ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT
FOR
THE PROPOSED 300-BED CAPACITY TERTIARY HOSPITAL ON L.R NO: 12825/232, ALONG KIAMBU ROAD, KIAMBU TOWNSHIP SUB-COUNTY, KIAMBU COUNTY

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GPS Coordinates: -1.210933S & 36.832461E

November, 2023

This ESIA-Study Report is submitted to the National Environment Management Authority (NEMA) in accordance with the requirements of EMCA, Cap 387 and the Environmental (Impact Assessment and Audit) Regulations, vied 2019

Authentication

The Environmental and Social Impact Assessment (ESIA) Study for proposed establishment of a 300-Bed capacity along Kiambu Road, Kiambu-County, Kenya was conducted and a full study report prepared in accordance with the *Environmental Management and Coordination Act (EMCA) Cap 387* of 1999 (amended 2015) and Environmental (Impact Assessment) and Audit regulations 2019 amendments which requires that High-Risks projects (Hospitals) to conduct full study report prepared for submission to the National Environmental Management Authority (NEMA) for consideration and licensing. We, the undersigned, certify that the particulars in this report are true to the best of our knowledge.

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Acronyms and Abbreviations

AfDB	African Development Bank
BID	Background Information Document
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
HDU	High Dependency Unit
HVAC	Heating, Ventilation, and Air Conditioning
IFC	International Finance Corporation
KEPH	Kenya Essential Package for Health
KPLC	Kenya Power and Lighting Company
kVA	Kilo-Volt-Amperes
MoH	Ministry of Health
MSDS	Material Safety Data Sheet
MSDS	Material Safety Data Sheet
NCWSC	Nairobi City Water & Sewerage Company
NGO	Non-Governmental Organization
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
RUJWASCO	Ruiru-Juja Water and Sewerage Company
SDG	Sustainable Development Goal
STP	Sewage Treatment Plan
UHC	Universal Healthcare
WHO	World Health Organization
WMP	Waste Management Plan

Non-Technical Summary

The Kenya Vision 2030 aims to transform Kenya into "a globally competitive and prosperous country with a high quality of life by 2030", while the Constitution introduces critical principles related to the right to health and devolution of the management of health services. The long-term health objectives that the country intends to achieve in pursuit of the imperatives of the Constitution and the Kenya Vision 2030 are set out in the Kenya Health Policy 2014–2030. The policy is aimed at "attaining the highest possible health standards in a responsive manner". It seeks to achieve this goal by supporting the provision of equitable, affordable, and high-quality health and related services to all Kenyans according to the highest attainable standards[1].

Kenya's private sector is one of the most developed and dynamic in Sub-Saharan Africa. The Healthcare private sector plays a critical role in preventing and treating diseases. Even among the poor, the private sector is an important source of care. For instance, 47 percent of the poorest quintile of Kenyans use a private facility when sick. In recognition of this important role, the Government of Kenya (GOK) has developed strategies to develop the private health sector in its Vision 2030 plan[2].

Over the past five years, the health sector has made remarkable progress in reducing the burden of disease in the country. Nearly 70% of Kenya's healthcare services are provided by the public sector, through the Ministry of Health (MOH), and other government-funded bodies. Healthcare services are supplemented by hospitals and clinics run by private companies, NGOs, and faith-based organizations.

Based on the above scenarios, Ruth Wanjiku Gakunju herein referred as the proponent has proposed to develop a 300-bed capacity tertiary Hospital along Kiambu Road on **L.R No: 12825/232**, Kiambu County. Pursuant to Environmental Management and Coordination Act Cap 387 (*sections 58 and 59 thereof. Section 58 inter alia*) and EIA Guidelines and Administrative Procedures, obligates the proponent of a project to undertake or cause to be undertaken at his own expense an Environmental Impact Assessment Study and prepare a report thereof. Its against this background that the proponent commissioned Earthcare Services Limited a registered NEMA firm of expert to undertake this Environmental Impact Assessment Study in fulfillment of the above-mentioned statutes.

Environmental and Social Impact Assessment Requirement

Environmental Management and Coordination Act Cap 387 (2015 amendments), and its subsidiary regulations require an Environmental Impact Assessments (ESIAs) for new projects listed in the second schedule. EMCA 1999 and Environmental (*Impact Assessment & Audit)* Regulations vied 2019 classifies projects into three categories based on different levels of Environmental Impact Assessment requirements according to severity of possible environmental impacts:

a) Category (A): Projects with Low environmental impacts. These are required to prepare a summary project report (SPR).
b) Category (B): Projects with Medium potential environmental impacts yet less adverse than high risks. These are required to complete a Comprehensive Environmental Impact Assessment project report (CPR).
c) Category (C): Projects which have highly adverse impacts (High risks), and which are required to have a full, detailed EIA study.

In accordance with Environmental Management and Coordination Act Cap 387, the proposed project is considered a high-risk project which must undergo full study. It's against this background that, the

[1] Kenya Health Sector Strategic Plan 2019-2024
[2] https://elibrary.worldbank.org/doi/epdf/

proponent commissioned Earthcare Services Limited a registered firm of experts, to undertake this EIA study for submission to the authority (NEMA) for consideration.

Overview of the Project

The proposed project is located along Kiambu road in close proximity to Evergreen Centre Children's Park and Ineza Runda Residential Park amongst other commercial facilities. The project location is Georeferenced by GPS Coordinates: **-1.209620S** and **36.831369E.**

Components of the Facility

The proposed project has been categorized as a tertiary hospital. The primary objective of the proposed hospital will be to provide improved healthcare services, treatment, and care for various human health disciplines. The services listed below shall be provided through various departments as follows;

a) Cardiology b) Dental c) Ear, Nose, Throat (ENT) d) Gynecology and Obstetrics e) Hematology f) Gastroenterology g) Internal Medicine h) X-ray, Mammography, Radiology	i) Nephrology j) Ophthalmology and Optometry k) Orthopedics l) Pediatrics m) Psychiatry n) Urology o) Dermatology p) Pulmonology q) Family planning and reproductive health

The Consultation clinics for different departments will be located on each floor of the main hospital building, together with related treatment and testing facilities for each department. The first floor and last floors will host different Wards, private rooms, operating theatres, and the Intensive Care Units (ICU).

Other Support ancillary Infrastructure's

The proposed development will have other ancillary support infrastructures which will include but not limited.

- Storm drainage system,
- Access road (15m-wide) located on the eastern side of the project location (between Ineza and the project boundary),
- Ramp leading to second floor,
- Sewage Treatment Plant (STP),
- Garbage collection point,
- Borehole,
- Funeral parlor,
- Fire hydrant system, and
- Provision of adequate green areas for landscaping and infiltration (Aesthetic Value)

Potential Environmental and Social Impacts

No major and alarming impacts have been identified for the proposed project. The project's development objective is to contribute to enhancing the health and wellbeing of the Country and especially the residents Kiambu and Nairobi Counties. This will be achieved by establishing a well-equipped hospital to cater for world-class and reliable medical services with high standard health services.

The project beneficiaries are doctors, nurses, administrators, patients, and the people of Kenya in general. Positive impacts primarily target the economy and the health of the people, whereby the project will provide job opportunities for different labour classes throughout its life cycle. Other benefits will include

job creation, boosting of local economic/trading activities, improved livelihoods of local artisans and revenue generation for both the National and County governments. Conversely, some of the negative impacts likely to result from the proposed project during the construction and operation phases include: -

- Increase in emissions that may adversely affect ambient air quality as a result of construction activities;
- Increase in noise emissions that may affect neighboring communities during construction activities;
- Increased generation of waste, including hazardous waste material, potentially contaminating soil;
- Traffic impacts,
- Noise pollution, and
- Injuries to workers and community members due to mechanical hazards

Negative impacts during the operation of the Project include:

- Increased consumption of water for domestic use and (i.e., landscaping);
- Increased generation of wastewater (effluent discharge);
- Increased generation of waste, especially hazardous waste, and its improper storage and disposal, may cause contamination and spread of diseases;
- Potential accidental discharge of hazardous liquids from laboratories into the municipal sewer network; and
- Mechanical and electrical injuries to patients and staff during the operation phase.

Summary of the Impacts

Aspects		Narratives
Ambient Air Cumulative Impacts	During Construction	The construction of the Project in combination with neighbouring developments, both existing and foreseeable, will result in increased dust and gaseous emissions in the Project areas. Emissions will be the result of earth works and vehicular movement on unpaved surfaces, mainly. This cumulative impact is anticipated to be temporary in nature and localized. This impact is predicted to be minor.
	During Operation	No negative cumulative impacts during the operation phase of the Project are anticipated given the nature of the Project and surrounding developments (existing and foreseeable) which do not constitute air emissions. This impact is predicted to be insignificant.
Noise Cumulative Impacts	During Construction	The construction of the Project, in addition to noise generated by the development of foreseeable projects is likely to cause an increase in noise emissions in project areas. Noise emissions will be as a result of heavy equipment and machinery on construction sites. However, noise generated by the Project and that of foreseeable Projects is anticipated to be temporary in nature and localized. This impact is predicted to be minor.
	During Operation	Noise emissions during operations are anticipated to be limited to the boundaries of the site given they are predominantly a result of human interaction, medical equipment and ventilation systems as opposed to the operation of high noise emitting equipment/machines. This impact is predicted to be insignificant.
Waste Cumulative Impacts	During Construction	Waste generated by the Project in addition to waste anticipated to generated from foreseeable developments and those existing is likely to have an impact on the municipal waste management systems, whereby the amount of waste landfilled is likely to increase. This impact is predicted to be minor
	During Operation	The cumulative impact of waste during the operation is similar to that of the construction phase, except waste quantities are likely to increase

Aspects		Narratives
		given the presence of more people within the facilities such as patients and their families. Additionally, an increase in the generation of hazardous waste from the area is expected for the project which will adds pressure on treatment facilities such as incinerators. This impact is predicted to be moderate.
Energy, Water and Wastewater Cumulative Impacts	During Construction	The construction phase of the proposed project is not anticipated to apply significant pressure on municipal services given that the number of workers on each site is considerably low in comparison to the demand of other projects. Energy consumption will also be primarily attributed to the use of fossil fuels for the operation of heavy equipment and generators onsite, while low voltage energy usage will be used for power tools. Energy consumption during this phase is temporary. This impact is predicted to be minor.
	During Operation	Existing and foreseeable developments, in addition to the proposed project are likely to increase the demand for the delivery of municipal services, such as the provision of energy, potable water and sewerage services. However, it has been observed that the infrastructure in all project areas is well established and fully functional. With regards to energy consumption and its result in GHG emissions, every source of GHG emissions is a source of cumulative impact and ultimately a contributor to the same impact. The mitigation measures, if properly implemented, will contribute to reducing the Project's GHG emissions. This impact is predicted to be moderate.
Traffic Cumulative Impacts		Traffic in project area (Kiambu Road) is likely to increase during the operation of the Project and is anticipated to face further increases as neighbouring developments are completed. The road and transportation infrastructure in the project area was observed to be adequate enough to absorb increased traffic in Project areas. This is also an aspect highly likely to be accounted for by urban development authorities. This impact is predicted to be minor.

Mitigation measures to address these potential impacts for the two phases of the Project are suggested in Chapter 8 of this report, and if these mitigation measures are effectively implemented then the proposed project will not have significant environmental hazard while addressing healthcare challenges in the Country.

Conclusion

The ESIA process has identified and assessed a range of potential impacts to the bio-physical and socio-economic environments. Where impacts have been identified, mitigation and enhancement measures for those impacts have been outlined in this ESIA. Most of the identified negative impacts are either of moderate or minor significance, even prior to the application of appropriate mitigation/management measures. Moreover, with proper implementation of the recommended mitigation/management measures, the significance of the potential or likely residual negative impacts looks set to be reduced to a minor or negligible level.

Given the medium potential for negative impacts and the high potential for significant positive benefits (both direct and indirect, particularly on the employment and improved healthcare services), the project is deemed to have a high level of environmental and social acceptability.

Recommendations

ESIA consultant (Earthcare Services Limited) is confident that every effort will be made by the Proponent to accommodate the mitigation measures recommended during the assessment process without

compromising the economic viability of the project or risking a lasting negative impact on the environment and people. The implementation of mitigation measures detailed in Chapter 8 and listed in the ESMP (Chapter 9) will provide a basis for ensuring that the potential positive and negative impacts associated with the project are enhanced and mitigated respectively, to levels deemed adequate for the project.

All stakeholders engaged during the ESIA process affirmed the potential project benefits. They also noted the anticipated potential adverse/negative impacts that can be easily mitigated/managed through implementing an ESMP.

In summary, based on the assessment findings, there's no reason why the project should not be authorized, contingent on the mitigations and monitoring for potential environmental and socio- economic impacts as outlined and recommended in the ESMP.

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Chapter 1 INTRODUCTION

1.1. Project Background and Overview

The Kenya Vision 2030 aims to transform Kenya into "a globally competitive and prosperous country with a high quality of life by 2030", while the Constitution introduces critical principles related to the right to health and devolution of the management of health services. The long-term health objectives that the country intends to achieve in pursuit of the imperatives of the Constitution and the Kenya Vision 2030 are set out in the Kenya Health Policy 2014–2030. The policy is aimed at "attaining the highest possible health standards in a responsive manner". It seeks to achieve this goal by supporting the provision of equitable, affordable, and high-quality health and related services to all Kenyans according to the highest attainable standards[3].

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It's against the above-mentioned background that, Earthcare Services Limited hereinafter referred to as the "EIA Consultant", has been commissioned by the proponent (*Ruth Wanjiku Gakunju*) to undertake an Environmental and Social Impact Assessment (ESIA) Study for the proposed 300 bed capacity tertiary Hospital along Kiambu Road, Kiambu County.

1.2. ESIA Study Requirement

Legal Notices no. 149 of the Environment Management and Coordination (EMCA) Impact Assessment and Audit Regulations (Amendment) of 2016 and no. 31 Environmental Management and Coordination (Impact Assessment and Audit) (Amendment) Regulations of 2019 categorizes the proposed project (Hospitals) as High-risk project which can be approved through the preparation and submission of a full Environmental and Social Impact Assessment (ESIA) Study Report5.

[3] Kenya Health Sector Strategic Plan 2019-2024

[4] https://elibrary.worldbank.org/doi/epdf/

[5] As per the 2016 and 2019 amendments of the National Environment (Impact Assessment and Audit) Regulations, Projects are classified as Low, Medium and High Risk based on their environmental and social risks. Low and Medium Risk projects maybe approved through the submission of EIA Project Reports; however, these amendments specify that High Risk projects shall require submission of an EIA Study Report.

1.3. Scope of the Study

The main objective of the study was to conduct an Environmental and Social Impact Assessment (ESIA) Study and prepare Environmental and Social Management Plan to ensure safeguard compliance during the implementation and operation phases of the proposed project (*300-Bed Capacity Hospital*). The specific objectives of the study were: -

a) To provide information on the existing environmental and social setting of the project area with baseline data;
b) To identify the adverse and beneficial impacts that may arise as a result of proposed works on physical, biological, socio-economic, and cultural environment due to the location, construction and operation impacts of the project structures & associated facilities in the project area,
c) To propose suitable, practical, and site-specific mitigation & enhancement measures to avoid, reduce, mitigate, and/or compensate for identified impacts, including the institutional arrangements, budget and required human resources to implement all such measures and monitor their effectiveness,
d) To define and prepare an Environmental and Social Management Plan (ESMP) as well as effective monitoring, reporting, and auditing program for the project, and
e) To identify relevant project stakeholders and inform them about the proposed project, involve them in the implementation process and receive their feedback and concerns for safeguarding the natural environment and affected population.

1.4. ESIA Terms of Reference

The main objective of the Terms of Reference (ToR) is a guide for the Environmental and Social Impact Assessment (ESIA) study for any proposed project as per the provisions of *Environmental Management and Coordination Act Cap 387 and EIA regulation 2019*. The general and specific objectives of the ESIA ToR are:

i. To list/identify the major issues and impacts to be addressed during ESIA study,
ii. To provide guidance for the ESIA report preparation, and
iii. To list and outline the specific activities to be performed during ESIA study.

1.5. Approach and Methodology

Environmental and Social Impact Assessment study requires baseline data on physico-chemical, biological, socio-economic, and cultural environment. Relevant data on the environmental and social conditions of the project area were collected and assembled into a concise description. The approach followed the requirement of Environmental (*Impact Assessment*) Regulations 2019 and EIA administrative guideline and procedures of 2002. Different techniques and approaches used is as outlined in the sub-sections: -

1.5.1. Kick-off Meeting

The kick-off meeting was held between the ESIA-Consultant and the project proponent and other technical experts. During this meeting, the list of activities for the study relevant to the Environmental and Social Impact Assessment of the project was discussed.

