Environmental Impact Assessment and Audit Regulations, 2003 and Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2016;
- Environmental Management and Coordination Act (Waste Management) Regulations, 2006;
- Environmental Management and Coordination Act (water quality) Regulation 2006;
- Environmental Management and Coordination Act (Noise and Excessive Vibrations Pollution Control) Regulations, 2009;
- Air Quality Regulation, 2014;
- The County Government Act 2012;
- Occupational Safety and Health Act OSHA, 2007;
- Work Injury Benefits Act, 2007;
- The Public Health Act (Cap. 242);
- The Physical Planning Act (Cap. 286);
- Building Code By-Laws;
- National Construction Authority Act (No. 41 of 2011, 6 and 16);
- The Energy Act (Amendment) 2015;
- The Water Act (Act No.43 of 2016);
- The Penal Code;
- The Land Registration Act, 2012;
- The Land Act, 2012;
- The Climate Change Act, 2016;
- The Nurses Act, Chapter 257
- Radiation Protection Act, Chapter 243
- The Medical Practitioners and
- Dentists Act, Chapter 253

1.6 Rationale of the EIA Study

This Environmental and Social Impact Assessment Report has been prepared following a request by the proponent, to the consultant, to develop an Environmental and Social Impact Assessment Report and an Environmental Management Plan (EMP) for the proposed construction and set up of cancer center and associated facilities. Environmental and Social Impact Assessment (ESIA) is a formal process used to predict how development of a project will affect natural resources such as water, air, land, socioeconomic and biophysical resources. An ESIA usually involves a sequence of steps: Screening to decide if a project requires assessment and to what level of detail; Scoping to ensure the ESIA focuses on key issues and to determine, where more detailed information is needed; Description of existing environmental baseline conditions; Preliminary assessment to identify key impacts, their magnitude, significance, and importance; Evaluation of Alternatives to the project; and Implementing the main EIA study, which involves detailed investigations to predict impacts, assess their consequences, or both.

1.7 Need for ESIA study

The proposed project, which falls under the health sector plays a vital role in the country's development, and just like other development activities, it has some adverse impacts to the environment. To ensure sustainable development, it is important to take into consideration the possible environmental and social impacts associated with this project to ensure a safe and healthy environment at all stages of the project operations. Environmental and Social Impact Assessment (ESIA) is one of the tools used by planners to achieve this goal.

1.8 ESIA Scope and Methodology

This study has been carried out within the framework of the guidelines and procedures spelt out in the Environmental (Impact Assessment and Audit) Regulations 2003 and Environmental Impact Assessment guidelines and Administrative procedures, and as a result of consultations with the project proponent. This was done in line with the requirements of Environmental Management and Coordination (Amendment) Act, 2015 and Environmental (Impact Assessment and Audit) Regulations 2003 among other legal and regulatory frameworks. The study covered the physical extent of the project site and its immediate environs. The study involved a sequence of steps: -

- Screening to decide if a project requires assessment and to what level of detail.
- Scoping to ensure the ESIA focuses on key issues and to determine, where more detailed information is needed.
- Evaluate and assess the baseline information (physical, biological and socio-economic environment) within the project area of influence.
- Conduct inclusive and participatory public consultation, engagement and participation during the study.
- Ensure sustainable development and good environmental practice by ensuring that natural resources are used wisely in the project to ensure inter and intra generational equity. This will ensure ecologically sound and sustainable project.
- Identify, prevent, avoid or offset any negative impacts that may emanate from the project thus preventing losses or any disadvantages to any stakeholders.
- Identify potential environmental impacts, both direct and indirect.
- Categorize, measure and propose appropriate mitigation measures for identified adverse impacts of the project.
- Assess the compliance of the project with policy and legal frameworks as stipulated in EMCA 2009 amended in 2015 and any other relevant laws of the republic of Kenya.
- Develop a comprehensive Environmental Management and Monitoring Plan (EMP), indicating the key action items and plans that will be required in order to ensure compliance during construction and operation phases of the project.

1.9 Project Objectives

The objectives of the ESIA study are as follows;

- To construct and setup of cancer centre, water reticulation and power connection to mains and auxiliary structures.
- To meet the growing need of availability and accessibility of a cancer treatment facility in the County.

- To create job opportunities to the society for both skilled and semi-skilled workers
- To Assist the National Environment Management Authority (NEMA), to decide on the implementation of the project.

1.10 Project Cost

Total estimated cost of the proposed project is **Kshs 601,223,566.**

CHAPTER TWO

2.0 PROJECT DESCRIPTION

2.1 Introduction

In Kenya the state of public health poses a severe challenge to health care providers for multiple reasons. One of the main challenges includes Medical Infrastructure for diagnosis of Cancer and treatment. Since couple of years now the cancer management in Kenya has been phenomenally improved and the private health care providers are playing a major role for improves the quality life of cancer patients however, they are still not able to manage the growing numbers of cancer cases in the county. This calls for need for creation of more centers that area able to offer more services than just cancer treatment. The proposed project shall be a self-sufficient campus with State-of-the-art specialty facilities. The primary architectural program will include Hospital, with support facilities. These facilities will be a "The best Cancer Treatment and Research center". The proposed campus will endeavor to provide Center of Excellence" to provide Primary, Secondary, & Tertiary Cancer prevention center.

2.2 Overview of Project

RVL Healthcare is proposing to setup a Cancer Hospital to be located in Nairobi, Kenya. The proposed hospital shall be a self-sufficient campus with State-of-the-art specialty facilities. The primary architectural program will include Hospital, with support facilities. These facilities will be a "The best Cancer Treatment and Research center". The proposed campus will endeavor to provide Center of Excellence" to provide Primary, Secondary, & Tertiary Cancer prevention center. The primary objective is be a "Centre of Excellence" in health research and advancement of Medical Sciences in Nairobi, Kenya. The institutes will facilitate a superb built environment for the national leadership in further educating practicing Physicians, Surgeons, Medical Scientist, and other healthcare providers. The program and "activities of the institutes focus on the providing the highest quality patient care services, medical education in advancing medical research". The project is be designed as "zero charge" campus. All the building shall be energy efficient with optimal space use. In addition, the site strategy should also take into consideration of future expansion.

The proposed project will implement the Green Building Concepts to ensure Conservation Features are included in the project. Strategies to be implemented include: -

- Rainwater Harvesting
- Solar PV, Solar hot water & Solar street lighting
- Double skin façade – cavity walls
- Double glazed on external windows
- STP and reuse of grey water for flushing and irrigation
- Usage of LED lighting
- Treated Fresh Air concept
- Use of IGBC accredited materials for construction
- Light weight AAC block work construction with fly ash content which is a by-product in market and with reduced sound and thermal properties
- Having vegetation equal to the footprint of the building
- Reduction of Light Pollution.
- Bifurcation of Waste during construction activity and during functioning of hospital.

- Usage of recycle content materials
- Usage of Low VOC materials

2.2.1 Redhill Cancer Centre

The proponent intends to develop a Cancer Centre facility that will provide a range of key general medical and surgical services that are associated with cancer treatment. The facility is designed to optimize patient flow with a patient centric model of care as demonstrated below: -

- Urgent care and emergency care with easy access and connectivity to diagnostic areas, operating theatres (OTs) and in-patient facilities.
- Out-patient consultation area, which includes consultation chambers, support departments for counselling, nutrition and physiotherapy that can be planned as per the disease management groups.
- Critical and acute care services, including intensive care units for both medical and surgical care.
- Diagnostic modalities should be located so they are accessible to the emergency room (ER) and out-patient as well as in-patient facilities:
 - Radiology modalities. Magnetic resonance imaging (MRI), computed tomography (CT), ultrasonography, X ray, fluoroscopy and mammography.
 - Nuclear medicine. Positron emission tomography/computed tomography (PET-CT), single photon emission computed tomography/ computed tomography.
 - Endoscopy areas.
 - Laboratory facilities, which include haematology, blood bank, biochemistry, cytopathology, surgical pathology, molecular pathology, microbiology, molecular biology and immunohistochemistry.
 - Non-invasive cardiology.
- Treatment modalities:
 - Systemic therapy (chemotherapy, immunotherapy, targeted therapy).
 - Bone marrow transplantation unit.
 - Radiation therapy.
 - Nuclear medicine.
 - Interventional radiology.
 - Surgical oncology.
- Pharmacy facilities
- Nursing, palliative, supportive care and rehabilitation

The proposed project site area is 9.3 acres. The hospital's features will include: -

- Basement: - Radiotherapy, Storage, Laboratory, Blood bank, Services
- Ground Floor: - Atrium, Registration, Diagnostic areas
- First Floor: - Consultation, Chemotherapy (17 beds), Executive Administration
- Second Floor: - Surgical OT (4), Pre/Post-OP (8 beds), ICU (10 beds)
- Third Floor: - IP rooms with ward beds (38 beds)

2.2.2 Architectural concept and planning of the proposed cancer hospital

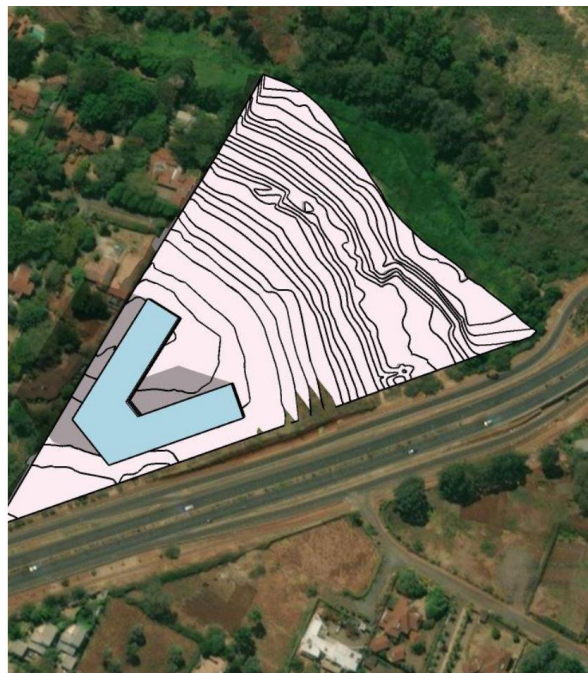
Architectural Planning

The Design Programme identified the proposed function and the preferred mood and style of the space. Intelligent space planning was carried out by considering the following factors: -

- function and zoning
- dimensions and shape of the space
- site, orientation and climate
- economy
- stretching space
- circulation patterns (traffic flows)
- storage
- services parallel to the departments
- special needs for elderly or disabled users
- emotion and psychology
- application of the principles of design
- application of the elements of design

The building form

- The shape of the building is evolved from the plot shape.
- The triangular shape of the plot will help to utilize the maximum coverage of the usable land.
- Open courtyard at the center portion will act as waiting space



The positioning of the proposed cancer hospital

Design Approach

- Instill confidence in Patients, everything revolves around the patients
- Instill confidence in Students, Physicians, and Other Healthcare providers
- Healing through the built environment and landscape

- Wait Time to reduce by interlinking spaces to explore and mediate
- Learning through the built environment and landscape
- To lead: Facilitate a Place of Excellence for students & Practitioner

Architecture and Campus Design

- Good campus planning and architecture allows the layout of streets, building approach and building entries to serve as way finding devices.
- Vehicular access and approach roads should be designed to be intuitive and clear to alleviate stress on the commute.
- Choices in scale, lighting and materiality for the main entry to the hospital, parking structures, and medical office buildings put patients and their families on the quickest path to the front door.
- Locating vertical circulation towers and major public spaces near main entries serves as a beacon for those arriving at night, signaling to patients and families where to go with clearly illuminated entrances.

Design Aesthetics

- Good hospital design should reflect both the region and the visual and cultural ethos of the institution.
- The covered drop-offs with valet parking, open and transparent lobbies and public spaces, and warm, natural materials that evoke a sense of comfort. Concierge and check-in services are becoming more common. Art and sound play a key role in creating a calming and welcoming aesthetic and providing positive distractions upon arrival.

Drop off and Parking

- Proper Parking designated areas to be defined through signage which would reduce stress of finding a space, and returning to your car and eliminating all worry of arrival.
- An expanded vehicular drop-off and pick-up area accommodates these services.
- With more patients and visitors utilizing alternative arrival methods, this drop-off sequence will become more important

Internal Way finding

- When architecture, medical planning, interior design and environmental graphics harmoniously blend, a first-time visitor can walk through a space without the aid or "you are here" maps.
- Aligning the patient journey with key architecture and interior elements alleviates the need for excessive signage, which can become distracting.
- Less signage also means more room for design that creates joy and delight. For example, bold colors or visually distinct changes at elevator banks pull people toward them. Using the concourse concept or promenade to connect departments together is a way to intuitively organize way finding.