1.5.2. Secondary Data

Available useful data and information pertaining to the project area were collected and reviewed including County Integrated Development Plan (CIDP), Healthcare Policies, Feasibility studies, Biodiversity publications amongst other relevant documents. In addition, Topographic, Geological maps and any other maps/information were also reviewed.

Secondary data on forest and wildlife were obtained from the publications from the Ministry of Forests and Environment. Finally, ESIA reports of similar projects were also reviewed to help in developing study methodologies, identification of impacts and devising mitigation measures.

1.5.3. Field Study

A multi-disciplinary study team comprising of environmental expert, sociologist, hydrologist, and geologist visited the project site and carried out field investigation through survey, inspection, observation, and measurement to collect baseline information on physical, biological, and socio-economic and cultural environments and identified possible issues pertinent to the proposed project including social aspects. Various participatory tools like: - Focus group discussion, key informant interview, and consultations with relevant stakeholders and interactions Barazas were used to collect relevant information. The collected baseline data were verified by citing standard references and evaluated before assigning impacts on them. Key components of the Physical environment assessed are as outlined in the table below.

Table 1-1: Summary of Key Environmental Aspect Evaluated

Aspect	Narrative
a) **Physical Environment**	Walkover survey and field observation were used to collect site-specific information about the physical environment of the project area. Geological information was reviewed to explore the general geology, geomorphology, geological features like discontinuities and possible geologic hazard, land stability within the project area. Information derived from the secondary sources was verified with site observation, site specific photography and consultation with area residents.
b) **Biological Environment**	**Vegetation** Composition, distribution patterns and characteristics of vegetation and forest types and sensitive habitat in the project area were assessed from direct field observations, systematic forest sampling (wherever applicable), transect walk survey, photography, maps, interaction with local people and relevant national government and County Government. Commercially important plant species were documented. Similarly, information on the protected floral and faunal species of the project area was also identified. **Wildlife and Birds** Direct observation as well as study of fecal droppings, interaction with local communities etc. was used to record the wildlife (mammals and avian fauna) in the project area and their natural as well as critical habitat. Birds were observed with the help of binoculars.
c) **Socio-economic and Cultural Environment**	Primary information on socio-economic environment was obtained through group discussion with communities, key informant interviews, onsite observation and administration of questionnaires and stakeholder consultations. All these were planned for basic health and sanitation conditions, educational, gender issues, infrastructure facilities, water and energy related issues, customs, practices, and traditions with focus on community consultations, dispute settlement and acquiring public information, and expectations from the proposed project.

Aspect	Narrative
	Focus Group Discussions (FGD) with the project affected persons (PAPs) and local/ward level agencies were carried out. Similarly, Key Informant Interviews (KIIs) with different key stakeholders were carried out during the field survey to help gather information on socio-economic and cultural activities as well as customs & tradition of the project area community. The information gathered and collected data were processed and analyzed using Statistical Package for the Social Sciences (SPSS).

1.6. Climate Change Risk Assessment Methodology

Risk assessment provides a basis for climate change adaptation planning, implementation, and monitoring and evaluation for any organization, regardless of size, type, and nature. This section therefore provides an approach and methodology used in assessing the risks related to the potential impacts of climate change in relation to the proposed project.

1.6.1. Approach

Since the enactment of Climate Change Act 2016 all investment projects are required to consider climate risk and incorporate adaptation measures in projects at risk from climate change impacts. This is consistent with the Sessional Paper No. 5 of 2016 on National Climate Change Framework Policy commitment to scale up support for adaptation and climate resilience in project design and implementation. Determination of how climate change will influence the proposed project was determined using current climate parameters and hypothesize global climate change. The methodology used consists of five phases, each with a number of action steps as outlined in the Table below.

Approach	Narrative
Identification of Hazards Affecting the Vulnerability of Infrastructures (Buildings)	• Current climate hazards affecting the vulnerability of infrastructures was used to identified using (Sector-specific historical records from past events, about vulnerability), and • Future climate hazards that will likely affect the vulnerability of the proposed project and climate was based on projected climate data
Data Collection Methodology	The scope of the assessment was conducting the following key aspects: - a) Data collection, • Climate data was collected from the past, present, and projected future climate change hazards from the best available scientific sources like Kenya Metrology department and Kenya climate risk and vulnerability data including downscaled projections from climate models that were generated for other assessments, and • Review of disaster risk reports (NDMA Bulletins)
	b) Empirical data-based Analysis was used to ▪ Deduce evidence of climate change over baseline, and ▪ Assess and document climate changes and patterns.

Approach	Narrative
	c) Exposure and sensitivity analysis. ▪ Identification of sector responses to climate influences. Baseline' climate/sector relationship (1974-2020) was determined using past and present empirical data, and ▪ Review of vulnerability/ hazard/ risks assessment sector linkages reports (NDMA).
	d) Scenario-based sector risk/hazards projections ▪ Prediction of future climate outlook using Arc-GIS was used, and ▪ Prediction of future hazards risks were also evaluated
	e) Risks Management ▪ Sector impacts (High, Medium, Low) was determined using appropriate sector impacts models/tools, ▪ Participatory Risk and Vulnerability Assessments was undertaken through structured questionnaires and rural based mapping through stakeholders' forums, ▪ Risk, vulnerability, and hazard mapping was done using Satellite imagery, Landsat, and Arc-GIS software's, ▪ Economic impacts of hazards were determined using Kenya Bureaus of statistics records, and ▪ Cost benefit analysis of climate change adaptation and climate investment solutions options for resilience building was done using mathematical empirical data, and f) Review of Kenya's Climate and climate change projections with emphasis on Kiambu and Nairobi region g) Review Kenya's and in particular Kiambu and Nairobi Agro-Ecological Zones in the face a changing climate, and h)
Stakeholder Consultation	Along with individual consultations with stakeholders and experts, stakeholder workshops/forums were undertaken to understand the community vulnerabilities which helped in cross-sectoral linkages and filling the gaps in knowledge in determining climate risks and vulnerability. Engagement with (National Government agencies and *Kiambu County Government officials, Department of Built Environment*) were done.
Data Analysis	Various tools were used to analyse the collected data including the use of Landsat imagery, Arc-GIS- using spatial data, and modelling etc.

1.7. Summary of the Assessment Criteria

The aggregate score (i.e., overall magnitude of consequence) were calculated for each combination of timeframe and global warming level (e.g., present day; 2040, high emissions). The process of assigning magnitude of adverse consequence scores took account of relevant vulnerability, exposure, and hazard information, including the differential impacts of climate-related risks on different population groups.

Climate impact chains are conceptually grounded within the IPCC AR4 definition of climate vulnerability, defining vulnerability as a function of its component's exposure, sensitivity, and adaptive capacity. We adapted this definition for a pragmatic interpretation and understand vulnerability as a function of the exposure and sensitivity of a system (*indicating the potential climate impact*) and lessened by its adaptive capacity. A conceptual impact chain depicting the IPCC concept as provided in Figure 1.

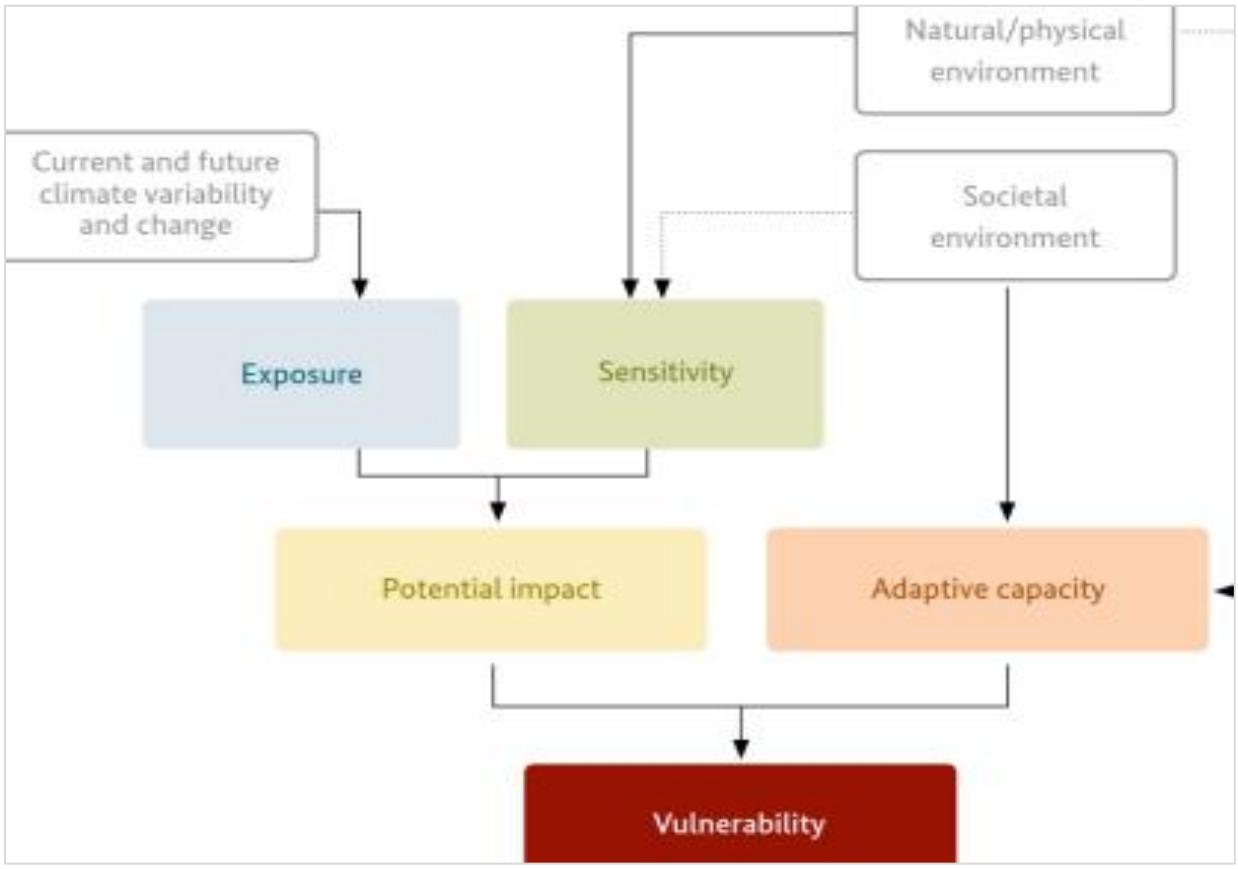

Figure 1: Indicator–based approach (Source: IPCC 2007)

Determination of Impact Significance: The Table below shows the four areas of impact significance (Negligible, Minor, Moderate and High) and how they were determined based on sensitivity and magnitude. Sensitivity and magnitude values range from 1 to 4 as follows; Very Low=1, Low=2, Medium=3 or High=4. The impact significance was determined by multiplying the sensitivity and magnitude values for each identified impact. The model that was applied IPCC-Model Vulnerability= (Exposure x Sensitivity)/ Capacity.

Significance			**Sensitivity**			
			Very low	Low	Medium	High
			1	2	3	4
Magnitude	Very low	1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	3	3 Minor	6 Moderate	9 Moderate	12 High
	High	4	4 Minor	8 Moderate	12 High	16 High

N/B: Uncertainty: It is important to note in desk reviews that past impacts or vulnerabilities may differ from those in the future: future climate stressors may differ, and non-climate stressors (such as population growth or demand for resources) may differ and affect the ability of a system to respond in the future.

1.8. Assumptions and Limitations

ESIA is a process that aims to identify and anticipate possible impacts based on past and present baseline information and details of the proposed Project. As the ESIA deals with the future, there is, inevitably, always some uncertainty about what will happen. Impact predictions have been made based on field surveys and with the best data, methods, and scientific knowledge available at this time. However, some uncertainties could not be entirely resolved. Where significant uncertainty remains in the impact assessment, this is acknowledged, and the level of uncertainty is provided.

In line with best practice, this ESIA study report has adopted a precautionary approach to the identification and assessment of impacts. Where it has not been possible to make direct predictions of the likely level of impact, limits on the maximum likely impact have been reported and the design and implementation of the Project (*including the use of appropriate mitigation measures*) will ensure that these are not exceeded. Where the magnitude of impacts cannot be predicted with certainty, the team has used professional experience and available scientific research from similar projects worldwide to judge whether a significant impact is likely to occur or not. Throughout the assessment, this conservative approach has been adopted to the allocation of significance.

1.9. Project Team

The team is comprised of a multidisciplinary of professionals appropriate to the proposed project (*development*) and the type of environment in which the project is located. The team composed of but was not limited to)

a) Engineers,
b) Architects,
c) Environmentalists, EHS Experts
d) Geologists,
e) Air quality experts,
f) Urban Planner
g) Sociologists and economists.

The professional qualification for each member of the EIA project team is as per the table below.

Table 1-2: Composition of the Team

No	Expert Name	Firm	Professional Qualification & Experience	Years of Experience	Proposed Role and Designation
1.	John Damascene Mabala Kuloba	Earthcare Services Ltd	Master of Environmental Studies and Community Development	Over 15 years	Team leader/Lead Expert Quality assurance
2.	Prof. Elijah K. Biamah	Earthcare Services Ltd	PhD in Environmental and Water Systems Engineering	Over 20 years	Lead Environmental Expert

No	Expert Name	Firm	Professional Qualification & Experience	Years of Experience	Proposed Role and Designation
3.	Prof. Beneah Manyuru Mutsotso	Earthcare Services Ltd	PhD in Sociology (Conflict and Social Change)	Over 18 years	Sociologist
4.	Engineer Oscar Wanyonyi Wafula	Earthcare Services Ltd	B.Tech. (Honors), Civil & Structural Engineering, Moi University.	Over 15 Years	Civil Engineer (interpretation of designs project description)
5.	Elly Orwe	Earthcare Services Ltd	BA (Geography and Environmental Studies) Ongoing Diploma in Natural Resource Management	Over 8 years	Biophysical and environmental data collection. Data collation and compilation of EIA Report
6.	Isaac Nyonje	Earthcare Services Ltd	Masters in Environment and Biosystems Engineering	Over 10 years	Environmental Health and Safety Issues and Air Quality assessment
7.	Hellen Mukuru	Earthcare Services Ltd	Bachelor of Environmental Studies and Community Development	Over 12 years	Waste Management, Health and Safety issues and biophysical assessment

Chapter 2 PROJECT DESCRIPTION

2.1. Overview

The proposed project is the construction of a 300-bed capacity tertiary hospital and related infrastructure along Kiambu Road, Kiambu County. (*Refer Appendix V for Site plan and Architectural Drawings*). Given that this is a tertiary hospital, the facility will be constructed and developed to provide healthcare in a number of departments and areas, which are detailed in the subsequent sections.

2.2. Location & Accessibility

The proposed project is located along Kiambu road in close proximity to Evergreen Centre Children's Park and Ineza Runda Residential Park amongst other commercial facilities. The project location is Georeferenced by GPS Coordinates: -**1.209620S** and **36.831369E**.

Figure 2: Proposed Site Location

2.3. Primary Facilities and Components of Hospital

The proposed project has been categorized as a tertiary hospital. The primary objective of the proposed hospital will be to provide improved healthcare services, treatment, and care for various human health disciplines. The services listed below shall be provided through various departments as follows;

r) Cardiology	z) Nephrology
s) Dental	aa) Ophthalmology and Optometry
t) Ear, Nose, Throat (ENT)	bb) Orthopedics
u) Gynecology and Obstetrics	cc) Pediatrics
v) Hematology	dd) Psychiatry
w) Gastroenterology	ee) Urology
x) Internal Medicine	ff) Dermatology
y) X-ray, Mammography, Radiology	gg) Pulmonology

	hh) Family planning and reproductive health

The Consultation clinics for different departments will be located on each floor of the main hospital building, together with related treatment and testing facilities for each department. The first floor and last floors will host different Wards, private rooms, operating theatres, and the Intensive Care Units (ICU). A detailed list of buildings and structural details are given in appendix for further clarification.

Figure 3: Artistic Impression of the Proposed Project

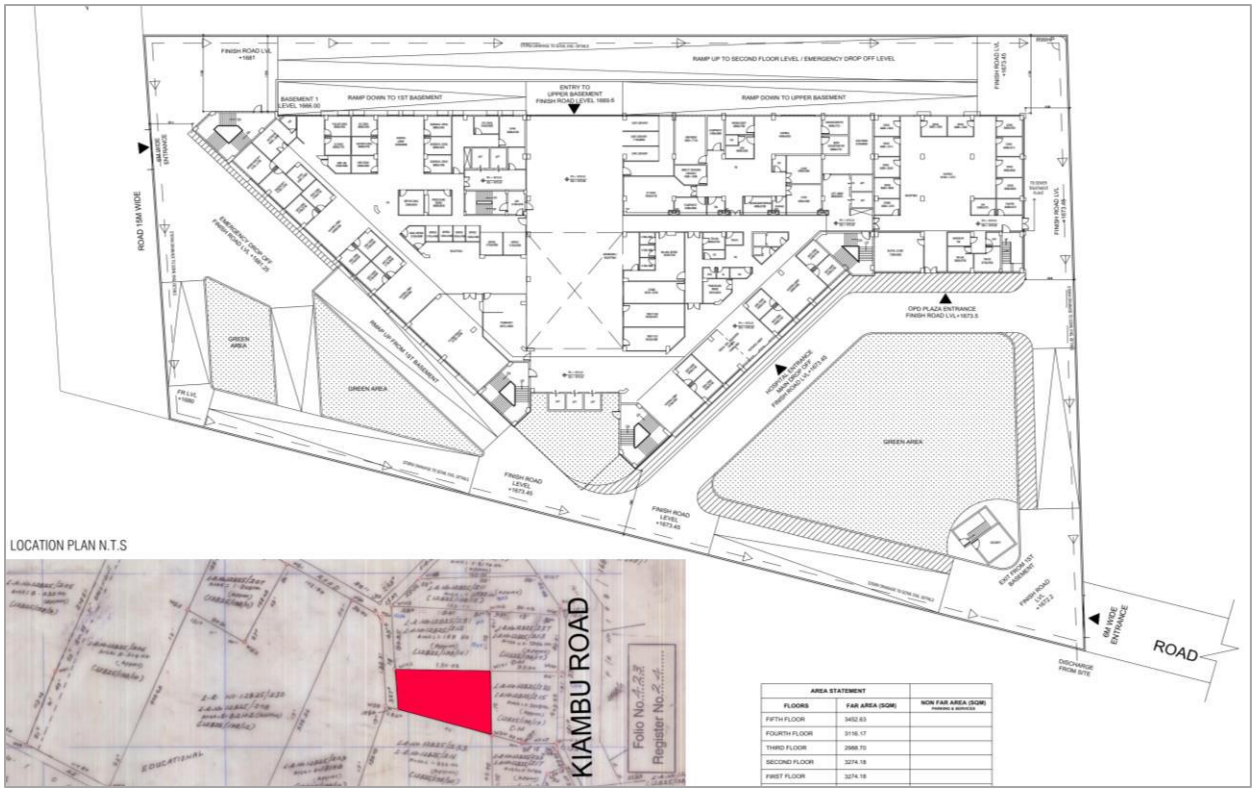

Figure 4: Layout Plan

Figure 3 above provides information on the general layout of the proposed project design. (*The proposed development is a five-storey tertiary Hospital with the approximate area coverage (m^2) as presented in the table below).*

AREA STATEMENT		
FLOORS	**FAR AREA (SQM)**	**NON FAR AREA (SQM)** PARKING & SERVICES
FIFTH FLOOR	3452.63	
FOURTH FLOOR	3116.17	
THIRD FLOOR	2988.70	
SECOND FLOOR	3274.18	
FIRST FLOOR	3274.18	
GROUND FLOOR	3274.18	
UPPER BASEMENT	3512.53	
1ST BASEMENT		5548.62
2ND BASEMENT		5367.51
STP AT 1ST BASEMENT		307.24
UGR		180
TOTAL	22892.57	11403.37

REQUIRED NO. OF CAR PARKING =22892.52/100 = 228.92 CARS i.e 229 CARS

CAR PARKING PROVIDED = 233 CARS (1ST BASEMENT-110 CARS & 2ND BASEMENT-123 CARS)

2.3.1. Other Components

The proposed development will have other ancillary support infrastructures which will include but not limited.

- Storm drainage system,
- Two access road (15m-wide) located on the northern side of the project location (between Ineza residential and the project boundary),
- Ramp leading to second floor,
- Sewage Treatment Plant (STP),
- Bunded garbage collection points,
- Borehole to augment water supply,
- Funeral parlor,
- Fire hydrant system, and
- Provision of adequate green areas for landscaping and infiltration (Aesthetic Value).

2.4. Project Neighborhood Description

The proposed project site is within a mixed-use development area along (*Kiambu Road*) with planned development. The immediate facilities around the proposed project location comprised (Bungalows, Maisonnette & high-rise apartments), learning institutions, churches, and commercial business ventures

(*Motor vehicle hubs and petrol service station*) forms the majority land uses features. Currently according to Kiambu County Land use plan, the proposed project area is classified as a residential area. The approval has been extended for public use Hospital development (*See attached Annexure IV*).

Plate 1: Ineza Residential Park at the Background

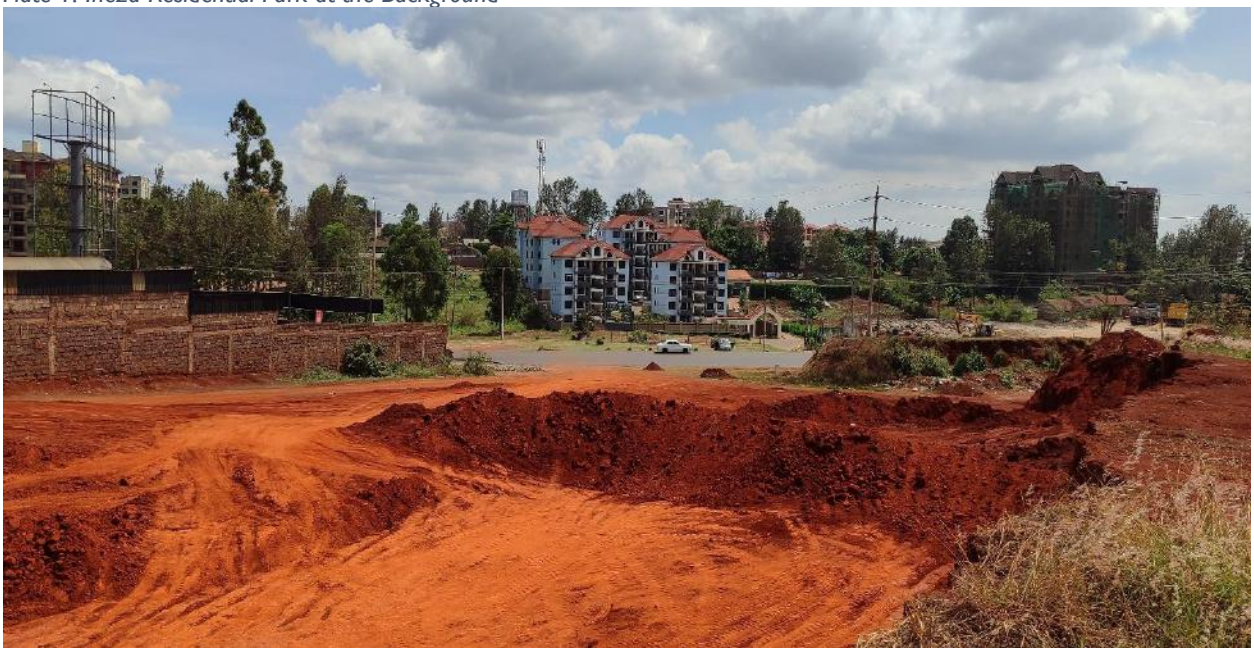

Plate 2: Shabach Gardens Across Kiambu Road Opposite East

a) Site Description

Currently the proposed project is undeveloped as captioned in Figure: 2 with short shrubs and grass dominating the site. There are no plant species of important value within and around the vicinity of the project location. In addition, there's no sensitive environment in close proximity that might be affected by the proposed development.

2.5. Project Activities

Table 2-1: Planned Construction Activities

Activities	Narratives
Pre-Construction Phase Activities	– Designing and drawing of the architectural plans for proposed project and applying for the various permits and licenses; – Environmental Impact Assessment; – Geotechnical survey; – Getting into collaborative agreements with key stakeholders including project manager, architects, quantity surveyors, engineers/contractors (structural, mechanical, electrical), material suppliers and landscapers,
Construction Phase	i. **Ground Preparation:** Land clearance and earth moving (Foundation base). ii. **Civil works:** Construction Activities of the proposed project components iii. **Electromechanical works**: Equipment installation, iv. **Development of vehicle parking (223 parking space)**, walkway, and vehicle access network.
Operation Phase	**General hospital activities including, operation, maintenance works amongst other activities.**

2.6. Construction Work Plan

The proposed project will require an estimated time frame of about 24 months for completion from the date of commencement to the date of commercial operation.

2.7. Utilities

2.7.1. Water Supply System

The water requirement for the construction phase include water for construction activities such as curing and formation of concrete mixtures and water for domestic consumption. Considering the number of workers required for development during construction as per Construction norms, water demand for domestic consumption and construction has been estimated to be about 20m^3 a day. The project operation activities will have storage tank (Capacity 400m^3) for normal operation and 200m^3 storage for Firefighting (Hydrant System). Water will be supplied or sourced through Ruiru-Juja Water and Sewerage Company (RUJWASCO), Nairobi Water and Sewerage Company (NWSC) and bowsers if required. Other water sources will be onsite borehole.

2.7.2. Power Supply

Power supply for the project will be sourced from the national power grid available on the project site (KPLC). The power will be utilized for construction and hospital operation needs. In addition to the use of power from the main grid, a standby generator with a total capacity of 45kVA will be installed to run the hospital during power outages. In addition to this, critical care areas such as Operation theatres, ICUs, HDUs, ETUs will be equipped with a *Central Uninterruptible Power Supply* (UPS) system with a capacity of 50kVA.

2.7.3. Wastewater & Solid Waste Management

Waste generated during the construction phase is anticipated to comprise of rubble and unsuitable spoil material generated during ground clearance work, inert construction materials such as metal offcuts,

unused concrete rubble, and general non-hazardous wastes. Hazardous waste generated during this phase may comprise of empty paint, oil, and chemical containers. All recyclable waste will be sold to legitimate brokers and interested buyers.

In addition to the mitigation measures contained in Section 8.9.3 of the ESIA and the Waste Management Plans (WMP) to be prepared. The project contractors will be required to establish waste storage areas for project waste management. The storage area will be divided into non-hazardous and hazardous waste with proper separation between the two staging areas. The hazardous waste storage area will be established as per the requirements set out in the Environmental Management and Coordination (Waste Management Regulation) 2006.

a) Effluent Discharge

During the construction phase, sanitary effluent will be directed to an onsite septic tank which shall be constructed at the early onset of the construction phase. The septic tank shall be lined with concrete to prevent leaks and it will have a capacity of the estimated wastewater generation during construction. The septic tank will be regularly emptied using suction trucks and wastewater will be disposed of by a licensed NEMA contractor/waste handler. Onsite mobile toilets will also be used whenever practicable.

b) Operational Phase

Operational phase activities will generate both non-hazardous (office wastes, general commercial waste) and hazardous wastes that includes medical waste (sh*arp objects, contaminated PPE, body tissue, radioactive waste, etc.*). Segregation of waste into categories for separate handling consistent with its potential hazard shall be implemented in strict compliant with Sustainable Waste Management Act 2022. Non-hazardous (*General solid wastes*) will be subject to recycling (effected principally at the source) and residuals disposed off at designated and permitted landfill (*Kangoni or Dandora dumpsites*). Hazardous waste will be stored in the designated hazardous waste storage area, designed according to the requirements of EMCA (Waste Management Regulation) 2006. Finally, the hospital will follow the provisions and mitigation measures provided in Section 8.9.4 regarding the disposal of hazardous and non-hazardous waste.

i. Wastewater

Wastewater generated during the operation phase will be adequately treated through state-of-the-art Sewage Treatment Plant (STP) for safe, permitted discharge into the municipal sewer network (Kiambu Nairobi trunk). Treatment levels and point of discharge shall be established as per EMCA (Waste Management Regulation) 2006. Laundry wastewater will be treated through a combination of coagulation & DE- chlorination. Settling or delaying tank will also be introduced for the purpose of sedimentation process. Hazardous waste (for example laboratory/surgical waste) will be collected separately through a dedicated drainage network up to the pre-treatment facility (STP).

Treatment of this waste will mainly be through chemical disinfection which involves the use of chemical agents such as 10% hypochlorite or other approved chemical disinfectant/sterilant. The wastewater will then pass directly to filtration and sedimentation processes as required. Cleaning wastewater and storm water from storage rooms and loading docks where waste is handled between transportation modes is to be regarded as health care wastewater and managed as outlined above.

Wastewater pre-treatment. Wastewater from laboratories will be neutralized, detoxified, and undergo removal of heavy metals as appropriate through engineering mechanisms. Wastewater from X-ray departments shall be neutralized and treated for removal of silver and finally the kitchens will be equipped with grease traps.

2.7.4. Public Spaces and Features

In addition to the waiting lounge at different sections of the hospital and reception of the hospital, each department will have a small waiting area for the patients waiting for consultation. Waiting lounges will be available on each floor. The Pediatrics department will also have Kids playing areas. In general the Hospital will have adequate green area in compliant to Forest Conservation and Management Act 2016.

2.8. Materials, Machinery and Equipment

The table below gives a list of project inputs, in terms of workforce, materials and equipment and other utilities.

Table 2-2: Summary Materials, machinery, and equipment

Inputs	Details	Source
Workforce	100 at peak	Contractor
Equipment/Machinery	Excavation and Backfilling (Civil Road) • Tippers • Excavators • Water Tanker • Pedestrian roller • Backhoe • Poker Vibrator • Truck mixers • Bar Bending machines. • Lowbed • Pickup trucks • Cranes	Contractor
Construction Material	Cement Sand Aggregate Water Binding wire Nails and Screws Reinforcing Steel Conduit pipes and fittings Electrical wire Electrical cables Electrical fixtures and fittings Lights Tiles (Terrazzo) Plasterboard GI Metal frame Smart board Toilet fixtures and fittings Air conditioning system Firefighting system	To be sourced from local suppliers if available or imported

2.9. Objectives and Justification

The provision of health services is primarily a mandate of the National government. However, increased budget strain from rising disease incidence and emergence of global health security threats like Covid 19 amongst others, underscores the value of cross sectoral collaboration i.e., National government and Private sector. The Kenyan private sector represents roughly 45% of the healthcare market, although this varies by submarket. There is a clear gap in the Kenyan healthcare sector and the proposed project will contribute towards bridging this gap. The Project will bring new technology and expertise to provide world-class healthcare and medical services to the Country.

The project's development objective is to contribute to enhancing the health and wellbeing of the Country and to address part of the significant specialized segment healthcare supply gap in both the County and the Country at large in realization of the Kenya UHC Policy and 2010 Kenya Constitution in particular bill of rights.

2.10. Estimated Cost

The estimated total project cost in Kenya Shillings **6,816,424,350** as summarized in the table below.

RLB Rider Levett Bucknall

THIS IS AN ORDER OF MAGNITUDE ESTIMATE OF CONSTRUCTION COST BASED ON PRELIMINARY INFORMATION AND ASSUMPTIONS AND IS SUBJECT TO REFINEMENT AS THE DESIGN, SPECIFICATIONS AND PROGRAMME ARE FURTHER DEVELOPED

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Co. No: 152596 C1/GBL

PROJECT : SUPER-SPECIALTY HOSPITAL
LOCATION : NAIROBI, KENYA

P20135/A1/N12R2

INDICATIVE DEVELOPMENT COST : NUMBER 12 REVISION 2
SUMMARY

	BASEMENT	EXTERNAL WORKS	TOP STRUCTURE	TOTAL
GROSS EXTERNAL AREA (GEA)	16 951 m²	N/A	16 756 m²	33 707 m²
BEDS	N/A	N/A	300 no	300 no
GEA PER BED	57 m²	N/A	56 m²	112 m²
COVERED PARKING	318 bays			318 bays
OPEN PARKING		61 bays		61 bays
TOTAL PARKING	318 bays	61 bays		379 bays
GEA PER PARKING BAY	42 m²	N/A		42 m²
PARKING RATIO				1,26 bays per bed
SITE AREA				11 236 m²

	ELEMENT / ITEM		% OF CONST COST	% OF DEV COST	BASEMENT US$	EXTERNAL WORKS & COMMON SERVICES US$	TOP STRUCTURE US$	TOTAL US$
1	SHELL & CORE	295 /m²	22%	14%	3 897 900	-	6 052 300	9 950 200
2	FIT-OUT	228 /m²	17%	11%	1 067 900	-	6 615 300	7 683 200
3	MEPF	674 /m²	51%	33%	5 536 400	-	17 191 700	22 728 100
4	EXTERNAL WORKS	74 /m²	6%	4%	-	2 488 900	-	2 488 900
5	PRELIMINARIES & GENERAL	64 /m²	5%	3%	525 100	124 400	1 493 000	2 142 500
ESTIMATED CURRENT CONSTRUCTION COST			100%		11 027 300	2 613 300	31 352 300	44 992 900

Chapter 3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1. Introduction

This chapter outlines the existing National and International Environmental and social legislation, policies, and institutions applicable to the Project that will guide the development of the Project, which is subject to this ESIA Study Report.