Waiting Areas

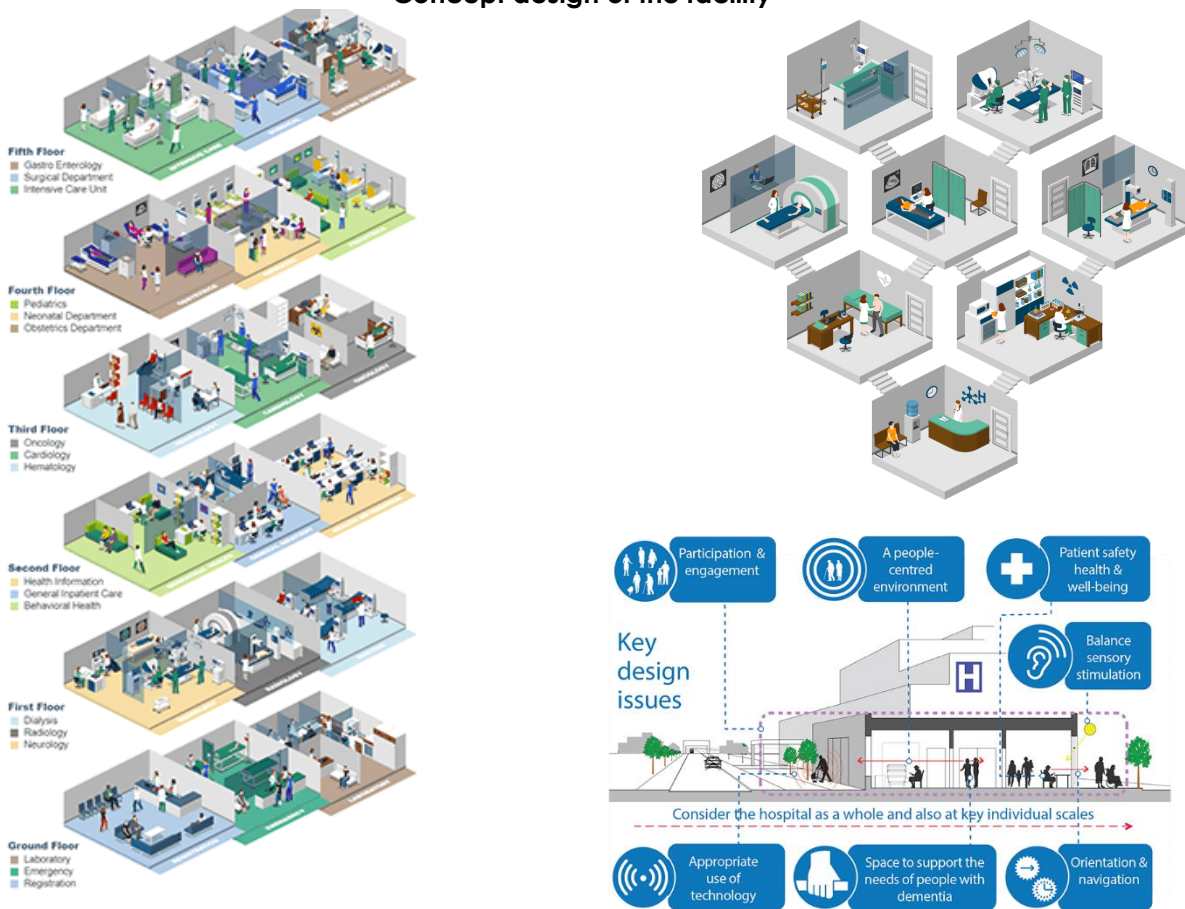
- Use of spaces and their visual identities to intuitively help patients navigate.
- The waiting room is one of the most stressful part of visit, hence making it as amazing place to be: provision of expansive views, windows for daylight, art and

beautiful, comfortable furniture. Locating waiting areas along the perimeter is an effective way to promote way finding and mitigate patient and family stress.

Pleasant Clinical Environment

- Patients and staff efficiently perform from a well-designed space.
- Clinical Areas need such much attention in design in comparison to the lobbies and waiting areas
- Imaging suites, procedure room where patients are conscious and blood drawing station benefit from natural daylight and positive distractions in art, material

Concept design of the facility



2.2.3 Design Highlights

Patient Centred Layout:

- Flow and navigation: Designed to simplify movement, with clear wayfinding and well-organized pathways to reduce patient stress and confusion.
- Privacy and comfort: Rooms and waiting area designed to provide privacy, comfort, and a sense of calm.

Integrated With Nature:-

- Biophilic design for healing: Designed to create connection with nature. Access nature elements like plants, sunlight, can reduce stress and accelerate healing.

- Abundant natural light: Large windows, skylight, and open spaces allow maximum light to patient room and common area, creating a brighter and more welcoming environment.
- Garden and landscaping: Patients room have view of nature wherever possible, overlooking surrounded landscaping. Indoor plants and green walls in common areas bring a touch of nature inside the building and also improve air quality.
- Preservation of green space: By limiting building spread, existing trees and green areas are protected, maintaining local biodiversity and natural beauty around hospital.

Flexibility And Future Expansion:

- Modular spaces: Spaces design to adapt to future needs, allowing the hospital to expand and reconfigure as the community's healthcare demand grow.
- Adaptable infrastructure: Built-in flexibility for adding new technology and services without major disruptions or renovations

Community and Social Spaces:

- Gathering areas: Spaces for family members and community events. Quiet space for spiritual and mental well being connected to nature.

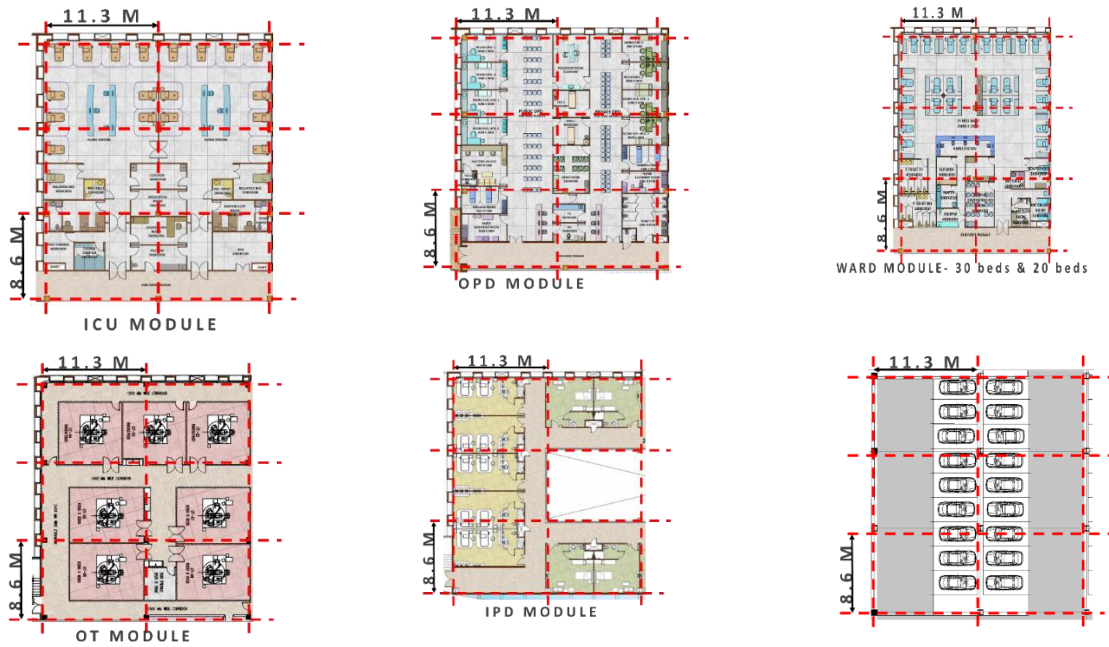
Cultural Sensitivity and Local Aesthetics

- Incorporating local material: using locally sourced material and local style, makes the hospital feel familiar and rooted in the community.
- Art and decor: Incorporating artwork and design elements that celebrates local culture, heritage and tradition.

Sustainable and Eco-Friendly Architecture

- Energy efficient: designed with solar panel, natural ventilation and energy efficient lighting to reduce operational cost.
- Water conservation: rainwater harvesting, efficient plumbing system, and landscaping designed for minimal use.
- Waste management: Hospital waste management is crucial for public health. It involves proper collection, segregation, treatment, and disposal of medical waste. Effective management minimizes the risk of infections and environmental contamination.

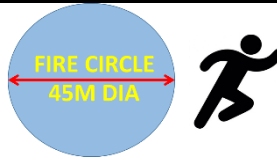
Structural & Architectural Design Approach for the hospital



Safety & Fire Precautions to be set in Hospital



pressurized corridors



fire dampers and fire door



Firefighting appliances



Evacuation plan

The organization will employ the green building concepts by: -

- Reducing foot print with multi storied development and Modular Design
- Choosing the best Building orientation and massing
- Practising Rainwater Harvesting
- Installation of Solar PV, Solar hot water & Solar street lighting
- Having Double glazed on external windows
- STP and reuse of grey water for flushing and irrigation
- Usage of LED lighting
- Treated Fresh Air concept
- Use of IGBC accredited materials for construction
- Light weight AAC block work construction with fly ash content which is a by product in market and with reduced sound and thermal properties
- Having Vegetation equal to the footprint of the building
- Rain water harvesting pits provided to avoid the site runoff less than 50% considering 30% of monthly rainfall.
- Reduction of Light Pollution.
- Bifurcation of Waste during construction activity and during functioning of hospital.
- Usage of recycle content materials
- Usage of Low VOC materials
- Regenerative drive to cut down the energy consumption in elevators by 25 to 30%.

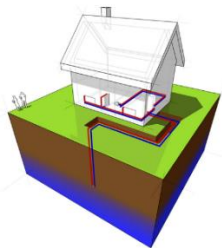
Green_Sustainable Strategies for Hospitals

- Green Building Principles
- Rain Water Harvesting
- Explore the possibility of Geo-Thermal based Heat Transfer of Condenser Cooling Water to River Bed for heat rejection
- Earth Air Tunnel - For Treating Non AC Areas and AHU Fresh Air
- Solar PV at Roof top
- Combination of Solar Hot Water and Heat Pump with free chilling
- All LED light in Common Area, Landscaping, Utility Area
- All LED automated Street Lighting



RAIN WATER HARVESTING

Rainwater Harvesting can be done as one of the strategy, and water collected from roof and site can be stored and reused.



GEOHERMAL COOLING

Geothermal cooling is one of the option to supply the cool air for the Hospital and can be utilize here.

SOLAR LEDS AROUND THE ROADS



SOLAR LED STREET LIGHTS

Solar LED street lights can be utilized in the whole campus. So that most of the public area lighting will be self sufficient.

RAIN WATER STORAGE

GEOHERMAL TUNNELS AT BACK SIDE



SOLAR PV

Due to high Solar angle in Ahmedabad, the use of Solar Panels is beneficial. And can produce for energy to serve the Hospital.

SOLAR PV SKIN ON BUILDING FACADE



Green building concepts

2.2.4 Construction Methodology for The Proposed Hospital

Steel is a preferred material for construction, due to its various advantages like quality, aesthetics, economy and environmental conditions. Pre-engineered Metal building concept forms a unique position in the construction industry in view of their being ideally suited to the needs of modern Engineering Industry. The major advantage of metal building is the high speed of design and construction for buildings of various categories.

Instead of conventional cement mortar plaster for internal plaster work, PREMIX GYPSUM PLASTER can be used which helps to increasing the productivity of the plasterer by 20-25%, requires no water curing, having less density and delivers a crack-free and smooth finish. Building can have Wall of AAC Block along its necessary RCC members, which provides great sound insulation and gives better thermal insulation than any other solid wall because space is full of air and reduces heat transmission.

Installation of Structural Glazing & DGU glass will help to work at different height of building, with safety & utmost quality. Glass system have U-Value, Visual Light Transmittance (VLT) values & SHGC (Solar Heat Gain Co-efficient) values as per green building criteria having 18% recycled content in manufacturing through float glass technology & produce glass product is 100% recyclable. 95% of raw materials required for glass products are coming within 90 km-R from the plant.

For the setup of Steel Building, there are basically eight major components in a pre-engineered building and they include:

1. Main Framing

Main framing basically includes the rigid steel frames of the building. The PEB rigid frame comprises of tapered columns and tapered rafters (the fabricated tapered sections are referred to as built-up members).

2. Purlins, Girts and Eave Struts

Purlins, girts and eave struts are also known as secondary cold-formed members. There is no welding involved in their preparation. They are prepared by just bending the steel coil giving it the desired shape (Z-shape for purlins and girts, and C-shape for eave struts).

3. Panels and Insulation

Single skin profile or ribbed steel sheets are used as roof and wall sheeting, roof and wall liners, partition and soffit sheeting. The steel sheets are generally made from steel coils. Minimum thickness of steel coils used is 0.5mm high tensile steel.

Another alternative is to provide pre-fabricated insulated panels, which comprises of two single skin panels (plain steel sheets galvanized / zinalume color coated) with polyurethane foam insulation in between.

4. Paints and Finishes

Normally the primary and secondary steel are coated with one coat (35 microns) of red oxide paint without any special treatment to steel. However, if some special paint has to be applied to steel in order to give better anti-corrosion properties etc. then the steel members have to be shot-blasted and then coated with the special paints.

For building inside & outside painting on walls & false ceiling is to be provided.

5. Doors and Windows

Steel or aluminum framed doors and windows are fixed to the purlins or the supporting profiled steel either by welding or bolted to the flanges already fixed to the purlins. Proper flashings are applied wherever necessary.