3.2. Policy Framework

3.3. The Constitution 2010

Kenya Constitution is the supreme law in Kenya. The constitution emphasizes environmental conservation and sustainable development. In the Preamble, the Constitution states that **"We, the people of Kenya will be respectful of the environment, which is our heritage, determined to sustain it for the benefit of future generations"**.

Article 2(5) of the Constitution states that the general rules of international law shall form part of the laws of Kenya. For the purposes of protection of the environment, several principles of international environmental law which act as a guide on the development of environmental legislation have been incorporated: the polluter pays principle; principle of public participation; principle of sustainability; principle of inter & intra-generational equity; principle of prevention; and precautionary principle.

The principle of sustainable development is entrenched in Article 10 2(d) of the Constitution as one of the national values and principles of governance.

The Constitution guarantees the right to a clean and healthy environment at **Article 42**. Article 42 further guarantees the right to have the environment protected for the benefit of present and future generations through legislative and other measures particularly those contemplated in **article 69** and the right to have obligations relating to the environment fulfilled under **Article 70**.

Article (69) (2) imposes obligations on every person to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Article 70 provides an avenue for redress for any person who alleges that the right to a clean and healthy environment has been or is likely to be denied, violated, infringed, or threatened. The Court is empowered to issue preventive, cessation, or compensatory orders. ***Relevance:*** *The project shall be undertaken within the provision of the Constitution. The proponent shall ensure that the project activities do not compromise the right to a clean and healthy environment. Requisite measures shall be put in place to guarantee the sustainability of the project. Such measures shall include but not limited to pollution prevention and control, protection of biodiversity, sustainable utilization of natural resources, et al*[6].

3.4. Sessional Paper No.10 of 2014 on the National Environment Policy, 2014

The overall goal of this Paper is to ensure better quality of life for present and future generations through sustainable management and use of the environment and natural resources. ***Relevance:*** *In line with the above policy statements, this ESIA has been conducted for the establishment of a hospital project to ensure that environmental and social issues are identified and appropriately addressed.*

[6] The National Council for Law Reporting. 2010. Laws of Kenya: The Constitution of Kenya. Nairobi, Kenya: The National Council for Law Report

3.5. National Environment Policy, 2013

The National Environment Policy aims to provide a holistic framework to guide the management of the environment and natural resources in Kenya. It further ensures that the linkage between the environment and poverty reduction is integrated into all government processes and institutions to facilitate and realize sustainable development at all levels. The main goal of this Policy is "*A better quality of life for present and future generations through sustainable management of the environment and natural resources*." ***Relevance:*** *The project will be guided by this policy to minimize environmental degradation whilst improving healthcare in the Country.*

3.6. Vision 2030

Kenya Vision 2030 aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030. The Social Pillar of the Kenya Vision 2030 seeks to invest in the people in order to improve the quality of life for all Kenyans by targeting a cross-section of human and social welfare projects and programmes with Health as a key sector. The Constitution, through the chapter on Bill of Rights, puts a heavy responsibility on the health sector to ensure that the right to health is realized.

Relevance: *It is through development of hospitals and other health infrastructures/facilities that, the goal of the Health Sector as outlined in the Social Pillar of Kenya's Vision 2030 to provide equitable, affordable, and quality healthcare to all citizens can be achieved.*

3.7. Kenya Health Policy (KHP 2014 -2030)

The policy gives directions to ensure significant improvement in overall status of health in Kenya in line with the country's long term development agenda, Vision 2030, the Constitution of Kenya 2010, and global commitments[7]. ***Relevance:*** *The Policy calls for the provision and distribution of healthcare services to all people that is commensurate with that of a middle-income country without segregation which the proposed project is envisioned.*

3.8. Occupational Safety & Health Policy Guidelines for the Health Sector 2012

Occupational Safety and Health (OSH) is an area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goals of occupational safety and health programs include fostering a safe and healthy work environment. The purpose for this guideline is to promote a safe and healthy work environment in Kenya's health sector.

Relevance: *The proponent will strive to promote a safe and healthy work environment, work practices and procedures for all staff of the health sector in order to minimize work-related injuries and occupational diseases. In addition, the management will facilitate compliance to OSH policy and legislation by clients, contractors, and visitors to the health facility.*

3.9. National Infection Prevention and Control Guidelines for Health Care Services 2021

These guidelines are intended to provide administrators and HCWs with the necessary information and procedures to implement IPC core activities effectively within their work environment in order to protect themselves and others from the transmission of infections. ***Relevance:*** *The proponent will provide procedures for cleaning, disinfecting, and reprocessing reusable equipment and protecting HCWs from transmissible infections.*

[7] Republic of Kenya, 2014. Kenya Health Policy 2014-2030. Nairobi, Kenya: Republic of Kenya, Ministry of Health

3.10. Sessional Paper No. 5 of 2016 on National Climate Change Framework Policy

Kenya is a developing country whose economy is highly dependent on the natural resource base, making it highly vulnerable to climate variability and change. Realisation of sustainable development in Kenya, despite significant progress to date, is threatened by climate change and its resultant impacts. The country has in the recent past seen increased evidence of climate change such as rising temperatures and changing rainfall patterns and has experienced extensive climate related impacts through the increased frequency and intensity of extreme weather events such as droughts and flooding. These manifestations of climate change constitute a serious threat to Kenya's natural, built economic and physical systems, on which the country's sustainable development and future prosperity depends.

Cognizant of this, the Government has, through the UNFCCC process committed to protect the climate system for the benefit of the present and future generations. Kenya ratified the UNFCCC in 1994 and the Kyoto Protocol in 2005. Kenya's continuing vulnerability to climate change and the threat this poses to achieving long-term development goals has thus been clearly recognised. As a result, Kenya initiated a concerted national effort to respond to climate change, which commenced with development of the National Climate Change Response Strategy (NCCRS) in 2010.

The impacts of climate change cut across diverse aspects of society, the economy, and the environment. The adverse impacts of climate change have the potential to significantly inhibit the sustainable development of Kenya in key priority areas amongst them the proposed project under:

- **Physical Infrastructure**: An improved and expanded physical infrastructure is an important and necessary enabler of socio-economic development. Vision 2030 aspires to develop world-class infrastructure facilities and services by focusing on quality, aesthetics, and functionality of the infrastructure services. One approach is to climate proof infrastructure, which refers to the integration of climate change risks and opportunities in the design, operation, and management of infrastructure.

3.11. Health Care Waste Management Strategic Plan 2016-2021

The Basel Convention rests the responsibility for waste management to the polluter and in this case, the health facility. The National Health Policy 2012-2030 has laid emphasis on healthcare waste management to accelerate prevention and minimization of communicable diseases and epidemics including HIV/AIDs, Tuberculosis, Hepatitis B and C, as well as other viral haemorrhagic fevers among others. This policy, therefore, is in line with the Public Health Act Cap 242 laws of Kenya which also addresses environmental health, water and sanitation including healthcare waste management. The key objective of this strategic plan is to strengthen HCWM systems in Kenya through the protection of patients, health workforce, the public and the environment from the hazards associated with health care risk waste. ***Relevance*** *the proponent will be guided by this plan in managing Healthcare wastes*.

3.12. Legal and Institutional Framework

3.12.1. Environmental Management and Coordination Act, Cap 387

The Environmental Management and Coordination Act (EMCA), Cap 387, is the framework law on environmental management and conservation. The National Environment Management Authority (NEMA) was established as the principal instrument of government charged with the implementation of all policies relating to the environment, and to exercise general supervision and coordination over all matters relating to the environment. In consultation with the lead agencies, NEMA is empowered to develop regulations, prescribe measures and standards and issue guidelines for the management and conservation of natural resources and the environment. The Act provides for environmental protection through: Environmental

impact assessment; Environmental audit and monitoring; and Environmental restoration orders, conservation orders, and easements.

Part (VI) under Section 58 of the Act directs that any proponent for any project listed on the Second Schedule of the act undertake and submit to NEMA an Environment Impact Assessment (unless exempted by NEMA), who in turn may issue a license as appropriate. The proposed development is listed in the Second Schedule of the Act (*introduced through April 2019 amendments to the Second Schedule vide Legal Notice 31 of 2019*) for which an EIA applies are: under the **High-risk projects** category including the **Hospital development**.

Relevance: *The proponent has contracted Earthcare Services Limited to undertake the ESIA and prepare the report for submission to the authority (NEMA). The proponent shall obtain an EIA license before the commencement of work.*

Below is a set of regulations developed under EMCA in relation to project development.

Table 3-1 EMCA Subsidiary Legislations and Relevance to the Project

Regulations	Description	Relevance
The Environmental (Impact Assessment and Audit) Regulations, 2019	These Regulations seek to give further effect to section 58 of the Act and provide details on how an EIA is to be conducted. Regulation 7 provides that any proponent of a High risk and projects (which includes Hospital Development) shall submit to NEMA a full study report of the likely environmental effect of the project. Part (V) Section 31 states that an Environmental audit is expected to be undertaken on the development activities likely to have adverse environmental impacts. The audit exercise is expected to be conducted by a qualified environmental inspector registered in accordance with regulation 14. Section 31(3) the environmental Audit study is prepared based on the baseline information provided in the Environmental impact assessment report study which will be used as baseline information upon which subsequent environmental control audit studies shall be undertaken. According to section 31(7) information required to be included in the audit report is mentioned; past and present impacts of the project, responsibility and proficiency of the operators of the project, existing internal control mechanisms to identify and mitigate activities with negative environmental impacts, existing internal control mechanisms to ensure workers health and safety, existence of environmental awareness and sensitization measures including environmental standards and regulations, law and policy for managerial and operational personnel.	*The environmental consultant is a firm of expert and has undertaken the ESIA study in accordance with the general environmental impact assessment guidelines sector environmental guidelines provided for in Part III of the regulations.*
EMCA (Water Quality) Regulations, 2006	The regulation provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams, springs, wells, and other water sources). It is an offence under Regulation No. 4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.	*The Proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water sources are implemented throughout the project life cycle.*

Regulations	Description	Relevance
	Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment. Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.	
EMCA (Waste Management) Regulations 2006 (Legal Notice 121)	These Regulations were published in the Kenya Gazette Supplement No. 69, Legislative Supplement No. 37, and Legal Notice No. 121 of 29th September 2006. The regulations provide details on management (handling, storage, transportation, treatment, and disposal) of various waste streams including: • Domestic waste • Industrial waste, • Hazardous and toxic waste • Biomedical wastes and • Radioactive waste. Regulation No. 4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include: i. Improvement of production process through- Conserving raw materials and energy • Eliminating the use of toxic raw materials and wastes • Reducing toxic emissions and wastes Monitoring the product cycle from beginning to end by- • Identifying and eliminating potential negative impacts of the product • Enabling the recovery and re-use of the product where possible, and • Reclamation and recycling and Incorporating environmental concerns in the design and disposal of a product. Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non-hazardous waste for appropriate disposal.	*The proponent shall ensure that any solid waste (Both non-hazardous and Hazardous) generated from the project activities is properly segregated, disposed appropriately and the quality of discharged effluent meets these regulations' standards.*
EMCA (Noise and Excessive Vibration	These Regulations aim at ensuring the maintenance of a healthy environment for all people in Kenya; the tranquillity of their surroundings and their psychological wellbeing by regulating noise levels and excessive vibration.	*The contractor shall undertake to minimize any noise emanating from work and provide PPEs to workers*

<table>
<tr><th>Regulations</th><th>Description</th><th>Relevance</th></tr>
<tr><td>Pollution) (Control) Regulations, 2009</td><td>
The regulations provide information on the following:
a) Prohibition of excessive noise and vibration.
b) Provisions relating to noise from certain sources.
c) Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and;
d) Noise and excessive vibrations mapping.
According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures, or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure, or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety, or property.

Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

Table 3-2 Maximum Permissible Noise for Construction Sites in Kenya
<table>
<tr><th></th><th>Facility</th><th colspan="2">Maximum Permissible Noise Level in dB(A)</th></tr>
<tr><td></td><td></td><td>Day (0601-1800, LAeq 12 hour)</td><td>Night (1801-0600, LAeq 12 hour)</td></tr>
<tr><td>(i)</td><td>Health facilities, educational institutions, homes for disabled, etc.</td><td>60</td><td>35</td></tr>
<tr><td>(ii)</td><td>Residential</td><td>60</td><td>35</td></tr>
<tr><td>(iii)</td><td>Areas other than those prescribe in (i) and (ii) (and of applicability to this Project).</td><td>75</td><td>65</td></tr>
</table>
</td><td>who are likely to be exposed to high noise levels. During operations, the proponent should attenuate noise producing equipment such as standby generator.</td></tr>
</table>

Regulations	Description	Relevance
EMCA (Air Quality) Regulations, 2014	The objective of the Regulations is to provide for prevention, control, and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources (e.g., *motor vehicles) and stationary sources (e.g., industries*) as outlined in the Environmental Management and Coordination Act, Cap 387. Part II of the regulations prohibits any person from causing air pollution either directly or indirectly. The first schedule of the regulations sets tolerant limits for different parameters while the second schedule lists the priority air pollutants which are categorized as general source pollutants, mobile source pollutants and greenhouses gases. The third schedule sets outs limit for both controlled and uncontrolled facilities. The fourth schedule provides guidelines for air pollution monitoring and parameters from stationary sources.	*The Project is not expected to have major impacts on the ambient air quality. However, any machinery in use must be in good working order to minimize emissions. The contractor will adhere to the provision of the act.*

3.13. Climate Change Act, 2016

This statute was enacted to provide for a regulatory framework for enhanced response to climate change and to provide for mechanism and measures to achieve low carbon climate development.

Section 3 (2) of the Act provides that the Act shall be applied in all sectors of the economy by national and county governments to: mainstream climate change responses into development planning, decision making and implementation; build resilience and enhance adaptive capacity to the impacts of climate change; promote low carbon technologies, improve efficiency and reduce emissions intensity by facilitating approaches and uptake of technologies that support low carbon, and climate resilient development; and mainstream and reinforce climate change disaster risk reduction into strategies and actions of public and private entities; among others.

Section 16 of the Act imposes climate change duties on private entities by providing that the National Climate Change Council in consultation with the Cabinet Secretary and other relevant departments may impose such duties. Under this statutory provision, a state agency can impose duties to conform to climate change imperatives even on actors in the construction sector including property developers.

Section 23 of the Act provides a right of a person to move to the Environment and Land Court to stop, prevent or discontinue a project, or even seek compensation against another person or entity who threatens or has indeed acted in a manner that adversely affects actions towards mitigation and adaptation to climate change.

Offences and Penalties

Section (97), The Act provides for various offences and penalties relating to climate change actions. For instance, where a person without lawful excuse ignores or fails to obey any instruction issued by any member, officer, or agent of the Council in exercise of their powers or their legal functions, commits an offence and is liable, on conviction, to a fine not exceeding ten million shillings or to imprisonment for a period not exceeding five years, or to both.

In conclusion section (100) The Act is guided by a well laid out and thought-out goals and objectives and follows proper guidelines and as such offers a good foundation for addressing climate change impacts and

provides a roadmap for ensuring that Kenya as a country achieves low carbon and climate change resilient development.
The strategies that have been put in place to address climate change also play a great role as they show the level of commitment that the government has in addressing climate change and more importantly implement some of the key tenets provided in the Constitution of Kenya such as upholding the citizens right to a clean and healthy environment, promoting public participation and protecting and conserving the environment not just for the current generation but also future generations. ***Relevance:*** *While designing the proposed project, low-carbon technologies were evaluated and considered where feasible to minimize greenhouse gas emissions (GHGs*). *The Act is important as it binds stakeholders in the construction sector to ensure that their actions do not negatively affect climate change mitigation and adaptation actions.*

3.14. Energy Act No: 1 of 2019

The purpose of the Act is to consolidate laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers, and functions of the energy sector entities; promotion of renewable energy; exploration, recovery, and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms.

Section 188 provides that the Energy Petroleum Regulatory Authority (EPRA) shall designate factories and buildings and energy appliances by types, quantities of energy use, or methods of energy utilization for purposes of energy efficiency and conservation.

Under section 189, there is an obligation on the owner of a designated factory or building to conserve energy, audit and analyze energy consumption in the building to ensure they comply with the set standards. The Regulations envisaged under section 190 of the Act will effectively promote green buildings by ensuring energy conservation in buildings (houses). ***Relevance:*** *The proponent will incorporate green building technology to abide by the provision of this Act. Renewable energy will be incorporated in the design and operation phase of the facility.*

3.15. Health Act, 2017

This is an Act of parliament whose objectives are to establish a national health system which encompasses public and private institutions and providers of health services at the national and county levels and facilitate in a progressive and equitable manner, the highest attainable standard of health services and to protect, respect, promote and fulfill the health rights of all persons in Kenya to the progressive realization of their right to the highest attainable standard of health, including reproductive health care and the right to emergency medical treatment.

Section12 (2) obligates service providers to provide health care, conscientiously and to the best of their knowledge within their scope of practice and ability, to every person entrusted to their care or seeking their support. Sub-rule (3) Notwithstanding the provisions of subsection (1)(a), the head of any health facility may impose conditions on the service that may be provided by a health care provider considering his or her health status.

Section 23 Public private partnership Notwithstanding the provisions of section 65 and subject to any other law regulating public-private partnerships, nothing under this Act shall prevent the national and county governments from entering into public-private partnerships for the purpose of establishing and deepening health service provision.

PART XIII section 89 Licensing of private entities. Under sub rule (1) the private entities shall be permitted to operate hospitals, clinics, laboratories, and other institutions in the health sector, subject to licensing by the appropriate regulatory bodies. ***Relevance:*** *The project management and the contractor shall ensure the provisions of the Act relating to the promotion and advancement of public and environmental Health are adhered to during the project implementation phases.*

3.16. Public Health Act Cap 242 (Revised 2012)

The Public Health Act regulates activities detrimental to human health. The Act defines an environmental nuisance as one that causes danger, discomfort, or annoyance to the local inhabitants or which is hazardous to human health. The Act addresses matters of sanitation, hygiene and general environmental health and safety which are directly related to projects and associated activities. It is, therefore, recommended that measures be taken in accordance with the Act to safeguard the health of the workers and the public.

Part IX, Section 115 of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary, and reasonably practicable measures to maintain areas under their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health. Such nuisance or conditions are defined under Section 118 waste pipes, sewers, drains or refuse pits in such a state, situated, or constructed as in the opinion of the medical officer of health to be offensive or injurious to health.

Relevance: *Implementation of the Project will pose potential health risks especially to the workers and public such as air emission impacts and Occupational Health and Safety (OHS) risks. These risks and impacts will need to be appropriately managed as recommended in Chapter 7 of this report. The Proponent will be required to abide by these provisions throughout the project cycle.*

3.17. Water Act 2016

The Act was enacted to provide for the regulation, management and development of water resources, water, and sewerage services. It repealed and replaced the former Water Act 2002. Section 11 establishes the Water Resources Authority (the precursor to Water Resources Management Authority/WRMA) whose functions under section 12 include:

i. Receiving water permit applications for water abstraction, water use and recharge and determining,
ii. Issuing, and varying water permits as well as enforcing the conditions of those permits.
iii. Collecting water permit fees and water use charges; and
iv. Determining and setting permit and water use fees.

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

Section 108 sub-sections 2 and 3 state that a person shall not discharge any trade effluent from any trade premises into the sewers of a licensee without the consent of the licensee upon application indicating the nature and composition of the trade effluent, maximum quantity of effluent to be discharged on any one-day, highest rate of discharge and any other information deemed necessary.

Section 143 subsections 1 (b) of the Act makes it an offence to throw, convey, cause, or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such a manner as to cause, or be likely to cause, pollution of the water resource.

Relevance: *The project proponent will be required to ensure that all construction waste is collected and dumped at approved sites to prevent potential for contaminating surface and underground water sources. The Act applies anytime throughout the project cycle when there is discharge of effluent to the environment.*

3.18. The Occupational Health and Safety Act, 2007

This is an Act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. It received presidential assent on 22nd October 2007 and became operational on 26th October 2007. The key areas addressed by the Act include:

a) General duties include duties of occupiers, self-employed persons, and employees.
b) Enforcement of the act including powers of an occupational safety and health officer
c) Registration of workplaces
d) Health General Provisions including cleanliness, ventilation, lighting, and sanitary conveniences,
e) Machinery safety including safe handling of transmission machinery, handheld and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver.

Under section 6 of this Act, every occupier is obliged to ensure the safety, health and welfare of all persons working in his workplace. According to section 44, potential occupiers, or users of any premises as workplaces are required to apply for registration to the Director for all premises intended for use as workplaces. Such places shall be maintained in a clean state during the operation phase (section 47).

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees. Other precautionary measures include issuance of a permit to work to any employee likely to be exposed to hazardous work processes or hazardous working environment.

Part VI of this Act provides for general health provisions while Part X provides for the general welfare of the workers with respect to supply of drinking water, washing facilities and first aid among other aspects. Section 53 of this Act requires that for workers employed in a process involving exposure to any injurious or offensive substances, suitable protective clothing, and appliances (*gloves, footwear, goggles, and head coverage*) shall be provided. ***Relevance:*** *The Act establishes codes of practices to be approved and issued by the Directorate of Occupational Safety and Health Services (DOSHS) for practical guidance of the various provisions of the Act. For the purposes of this Project.*

- *The facility should be registered as a workplace by DOSHS;*
- *Workers should be provided and prevailed upon to wear PPE appropriate for specific tasks to ensure their health, safety, and wellbeing;*
- *Safety and health committee should be formed;*
- *Annual occupational safety and health or fire safety and risk assessment audits should be undertaken;*
- *An emergency preparedness and response plan should be prepared; and*
- *Annual environment, safety and health training should be undertaken.*

The Proponent will be required to ensure that the ESMP forms part of the contract document and the main contractor prepares a contractor specific Environment and social management plan and includes adequate measures to promote safety and health of workers and community during the construction phase of the proposed project.

3.19. Work Injury Compensation Benefit Act (WIBA), 2007

This Act provides for compensation for employees for work-related injuries and diseases contracted in the course of employment and for connected purposes. The Act includes compulsory insurance for employees. The Act defines an employee as any worker on a contract of service with an employer.

The salient features addressed by the Act include the following:

i. Obligations of employers
ii. Right to compensation
iii. Reporting of accidents
iv. Compensation
v. Occupational diseases
vi. Medical aid and
vii. Appeals

According to section 7 (1) of the Act, every employer is required to obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under the Act to any of his employees. In addition, every employer carrying on business in Kenya shall within the prescribed period and in the prescribed manner register with the Director-section 8 (1).

According to section 46 (1), the employer shall be responsible for availing necessary means of transport where an employee is injured in an accident, which necessitates his conveyance to a hospital medical facility and from a hospital or medical facility to his residence.

Relevance: *Under the above Act, the main contractor is required to:*

- *Maintain an insurance policy to cover all staff.*
- *Report any accident that has occurred to the Directorate of Occupational Health and Safety Service within 7 days from the date of occurrence or receiving notice.*
- *Maintain a record of accidents on site.*
- *Sensitize staff and create awareness on health and safety measures.*

3.20. Physical Planning and Land Use Planning Act, 2019

This is an Act of Parliament to make provision for the planning, use, regulation, and development of land and for connected purposes.

Section 57 (1) A person shall not carry out development within a County without a development permission granted by the respective county executive committee member. Sub-Section (2) A person who commences any development without obtaining development permission commits an offence and is liable on conviction to a fine not exceeding five hundred thousand shillings or to imprisonment for a term not exceeding two months or to both. (3) A county executive committee member shall require a person who has commenced a development without obtaining development permission to restore the land on which the development is taking place to its original condition or as near to its original condition as is possible and that such restoration shall take place within ninety days.

Section 59 (1) A person applying for development permission shall ensure that any documents, plans and particulars that are provided to the respective county executive committee member while applying for development permission have been prepared by the relevant qualified, registered, and licensed professionals. ***Relevance:*** *The proponent shall ensure that the proposed development is within the requirements of the area's zoning plan and approved by the county government. In addition, the proponent will ensure the development does not in away have injurious impact on the environment.*

3.21. The Sustainable Waste Management Act, 2022

An Act of Parliament to establish the legal and institutional framework for the sustainable management of waste and to ensure the realization of the constitutional provision on the right to a clean and healthy environment and for connected purposes. The Sustainable Waste Management Act, No.31 of 2022, was signed into law on 7th July 2022 and salient features and key objective include: -

a) Promote sustainable waste management;

b) Improve the health of all Kenyans by ensuring a clean and healthy environment;
c) Reduce air, land, fresh water, and marine pollution;
d) Promote and ensure the effective delivery of waste services;
e) Create an enabling environment for employment in the green economy in waste management, recycling, and recovery, and
f) Inculcate responsible public behavior on waste and environment.

PART VIII regulation 30 (1) A person who fails to manage waste in accordance with this Act shall be required to clean up and restore the site where the waste was being managed to its natural state. Under regulation (3) A restoration order issued under this section shall be effected in accordance with the Environmental Management and Co-ordination Act, 1999 (No. 8 of 1999).

The Private entities or any of their officers who fail to manage waste in accordance with the Act will be liable to a fine of:

i. at least 5% of the entity's net income registered in the previous tax year or KES 5,000,000 whichever is higher; and
ii. at least KES 200,000 for the entity's officers.

Relevance: *The contractor and the proponent shall adhere to the provisions of this Act in ensuring that generated wastes during construction and operation phases are segregated at source for appropriate recovery, recycling, and disposal.*

3.22. Draft National Building Code, 2022

The draft code seeks to repeal and replace the 1968 Building Code which is now considered obsolete as it does not consider developments that have occurred in the construction industry including green buildings, new cheaper and stronger construction materials, and new construction technologies, among others. The purpose of the Code is to promote order and safety in construction works, and the health and safety of persons in or about construction works. The National Construction Authority will be the enforcer of the Code.

Section 5 of the Code provides that a person shall not engage in construction works without complying with the Code. It further provides that a person who intends to undertake any construction works shall obtain: (a) a **development permission** in accordance with the Physical and Land Use Planning Act, 2019; No. 8 of 1999; (b) an **environmental impact assessment** license issued in accordance with the Environmental Management and Coordination Act, 1999; (c) a **compliance certificate** issued in accordance with the Act; and (d) any other applicable approval.

Section 6 states that preparation of the design and supervision of the works in a building shall only be undertaken by a registered and licensed professional including a physical planner, architect, engineer, land surveyor, building surveyor and quantity surveyor duly registered under the relevant law. ***Relevance:*** *The proponent will seek relevant permissions and clearance as per the provision of this code*.

3.23. National Construction Authority Regulations, 2014

The Regulations were published in the Gazette Notice on 6 June 2014 vide Legal Notice No. 74 of 2014. Regulation 17 requires all construction works, contracts or projects in both the public and private sector to be registered with the NCA, within 30 days of the award of tender for such construction. The NCA is required to register the project, if all is in order, within 30 days of such application for registration. Within 30 days of registration of the project, the owner of the construction works must submit to NCA information relating to issuance of a completion certificate.

Part V provides for accreditation and certification of construction workers. Regulation 19 requires the NCA to accredit and certify all construction workers and construction site supervisors that meet the

stipulations under regulation 22, which accreditation is valid for 3 years subject to renewal. ***Relevance:*** *The proponent will abide by the provision of this regulation in ensuring that the contractors awarded to undertake construction are registered by NCA.*

3.24. Forest Conservation and Management Act, 2016

This statute was passed in 2016 to repeal and replace the Forests Act No. 3 of 2005 and the Timber Act (Cap 386). It seeks to give effect to Article 69 of the Constitution regarding forest resources; to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socio-economic development of the country. The Act applies to all forests whether located on public, community, or private lands as per section 3 of the Act.

Section 37(2) of the Act provides that every county government shall cause **housing estate developers within its jurisdiction to make provision for the establishment of green zones at the rate of at least five percent of the total land area of any housing estate intended to be developed**. The proponent will create green areas within the project footprint to abide by the provisions of this Act.

3.25. HIV/AIDs Prevention and Control Act, 2006

Part 11 Section 7 requires HIV and AIDs education in workplaces; specifically, provision of basic information and instruction on HIV/AIDS prevention and control. ***Relevance:*** *During the construction phase, the contractor to a large extent is expected to create awareness to the employees and local community on issues related to HIV/AIDs through posters.*

3.26. County Government Act No: 17 of 2012

The Act provides for county governments' powers, functions, and responsibilities to deliver services. Part XI of the Act provides for county planning.

Section 103 sets out objectives of county planning to include: ensuring harmony between national, county and sub-county spatial planning requirements; facilitating the development of a well-balanced system of settlements and ensuring productive use of scarce land, water and other resources for economic, social, ecological and other functions across a county; maintaining a viable system of green and open spaces for a functioning eco-system; harmonizing the development of county communication system, infrastructure and related services; and developing urban and rural areas as integrated areas of economic and social activity.

Section 104 (3) is to the effect that the county government shall designate county departments, cities and urban areas, sub-counties, and wards as planning authorities of the county. This means they are mandated to give the requisite approvals and impose development restrictions in line with the plans of the area.

Section 111 provides that each city and municipality shall have: city or municipal land use plans; city or municipal building and zoning plans; city or urban area building and zoning plans; location of recreational areas and public facilities. ***Relevance:*** *The proposed project has been approved by Kiambu County Government and the proposed development is within the land use character of the area.*

3.27. INTERNATIONAL FRAMEWORKS

Kenya is a signatory to many agreements and conventions on environmental management. These include support for the provisions of Agenda 21 amongst other declarations and statements of principle, such as the Rio-Declaration in 1992 on Environment and Development. Kenya is also party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1992, the Minamata Convention on Mercury, and the Stockholm Convention for Persistent Organic Pollutants (POP's) 1972.

3.27.1. IFC Performance Standards on Environmental & Social Sustainability, 2012

IFC, a division of the World Bank Group that lends to private investors, has a Sustainability Policy, and set of Performance Standards (PSs) on Social and Environmental Sustainability (January 2012). The PSs are directed towards providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate and, manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities.

3.28. IFC General Environmental, Health and Safety (EHS) Guidelines

The Environmental, Health and Safety (EHS) Guidelines are technical reference documents that address the IFC's expectations regarding the EHS performance of its projects. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility. The EHS Guidelines serve as a technical reference source to support the implementation of the IFC Performance Standards.

General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors; these are listed in Table 3.3.

Table 3-3: IFC General EHS Guidelines

1 Environmental 1.1 Air Emissions and Ambient Air Quality 1.2 Energy Conservation 1.3 Wastewater and Ambient Water Quality 1.4 Water Conservation 1.5 Hazardous Materials Management 1.6 Waste Management 1.7 Noise 1.8 Contaminated Land	2 Occupational Health and Safety 2.1 General Facility Design and Operation 2.2 Communication and Training 2.3 Physical Hazards 2.4 Chemical Hazards 2.5 Biological Hazards 2.6 Radiological Hazards 2.7 Personal Protective Equipment (PPE) 2.8 Special Hazard Environments 2.9 Monitoring
3 Community Health and Safety 3.1 Water Quality and Availability 3.2 Structural Safety of Project Infrastructure 3.3 Life and Fire Safety (L&FS) 3.4 Traffic Safety 3.5 Transport of Hazardous Materials 3.6 Disease Prevention 3.7 Emergency Preparedness and Response	4 Construction and Decommissioning 4.1 Environment 4.2 Occupational Health and Safety 4.3 Community Health and Safety

Where applicable, the above-mentioned EHS Guidelines will be applied to the proposed Project.

3.28.1. Parameter Specific International Guidelines

IFC EHS Guidelines – 1.1 Air Emissions and Ambient Air Quality

The IFC recommend that the air quality guidelines as set out by the World Health Organization (WHO) be utilized in such an assessment. The WHO standards are divided into several stages, which have interim targets and a final guideline target. The WHO guidelines are recognized to be particularly conservative, as they make no consideration of the economic burden of achieving the stipulated guidelines. The WHO final guideline target is aspirational, and as such, this target should be progressively worked towards.

In the case of the proposed Project, progression towards the achievement of the final guideline target may be assisted by regulatory changes to the quality of fuel used for construction and project-owned vehicles (*for example, low Sulphur fuels*) and the regular maintenance and potential mandatory testing of those vehicle

emissions. Kenya has air quality standards for determining ambient air quality, these will be used in this assessment.