6. False Ceiling

This is usually required for residential building or offices. A metal frame work is hung from the ceiling and false ceiling of rigid boards are either bolted or placed over the frame work.

7. Partition Walls

This is usually required for residential building or offices. Partition wall comprises of two rigid boards having insulation sandwiched in between and fixed to the steel columns or supporting profiled steel and purlins. Alternatively, prefab sandwich panels can also be fixed to the columns and purlins.

8. Flooring

Flooring is usually of conventional nature consisting of cement concrete. For intermediate floors metal decking sheet is fixed to purlins and concrete poured over it.

9. Erection

Steel framing members are delivered at site in pre-cut sizes, which eliminates cutting and welding at site. Being lighter in weight, the small members can be very easily assembled, bolted and raised with the help of cranes. This system allows very fast construction and reduces wastage and labour requirement. These buildings can then be provided with roof decking and wall cladding with metal profile sheets and proper insulation. The framing are so designed that electrical and plumbing services are part of it and can be very easily concealed.

10. Maintenance

In Pre-engineered Pre-fabricated steel houses, the maintenance area is the roofing & cladding. Steel roofing & side wall cladding requires minimum maintenance. The roof should be inspected immediately after installation to check if cleaning of the roof has been carried out fully. It is very often seen that the drilled-out metal and debris are not swept away. These can act as initiators of corrosion and lead to premature failures.

In case of cement particle board walls painting required every 3-4 years.

Comparison of the chosen steel structure construction technology to the ordinary concrete technology

CRITERIA	STEEL STRUCTURE	CONCRETE	ADVANTAGE OF STEEL
Building Dimensions	Suitable for spans over 10M. And up to over 50M.	Suitable for span Below 10M.	Up to 30% cost Saving
Fabrication	Precise Fabrication under controlled Environment	Built on Site	50 % saving in fabrication Time & better Quality
Construction Time	Fast	Slow	More than 50% saving in construction time

Industrial Applications	Can Support Variable requirements	Limited to support light equipment	Cost effective solution
Modularity & scalability	Expansion is easy	Expansion is difficult	Lower Modification cost
Consistency and reliability	Steel Strength is stable over time	Concrete strength will change over time	Strength assured
Quality	Quality of steel is Guaranteed:	G factors lead to quality deterioration	
	Homogeneous Product	Quality of concrete ingredients.	Lower Quality Control
	Fabricated under shop control	Weather conditions	Environment Friendly

2.2.5 Infrastructure requirement

The infrastructure requirement for the proposed project has been broadly classified into the following two categories:

- a) Basic Infrastructure: includes construction material, water supply, drainage, power, parking, road and streetlight.
- b) Environmental Infrastructure: comprising drainage and sewage system, biomedical and solid waste management and green areas/landscaping.

2.2.5.1 The basic infrastructure requirement includes:

- a. Construction material: - The major materials required for construction of the proposed project will be steel, cement, bricks, metal, flooring tiles/stones, wood, sanitary and hardware items, electrical fittings, water and roof materials. These will be purchased from licensed contractors that have complied with the relevant authorities.
- b. Water: - During the construction stage, water will be sourced from the Nairobi City Water and Sewerage Company. The designs of the health facility will also employ techniques that will seek rainwater harvesting. Water Saving PHE System and VFD Operated Pump system will be installed. Distinct modes, namely the mist mode which can save up to 95% water by generating the water into minute droplets or mist-like consistency and the shower mode. For successful operation of whole plumbing system we can install PRS/PRV valve system, various pumps such as domestic water supply pumps, hot water supply pump, flushing water system having connection through STP, Sump Pump at Basement for Rain Water Harvesting, pump for Excess Water in STP, pump for Laundry operation & kitchen area in service. Rain Water Harvesting: Arrangement for effective technique for rain water harvesting through proper storm water collection & its conveyance up to Percolation Wells will be made.
- c. Storm water drainage systems: - In general, the rainwater from terraces and other elevated open areas shall be collected through rainwater down-take pipes and connected to catch basins. The rainwater from hard courts and landscaped areas shall be collected by catch basins through a RCC pipe network, or open drains with gratings, and connected to the storm water channels. Water from the roofs will flow through downpipes, into manholes and to the untreated water tank.

- d. Power: - The operation of the cancer Centre will use energy from KPLC. The project has plans to also install a solar power system and have Backup generators in case of power outage.
- e. Parking provisions: - There will be adequate parking provisions within the project site, with plans being made for about 40 vehicles at site at one point.
- f. Roads and street lighting: - The project area is well served by a good road network which is tarmacked. The primary access for the proposed development is Westlands - Red Hill Link Road (J15_Nairobi_R). Based on the Road Classification Manual (MoR, 2009) and Kenya Gazette Supplement No. 4 of 2016 on the Classification of Roads (GoK, 2016), Westlands - Red Hill Link Road is class Bu—an urban arterial falling under the jurisdiction of Kenya Urban Roads Authority (KURA). The proposed hospital is to provide designate areas within the development for pick-up and drop-off, emergency entry and exit points for ambulances to reduce, to prevent queuing along the Redhill Link Service Road. The project will ensure that there is adequate street lighting within the project location. The proposed project has also setup Traffic management.
- g. Communication: The area is well covered by all mobile service providers (Safaricom, Airtel, and Telkom Kenya) and internet providers (Safaricom, Faiba, Vilcom , Starlink and Poa Internet).
- h. Green Spaces: - The Hospital's Master Plan has included the setup of green spaces within the facility. The preservation of green space will be done by limiting building spread, existing trees and green areas at the site will be protected, and the local biodiversity and natural beauty around hospital will be maintained. The hospital will work closely with the Nyari Resident Association on the maintenance of the area's biodiversity.

Traffic movement/ management for the proposed facility

REDHILL CANCER HOSPITAL



VEHICULAR MOVEMENT

ARCHITECTURE

2.2.5.2 Environmental requirement

- a. Wastewater management: - The proposed healthcare facility will be connected to an ETP .
- b. Solid and biomedical waste: - It is envisaged, that about 350- 650 kg of solid waste will be generated from the project, and in this about 48-50 kg of Bio-medical waste will be generated. During the construction and operation phases, solid waste will be transported to the area's waste disposal site by NEMA registered expert. All healthcare facility waste deemed hazardous to the environment will be autoclaved at approved waste handling facility before being dumped at approved dumpsite.

2.3 Project Cost

Total estimated cost of the proposed project is **Kshs 601,223,566.**

2.4 Project Activities

The activities to be carried out during each phase of the project are described below.

2.4.1 Planning / Pre-Construction Phase

Most activities at the planning stage have been undertaken and others are ongoing. It entails project acquisition of land, developing designs for the infrastructure, and seeking approvals from relevant authorities including NEMA. This is also a very a critical phase to involve all the stakeholders including surrounding persons and an opportunity to establish whether land related conflicts exist. In the case of the proposed project, there is no land ownership or property disputes and the proponent has genuine title deed and relevant land permit documents i.e. change of land use document. During this phase, proponent will also mobilize construction machinery, seek out various contractors and required utilities, erect temporary material storage structures and avail all other construction materials in readiness for the next phase of the project. All these activities shall be guided by best 21 practices in environmental protection and safety protocols provided by national environmental and safety legislations.

2.4.2 Construction Phase

The construction activities will include: -

- Excavation – foundation, machine pits excavated to manufacturer's specification, electric cable trenches, drainage for water and waste water, service tanks.
- Concrete foundation for stands, motors and machineries & Concrete Flooring
- Power station to provide power output of the needed capacity

2.4.3 Final Inspection and occupation

Final inspection will be undertaken to ensure that the project has been done properly and according to the terms of the contract. The inspection team will normally include the project proponent/client, the architect, the engineer and the contractor or their representatives and the County inspection team. The inspection will normally begin at the bottom of the construction to the top and look at and inspect every detail of construction, functioning of electrical installations etc. The inspection team shall prepare a punch list indicating the items that need to be corrected. The list will be given to the contractor for necessary action within a specified period. If no new defects are noted,

the job will officially be completed. A facility inspection report and certificate of occupation will subsequently be issued. In issuing the certificate of occupation, the inspection will take into account health and safety considerations of intended occupants. Upon certification of the building for occupation, and upon receipt and consideration of necessary legal and other relevant documentation from the contractor, the project proponent will file a formal 'Notice of Completion'. The project will then be handed over to the proponent.

2.4.4 Operational Phase

The operational phase will include the operation of the cancer treatment facility.

i. General maintenance activities of the facility

Activities undertaken during the project operations phase include general maintenance of the hospital, general housekeeping and repairs of any defect that can be identified at the facility.

ii. Waste Management

The project proponent will be required to manage the waste generated during the operation phase of the project appropriately. This can be done by providing facilities for temporary storage or handling of the solid and liquid waste generated during the period, the bins can be emptied by the contracted company for appropriate disposal. The waste water generated will be channeled to an Effluent Treatment Plant that will be constructed by the proponent.

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

- a) **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.
- b) **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 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. 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.

iii. Recourse management

- Electricity: - the organization will monitor the energy consumption on monthly basis and help in the reduction of cost the organization is to Installation of Solar PV, Solar hot water & Solar street lighting.
- Water: - the organization will monitor their consumption on monthly basis and it will setup strategies to ensure that there is no unnecessary / excess consumption of water by reuse of grey water for flushing and irrigation. The organization is also to have a system that will recharge groundwater in the area by constructing recharge pits, trenches, and shafts, which will allow rainwater collected from the building to be infiltrated back to the ground and replenish the aquifer of the area.

2.4.5 Decommissioning Phase

The activity at this phase would be bringing to a cease all activities and related operations. It may entail removal of machinery and equipment installed to pave way for its rehabilitation. Demolition of activities may result in debris, left over raw materials and waste products from the activities.

CHAPTER THREE:

3.0 ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE CONDITIONS

3.1 Introduction

Collection of base line data is an integral aspect of the preparation of environmental impact assessment report. The baseline environmental qualities of various environmental components like air, noise, water, land, flora and fauna and socio-economic form an important and integral part of any environmental study. The baseline data forms the basis for predicting/assessing the environmental impacts of the proposed project. The baseline environmental quality is assessed through field surveys within the impact zone for various components of the environment. The scoping and the extent of data generation were formulated based on interdisciplinary team discussions, and professional judgment keeping in view of the approved TOR by NEMA.

3.2 General Location

The project will be located in Nairobi County which is the Capital City of Kenya. The city borders Eastern Province to the east and East Province to the west and south and Rift Valley Province to the Northwest. Nairobi owes its birth and growth to the construction of Kenya-Uganda Railway. Following its establishment in 1899 as a railway depot, Nairobi soon became a communications centre and the headquarters of the provincial administration. Recently the Government of Kenya declared Nairobi a Metropolitan City so as to comprise of the nearby towns such as Thika, Machakos, Kitengela, Athi River, Kikuyu, Limuru, Ongata Rongai and Ngong. Nairobi is located at approximately 10 17'S 36049'E at the South Eastern end of Kenya's agricultural heartland. It occupies an area of about 696 km² and the altitude varies between 1,600 and 1,850 metres above sea level. The proposed project is situated LR NO 5829/2 (Originally Number 3857/2).

3.3 Physical Environment

3.3.1 Climatic Conditions

The climatic conditions prevailing in Nairobi are characterized by a warm and moderate temperature. Nairobi has a significant amount of rainfall during the year. This is true even for the driest month. This climate is considered to be Cfb according to the Köppen-Geiger climate classification. The mean yearly temperature observed in Nairobi is recorded to be 18.8 °C | 65.8 °F. Approximately 674 mm | 26.5 inch of rainfall occurs on a yearly basis. The location Nairobi is located in a temperate zone, making it difficult to categorize the seasons.

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	19.7 °C (67.5) °F	20.5 °C (68.9) °F	20.5 °C (68.9) °F	19.3 °C (66.8) °F	18.5 °C (65.3) °F	17.6 °C (63.8) °F	17 °C (62.7) °F	17.3 °C (63.1) °F	18.5 °C (65.3) °F	19.3 °C (66.7) °F	18.3 °C (64.9) °F	18.6 °C (65.5) °F
Min. Temperature °C (°F)	14.4 °C (57.8) °F	14.8 °C (58.7) °F	15.5 °C (59.9) °F	15.7 °C (60.2) °F	14.7 °C (58.5) °F	13.3 °C (56) °F	12.2 °C (54) °F	12.6 °C (54.6) °F	13.1 °C (55.7) °F	14.5 °C (58.1) °F	14.7 °C (58.4) °F	14.4 °C (57.8) °F
Max. Temperature °C (°F)	25.8 °C (78.5) °F	26.8 °C (80.3) °F	26.5 °C (79.7) °F	24.4 °C (75.9) °F	23.1 °C (73.6) °F	22.2 °C (72) °F	22 °C (71.5) °F	22.3 °C (72.2) °F	24.3 °C (75.7) °F	25 °C (77.1) °F	23.2 °C (73.8) °F	24 °C (75.2) °F
Precipitation / Rainfall mm (in)	37 (1)	34 (1)	62 (2)	125 (4)	102 (4)	48 (1)	20 (0)	28 (1)	20 (0)	49 (1)	94 (3)	55 (2)
Humidity(%)	59%	53%	59%	72%	72%	67%	64%	63%	58%	59%	75%	70%
Rainy days (d)	5	4	9	16	13	7	3	4	3	8	14	9
avg. Sun hours (hours)	9.5	9.6	8.5	6.6	5.7	4.6	4.2	4.3	6.5	7.2	6.4	8.1

There exists a variation of 105 mm | 4 inch in precipitation levels between the month with the least rainfall and that which experiences maximum downpour. During the year, the average temperatures vary by 3.5 °C | 6.3 °F.