IFC EHS Guidelines – 1.3 Wastewater and Ambient Water Quality

IFC EHS Guideline 1.3 specifies that discharges should not result in contaminant concentrations more than local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality. Receiving water use and assimilative capacity, taking other sources of discharges to the receiving water into consideration, should also influence the acceptable pollution loadings and effluent discharge quality.

Kenya has water quality criteria/standards for effluent discharge into the environment, these will be used in this assessment and effluent discharge.

IFC EHS Guidelines – 1.4 Water Conservation

Mechanisms included in the water conservation guidelines include: –

- The setting of targets for water use, and monitoring of water flows against these targets;
- Water reuse where possible; and
- Reducing leaks and making more efficient use of water within the water reticulation system.

IFC EHS Guidelines – 1.7 Noise

The IFC EHS Guidelines – General EHS Guidelines: Environmental Noise Management 1.7 Noise (IFC 1.7 Noise) is an internationally recognized guideline document containing information for the assessment and management of noise.

Table 3-4 presents the IFC noise guidelines that should not be exceeded at the nearest Noise Sensitive Receptor (NSR) locations offsite. In addition to the absolute values provided in Table 3-5, the IFC also requires that noise increase above existing (background) levels should not exceed 3dB.

Table 3-4 IFC Noise Guidelines

Receptor	**One Hour LAeq (dB(A)**	
	Daytime (07:00 – 22:00)	**Night (22:00 – 07:00)**
Residential; institutional; educational	55	45
Industrial; Commercial	70	70

LAeq = A-weighted equivalent sound levels over a measurement period, dB(A) = A-weighted decibel

IFC Guidelines are designed to apply noise emissions from facilities and stationary noise sources such as factories. The value of 70 dB(A) at the property boundary differs to the Kenyan standard (Table 3-2); hence the Kenyan noise standard of 75 dB(A) and 65dB(A) for day and night-time at the property boundary will apply to this Project.

IFC (2007a). Environment, Health, and Safety (EHS) General Guidelines.

EHS Guideline on Healthcare Facilities. This guideline provides directions on IFC's specific requirements for environmental management for the health care sector. The guideline is intended to apply primarily to a range of larger health care facilities and activities including hospitals (*general, specialist and teaching*), medical and animal research facilities; laboratories (*commercial, teaching or research*); and ancillary services (blood banks, morgues).

- **Occupational Health and Safety (OHS) issues:** Hospital employees assigned to cleaning, disinfection and waste management are at the highest risk of contracting nosocomial infections in

the health care setting. Accordingly, the health care facility will institute and maintain a specialized training program for these, and other employees deemed at high risk; and

-

Community Health and Safety Issues: Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards.

3.29. WHO National Guidelines on Safe Disposal of Pharmaceutical Waste, 2001.

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

The recommended methods for disposing of unwanted pharmaceuticals include:

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

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

3.30. Institutional Arrangement and Framework

The overall authority for implementation of the environmental and social mitigation measures and management plans will be the Project Manager who will have oversight of the ESMS implementation on a day-to-day basis. The Project Proponent's Managing Director will be ultimately responsible for ensuring that the Project team discharge their respective Environmental and Social (E&S) duties. A summary of other organizations relevant to the proposed Project are provided in **Error! Reference source not found.** 3-5 below.

Table 3-5: Relevant Institutions

Institution	Relevance/Description
National Environment Management Authority (NEMA)	EMCA 1999 No. 8 part (iii) section 4 outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for purposes of EMCA; set national goals and objectives and determines policies and priorities for the protection of the environment and promote co-operation among public departments, local authorities, private sector, non-governmental organizations, and such other organizations engaged in environmental protection programmes. It also performs such other functions as assigned under Environmental Management and Coordination Act Cap 387.

Institution	Relevance/Description
	Relevance: *The contractor and the proponent will work in liaison with NEMA in getting EIA approvals and generally in complying with the provisions of EMCA Cap 387.*
Kiambu County Government	Kiambu County is the creation of the Constitution of Kenya 2010. Kiambu County is charged with the responsibility of providing a variety of services to residents within its area of jurisdiction. These include the services that were hitherto provided by the defunct municipal Council and the ones that have been transferred from the national government. Some of the County departments whose functions are pertinent to the proposed project include the following: • Physical Planning • Public Works • Environment Management • Health Department ***Relevance:*** *The proponent will seek relevant County approvals before work commencement.*
National Construction Authority (NCA)	The National Construction Authority (NCA) was established in 2012 to regulate the construction sector and is mandated to register streamline, build capacity, and regulate the undertakings of contractors. In order to do this; the authority registers projects, provides supervisors and workers accreditation and also does contractor registration. ***Relevance:*** *The contractor/proponent will ensure the proposed projects are registered with the National Construction Authority and issued with the compliance certificate.*
Directorate of Occupational Health and Safety (DOSH)	The State Department of Labour and skills Development carries out health and safety services through the Directorate of Occupational Safety & Health Services (DOSHS). These services are carried out to ensure that every workplace is free of any hazards and complies with laid down standards to assure safety of employees. Some of these services include but are not limited to Registration of workplaces, Registration of plant, Registration of Approved persons and institutions, workplace inspection & audits, Examination & testing of plants, Accident investigation & WIBA processing. ***Relevance:*** *The proponent will ensure the facility is registered with DOSH as a workplace.*
Ministry of Health	Surveillance of public health with respect to workers and affected communities, especially regarding disease prevalence, and other communicable diseases. Identify suitable linkages between the project and health facilities including emergency access. ***Relevance:*** *The proponent will work closely with the MoH.*

Chapter 4 ENVIRONMENTAL & SOCIAL BASELINE INFORMATION

4.1. Introduction

This chapter provides a description of the existing bio-physical and socio-economic conditions of the Project Area, which will directly or indirectly be affected by the proposed project activities. It is essential that the baseline conditions of an environment and society are characterized to accurately predict the potential effects of the project on the environment and society. The collection of baseline data therefore focused on providing information to support the assessment of any potential impact of the project. To put the Project into context, information was collected at the project area level. Secondary and primary information was collected within the project area specifically within and in the immediate vicinity of the project site/plot (*Area of Influence (AOI*).

4.2. Methodology

The methodology for conducting the baseline environmental survey has been obtained from the guidelines provided in the "EIA and administrative guidelines. Environmental attributes and frequency of monitoring are given in the Table below 4-1.

Table 4-1: Environmental Attributes & Frequency of Monitoring

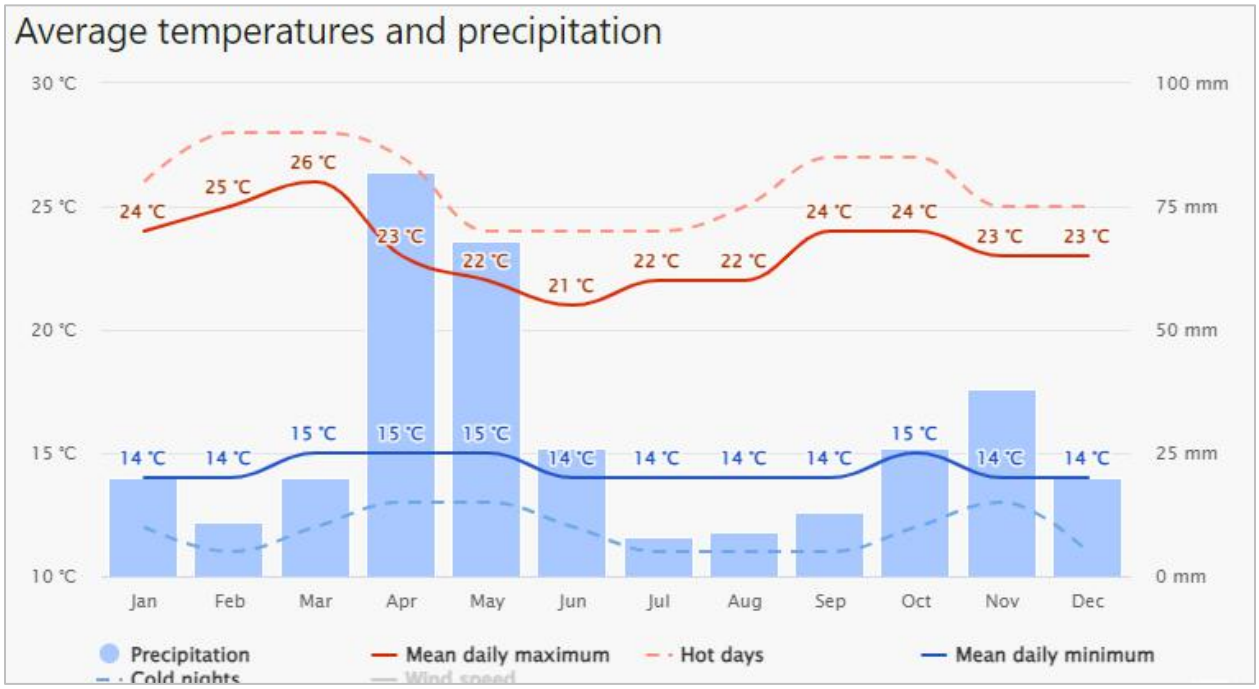
Attribute	Parameters	No. of Sampling Locations	**Frequency of Monitoring / Data** Collection
Meteorology	Wind speed & direction, temperature, relative humidity, rainfall.	Project Site	Data collected from Meteorology of Kenya
Ambient Air Quality	PM_{10}, $PM_{2.5}$	3	24 hourly samples
Noise levels	Noise levels in dB(A) Leq	3	At least one day on working day
Biological Environment	Existing flora and fauna.	Study Area	Through field visits and substantiated through secondary data sources.
Land use /Land Cover	Land use for different land use Classifications.	Study Area	Land use / Land Cover Analysis using satellite imaging and GIS technique
Socioeconomic Environment	Socio-economic characteristics, labour force characteristics, population statistics existing amenities in the study area.	Study Area	Based on field survey and data collected from KPHC 2019 records.

4.3. Biophysical Baseline

4.4. Climate

The climate experienced in the project area (Kiambu Road) is similar to what is experienced in the entire Kiambu County. The county generally experiences a bimodal type of rainfall. The heaviest rainfall it receives is between mid-March and May, followed by a cold season, usually with drizzles and frost during June to August, and short rains between October and November. The mean annual rainfall in the county is 1200mm, with mean daily temperatures of 26°C. It is usually dry and cold between July and August, but hot and dry in January and February.

The annual average temperature for the county is 15-23°C (Figures 4). The western areas including the upper midland semi-arid, upper midland semi-arid arid and the lower highland semiarid agro ecological zones experience annual average temperatures greater than 20°C.



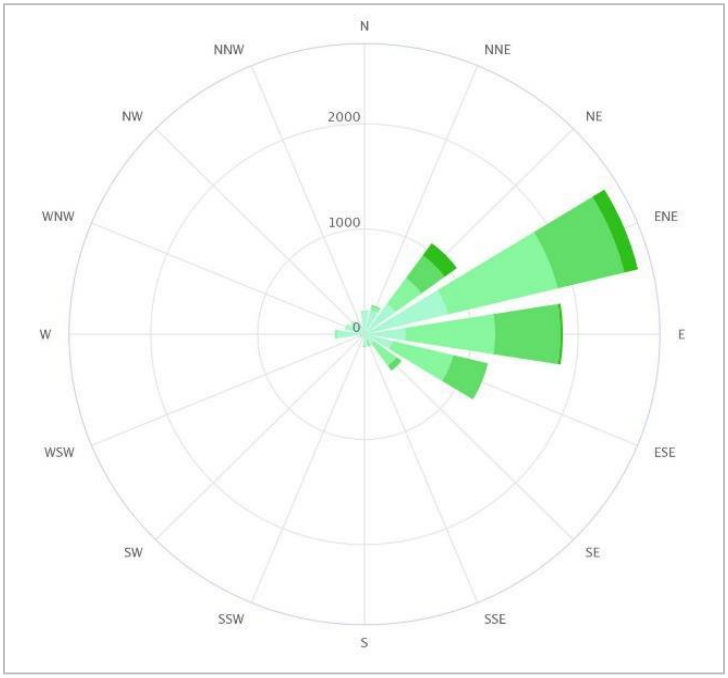
[8]

Figure 5: Monthly mean Temperature and Precipitation

In regard to climate change, the developers are encouraged to adopt climate change adaptability measures which include water recycling as well as the use of solar power harvesting technologies.

a) Windrose

It is observed that in the study period, wind velocity ranges 0.9-2.9 m/s with the predominant wind direction being East North-East (ENE) and East as shown in Figure 5[9]. Windrose was used in air quality measurements and air dispersion modelling of the project area to devise better migration measures during construction.



[8] Kenya County Climate Risk Profile: Kiambu County

[9] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/kiambu_kenya_192710

4.5. Topography and Drainage

Topography and drainage are two of the very basic structuring elements that determine the ability to develop specific areas for specific purposes. The provision of services such as sanitation and stormwater management are directly linked to the drainage patterns, while the slope of an area determines where and what type of development can take place in a specific location. There are limits to the slope on which urban development can take place. Ideally, the topography and drainage patterns describe the physical appearance of an urban form.

The topography of the project site and the study area of 2.5km radial zone is slightly undulating topography with a very gradual gradient. The average elevation of the study area is about 1695.6m above mean sea level. There are no hills in the study area.

4.6. Geology & Soil

The geology of an area is fundamental to sustaining development over a long period. Geology influences not only soil conditions but also development costs and the safety of developments within urban areas.

The geology of the area is part of the Eastern Border Zone of the Rift Valley, filled with kainozonic volcanic and sediments underlying the upper Athi generating good aquifers. Soils on the other hand develop from weathering activities of the volcanic rocks and are highly fertile with high levels of perforation.

Typical tropical red soils (Latosols) are also dominant within the project area. They have a high clay content, a thin, but fertile, humus layer and a distinct aggregate structure. These characteristics make them resistant to soil erosion.

4.7. Land Use

The basic purpose of land use pattern and classification in an EIA study is to identify the manner in which different parts of land in an area are being utilized or not utilized. A systematic digital image interpretation approach was used to delineate the land use classes. The study was focused on demarcating boundaries of different land use/land cover units from an analysis from the satellite imagery and onsite observations.

a) Surrounding Land Uses

Landsat imageries for the study were classified into three distinct classes namely; vegetation, agricultural and built-up areas. Vegetation is represented by parcels of land under natural vegetation cover such as trees and shrubs. Vegetation cover is predominant along the riverine and ridges. The land use change over a 15-year period indicates a rapid decline in vegetation cover. Agricultural is the land under farming, bare land, and cultivation. Most of these areas have been undergoing rapid decline of agricultural crops farming to built-up areas with massive land use and land cover changes. The built-up areas are areas with buildings including commercial, residential, and educational among many others. The land use change over the period of 1988 to 2019 indicates a rapid increase in developments.

The proposed project area is predominantly surrounded by residential areas and a several commercial ventures along the main road (Kiambu Road), a learning institution located approx.. 0.45km south of the project site (*St Mary's Girls School, Runda*), upcoming and existing service stations (Shell), located directly to the east and south of project site, respectively as depicted in Figure 3.

Plate 3: Commercial Property Bordering the Site

Plate 4: Current Site Land use

b) Land Tenure System

Presently, the entire development site comprises L.R. No. 12825/232, measuring a total of approximately 0.9669 hectares. In respect to land tenure and ownership, Ruth Wanjiku Gakunju amongst other siblings as indicated in the certificate of lease owns the above-mentioned property and is registered under the Land Registration Act (No 3 of 2012) and the Land Act 2012 as a leasehold tenure for a period of 99 years beginning June 2016.

4.8. Environmental Biodiversity Features

Environmental studies, including wetland, flora, and fauna assessments were conducted to determine the important natural features in the proposed project area (Kiambu Road Thindigua) as discussed below.

4.9. Natural Features

There are no permanent rivers close to the proposed project site. Gatharaine and Riara Rivers are located north of the project site at approximately 3km and 5km respectively. Wetlands as defined by EMCA (*Wetlands, Riverbanks, Lake Shores, and Sea Shore Management*) Regulations, 2009 occurs in low lying areas east of the project site across Kiambu road which include valley bottom wetlands without channels.

4.9.1. Flora

The flora of the study site is largely characterized by artificial tree plantations comprising stands of large *Eucalyptus spp*, and pine tree species. The remaining natural vegetation is mostly limited to the riverine and protected forest (Karura forest) and open grassed areas. According to onsite observation and secondary data review, there are no rare and endangered plant species in the proposed project area. Grasslands in the area are mostly small, very localized, and visible for only a few weeks in the year when they flower.

Plate 5:Typical Vegetation Cover along the Plot Boundary

4.9.2. Fauna

The faunal assessment focused on mammals, birds, reptiles, and amphibians, with more emphasis on the threatened or conservation-important species occurring, or likely to occur, within the project/study area. No faunal species of conservation concern were identified during the study. This is attributed to intense human activities in the project area (*Commercial and residential*). There is no wetland in the area for foraging purposes and as ecological corridors for movement. Though several insects were observed including butterflies and grasshoppers.

4.10. Socio-economic Environment

The socio-economic status of the population is the indicator of the change in the lifestyle due to the developmental activities taking place in the region. The properties which appear within the 2.5km radius from the center of the proposed Project site were considered for socio-economic study of the project area.

Figure 6: Sample Area Size

4.11. Population

Kiambu township Sub-County or Municipality recoded 253,75 population, whereas the proposed project location (*Thindigua location-Kasarini sub location*), the population recorded in 2019 was about 22,401 according to the Kenya Housing and Population Census.

a) Density

According to the 2019 KPHC census, the population density in Kiambu Subcounty/municipality and in particular Thindigua sub location was 1,091 people per square kilometer. Kirigiti within Municipality ward had the highest density of 6,044 persons per square kilometer, and the most sparsely populated ward was Kamiti in Ting'ang'a with 190 persons per square kilometer, followed by Anmer with 343 persons per square kilometer. The population distribution as of 2019 is shown in table 4-2 below:

Table 4-2: Population by Ward in Kiambu Town Subcounty

Ward	Male	Female	Total
Municipality	56,503	62,671	119,186
Ndumberi	15,224	16,134	31,359
Riabai	12,809	14,041	26,854
Tinganga	13,158	13,554	26,717

4.12. Physical Infrastructures

4.12.1. Roads and Power Infrastructures

The proposed project site is accessed via Kiambu road the main access. Currently there are no earmarked wayleave easement passing through the proposed project site. As far as powerlines and power supply are concerned, most existing developments in the area are served by existing Kenya Power and Lighting Company (KPLC) grid lines located 200m away.

Plate 6: Kiambu Road

4.12.2. Water and Sewerage Networks

a) Water Supply

The proposed site location has a wide variety of water sources, which include, water supply from Kiambu Water & Sewerage Company Limited {KWSCL comprising (Kamiti weir of production capacity of 4,000 cubic meters of water per day and Riara weir full production capacity of 4,000 cubic meters of water per day}. Other sources of water include boreholes and supplements from Nairobi Water and sewerage Company. The proposed project is consultation with RUJWASCO and NCWSC for water supply. The facility will have a state-of-the-art Effluent Treatment Plant (ETP/SPT) with the capacity to handle peak load from various units of the facility during operation. Areas along Kiambu road are also well covered by sewer trunks for effluent management. The proposed project will be connected to these services during its operation if practically feasible.

4.13. Education

Kiambu county has 1225 primary schools with 576 being public and 349 being private whereas there are 303 secondary schools consisting of 227 public schools and 76 private schools with a total enrolment rate of 89,065. The proposed project area host two private schools located at 0.49Km South (*St Mary's Girls School, Runda*) and Brookhouse School Runda located extreme northwest.

Plate 7: Public Education Facility in the area

4.14. County Health Facilities

The Constitution of Kenya (2010) guarantees health as a fundamental human right. Article 43 (1) states that every person has a right to the highest attainable standards of health. Furthermore, the Kenya Health Policy, 2014, sets out standards of access to health care. There are a total of 505 health facilities distributed across the county; 108 are public, 64 are faith-based and 333 are private health facilities. The County health system is structured along five levels of care that are guided by the Kenya Essential Package for Health (KEPH). These levels are:

a) Level 1 - Community Health Services;
b) Level 2 –Dispensaries;
c) Level 3 – Health Centre's;
d) Level 4 – Primary Hospitals; and
e) Level 5 – Secondary Hospitals (County Referral Hospitals).

The County Government owned facilities include 3 Level 5 hospitals, 11 Level 4 hospitals, 24 health centres and 70 dispensaries. Only three sub counties host Level 5 hospital which include, Gatundu South, Kiambu Town and Thika town[10]. Based on the Kenya Population and the entire Kiambu County healthcare facilities, this therefore, means that the number of health facilities required to cater for the residents is not enough, and additional supply is needed. The proposed project area radial zone of 3.5km does not host any healthcare facility. However, several health facilities dominate Kiambu town and their environs amongst them: -

- Kiambu County Referral Hospital (Kiambu town)
- Radiant Group of Hospitals (Kiambu-Githuguri road)
- Mercylight Hospital (Township, opposite Kiambu law court)
- St Mary's Mother & Child Medical Services
- St. Teresa Hospital Kiambu, and
- Oasis Health Services (Thindigua shopping center)

[10] Kiambu County Nutrition Action Plan (CNAP) 2025

Plate 8: Kiambu Level 5 Hospital

Chapter 5 PROJECT ALTERNATIVES ANALYSIS

5.1. Introduction

This section cross examined the proposed project against available feasible alternative, this analysis is often undertaken in order to determine whether the project can be implemented within an alternative which is sustainable than the one presented by the preliminary feasibility studies and engineering designs. In this chapter, consideration was made based on alternative parameters listed below.

a) No Project Option Alternative,
b) Alternative Location, and
c) Alternative Technology.

Ultimately, after subjecting the project to the above-mentioned option analysis, inference was made between the Project Option alternative and No Project Option alternative. The sub chapters below present in detail analysis of the options analyzed.

5.2. No Project Option 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. The proposed project (Tertiary Hospital) has a high potential of delivering health care services with modern healthcare treatment.

No project alternative would deprive (*The Country and the County*) all the beneficial impacts resulting from the proposed project implementation. The comparison of various considered project alternatives showed that the project will not cause severe adverse environmental impacts if appropriate mitigation and monitoring measures identified are implemented in the project design and implementation. Therefore, in order to support the government's initiative and objectives of increasing healthcare facilities in achieving Vision 2030 and Universal Healthcare. Therefore the "no-project" scenario is not an ideal solution, and it is recommended that the project be continued, but with the proper implementation of all mitigation measures proposed in the report and strict adherence to different legal requirements and statutes.

5.3. Site Alternatives

Location plays a vital role in the impact of implementation of the project. The proposed site location is along Kiambu road (Kiambu Municipality), Kiambu County. The proposed site location serves the suburbs of Nairobi, Kiambu town, Thindigua and adjoining rural areas of Kiambu township where there are inadequate basic health services facilities. The proposed hospital is close to the Kenya capital city (Nairobi) considered east Africa business hub which require more investments into the healthcare systems if it is to effectively reap from regional health tourism. So, the proponent has considered the location as one of the principal aspects that contributes to the successful venture of the proposed development.

Relocation may also lead to a No Action Alternative situation. The other consequence is that it would discourage both foreign and local investors, especially in the health sector which require substantial investment. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. The problem is further aggravated by acquiring land to accommodate the scale, type and size of the project and completing official transactions on it may take a long period which might discourage the investors.

5.4. Layout/Design

The layout of all services is as per attached civil designs. Alternative designs have been explored and the best one with least requirement of energy input or use of day light has been selected. Open spaces are

provided in the design of the components. These spaces will be utilized for greenery maintenance, parking lots and also used as emergency disaster evacuation purposes. Maximum care and planning have been done to make the hospital more technically and environmentally friendly.

5.5. The Proposed Alternative

Health infrastructure improvement is key in achieving UHC. Over the years the country has put emphasis on UHC as key in achieving the SDG goal one (1) and three (3) on ending extreme poverty and good health and well-being respectively. However, there still existing gaps leading to inaccessibility to timely and quality health care services. Therefore, the proposed project will help reduce the burden of large influx of patients having to travel abroad due to inadequate facilities available in the Country. The proposed project will provide state of the art medical facilities for different ailment diagnosis and treatment.

Therefore, building as proposed is the best option. However, the anticipated negative impacts due to the project construction and operation will be minimized, controlled, or eliminated if the proposed mitigation measures, as suggested in the ESIA report, are effectively implemented.

5.6. Conclusion

No alternative site has been identified. If the project is not implemented, then all positive impacts related to the proposed project will be lost. So, the best option is to 'build as proposed' by mitigating its potential negative impacts. Finally, construction of the facility will be carried out in accordance with both Kenya and International Building Codes. The project proponent will consider the use of non-conventional, more sustainable building materials, as well as considering the installation of renewable energy as part of their energy mix for the project in compliant with Climate Change Act 2016.

Chapter 6 STAKEHOLDER CONSULTATION

6.1. Introduction

Stakeholder consultation is useful for gathering environmental data, understanding likely impacts, determining community and individual preferences, selecting Project alternatives, and designing viable and sustainable mitigation and monitoring plans. Stakeholder consultation in the Environmental Impact Assessment (EIA) process is undertaken during the Project design, implementation, and initial operation. The aim is to disseminate information to interested and affected parties (stakeholders), solicit their views, and consult on sensitive issues.

6.2. Stakeholder Mapping & Identification

According to African Development Bank Group (AfDB), stakeholders are defined as "people/communities who may - directly or indirectly, positively, or negatively – affect or be affected by the outcomes of projects or programs. Informed by the scoping exercise conducted on **23rd and 24th October 2023**. Table 6.1 presents the potential primary and secondary stakeholders of the Project that were consulted. Categorization was done dependent on two variables, namely; interest of the stakeholder and the relevance/importance of the stakeholder to the Project.

Table 6-1: Consulted Stakeholders

Categories of Key Stakeholders	
Affected Communities (Settlements within 2km radius from Project activities**)** 1) Kasarini Community Board 2) Thindigua Resident 3) Thindigua Registered 4) Kiama Kiama Community 5) Thindigua Registered Association (TRA) 6) Thindigua Development Forum 7) Thindigua Security Members 8) Thindigua Pamoja 9) Urban Drive Autos 10) Shell Petrol Station	**Government Agencies** a) Ministry of Health b) Kiambu Water & Sewerage Company (KWCL) c) National Construction Authority (NCA) d) Kiambu County Government (Dept. of Environment, Energy, Water and Sanitation, Physical Planning, and Department of Health and Public Sanitation.
Political Leaders & Government Officials 1. Sub County Ward Administrator 2. Thindigua Chief/Assistant Chief/Village Elders **3.**	**Commercial/Non- Commercial Organisations** a) Business person's within the vicinity (Motor hubs) b) Opinion leaders, c) Private Residential Homes Neighbouring the Proposed Development area. **Other Key Stakeholders** • Project architects • Project Planners • Engineers
Media • Newspaper (Disclosure of information about the Project)	

6.3. Grievance Redress Mechanism

Stakeholders may have different types of grievances regarding the proposed project. Therefore, a Grievances Readdress Mechanism (GRM) will be put in place wherein all the project stakeholders are given a venue to lodge complaints regarding any aspect of issues related to the project along with the strategy to inform the local stakeholders about the GRM and its functioning procedures through stakeholder consultations.

6.4. Public Consultation Methodology

The Consultant prepared a background information document (BID) for the proposed project which was distributed to stakeholders during a visit to the project surroundings, enabling the process to be free, prior, and informed. Consultation notices were also communicated to different stakeholders as provided for in the *Environmental Management and Coordination Act* (EMCA) Cap 387 and displayed or posted on the public and strategic locations including Chief's office notice board, as well as public places in the vicinity of the proposed project site. Other media used were via emails and WhatsApp.

6.5. Site Notice Placement

A3 site notices in English were placed at 4 public locations within and around the application/proposed project area from **6th November 2023** for a period of at least 7 days from the day of placement. The on-site notices included the following information:

a) Project name.
b) Project location

Earthcare Services Ltd

PUBLIC NOTICE

INVITATION FOR PUBLIC PARTICIPATION MEETING AND SUBMISSION OF MEMORANDA FOR THE PROPOSED 300-BED CAPACITY HOSPITAL ON L.R NO: 12825/232, ALONG KIAMBU ROAD, KIAMBU COUNTY

Ruth Wanjiku Gakunju herein referred as the proponent has proposed to develop a 300-bed capacity specialty Hospital along Kiambu Road on **L.R No: 12825/232,** Kiambu County.

Pursuant to Article 10 (2) (a) of the Constitution of Kenya 2010, the principle of public participation is one of the national values and principles of governance. Further, the Environmental Management and Coordination Act (EMCA) subsidiary regulations Environmental (Impact Assessment and Audit) Regulations, 2003 under rule 17 provide for the requirement of public participation in conducting an Environmental Impact Assessment Study. Therefore, the objective of this notification is to invite members of the public and the Project Affected Persons (PAPs) for the public consultation forum/meeting Scheduled on **10th November 2023** at the proposed project site (Evergreen Centre Children's Park) along Kiambu Road from 10:00AM.

Written comments on the proposed development may be sent via email address: kuloba@earthcare.or.ke

a) Key Informants

During the scoping stage several consultations were conducted including Key Informant Interviews/ meetings held with various Kiambu County government officials, Kiambu Municipality Planning Team representatives. During these interviews, the simple, non-technical description of the project was given, along with an overview of the project's likely impacts on people and the environment.

b) Media

The proponent will publicize the project and its anticipated effects and benefits through announcement of the notice in both official and local languages on a radio with a nation-wide coverage for at least once a week for two consecutive weeks. Subsequently, the proponent will publish a notice on the proposed project for two successive weeks in a newspaper that has a nation-wide circulation as well as the Kenya Gazette. The project proponent and contractors were also interviewed in order to get technical information about the proposed project. Public consultations were done with the following aims: -

- To inform the public about the proposed project and provide them with balanced and objective information to assist them in understanding the proposed project, project alternatives, opportunities, anticipated impacts (*both positive and negative*) and mitigation measures;
- To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered;
- To obtain public feedback in terms of their views, concerns, and opinions on analysis, impacts and alternatives of the proposed project; and
- To facilitate involvement and participation of affected persons throughout the project life cycle.

6.6. Major Stakeholder Concerns

Finally, public consultation meetings were held on **10th November 2023** with the affected parties and communities as outlined in Figure: 6.1 to explain the project and its effects, and to receive their oral or written comments on key issues of the proposed development. All issues discussed were recorded and incorporated in the final EIA study report. The proponent through ESIA consultant ensured that all concerned public and private stakeholders in the project area have adequate input during the ESIA study to help the authority make an informed decision.

Table 6-2: Public Consultation Summary Response

Name and Designation	Organization/Location	Opinions/Concerns/Issues/Suggestions	Response
Dr. William Mwiti	Resident of Kasarini (Nairobi Hospital Practitioner)	He wanted to know whether the proposed project is a specialty or a primary medical care.	**Proponent Response:** The hospital will be a private tertiary medical centre but will also have community outreach.
Ndegwa Kabogo	Kasarini Residents (Kiama-Kiama)	He wanted to know how the hospital will handle wastewater and other waste materials.	**Response (proponent):** The hospital will have a comprehensive wastewater treatment plant augmented with existing sewer trunk to manage effluent.
Beatrice Ndichu	Peace Chairperson Kiambu Sub County	She wanted to know whether area youths will be accorded jobs opportunities during the project implementation.	**Response (proponent):** The proponent assured residents that they will be guided by labour laws requiring 70% local content. Hence, Thindigua youths and unemployed will be employed during different phases of the project. He said a total 454 employment opportunities will be created during the first year of operation.
Dr. William Mwiti	Resident of Kasarini (Nairobi Hospital Practitioner)	He wanted to know the source of water and if the proponent will have some CSR in terms of water provision to the nearby community.	**Response (Proponent):** The hospital will have 3-sources of water including: Ruiru water supply, Nairobi Water supply (NCWSC) and a borehole.
James Kiarie	Kasarini Residents	His concern was about traffic management.? He wanted to know access routes in and out of the proposed project location.	**Response (Proponent):** The proponent clarified that there will be two access roads (15m wide access roads) with adequate and robust traffic management plan. He said during construction one access will be through Evergreen business centre and another through Ineza access road.

Attached questionnaires and proceedings provide more details during the public consultation.

Plate 9: Kiambu Sub County Environmental Officer Addressing the Attendees

Plate 10: Kiambu Sub County Ward Admin (Standing) Addressing the Attendees

Plate 11: Thindigua Location Area Chief (NGAO) Addressing the Gathering

Plate 12: Ndegwa Kabogo (Standing) Addressing the Attendees

Chapter 7 IMPACT IDENTIFICATION & ASSESSMENT

7.1. Introduction

As part of this Environmental and Social Impact Assessment (ESIA) process, potential impacts associated with the construction and operation of the hospital need to be identified. In this chapter impacts are identified and semi-quantitatively assessed to determine the likely environmental or social significance.