It has been determined that November exhibits the highest relative humidity, with a percentage of 74.78. On the other hand, it is observed that during February, there is an extremely low level of relative humidity at only 53.25 percent. The wettest month is April (20.97 days), whilst the driest is September (4.23).

3.3.2 Topography

The project site is in an area with a gently sloping topography that is generally flat in most of the area with a gradient of not more than 2%. Most of the land area has been under the influence of man due to the development activities mainly from the construction industry that has shaped most of the land area giving it a new look. This has resulted in to an area with approximately 40% of the entire earth surface covered by civil and structural works.

3.3.3 Soils

The dominant soils in the area are vertisols, arenosols, ferralsols, acrisols, luvisols and The rocks in the Nairobi area mainly comprise a succession of lavas and Pyroclastics of the Cainozoic age and overlying the foundation of folded Precambrian schist's and gneisses of the Mozambique belt (Saggerson, 1991). The crystalline rocks are rarely exposed but occasionally fragments are found as agglomerates derived from former Ngong volcano. The soils of the Nairobi area are products of weathering of mainly volcanic rocks. Weathering has produced red soils that reach more than 50 feet (15m) in thickness (Saggerson, 1991). A number of subdivisions are recognized in the Nairobi area according to drainage, climatic regions and slopes, and other categories have been introduced for lithosols and regosols.

3.3.4 Water Source

Nairobi receives its potable water from a variety of sources. 94% of the water is sourced from three main reservoirs in the Tana River Basin; the Thika Dam, Ndakaini; The Sasumua Dam and the Chania-B Dam. 6% of water supply is from local sources such as the Kikuyu Springs and the Ruiru Dam on the Athi River Basin. The Thika Dam provides most of water for the needs of the increasing population in Nairobi. Ground water from boreholes adds an estimated 85,000m³. The Nairobi City Water and Sewerage Company (NCWSC) provide water services within Nairobi.

3.4 Ecological Environment

3.4.1 Flora and Fauna

There are no endangered animals and plants in the immediate environs of the proposed project site. No major forest areas exist within or near the proposed development.

3.5 Infrastructure and Services

3.5.1 Water supply

The proposed project plans to source water from a borehole that will be drilled at the site, with an alternative of supply from Nairobi water and sewerage company in future in

case of expansion of the water supply in the area by Nairobi water and sewerage company.

3.5.3 Electricity supply

The national electricity grid passes through almost all the areas around Nyari Area. The proposed hospital will be connected to the main line with an individual meter for the building.

SITE PHOTOS



Vegetation cover on site



Nearby Gitathuro River which flows along the lowermost boundary of the project site



Well-built storm drains and a view of the Red Hill Link Road



Nearby Nyari Estate



Vegetation cover on site

CHAPTER FOUR

4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This section of the report discusses the policies, applicable Environmental Health and Safety (EHS) legislations and institutional framework that are relevant to the Proposed Project.

4.1 National Policies and Regulations

In Kenya there are various sector specific legal instruments that cover environmental and social issues such as public health; soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc.

The main piece of legislation governing environmental management in Kenya is the Environmental Management and Co-ordination Act (EMCA) of 1999, Amended 2015. The main objective of this Act is to provide for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. EMCA provided for the establishment of a National Environment Management Authority (NEMA), which became operational in July 2002. NEMA has the statutory mandate to coordinate all environmental activities. The EMCA has given rise to various regulations that govern environmental Impact Assessment and Audit and regulations governing Water Quality, Air Quality, Noise and Excessive Vibrations, Waste Management, Wetlands, River Banks, Lake Shores and Sea Shore Management and Conservation of Biological Diversity.

4.2 National Policies

Table below 1 shows the National Policies relevant to the Proposed Redhill Cancer Center

National Policy	Community development
The National Environment policy, 2013	<ul style="list-style-type: none">• The National Environment Policy aims to provide a holistic framework to guide environmental and natural resource management in Kenya.• It also ensures that the link between the environment and poverty reduction is integrated into all government processes and institutions in order to facilitate and realize sustainable development at all levels in the context of a green economy, enhancing social inclusion, improving human welfare, creating employment opportunities and maintaining a healthy functioning of the ecosystem.
The Kenya Health Policy 2012 – 2030	<ul style="list-style-type: none">• The policy is based on the Constitution of Kenya 2010, Vision 2030 and global health commitments.• Its broad aim is to ensure equity, people-centeredness and participation, efficiency, multi-sectoral approach and social accountability in delivery of healthcare services.• It sets out the goal, objectives, guiding principles and policy directions aimed at achieving Kenya 's health agenda and a comprehensive implementation framework. Also included is the institutional management plan under the evolved system

	<p>of government taking into account the varied roles of the national and county levels of Government.</p> <ul style="list-style-type: none"> • The policy also sets out a monitoring and evaluation framework to track progress in achieving the policy objectives.
The National Environmental Sanitation and Hygiene Policy 2007	<ul style="list-style-type: none"> • The Environmental Sanitation and Hygiene (ESH) Policy is intended to improve people 's health and quality of life. <p>Strategic interventions have been developed to determine the success of the policy implementation.</p> <ul style="list-style-type: none"> • One of the key purposes of this policy is to clarify the various roles in order to enhance the existing legal and constitutional framework and to encourage the private sector, civil society and community participation in the planning, implementation and ownership of ESH services. • Sanitation and the Environment: One of the key objectives of the policy is to protect the environment from pollution and its negative effect on human health. The government will seek to minimize negative impacts arising from various types of sanitation systems, and maximize positive effects. • Well-functioning sanitation and hygiene systems are a means of protecting the environment. • The health risks associated with poor ESH increase poverty.
Land Policy (Sessional Paper No. 3 of 2009).	<ul style="list-style-type: none"> • Envisions the efficient, sustainable and equitable use of land for prosperity and posterity • Seeks to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives. • Seeks to offer a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that will provide inter alia, economically viable, socially equitable and environmentally sustainable allocation and use of land, efficient and effective utilization of land and land-based resources. • Government shall develop a comprehensive and integrated land use policy having regard to fragile areas and the needs of neighboring communities and individuals in such areas • Government shall ensure that environmental impact assessments and audits are carried out on all proposed projects, programmes and activities on land that have a likelihood to degrade the environment.

4.3 National Legislation

The following legislative provisions and regulations are considered key to management of the environmental, health and safety aspects related to the proposed development.

Legal and regulatory framework applicable to the project

No	Legislation/Regulation/Standard	Provisions	Relevance to the Project/ License or Permit Required/ or Activity requiring regulation
1	The Constitution of Kenya (2010)	<ul style="list-style-type: none"> - The Constitution has enhanced protection and enforcement of fundamental rights amongst other gains. It provides for a two-tier structure of government, i.e. the National and the County Governments. It distributes the functions and powers between the two levels as detailed in Chapter Eleven and the Fourth Schedule. - In relation to the County Governments, Part 2 of the Fourth Schedule provides that they shall be responsible for county planning and development. 	<ul style="list-style-type: none"> • The project shall be implemented in consultation with both the national government and the county government including the relevant authorities;
2	Environmental Management and Coordination Act 1999, Amended 2015	<ul style="list-style-type: none"> - Provides for protection and conservation of the environment, environmental impact assessment, and environmental auditing and monitoring. - Provides that all reasonable measures shall be taken to mitigate any undesirable effects not contemplated in the ESIA and an environmental audit report on those measures be prepared and submitted to NEMA 	<ul style="list-style-type: none"> • Project has initiated this ESIA in compliance with regulations
3	Environmental (Impact Assessment and Audit) Regulations, 2003 Amended 2019	<ul style="list-style-type: none"> - Provides for the procedure for carrying out the Environmental and Social Impact Assessment (ESIA). Provides for the contents of an ESIA Study Report. 	<ul style="list-style-type: none"> • The ESIA to be carried out in accordance to the regulations.
4	Environmental Management and Co-ordination (Water Quality) Regulations 2006	<ul style="list-style-type: none"> - Provides for the protection of ground and surface water resources. - Provides for the parameters in the quality of wastewater discharged from any facility/activity into the environment or sewer. 	<ul style="list-style-type: none"> • Any discharges to the surface water courses during operation phases to be monitored for conformance with the standards

5	Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	<ul style="list-style-type: none"> - Prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. - Provides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential. - Provides that where a sound source creates or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, a license is required 	<ul style="list-style-type: none"> • Sound level limits of 60dB (day) and 35dB(night) to be observed during operations • License to emit noise/vibrations in excess of permissible levels to be acquired if necessary
6	Environmental Management and Co-ordination (Waste Management) Regulations 2006	<ul style="list-style-type: none"> - Provides for standards for handling, transportation and disposal of various types of wastes including hazardous wastes. - Requirements to ensure waste minimization or cleaner production, waste segregation, recycling or composting. - Provides for licensing of vehicle transporting waste. - Provides for the licensing of waste disposal facilities 	<ul style="list-style-type: none"> • Disposal of generated waste from operations under the Project;
7	Environmental Management and Co-ordination (Fossil Fuel)	<ul style="list-style-type: none"> - Provides for emission standards for internal combustion engines. 	<ul style="list-style-type: none"> • Use of diesel-powered generators and compressors in operations
8	Environmental Management and Coordination (Air Quality) Regulations, 2014	<ul style="list-style-type: none"> - Provides for ambient air quality tolerance limits. - Prohibits air pollution in a manner that exceed specified levels. - Provides for installation of air pollution control systems where pollutants emitted exceed specified limits. - Provides for the control of fugitive emissions within property boundary. - Provides for the control of vehicular emissions. 	<ul style="list-style-type: none"> • Exhaust/stack emissions from equipment at hospital vehicles in use by staff or patients

		- Provides for acquisition of an emission license.	
9	The Public Health Act (Cap 242)	- Provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans	<ul style="list-style-type: none"> • Generation of wastes from operations under the project • Handling, storage and disposal of waste at the project
10	Occupational Safety and Health Act (OSHA), 2007	<ul style="list-style-type: none"> - Provides that every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace - Provides that before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises - Provides that workplace shall be of sufficient size for work to be carried out with ease and shall further have the necessary free space and, having regard to the nature of the work, an adequate amount of air for each employee, the minimum permissible being ten cubic meters per person - Provides that an occupier shall ensure that effective and suitable provision is made for securing and maintaining, by the circulation of fresh air in each workroom, the adequate ventilation of the room - Provides that an occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing - Provides that sufficient and suitable sanitary conveniences for the persons employed, patients and visitors in the facility shall be provided, maintained and kept clean, and effective provision shall be made for lighting the conveniences; and, where persons of both sexes are or are intended to be employed (except in 	<ul style="list-style-type: none"> • Site registration as a workplace • Safety measures are required in use of tools and machinery on sites • Protection of the workers and general public with any form of interaction with the sites is necessary

		<p>the case of workplaces where the only persons employed are members of the same family dwelling there), such conveniences shall afford proper separate accommodation for persons of each sex</p> <ul style="list-style-type: none"> - Provides that all machinery and equipment whether fixed or mobile for use either at the workplace or as a workplace, shall only be used for work which they are designed for and be operated by a competent person 	
11	The Factories and Other Places of Work (Fire Risk Reduction) Rules, 2007	<ul style="list-style-type: none"> - These rules apply to every workplace, process and operations to which the provisions of the Act apply 	<ul style="list-style-type: none"> • The project will need to provide necessary infrastructure to prevent fire incidence
12	Land Registration Act, 2012 (Act No. 3 of 2012)	<ul style="list-style-type: none"> - Provides for the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. 	<ul style="list-style-type: none"> • The proposed project site is registered and has a title deed.
13	The Physical and Land Use Planning Act, 2019	<ul style="list-style-type: none"> - Provides for zoning of areas for hospital projects. 	<ul style="list-style-type: none"> • The Proposed Project has been approved by the County's Physical Planning Department.
14	National Construction Authority Act. (Cap.449A) National Construction Authority Regulations, 2014	<ul style="list-style-type: none"> - Regulates construction activities and registration of contractors in Kenya. 	<ul style="list-style-type: none"> • The Project shall seek development approval from the NCA and engage approved contractor during construction phase
15	Employment Act No 11 of 2007	<ul style="list-style-type: none"> - Prohibition Against Forced Labor - Prohibition of child Labor 	<ul style="list-style-type: none"> • Project proponent undertakes to abide by the requirements of the Act
16	Climate Change Act, 2016	<ul style="list-style-type: none"> - This Act is applied for the development, management, implementation, and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya. The Act places duties on the national government and county governments to mainstream climate change responses into development planning, decision making, and implementation and to respond in various other 	<ul style="list-style-type: none"> • Every development possesses climate change risks. Critical functions of the hospitals will either act as climate stressors or enablers. Such associated risks, if unmitigated, might contribute to costly climatic damages or disruptions, either currently or in future. Project proponent

		<p>ways to climate change. The Act sets out principles of climate change planning and implementation of measures. Per the Act, every development undertaken by the public and private sectors is required to act in the best interests that protects the environment. The act establishes an institutional framework to govern climate change matters to ensure compliance. Such a framework includes the following stakeholders.</p> <ol style="list-style-type: none"> 1. National Climate Change Council- Tasked with the responsibility of providing an overarching national climate change coordination mechanism by ensuring that the legislative and policy-making functions 2. Cabinet Secretary Climate Change Response Function-Coordinates negotiations on climate change related issues 3. Climate Change Directorate- Lead agency of the government on national climate change plans and actions to deliver operational coordination. 4. National Environmental Management Authority (NEMA)- Tasked with monitoring, investigating, and reporting on whether public and private entities are in compliance with the assigned climate change duties in addition to regulating, enforcing, and monitoring compliance on levels of greenhouse gas emissions as set by the Council under the Climate Change Act. 	<p>undertakes to abide by the requirements of the Act</p>
17	The Nurses Act, Chapter 257	<p>- This is an Act of Parliament that makes provision for the training, registration, enrolment and licensing of nurses, to regulate their conduct and to ensure their maximum participation in the health care of the community and for connected purposes.</p>	<ul style="list-style-type: none"> • The proponent has complied with the same in order to achieve the required set standards when it comes to the provision of medical care

18	Radiation Protection Act, Chapter 243	- An Act of Parliament to provide for the protection of the public and radiation workers from the dangers arising from the use of devices or material capable of producing ionizing radiation e.g. X- ray machines and for other connected purposes.	<ul style="list-style-type: none"> • Compliance with this act will be a main objective by the proponent to ensure proper use of radiation emitting equipment and therefore protect patients and other employees from the harmful effects occurring from overexposure to radiation
19	The Medical Practitioners and Dentists Act, Chapter 253	- An Act of Parliament to consolidate and amend the law to make provision for the registration of medical practitioners and dentists and for purposes connected therewith and incidental thereto.	<ul style="list-style-type: none"> • This Act should act as guidance to the proponent on the requirements of hiring of doctors to avoid cases of malpractice.
World Bank Safeguard Policies			
1.	Environmental Assessment: OP/BP 4.01	- Used to identify, avoid, and mitigate the potential negative environmental impacts associated with a project	<ul style="list-style-type: none"> • Project has potential to impact the environment through pollution of soil and water and social impact to local community
- IFC Performance Standards			
1.	Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts	- Establishes the importance of integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects.	<ul style="list-style-type: none"> • The nature of the project and the existing local regulation since the proposed project falls in the category listed in the Second Schedule of the Environmental Management and Co-ordination Act (EMCA), 1999 Amended 2015.
2.	Performance Standard 2: Labour and Working Conditions	- Recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers as guided by the ILO Conventions.	<ul style="list-style-type: none"> • The proposed project is expected to create job opportunities for both skilled and unskilled Labor during construction and operation phases.
3.	Performance Standard 3: Resource Efficiency and Pollution Prevention	- Recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may	<ul style="list-style-type: none"> • The proposed project is anticipated to generate negative impacts during its life cycle, however the significance of the impacts will range between minor

		threaten people and the environment at the local, regional, and global levels.	to moderate before mitigation and will further reduce after implementation of mitigation measures.
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Institutional frame work

Institution	Role in Proposed Project	Project cycle stage Required
NEMA	<ul style="list-style-type: none"> - Issuance of EIA license - Inspections and monitoring compliance with license and approvals conditions - Protect public interests 	Throughout the Project Cycle
Directorate of Occupational Health and Safety	<ul style="list-style-type: none"> - Registration of the facility as a work place - Enforce compliance with OSHA No. 15 of 2007 - Registration of the construction site as a work place - Enforcing compliance with Occupational Health and Safety Regulations at the construction site 	Throughout the Project Cycle
Ministry of Health	<ul style="list-style-type: none"> - Health policy - Health regulation 	Throughout the Project Cycle
Nursing Council of Kenya	<ul style="list-style-type: none"> - Provides registration information of nurses to avoid cases of malpractice 	Throughout the Project Cycle
Medical Practitioners and Dentists Board	<ul style="list-style-type: none"> - Provides registration information of medical practitioners and dentists to avoid cases of malpractice 	Throughout the Project Cycle
The Pharmacy and Poisons Board	<ul style="list-style-type: none"> - Provides registration information of approved medical drugs and appliances 	Throughout the Project Cycle

CHAPTER FIVE

5.0 STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE

In order to gain public views, concern and values with regard to the proposed project, public living in close proximity to the project will be identified and consulted. Through this, it is anticipated that transparency and accountability in the final project report would be achieved.

Possible conflicts between the key stakeholders, living in Nyari, interested parties, mandated government agencies, among others, would be addressed and solved at an earlier stage. Possible delays in project implementation and extra costs will be avoided.

5.1 Stakeholder Identification

The stakeholders to be consulted during the EIA study include the following groups:

- The Landlord;
- Physical Planning Department, Nairobi
- Kenya Power and Lighting Company (KPLC);
- Nairobi Water Supply and Sewerage Company;
- Nyari Residence Association;
- Ministry of Health (MoH),
- Kenya Nuclear Regulatory Authority,
- Cancer Institute of Kenya
- Neighbours with land parcels.

Once the above stakeholders had been identified on the ground, a further analysis was done to better understand their relevance and the perspective they offer, in understanding their relationship to the project issues and each other, and to prioritize them based on their relative usefulness to this engagement.

5.2 Key Standards and Legislations during the Stakeholder Engagements

According to Kenyan regulations, stakeholder engagement is mandatory as per the following regulations:

1. The Constitution of the Kenya 2010, Article 69, 1(d) empowers the state to encourage public participation in the management, protection and conservation of the environment.
2. Environmental Management and Coordination Act, 1999 (Amendment 2015) emphasizes on public participation in development of policies, plans and processes for the management of the environment.
3. Environment Impact Assessment Guidelines and Administrative Procedures required public participation and disclosure of project information during ESIA procedure in the development of projects, policies, plans and programmes.
4. Climate Change Act, 2016, which guides the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya. The Act is applicable to all sectors of the economy by the national and county governments to facilitate capacity development for public participation in climate change responses through awareness creation, consultation, representation and access to information.
5. Environment and Social Impact Assessment Guidelines and Administrative Procedures requires public participation and disclosure of project information during EIA procedure in the development of projects, policies, plans and programmes.

As compared to the Kenyan law, the World Bank ESF advocates for stakeholder engagement and has dedicated ESS 10 i.e. Stakeholder Engagement and Information Disclosure, which takes into account among others objectives, scope of application and requirements. ESS 10 must be applied in conjunction with ESS1. Requirements regarding engagement with workers are found in ESS2.

Stakeholder Involvement Process

The consultant developed a stakeholder engagement strategy, which will ensure that all stakeholder interfaces are managed based on their needs, interests, and influence during this assignment. The strategy focuses on both formal stakeholder engagement and day-to-day relationship management as outlined in.

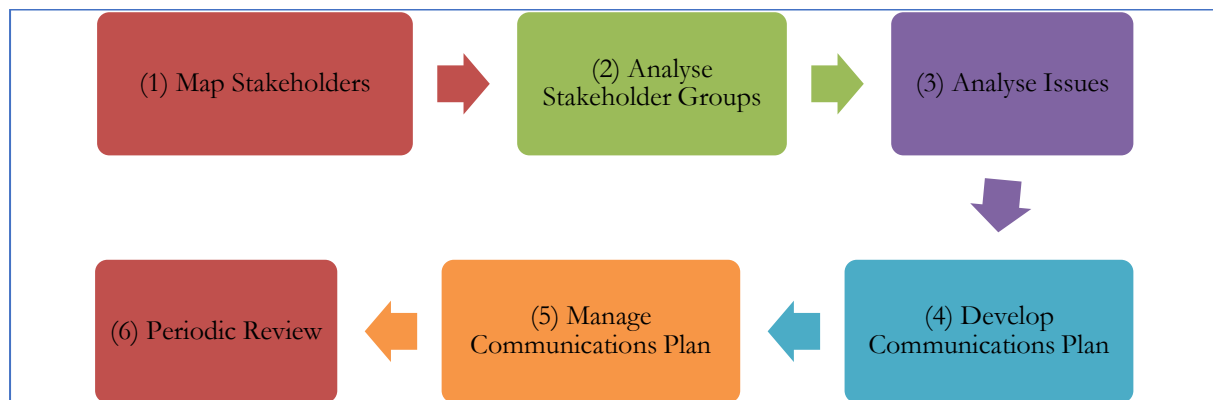


Figure 5: Stakeholder Management Process

The benefits of this approach include:

- Gaining a full understanding of all the stakeholders, their needs and appropriate communication channels can increase the likelihood of the project's success.
- Having clear 'owners' and strategies for key stakeholders helps get closer to their needs and ensures that messages are consistent and appropriate.

It provides a structure that can then be reviewed regularly, enabling the approach to be flexed to achieve overall project success.

5.3 Stakeholder Consultation Process

The Consultant will adopt a number of levels and strategies of engagement across this spectrum using a variety of different tools as presented in **Figure 6** below.

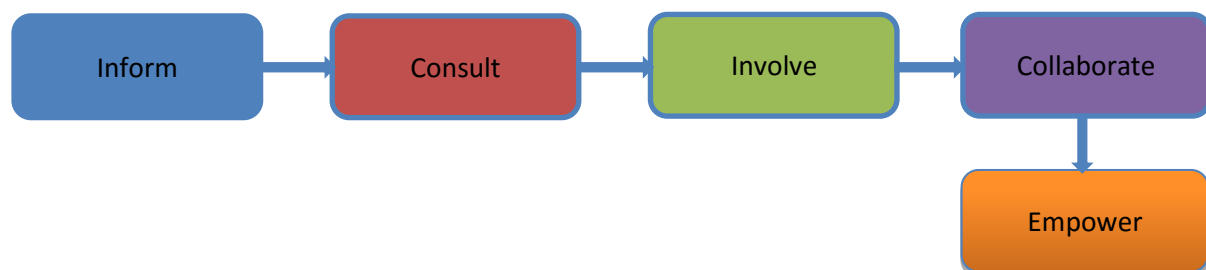


Figure 6: Stakeholder Consultation Process

1. **Inform:** Provide stakeholders with balanced and objective information to help them understand the project, the problem, and the solution alternatives. (There is no opportunity for stakeholder input or decision-making). This is done through Nyari Residence Association's meetings.
2. **Consult:** Gather feedback on the information given. Level of input can range from minimal interaction (online surveys, etc.) to extensive. Can be a one-time or

ongoing/iterative opportunity to give feedback to be considered in the decision-making process. Questionnaires and KIIs were used here.

3. **Involve:** Work directly with stakeholders during the process to ensure that their concerns and desired outcomes are fully understood and taken into account at each stage. Final decisions are still made by the consulting organization, but with well-considered input from stakeholders through public participations.
4. **Collaborate:** Partner with stakeholders at each stage of the decision-making, including developing alternative solution ideas and choosing the preferred solution together. Goal is to achieve consensus regarding decisions by all key stakeholders.
5. **Empower:** Place final decision-making power in the hands of stakeholders. This level of stakeholder engagement is rare and usually includes a small number of people who represent important stakeholder groups. A final report being submitted to NEMA.

5.4 Public Consultation

Public consultation and participation is a facilitative process of strengthening the organizational and management capacities of people in such a way that they become self-reliant in solving their own problems. It connotes the organized action of the people towards the resolution of issues or acquisition of what they desire and what may benefit them. This, then, requires that people, as a group, must have proper ownership of actions and highly organized course of action.

Objectives of Public Participation

The consultants planned and conducted public consultation meetings with Nyari residence in the project area on **15th November 2024**. A two weeks' notice had been given to the Nyari residence's committee and all those in close proximity to the project. The purpose of these consultative meetings was to:

- Inform the local people, leaders and other stakeholders about the proposed project and its objectives;
- Initiate public involvement processes, in a bid to induce and cultivate a sense of peoples' belongingness to the project;
- Suggest and facilitate the peoples' roles in the project's sustainability, in terms of management, maintenance and productivity;
- Seek views, concerns and opinions of people in the area concerning the project;
- Establish if the local people foresee any positive or negative environmental effects from the project and if so, how they would wish the perceived impacts to be addressed; and
- Find out if there are issues or places of cultural/or religious importance to the local communities that could be negatively impacted upon by the Project.

Aims of the Consultation Process

Effective public participation requires the availability of adequate information in public inputs. The latter involves various values, critiques, questions, information, suggestions and other inputs, which are expressed by individuals, groups or organizations among the general public in an attempt to influence decision-making. The consultant held public consultations with Interested and Affected Parties (IAPs) with the following aims:

1. Improve project design and thereby minimize conflicts and delays on implementation;

2. Facilitate the development of appropriate and acceptable entitlement options;
3. Increase long term project sustainability and ownership; and
4. Reduce problems of institutional coordination.



Initial Meeting between the Proposed Redhill Cancer Hospital Project Proponent, Environmental Consultant and Nyari Office Committee Representatives at the Nyari Office on 18th June 2024.



Meeting between RVL Healthcare Limited and Nairobi County Government Officials at the Chief Officer, Urban Development and Planning Office (Nairobi County Building - Annexe) on 12/11/2024



Preliminary meeting with Nyari Residents Association and Northern Block representatives at Nyari Estate 13.11.2024





Photos of the major public participation conducted on the 15th November 2024

5.5 Community Perceptions on the Project

From the public consultations undertaken, it was evident that the community embraced the facility. A summary of project impacts anticipated by the local community consulted during the meetings is presented below:

Potential Positive Impacts

- a) Improve livelihood of the people
- b) Enhance business
- c) Growth of the area
- d) Improved drainage systems
- e) Creation of employment as labour will be sourced from the local community
- f) Improved infrastructure that is, water and electricity supply

Potential Negative Impacts

- a) Change of land use to hospital use.
- b) Noise pollution as a result of use of heavy machinery during the construction phase of the project.
- c) Air pollution due to the dust from the excavation process and movement of the heavy machinery.
- d) Loss of biodiversity especially the flora; vegetation in the project area will have to be cleared
- e) Increased soil erosion due to land disturbances from the heavy machines.
- f) Accidents during the construction works

Areas of concerns raised to the proponent so far were:

- Project impacts on infrastructure i.e. road
- Environmental issues - impacts of discharge from the project on the river passing near the project site; the river was already impacted by silt from a collapsed dam during the last rains (plans are in place by the Residents' Association to clean up the silt and enhance the wall of the second dam to avoid its collapse)
- Security concerns - with influx of workers into the area
- Pollution impacts during the setup and operation of the facility (air, soil and water)
- Issue on waste generation and its management i.e. solid and liquid
- Zoning/ land use issues - project will be situated in Zone 13 (adherence of project to specifications concerning utilization of land in the zone is key)
 - 4 or 5 projects are already coming into the area, raising zoning issues

Conclusion

The community supports the project since it will bring about numerous social economic benefits in Nyari area. However, the community emphasizes the need to be involved in the overall project and that the proponent should commit to adhere to all laws and regulations that governs the setup and operation of such entities. The proponent will ensure that Nyari Residence Association are involved at all stages of the project. In so doing, this will go a long way in ensuring the smooth implementation of the project.

CHAPTER SIX

6.0 ALTERNATIVES FOR DEVELOPMENT

During the course of formulating the proposed project, several project alternatives were considered to ensure that the best option of project development was adopted. The consideration of alternatives is one of the more proactive approaches of environmental assessment. This process serves to enhance the project design through an examination of other feasible options instead of only focusing on the more defensive task of reducing adverse impacts of a single design. Project alternatives have been evaluated by the ESIA team to achieve project objectives while having least adverse environmental impacts. The alternatives assessed during this process include.

6.1 Alternative Site

Relocation option to a different site is an option available for the project implementation. At present the developer does not have an alternative site. This means that they look for the alternative land. The other option available for the project implementation is for the proponent to relocate it to an alternative site either within Nyari or its neighborhood. At the moment, the proponent does not have an alternative site. This implies that they have to buy another piece of land elsewhere. Looking for land of the similar size and market location and completing official transactions might take over one year, with no guarantee that the land would be available, and if such land is available, its cost might be beyond the proponent's budget. In addition, the proponent will incur loss on the activities they have already undertaken such as approval fees for change of land use, structural and architectural drawings. This option would result to loss of anticipated jobs that would be envisioned by the project.

6.2 No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the proponent and the community as a whole. The land will continue to remain idle and underutilized. The proponent will also incur loss on the activities they have already undertaken such as approval fees for change of land use, structural and architectural drawings. This option would result to loss of anticipated jobs that would be envisioned by the project.

6.3 The proposed development alternative

Under the proposed development alternative, the developer of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proposed project, provided all environmental measures are complied with during the construction period and occupation phases.

6.4 Analysis of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The steel and concrete that will be used will meet the Kenya Bureau of Standards requirements.

6.5 Alternative power source

- Main Electricity grid: - The site is already supplied with power from the main Kenya power grid. The option is cheap on the short term but expensive in the long run due to the recurrent electricity bills during operation phase.
- Solar Power: - The project area has a high potential for solar energy since the location has about 4 to 6 sunshine hours in a day. Solar power is therefore recommended for green energy but initial cost of installation of solar panels, batteries and other accessories is prohibitive. The organization will install Solar PV, Solar hot water & Solar street lighting.

From the design of the project the proponent is planning to combine the use of both mains and solar power in their operations. This will help in the minimizing of expenditure on electricity bills. The structure, building orientation and massing will be set to enhance use of natural lighting during the day.

6.6 Waste Management Alternatives

During construction waste from project construction activities will include, debris, human related wastes, worn out tires and plastic containers. The team recommends the construction of lavatories to manage human waste from the construction staff, stone waste and loose soil be heaped together and sold for footpath construction and a reserve for use in landscaping the site.

6.6.1 Liquid waste

a) Septic Tank System

The study team examined the option of constructing septic tanks. This involves the construction of underground concrete-made tanks to store the sludge with soak pits. This option requires regular monitoring and record keeping ensuring timely exhaustion in order to avoid leaks and spills.

b) Bio-Digesters

The team examined this option and noted that it is an environmentally friendly alternative and can be used for wastewater recycling. Methane is also produced through this option, widening the energy options. However, many of the available bio-digesters today use more energy due to their heavy electric mortars and thus their use may be counter-productive in environmental sustainability.

c) Constructed Wetland

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

d) Wastewater Treatment Plant

This refers to the use of a series of ponds/lagoons which allow several biological processes to take place, before the water is released back to the river. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used/heavy metals sink and decomposition processes take place. They are usually a nuisance to the public because of smell from the lagoons/ponds in case of failure of the system.

Lagoon systems usually comprise open ponds. Selection of this alternative would require close monitoring to avoid air pollution (offensive odour), overflowing during rainy season and subsequent proliferation of vermins and rodents in the project area.

The team recommended that the proponent to construct a Septic Tank and an Effluent Treatment Plant.

6.6.2 Solid waste

a) Contracting private waste handlers

The team surveyed the possibility of commissioning waste handlers from the private sector to dispose of the waste.

b) Recycling

The study team analyzed the practicability of implementing this option. Waste segregation is a requirement through providing labeled waste-specific litterbins.

c) Landfill

Upon gauging this option for its viability, the team noted that the possibility of using this option requires adequate land to be used.

The study team recommended that the proponent contracts the services of NEMA-registered private waste handlers.

CHAPTER SEVEN

7.0 OCCUPATIONAL HEALTH, SAFETY AND ACCIDENT PREVENTION PLAN

7.1 Site Organization

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

- Developing a clear site organization plan and construction schedule
- Delivery and storage of material at appropriate locations and times
- Right size of staff/workers with clear work schedule and appropriate dress gear
- Control staff and vehicle movement on site and keep out unwanted persons
- Site office with safety kit i.e. first aid and fire extinguisher
- Adequate water supply for both construction work, operation and worker use.

7.2 Project Team

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

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

7.3 Enforcement of Standards and Legal Requirement

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

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

7.4 Activities of Workers

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

- Excavation using pick axes and shovels
- Pushing of wheel barrows
- Watering of roads and walk surfaces
- Hand packing of stones on road surface
- Lifting and laying of building material, stone, concrete etc.
- Bending, cutting and laying of reinforcement steel
- Other general building work activities.

7.5 Activities by Machinery and Light Equipment

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

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

- Tipper
- Machinery or equipment installed for operation

7.6 Insurance

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

CHAPTER EIGHT

8.0 ANTICIPATED IMPACTS AND MITIGATION MEASURES

8.1 Introduction

This chapter focuses on the anticipated positive and negative impacts of the proposed project on the natural and human environment during its construction, operation and decommissioning phases. These impacts can be categorized in various ways according to their nature such as, positive or negative impacts; random or predictable impacts; cumulative, local or widespread impacts; temporary or permanent impacts; short- or long-term impacts. They can also be categorized based on their level of significance.

Some impact mitigation has already been proactively addressed in the project design while others will be undertaken through considered incorporation in the implementation of the project and guided by the Environmental Management and Monitoring Plan (EMMP) developed in this report. The prediction and analysis of the environmental impacts of the proposed project is based on:

- Compliance with relevant Kenyan legislations and standards on environment, health and safety and the World Bank Safeguards as well as World Bank's Environment, Health and Safety guidelines.
- Professional judgment - the proposed site is within an area zoned as an Industrial Zone and the environmental impacts will mostly result from construction activities that will include excavation of the ground, site preparation, construction, commissioning and operation phases.

8.2 Potential Positive Impacts

Based on information gathered during the study, the following are the potential positive social and environmental impacts identified with respect to the project phases.

8.2.1 Construction Phase

- a) Employment opportunities:** - One of the main positive impacts during projects construction phase is the availability of employment opportunities especially to casual workers and several other skilled workers such as building and construction engineers. Employment opportunities are of benefit both economically and socially. Several workers including casual labourers, masons, carpenters, joiners, electricians, and plumbers are expected to work on the site during the construction phase. Apart from casual labour, semi-skilled, unskilled labour and formal employees are also expected to obtain gainful employment during the period of construction. Generally, employment during the construction phase will lead to multidimensional development in the area and improve several people's living standards.
- b) Improvement of the Informal Sector:** - There are usually several informal businesses, which come up during the construction periods of such projects. These include food vendors who benefit directly from the construction workers buying food and other commodities from them. This will promote the informal sector in securing some temporary revenue and hence improve their livelihood.
- c) Economic Growth:** - Through the use of locally available materials during the construction phase e.g. cement, concrete, sand, ballast electrical cables and others; the project will contribute towards growth of the country's economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel and others will attract taxes including VAT which will be

payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

- d) **Market for Supply of Building Materials:** - The project will require supply of large quantities of building materials most of which will be sourced locally. This provides ready market for building material suppliers such as quarrying companies and hardware shops.

8.2.2 Operations Phase

- a) **Employment opportunities:** - The proposed project is expected to provide formal employment. Medical practitioners such as surgeons, oncologists, cardiologists, laboratory technicians, nurses, palliative care givers will be employed on a long-term to provide medical services. Other forms of employment will be created on contractual basis such as provision of security and basic utility services, maintenance and repair work.
- b) **Health infrastructure:** - The proposed cancer facility will employ state-of-the-art medical equipment and will be the first of its kind within Nairobi County. It will provide an extra option to the general public on where to seek specialized cancer medical care locally. Its operation will lead to improved access to quality healthcare services provided to the population, and in particular to the most vulnerable groups.
- c) **Reduced medical costs:** - The operation of the proposed cancer healthcare facility is anticipated to ensure reduced medical costs. The proposed healthcare facility will offer a much-needed alternative to seeking specialized medical services. Besides, the distance covered before accessing the medical services will have reduced.
- d) **Increased business opportunities:** - Various goods and services such as medical provisions, catering services, telecommunications and energy will be required for the healthcare facility operations. This will create additional economic value for the community as the healthcare facility is expected to support business ventures that relate to the good and services it will require.
- e) **Optimal land use:** - The successful implementation of the healthcare facility will mean that the land will be used to an optimum level and thus getting maximum benefits not just to the developer but also to the residents and the government among other beneficiaries.
- f) **Growth of the economy:** - The healthcare facility will reduce the expenditure of foreign exchange by Kenyans seeking specialized treatment abroad.

8.2.3 Decommissioning Phase

- a) **Land restoration:** - The proponent shall ensure that the land will be restored to its former state by: clearing all construction waste from site and disposing them at designated dumping sites; and, planting of native vegetation.
- b) **Employment opportunities:** - Several employment opportunities will be created for the demolition staff, though temporary.
- c) **Re-use of construction materials:** - Some of the construction materials initially used during the construction phase are re-usable. Their re-use in other application will be beneficial to both the proponent and the contractor.
- d) **Alternative land use:** - It is anticipated that the land will be used for other income generating activities such as shopping malls and educational institutions.

8.3 Potential Negative Impacts

Based on information gathered during the study, the following are the potential negative social and environmental impacts identified with respect to the project.

8.3.1 Construction Phase

- a) Solid waste: - The project's construction activities will lead to the generation of high amounts of solid waste comprising of stones, wood, broken glass, empty containers, metal pieces etc. If not well managed, solid waste piles can harbor vectors and rodents, and also cause water borne diseases in the area. Unregulated waste piles can also cause accidents e.g. trips and falls, to the construction workers and persons visiting the site.
- b) Noise pollution: - During the construction phase, noise is expected to be produced by the construction equipment and machinery such as concrete mixers, drilling equipment and vehicles delivering construction materials. The noise generated due to such activities is likely to be a nuisance within the immediate locality of the site.
- c) Dust emissions: - Particulate matter pollution is likely to occur during the site clearance, excavation and spreading of the topsoil. This can have health implications to the workers such as increased cases of asthma attacks, flu etc.
- d) Oil leaks and accidental spills: - Movable parts of various construction equipment will require to be lubricated continuously to minimize the usual corrosion or wear and tear. Likewise, vehicles on site may require oil change. Possibilities of oil spills and contamination of the soil and water on site are high.
- e) Loss of flora and fauna: - Construction projects, whether commercial developments, housing estates, infrastructure or public-sector projects, all have the potential to damage natural habitats, and pose a threat wildlife and plant species. During the site visit, the team noted that there neither endangered faunal nor floral species within the site.
- f) Soil erosion: - There is a possibility of soil erosion occurring during construction during rainy and windy seasons. Soil erosion is an important problem both at its source and downstream of the development site. Eroded soil will be deposited somewhere, and the location of the deposition could alter downstream hydrology and increase flooding. It may also pose a water quality issue directly as a result of siltation and indirectly from contaminants carried with or attached to soil particles.
- g) Faecal waste: - The construction workers will generate faecal waste during their day-to-day operations. The generated waste needs proper handling to prevent diseases such as diarrhea, outbreak on the site.
- h) Workplace accidents and hazards: - During construction of the proposed project, it is expected workers are likely to have accidental injuries and hazards as a result of handling hazardous waste. Because of the intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others.

8.3.2 Operations Phase

- a) Increased demand for Electricity: - The operation of various equipment within the cancer facility will require large amounts of energy. The proponent will rely on

power from the national grid electricity provided by the Kenya Power, increasing the overall demand for electric power.

- b) Liquid waste:** - During the operation phase of the cancer facility, liquid waste will be generated from the various operations taking place in the facility.
- c) Radiation emissions:** - It is anticipated that the cancer facility operations will result in the generation of radiopharmaceutical products which have the capacity to adversely affect health if not properly contained and managed. The facility has plans and monitoring equipment to fully contain and manage these products.
- d) Solid and biomedical waste:** - Solid waste produced by the proposed cancer facility will increase the burden on waste disposal methods that are environmentally sound. Consequently, waste incineration will lead to carbon emissions.

Expected types of biomedical waste

Type of waste	Waste description	Generation area
Human anatomical	Human tissues; amputated body parts	Operating Theatres (OTs),
Infectious solid waste	Items contaminated with blood and body fluids: Cotton dressings Beddings Pathological wastes Infected blood Patient samples Specimens	OTs, Intensive Care Units (ICUs), Pathology Lab, Blood Bank, Wards, Emergency Room (ER)
Sharps	Needles; syringes; scalpels; blades; glass	OTs, Cath Labs, ER, ICUs, Wards
Disposables	Disposables other than Sharps, e.g. Gloves, catheters, IV-sets, valves, and any other infected plastics	OTs, Cath Labs, ER, ICUs, Wards
Liquid waste	Waste generated in the laboratories	Labs
Discarded medicines	Wastes comprising outdated, contaminated and discarded	All patient areas, Pharmacy

8.3.3 Decommissioning Phase

- a) High noise levels and excessive vibration:** - The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas.
- b) Dust:** - Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighboring residents.

- c) Solid waste: - 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, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia, which may be released because of leaching of demolition waste, are known to lead to degrade ground water quality.

8.4 Mitigation Measures

8.4.1 Noise and vibration pollution

Construction and decommissioning phase mitigation measures

- Comply with the legal requirements for the management of noise impact specified in the noise quality regulations;
- Use of modern construction equipment, which produce the least noise;
- Maintain construction equipment properly as per manufacturer's instructions;
- Construction activities to be restricted to daytime hours only to ensure minimal disturbances to neighboring land users;
- The operation of machinery to be restricted to when it is actually required;
- Workers to wear ear plugs/ muffs as part of the personal protective gear where necessary

Operation phase mitigation measures

- Comply with the legal requirements specified in the noise quality regulations;

8.4.2 Air pollution

Construction phase mitigation measures

- Maintain construction machinery at all times as per manufacturer's instructions;
- Impose speed restrictions for trucks and construction vehicles around the site at 10Kph. Post speed limit notice at the entrance to the construction site;
- Keep the loose soils and stockpile at the construction site moist at all times or cover with a membrane to prevent them from being blown away;
- Haulage trucks entering or leaving the site to be covered;
- The project area to be cordoned off to minimize dust migration to nearby facilities by wind;
- Provision of PPE in accordance with the risk of the various work places e.g. masks; goggles; coveralls; etc.;
- Prohibit idling of vehicles and create awareness on the same;
- Prohibit open burning of solid wastes;
- Securely cover skips and minimize drop heights;

Decommissioning phase mitigation measures

- Use manual methods during demolitions to minimize generation of dust;
- Cover areas to be demolished.

8.4.3 Solid waste generation

Construction phase mitigation measures

- Practice waste minimization, segregation and proper disposal according to EMCA (Waste Management) Regulations, 2006;

- Contractor to establish a solid waste management plan for disposal of debris/garbage at the construction site which will include levelling the uneven grounds on site;

Operation phase mitigation measures

- Practice waste minimization, segregation and proper disposal according to EMCA (Waste Management) Regulations, 2006;

8.4.4 Soil and water pollution

Construction and decommissioning phase mitigation measures

- Adopt protective measures to prevent spills of construction materials and put in place a suitable spill response plan;
- Prevent the washing away of construction materials, soil, silt or debris into any drainage system;
- All applicable regulation for the safe use, handling, storage and disposal of hazardous waste to be followed;
- No repair or servicing of vehicles will be allowed on site;
- Construction waste to be disposed offsite by NEMA approved waste handlers.

Operational phase mitigation measures

- Waste water from processes will be passed through an effective waste water treatment system to remove any contaminants from cooling process. Biocides will be used to prevent the growth of microorganisms;
- The treated water quality will meet standards as set by the Water Quality Regulations 2006. Regular water analysis will be undertaken to ensure compliance. Any sludge produced will be disposed via relevant licensed hazardous waste handlers;
- Avoid contamination of ground water by use of impervious liner in the storage yard;
- Ensure proper and timely maintenance of vehicles and machines to avoid spillage;
- Train workers regularly on proper use of chemicals

8.4.5 Occupational health and safety issues

Mitigation measures for entire project cycle

- Appoint a Health and Safety officer with knowledge to guide and implement Health, Safety issues during construction;
- Develop a site safety action plan detailing emergency procedure, restriction on site and personnel responsible for safety inspections and control;
- Suppress dust generation;
- Workers hired during any phase to first be trained on the appropriate use of the provided personal protective equipment;
- Project proponent to ensure all workers and visitors to the project site also use the provided personal protective equipment appropriately;
- The project proponent to ensure that tools and equipment provided for use during all phases are well-serviced and maintained;
- The project proponent to ensure that among the workers are trained first aiders with a fully equipped first aid station;
- Provide a General Register for recording injuries that occur on site and preventive corrective actions implemented as appropriate;

- Install safety signs and posters throughout the project area for enhanced safety awareness especially fire-fighting equipment, evacuation procedures and informative signage to inform of safety hazards and controls; etc.;
- Comply with all requirements outlined under the Occupational Health and Safety Act, Public Health Act as well the Local Government Act.

8.4.6 Public Health and Amenities

Mitigation measures for entire project cycle

- The proponent should adopt energy and water conservation good practices.
- The proponent will put in measures in the project design to ensure water conservation;
- Give ample notice for interruptions in shared amenities and provide alternative options;
- Adhere to hospital safety best practices;
- Proponent should liaise with Kenya Power to find best way to meet energy demands without interfering with existing grid output;
- Practice good waste management;
- Conduct regular water and energy audits

8.4.7 Increased Traffic

Mitigation measures for construction phase

- Use reflective signature to direct traffic to designated areas.
- Sensitize drivers to observe speed limits
- Develop and implement a traffic marshal plan for the construction site
- Provide sufficient parking/ holding area for traffic delivering and collecting materials from the construction site.

Mitigation measures for operation phase

- Develop and implement a traffic marshal plan for the for the operational phase

CHAPTER NINE

9.0 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction

Integrating environmental issues into construction and operation management, such as those related to development of a healthcare facility is that it increases efficiency while enhancing the organization's financial and environmental management. These issues, which are normally of financial concern at company level, are costs, product quality, investments, level of productivity and planning.

Environmental planning and management as a concept seek to improve and protect environmental quality through segregating activities, which are environmentally incompatible. Environmental planning and management integrate social systems, regulatory law, environmental awareness and ethics. Environmental Management Plan (EMP) for development projects such as the proposed project development is aimed at providing a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, EMP assigns responsibilities for action to various actors, and provides time frame within which mitigation measures can be done and the cost.

EMP is a vital output for an environmental impact assessment as it provides a checklist for project monitoring and evaluation and as a basis for environmental audit. A number of mitigation measures have already been incorporated into the project design. The EMP is outlined in the table below to address the identified potential negative impacts and mitigation measures of the proposed Cancer Centre facility on plot LR NO 5829/2 (Originally Number 3857/2), Nairobi County.

9.2 Environmental Monitoring and Evaluation

Environmental monitoring and evaluation are essential in project's lifespan as they are conducted to establish if the project implementation has complied with the set environmental management standards as articulated in the Environmental Management and Coordination Act (EMCA) CAP 387, and its attendant Environmental (Impact Assessment and Audit) Regulations, 2003 amended 2015.

Environmental Management Plan for The Project

		Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indicators	Cost (KShs)
Design Phase							
1.		Proposed Project	Landscape visual impact	<ul style="list-style-type: none"> Design of infrastructure that conforms with the project site features (topography and aesthetics) 	Design Consultant	Site infrastructure design blending with host environment	Approx. 500,000/=
2.		Proposed Project Sanitation Facilities	Soil and water contamination	<ul style="list-style-type: none"> Design appropriate containments for oils/other construction chemicals and sanitary waste from the contractor's camp. 	Design Consultant	Availability of sanitary facility and paved containments in the design	Approx. 700,000/=
3.		Proposed Project Vegetation Cover	Removal of existing Vegetation	<ul style="list-style-type: none"> Design of appropriate construction that provides for incorporation of existing vegetation 	Design consultant	Site infrastructure incorporating vegetation	Approx. 200,000/=
Pre-Construction Phase							
1.		The proponent	Potential lack of support From project area community	<ul style="list-style-type: none"> - Timely dissemination of project facts to community and stakeholders - Convening of meetings with Community and Stakeholders to 	Project owner	Feedback information and forms from project area community	Approx. 500,000/=

				carry out sensitization and disseminate project facts			
2.		Clearing of Proposed Project site vegetation	Vegetation damage	<ul style="list-style-type: none"> - Maintain native vegetation cover by selective removal of vegetation which cannot be incorporated in the project design by use of manual clearing technics; <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act (EMCA), 1999 Amended 2015 		Existing vegetation incorporated in the Constructed Site area	Approx. 600,000/=
3.		Clearing Proposed Project vegetation of site	Generation of Solid Waste	<ul style="list-style-type: none"> - Contractor to provide strategically located solid waste collection container (skip); - Collect together all generated waste from site clearing; - Transport and dispose all waste away from site; - Liaise with the County government on suitable dumping site for spoils; <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 	Contractor	Presence of waste collection bins Contract with NEMA Registered Waste Disposal Firm	Approx. 100,000/= for waste collection bins 25,000/= per month for Waste Disposal

				<p>(EMCA), 1999 Amended 2015,</p> <ul style="list-style-type: none"> Water Act 2012 and Public Health Act, Cap 242 			
4.		Clearing Proposed Project vegetation of site	Noise pollution (excess noise and vibration)	<ul style="list-style-type: none"> Use of noise reduction/hearing protection devices when working with noisy equipment; Instruct machinery operators to avoid raving of engines; Carry out site preparation activities during the day; <p>This is in line with</p> <ul style="list-style-type: none"> Environmental Management and Coordination Act (EMCA), 1999 Amended 2015; Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 OSHA Act, 2007. 	Contractor	<p>Records of machine and vehicle maintenance</p> <p>Availability and use of Ear Muffs</p>	Approx. 200,000/= for Provision of noise pollution
5.		Clearing Proposed Project vegetation of site	Sanitary other Domestic Waste	<ul style="list-style-type: none"> Provide site clearing workers with solid waste bins for their use; Ensure site has toilet facilities; Sensitize workers on site cleanliness and hygiene <p>This is in line with:</p>	Contractor	Presence of waste bins and Toilets for use by workers	Approx. 400,000/= for provision of Sanitary and waste collection facilities.

				<ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2015 • Water Act 2012 • Public Health Act, Cap 242 			
Construction Phase							
1		Soil Excavation at Proposed Project site	Soil Erosion	<ul style="list-style-type: none"> - Excavated soil is to be used for backfilling excavated areas while excess soil is disposed of off-site; - Soils are not to be left exposed to wind/water; <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2015; • Water Act 2012, 	Contractor	<p>Ground cover in constructed areas</p> <p>Quality of surface water at the site</p>	Part of Construction Obligation
2.		Construction of the Proposed Project site	Air Pollution (dust, fuel and smoke emissions)	<ul style="list-style-type: none"> - Control speed of vehicles and Prohibit idling; - Spray water during construction; - Maintenance vehicles & equipment regularly; - Provision of dust masks for use in dusty conditions; - Use serviceable vehicles/machinery to reduce smoke; <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental 	Contractor	<p>Records of machine and vehicle maintenance</p> <p>Availability and use of Noise Masks</p> <p>Low dust generation during construction</p>	Approx. 500,000/= for air pollution prevention

				<p>Management and Coordination Act 1999 Amended 2015;</p> <ul style="list-style-type: none"> Occupational Safety and Health Act (OSHA) 2007; Public Health Act, Cap 242 			
3.		Construction of the Proposed Project site	Excess noise and vibration	<ul style="list-style-type: none"> Use noise hearing protection devices when working with noisy equipment or noisy environment; Use serviceable equipment with low noise emission; Instruct truck/machinery operators to avoid raving engines; <p>This is in line with:</p> <ul style="list-style-type: none"> Environmental Management and Coordination Act 1999 Amended 2015; Noise and Excessive Vibration Pollution (Control) Regulations, 2009 Occupational Safety and Health Act (OSHA) 2007 	Contractor	<p>Records of machine and vehicle maintenance</p> <p>Availability and use of Ear Muffs</p>	<p>Approx. 300,000/= for Provision of noise pollution</p>
4.		Construction of the Proposed Project site	Generation of Solid Waste	<ul style="list-style-type: none"> Provide communal solid waste collection containers (skip) for the collection and storage prior to appropriate disposal; 	Contractor	<p>Clean, Organized, Neat Site</p> <p>Presence of waste collection receptacles</p>	<p>Approx. 200,000/= for waste containers</p> <p>10,000/= per month for waste collection and disposal</p>

				<ul style="list-style-type: none"> - County Government/ NEMA to provide waste dumping site; - Engage a NEMA Registered Waste Collection Firm; - Excavation activities to be done during the dry season to avoid soil erosion and siltation of streams; - Site soil to be used to backfill excavated sites; <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2015; • Waste Management Regulations, 2006; • Water Act 2012; • Public Health Act, Cap 242 		Contract with NEMA Registered Waste Disposal Firm	
5.		Construction of the Proposed Project site	Risk of fire	<ul style="list-style-type: none"> - Provide firefighting equipment at the construction site area; - Contractor staff to be sensitized on firefighting equipment use; - No burning of materials is to be permitted at the site. <p>This is in line with:</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act (OSHA) 2007; • Public Health Act, Cap 242 	Contractor	Performance records Presence of Fire Extinguishers at construction site	Approx. 300,000/= for fire extinguishers

6.	Construction of the Proposed Project Site	Potential pollution of Surface and Groundwater	<ul style="list-style-type: none"> - No disposal of domestic waste at the project site; - Use of waste bins/proper wastes management; <p>This is in line with;</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act (EMCA), 1999 Amended 2015, • Public Health Act Cap 242 	Contractor	Water Quality Report Waste Presence of Bins	Approximately 50,000/- for communal waste containers 200,000/- Per year.
7.	Construction of the Proposed Project site	Safety of Workers and other visitors to construction site	<ul style="list-style-type: none"> - Use of construction site barrier tapes to isolate the site(working) area to bar intruders from accessing the area in case of a dropping object; - Appropriate head, hand and foot protection (PPE) during the manual clearing of vegetation and construction activities; - Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa. Maintain work productivity; - Construction site visitors require appropriate safety Gear. <p>This is in line with:</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act (OSHA) 2007; 	Contractor	Workers have Safety Gear Medical records Emergency contacts for Hospital and Police available	Approx. 300,000/= for safety gear

				<ul style="list-style-type: none"> Environment Management and Coordination Act (EMCA), 1999 Amended 2015; Public Health Act Cap 242 				
8.		Construction of the Proposed Project site	Working heights	at	<ul style="list-style-type: none"> - Testing of structures for integrity prior to undertaking work; - Implementation of fall protection including induction on climbing techniques and use of fall protection measures, 	Contractor	Medical Records and Training records Availability and use of proper PPE	Approx. 500,000/= for special safety equipment
					<ul style="list-style-type: none"> - Provision of harnesses and scaffolds for working at heights; - Inspection, maintenance, and replacement of fall protection equipment; - Use of helmets and other protective devices that are going to mitigate against scratches, bruises; lacerations and head injuries due to dropping objects - Provide first aid facilities at the site; <p>This is in line with:</p> <ul style="list-style-type: none"> Occupational Safety and Health Act (OSHA) 2007; Public Health Act Cap 242 	Contractor	Availability of Fall Protection Equipment at the Construction Site	

9.	Construction of the Proposed Project site	Community misconceptions	<ul style="list-style-type: none"> - Awareness creation amongst the Community on project facts; - Community issues to be responded to promptly; - Project progress reports and monitoring reports to be prepared and recommendations implemented; 	Contractor	<p>Records of Meetings with Community</p> <p>Records of community issues recorded and responses.</p>	Approx. 100,000/= for convening meetings
10.	Construction of the Proposed Project site	Surface run off and sedimentation from construction activities	<ul style="list-style-type: none"> - Construction of effective drainages and culverts; - Plant soil binding grasses and other native plants <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2015; • Water Act 2012 	Contractor	Surface runoff water impact protection facilities in the project area	Construction Obligation
11.	Construction of the Proposed Project site	Dangers of Labour arising Child issues	<ul style="list-style-type: none"> - Contractor to be strictly advised not to engage any underage persons (under 18 years of age) to perform any form of work at the site during construction - Contractor will be required to comply with the Employment Act, 2007 <p>This is in line with</p> <ul style="list-style-type: none"> • Employment Act, 2007 	Contractor	List of workers that does not contain underage persons	Construction Obligation
Operational Phase						

1		Operation of Proposed Project Facility	Exposure to occupational safety and health risks associated with a hospital environment	<ul style="list-style-type: none"> - All workers and staff should be provided with appropriate protective gears. - Place sharps in sealable, puncture resistant leak proof containers, replace sharp containers when they are ¾ full. - Place blood soaked, dripping, blood caked disposable PPE and waste materials in leak proof bags or impervious containers. - Close and seal containers and bags prior to removal or replacement to prevent spillage or protrusion of contents during handling, transport, or storage. - Avoid excessive or rough handling to prevent rupture of containers and bags. - Treat all human blood and Other Potentially Infectious Materials (OPIM) as if contaminated with blood-borne pathogens. - Wash hands and skin with warm water and soap immediately after 	Proponent obligation	<p>Training records</p> <p>Availability and use of proper PPE</p> <p>Availability of firefighting appliances and equipment</p> <p>Cleaning schedule</p>	Operational budget
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				<p>any contact with blood or OPIM and remove gloves, even if gloves appear to be intact.</p> <ul style="list-style-type: none"> - Use waterless antiseptic hand cleansers when hand washing facilities such as warm water and soap are not available. - Maintain a cleaning schedule, which requires the cleaning of work surfaces, equipment surfaces and waste containers. - Sensitize hospital management on social issues such as increased incidences of reported Hospital Acquired Infections. - Practice good personal hygiene. - Institute and implement a first aid provision process and readily available emergency response plan. - Hospital equipment and apparatus requiring additional safety measures should be managed and operated by qualified persons. - Install firefighting equipment and 		
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				<p>maintain firefighting equipment regularly.</p> <ul style="list-style-type: none"> - Provide emergency numbers at strategic points. - Adequate sanitary facilities should be provided and standard cleanliness maintained - Hospital management should be provided with evacuation procedures in case of fire. - The hospital management should practice fire drills at least once every six months to ensure that they have the knowledge to act accordingly in case of fire. - Members of staff to be given the correct tools and equipment for the jobs assigned. - Members of staff to be trained in the use of all equipment that they will be required to operate. <p>This is in line with</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act (OSHA) 2007 • Public Health Act Cap 242. 		
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2.		Operation of Proposed Project Facility	Noise Nuisance	<ul style="list-style-type: none"> - Hospitals are generally quiet places. - Ambulances to silence sirens when approaching hospital. - Increased vegetation cover and available perimeter wall will act as containment for noise. - Convenient location of backup generator, away from residential neighbourhoods Vicinity. - Use sound deflectors to minimize noise from the generator. - Routine service of the back-up generator to increase the efficiency of fuel burning. - Installation of signage in appropriate places such as high human activity points to remind people to observe silence <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2015; • Noise and Excessive Vibration Pollution) (Control) Regulations, 2009; 	Proponent obligation	<p>Maintenance schedule report for equipment and machinery on site</p> <p>Presence of signages</p>	Operational budget
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				<ul style="list-style-type: none"> Occupational Safety and Health Act (OSHA) 2007 			
3		Operation of Proposed Project Facility	Pressure on utilities water and electricity	<ul style="list-style-type: none"> Utilization of natural light as much as possible during the day. Consideration of water harvesting Timely repair of any leaking water faucets. Install appropriate Building Management Systems to minimize energy use or demand 	Proponent obligation	Electricity and Water consumption report	Operational budget
4		Operation of Proposed Project Facility	Generation of hazardous hospital waste (Pathological waste/Anatomical waste; Infectious and Potentially Infectious waste; Sharps; Chemical waste; Radioactive waste; Pharmaceutical/Medicinal waste; General solid waste	<ul style="list-style-type: none"> Will be collected and segregated at the generation source and will be placed in colour corded bins and bags based on their types and the bags will have address and license of the waste treatment facility provider and will be stored in Biomed waste storage room for further disposal as per NEMA guidelines. <p>This is in line with:</p> <ul style="list-style-type: none"> Environmental Management and Coordination Act 1999 Amended 2015; 	Staff, Proponent and external contracted Hospital Waste Handlers	<p>NEMA license of the waste collector</p> <p>Waste tracking forms</p> <p>Waste Collection and Disposal Reports</p> <p>Presence of Waste Bins</p>	Operational budget

				<ul style="list-style-type: none"> • Waste Management Regulations, 2006; • Water Act 2012; • Public Health Act, Cap 242 			
Decommissioning Phase							
1.		Decommissioning of Proposed Project Facility	Air Pollution (dust, smoke, fuel emissions)	<ul style="list-style-type: none"> - Control of demolition vehicle speeds; - Prohibition of idling of vehicles; - Water is to be sprayed on building undergoing demolition during decommissioning to reduce dust emission; - Regular maintenance of vehicles and equipment; - Provision of dust masks for use in dusty conditions. - Use of serviceable vehicles and machinery to avoid excessive smoke emission <p>These is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2018 • Occupational Safety and Health Act (OSHA)2007 	Decommissioning Contractor	Decommissioning Records	Approx. 200,000/= for nose protection equipment (dust masks)
2.		Decommissioning of Proposed Project Facility	Noise pollution	<ul style="list-style-type: none"> - Noise reduction/ hearing protection devices when working with noisy equipment; 	Decommissioning Contractor	Decommissioning Records	Approx. 200,000/= for noise pollution mitigation

				<ul style="list-style-type: none"> - Use of serviceable equipment with low noise level; - Instruction to truck/machinery operators to avoid raving engines; - Use of noise protection (ear muff) during demolition; <p>This is in line with:</p> <ul style="list-style-type: none"> • Environmental Management and Coordination Act 1999 Amended 2015. • Occupational Safety and Health Act (OSHA) 2007. 			
3.		Decommissioning of Proposed Project Facility	Potential Injury to Workers	<ul style="list-style-type: none"> - Use of appropriate head, hand and feet protection (PPE) during demolition of structures - Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity; <p>This is in line with:</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act (OSHA) 2007 	Decommissioning Contractor	Availability appropriate gear/Records Use of Proper PPE	Approx. 200,000/= for PPE and other safety equipment

4.		Decommissioning of Proposed Project Facility	Working heights at	<ul style="list-style-type: none"> - Use construction site barrier tape to isolate the site to guard site visitors from accidents and injuries; - Implement a fall protection program that includes training in climbing techniques and use of fall protection measures, Provide Harnesses; - Use of helmets and other protective devices to mitigate against injury, - Provide first aid facilities at the site <p>This is in line with:</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act (OSHA) 2007 	Decommissioning Contractor	Availability of appropriate Safety Gear/Records Proper use of PPE	Approx. 100,000/= for PPE and other safety equipment
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CONCLUSION AND RECOMMENDATIONS

Conclusion

Access to cancer health care services is important for the achievement of health equity and for increasing the quality of a healthy life for everyone. The proposed project will eliminate the limited access to cancer treatment facility within the country. In the proposed project's life cycle, there will however be insignificant environmental impacts. An Environmental Management Plan (EMP) outline has been developed to ensure the impacts will be mitigated effectively. The plan provides a general outlay of the activities, associated impacts, and mitigation action plans. Implementation timeframes and responsibilities are also defined, and where practicable, the cost estimates for recommended measures provided.

Recommendations

After assessing the project impacts, the EIA Expert (s) are of the view that the negative impacts arising out of the proposed project development are manageable and therefore the Proponent should be allowed to proceed with this development as long as the proposed Environmental Management Plan is implemented and complies with all the relevant laws, by-laws and regulations governing the health industry.

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Annex

1. Architectural drawings
2. Approved Bills of Quantity
3. Land title
4. Public participation questionnaires and Minutes from various stakeholders' engagement
5. Expert's NEMA EIA/ EA license
6. Baseline Ambient Air Report
7. Ambient Noise Report
8. Soil Analysis Report
9. Traffic Assessment Report
10. Effluent Treatment Plant design