7.2. Methodology

Various methods such as checklists, matrices, expert opinion, modelling etc., are available to evaluate environmental impacts associated with development projects as part of environmental impact assessment process and reporting. The primary basis for impact identification of a project starts with thorough understanding of the project and its various components, understanding of the natural, social, and economic components that are likely to get affected through collection of baseline data on those components and review of similar development projects and their implementation experience.

The impacts are assessed based on the impact's magnitude as well as the receiver's sensitivity, culminating in an impact significance which identifies the most important impacts that require management. Below are the impact categories: -

- Nature of impacts (direct/indirect, positive/negative);
- Duration (short/medium/long-term, permanent (irreversible)/temporary (reversible), frequent/ occasionally);
- Extent (geographical area, size of affected population/habitat/species);
- Intensity (minimal, severe, replaceable/irreplaceable);
- Probability (high/medium/low probability); and
- Possibility to mitigate, avoid or offset significant adverse impacts.

The impacts were calculated using matrix rating out of 147, whereby Intensity, Extent, Duration and Probability were each rated out of seven as indicated in the Table below. The weight assigned to the various parameters was then multiplied by +1 for positive and -1 for negative impacts. The impacts were rated prior to mitigation and again after consideration of the mitigation measure proposed in this Environmental Impact Assessment (EIA) Report.

Table 7-1: Probability/Consequence Matrix

Probability	Significance																		
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3
Consequence	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3

Probability	Significance																		
7	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Consequence	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

7.3. Limitation or Uncertainty of Impact Prediction

Uncertainty of impact prediction are mainly due to the lack of long-term data, poor understanding of complexity of ecosystem associated with the project, lack of information on historical/history of environmental condition at site (*except current baseline*) and lack of consistent methodologies which can be used to predict outcomes or reliability of predictions of previous projects.

The impacts are predicted by reviewing the data collected during the field visits and information of the project shared by the project designers and engineers. The data collected during the field visit is limited in terms of number of days to a week, which limits the overall understanding of even the short-term environmental conditions.

7.4. Constructional Impacts

In any development project major direct impacts to the environment (either short term or long term) occur mainly during the construction phase. Potential direct or indirect impacts on the environment from the proposed works include: -

- Impact on natural habitat (Groundwater) and associated ecology,
- Impacts of noise, vibration, and disturbance during the construction,
- Impacts on landscape integrity/scenery,
- Pollution of the natural environment (e.g., spills, pollution from construction related waste),
- Noise pollution, and
- Risk of accidents and pollution on workers and local community area residents.

7.5. Impacts on Natural Environment

Table 7-2: Anticipated Impacts

Aspect	Narratives
Impacts of Noise, Vibration, & Disturbance.	Noise pollution and disturbance due to construction work is an unavoidable impact of such construction projects. The proposed project location in relation to the nearest sensitive receptors (Residential) sitting at a distance of 200m. Hence, although there will be an impact due to noise and disturbance, this impact is anticipated to be minor.
Solid Waste Generation	During the construction phase considerable quantity of construction waste such as plastic, earth, debris, broken brick piece, sand, soil waste, cement, domestic waste like organic food etc. will be generated. Solid waste generated during construction phase shall be separated/segregated and reused as far as possible. Some of the items like packing materials, left over reinforcement bars will be sold to scrap dealers. Food waste generated from construction works will be collected by registered NEMA waste handlers.
Air Pollution	Air Quality around the project site will be adversely impacted during the construction stage. Various construction activities especially related to handling of loose material are likely to cause generation of fugitive dust, that adversely impact the air quality of the surrounding area of the project site. However, appropriate mechanisms will be put in place to minimize fugitive dusts.
Impacts Terrestrial Fauna	During the construction phase, trees around the construction sites may be cut down which may lead to damage or habitat modification. Biodiversity loss is usually observed as one or both of: i. Reduced area occupied by species and community types and ii. Reduced abundance of species or condition of communities and ecosystems. Nevertheless, the proposed project location is already modified due to human activities with no habitat of importance.

Aspect	Narratives
Occupational Health and Safety (OHS)	Construction workers are more likely to face occupational health hazards such as minor or major injuries due to lack of general safety requirements and precautions applicable while working at construction sites, and handling with machines and equipment, use of equipment. Poorly designed temporary labour camps and sanitation facilities may pose a health threat and nuisance to the workers. The contractor will put adequate safety provisions and strict adherence to OSHA 2007.
Traffic Congestion/ Road Accidents	The existing road (Kiambu Road) is one of the busiest roads corridors in the proposed project area. The influx of heavy construction vehicles used for the construction work may cause road accidents if they are not following traffic rules. The construction work beside the existing road will impede regular movement of the vehicles. The construction workers, pedestrians and onlookers are also prone to accidents. Road accidents may also occur at road crossings and intersection during construction work. Contractor will ensure construction works does no impede traffic flow along the main road with adequate parking provision within the construction site.

7.6. Positive Impacts

a) Employment, Skill Development and Economic Stimulus

The construction of the Project allows for the creation of local employment opportunities, as the Project is expected to offer a total of approximately job opportunities for 50-100 individuals daily for the construction activities. This phase of the Project may also allow for the purchase of supplies from the local market, thereby contributing to the local economy in at the Project site. Opportunities for skill development amongst locals in the field of construction are likely to be created.

b) Increase in Government Revenue

The construction activities and materials will attract taxes including VAT which will be payable to the Government hence increasing Government revenue while the cost of these raw materials will be payable directly to the producers/suppliers.

c) Optimal Utilization of the Land

Currently the proposed project site is empty and underutilized. The project will elevate the stature of the project location.

d) Improve capacity to provide specialized health care services.

The hospital will provide Kenyans with specialized healthcare treatment for different human ailment

7.7. Operational Phase Impacts

The operation of the proposed 300-capacity tertiary hospital will interact with different components of the environment. For the successful operation of the project, proper planning is required in order to minimize the environmental impacts. The operation impacts of the project on the surrounding

environment will be associated with the issue of infectious waste storage and emissions. The project operations may result in the following adverse impacts.

i. Operational Wastes, including Hospital infectious wastes,
ii. Safety Hazards, Public Health, and Nuisance,
iii. Increased run-off from new impervious areas,
iv. Pressure on existing utilities,
v. Noise pollution (Ambulance sirens),
vi. Traffic Congestion.
vii. Wastewater generation (Effluent Discharge)

Chapter 8 IMPACT MITIGATION MEASURES

8.1. Introduction

This section presents analysis of project's significant impacts, and mitigation measures postulated, that will enable the impacts to be managed, reduced, or avoided where possible in all phases of the proposed project.

8.2. Construction Phase

8.3. Fugitive Dust

Dust generated during construction will result from construction works, concreting and earthworks, including trenching, levelling, bund construction and reinstatement operations. The major dust sources will be from the vehicles transporting construction materials and equipment to the work areas. The occurrence and significance of the dust generation will depend upon meteorological and ground conditions at the time and location of activities. However, under normal meteorological conditions, dust impacts will be limited to within several hundred meters of the construction areas. Dust generation can affect the ability of nearby community visibility and vegetation to maintain effective evapotranspiration. Dust may also pose health risks and irritation to humans.

a) Impact Significance

Quantities of dust generating over the period of construction phase from construction machinery is anticipated to be relatively low. However, there will be relatively high quantities of fugitive dust generated due to construction activities such as earthmoving, levelling, excavation, demolition, transportation of materials and concreting. The construction area will be hoarded and covered with tarpaulin nets, so it is not anticipated that dust levels will impact greatly on existing settlements and business ventures. The emissions of dust from construction activities impacts will be localized and the dust is likely to settle in close proximity to the area where construction works are being carried out.

Activity and Interaction (Dust and Emission) Pre-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Short Term (2)	Impact can be reversed with minimal management after construction	Moderate (Negative)-96
Extent	Beyond (3)	It is expected that during construction activities dust will extend as far as the development site area.	
Intensity	Serious (4)	It is expected that during construction fugitive dust. will have a serious impact.	
Probability	Highly probable (4)	It is highly probable that fugitive dust and other emissions will impact on the surrounding receptors.	
Nature	Negative		

Fugitive Dust Control Measures

- Prohibit dusty activities during high prevailing winds.
- Apply dust suppression techniques to limit the dust dispersion from stockpiles,
- Ensure materials prone to wind-blown are covered with appropriate materials or dampness is applied, and
- Limit the height of topsoil stockpiles to 4–5 metres.
- Restrict the speed limit for construction vehicles to 20 Km/hr.

- Erecting tarpaulin netting to control cement dust from settling in nearby properties.
- Drop heights when loading and offloading material should be minimized, and
- The contractor and/or project supervisor must outline a plan to make daily inspections to assure the implementation of preventive measures to control fugitive dust.

Post-Mitigation Measures			
Duration	Short term (2)	During the construction period and the impact can be reversed with minimal management after construction	**Negligible (Negative) -24**
Extent	Limited (2)	Will only occur within and immediately around the Project site.	
Intensity	Minor (2)	Very little impact to the receptors	
Probability	Unlikely (3)	It is unlikely that dust emissions will have an effect on air quality	

Impact significance: Consequently, the air quality impacts associated with dust generation will be of "low" significance (subject to provision of applicable dust control measures outlined above).

8.4. Noise and Vibration

Noise will be generated by equipment associated with the construction activities including welding, earth moving, hydraulic machines, vehicle movements, etc. Noise impacts on sensitive receptors such as (Residential areas etc.) will depend on where they are located relative to the proposed project activities. The following activities are expected to be the most significant noise sources during the construction phase of the proposed project activities:

- Concreting,
- Excavation and demolition,
- Welding,
- Hammering and hydraulic machine etc.

The above noisy activities would be similar to those associated with typical construction sites and it will have temporary impacts at each section of the construction activities. Construction activities are likely to be confined to daytime and noise levels will only affect limited areas for a relatively short time.

b) Impact Significance

The generation of construction noise is not expected to represent a significant issue to local residents for the following reasons.

- The construction noise is expected to be of a short duration and dispersion of the noise is likely to be about 100-150 meters from the construction site.
- Construction activities and transportation and materials delivery will be limited to daytime.

The project area is surrounded by some busy roads, so noise from the site may pose little nuisance to the local communities, although construction vehicles may cause additional congestion. Subsequently, the impact of the noise will be only as much as the duration of the construction activities, and therefore, the impact is "low".

Vibration

Construction activities have the potential to produce vibration levels that may be annoying or disturbing to humans and may cause damage to structures and architecture if appropriate precautions are not taken. Construction activities would result in varying degrees of ground-borne vibration, depending on the stage of construction, the equipment and construction methods employed, the distance from the construction locations to vibration-sensitive receptors and soil conditions.

c) Impact Significance

There is the potential that, at times, vibration effects would reach levels that would be annoying to the neighboring community. Vibration causing construction equipment would be used on an intermittent basis (i.e., short-term, and temporary in nature) during the construction period. Consequently, no potential significant adverse vibration impacts would be anticipated to occur and therefore, the impact is "low".

Activity and Interaction (Noise and Vibration) Pre-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Short term (2)	It's likely that noise will be produced for the duration of the construction phase.	Moderate (Negative) -96
Extent	Beyond site (3)	It is expected that during construction activities noise will extend as far as the development site area.	
Intensity	Serious (4)	It is expected that during construction noise and vibration will have a serious impact	
Probability	Highly probable (4)	It is highly probable that noise will impact on the surrounding receptors.	
Nature	Negative		

Mitigation Measures

- Restricting construction activities (including drilling using pneumatic hammers) to daylight hours (06:00 – 17:00) and not during weekends and public holidays;
- Switching off equipment when not in use,
- Monitoring and maintenance plan to ensure that the construction equipment is in good conditions and have noise mufflers;
- Reduce the operation time of the equipment that is closest to the most sensitive areas; and
- Incorporate the use of mufflers, temporary barriers, and/or attenuating elements to the equipment to be used during the construction period.
- Ancillary plants such as generators, compressors and pumps will be placed behind existing physical barriers.
- Zones with noise level above 75 dBA must be marked with safety signs and appropriate PPE must be worn by workers,
- Give notice as early as possible to sensitive receptors for periods of noisier works such as excavation, and
- Fit all pneumatic tools with an effective silencer on their air exhaust port,

Post-Mitigation Measures			
Duration	Short term (2)	Noise will be produced for the duration of the construction phase.	**Minor (Negative) -36**
Extent	Beyond Site (3)	It is expected that during construction noise will extend beyond the development site area	
Intensity	Minor (2)	It is expected that during construction noise will have a minor impact.	
Probability	Unlikely (3)	Unlikely of noise causing disturbance with mitigation.	

8.5. Waste Generation

The construction of the proposed Project will generate non-hazardous solid wastes consisting of rubble, construction materials residues and domestic wastes generated by Laboure's. Effluent wastewater generated will be discharged to an existing sewer line Kiambu County sewerage system. Any material that cannot be reused will be discarded in an authorized landfill. The residues will be transported by authorized waste contractors and will be conducted in accordance with applicable regulation.

Activity and Interaction (Waste Generation) Pre-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Short term (2)	Only during construction phase short term	Minor (Negative) -36
Extent	Minor (2)	Impacts would be site specific and in the local environment.	
Intensity	Local (3)	On-going natural and /or social issues. Discernible changes to natural or social Baseline	
Probability	Unlikely (3)	The probability of change is uncertain	

Mitigation Measures

- Appropriate receptacles and recycling bins will be clearly labelled for the collection and segregation of each of these waste materials and will be provided throughout the development and open space areas, as appropriate,
- Ensure waste materials are segregated on-site into appropriate categories,
- All waste types and amounts will be recorded and reviewed at regular intervals, to allow for continuous analysis and review of procedures that will be made to reduce waste to landfill,
- All wastes generated will be managed in accordance with appropriate waste management legislation (EMCA Waste Regulation 2006) and other relevant policies, and will be transported and recovered/ disposed of by licensed waste management Contractors,
- Contractors working on site during the construction phase will be responsible for the collection, control and disposal of all wastes generated by the works,
- Both hazardous and non-hazardous, shall be collected and disposed of by a licensed waste management contractor, and
- Construction waste materials shall be segregated on-site for recycling.

Post-Mitigation Measures			
Duration	Short term (2)	During the construction period and the impact can be reversed with minimal management after construction	

Post-Mitigation Measures			
Extent	Limited (2)	Will only occur within and immediately around the Project site.	**Negligible (Negative) -24**
Intensity	Minor (2)	Very little impact to the receptors	
Probability	Unlikely (3)	It is unlikely that waste materials will have an effect on the surrounding environment.	

d) Impact Significance

Based on the above the wastes associated with the proposed project activities will be of "Medium" significance.

8.6. Biological Environment (Flora and Fauna) Clearance

The construction phase is characterized by site development. These activities include site clearance and vegetation removal. The removal of vegetation for site clearing will have a negative visual impact on the receiving environment. The infrastructure area will become noticeable to nearby receptors as it will contrast the surrounding areas. No endangered species of flora and fauna are known to be present at the proposed site. The site was observed to be of low biodiversity value due to human activities.

Activity and Interaction (Vegetation Clearance) Pre-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Medium term (3)	The impact will occur for 1-5 years, and the impact can be reversed with minimal management.	Moderate (Negative)-90
Extent	Local (3)	The impact will extend only as far as the development site area.	
Intensity	Minor (2)	Minor natural and /or social impacts which are mostly replaceable. Very little change to the baseline.	
Probability	Likely (5)	The impact may occur. < 65% probability	
Nature	Negative		

Mitigation/Management Measures

- Vegetation should only be removed when and where necessary;
- Place barriers between the project area and non-project zones such as vegetation to remain in the Project zone,
- All construction activities must be maintained within the limits set for it, to reduce any impacts to the areas found outside the limits of the construction.

Post-Mitigation Measures			
Duration	Short term (2)	Less than 1 year and the impact can be reversed with minimal management.	**Negligible (Negative)-24**
Extent	Local (2)	The impact will extend only as far as the development site area	
Intensity	Minor (2)	Minor natural and /or social impacts which are mostly replaceable. Very little change to the baseline	
Probability	Unlikely (3)	On-going natural and /or social issues. Discernible changes to natural or social Baseline.	

e) Impact Significance

The proposed project site is already disturbed since it has been used as a commercial for many years. Furthermore, due to human activities on the piece of land, there is no significant terrestrial fauna. Considering these facts and the proposed mitigation measures, the significance rating for the project impact on loss of terrestrial flora and fauna is predicted to be low, direct.

8.7. Human Environment

Construction of new developments may cause temporary disturbance and disruption to area residents, businesses, and other users of the area. This may be due to noise or dust emanating from a development site, or by closure of roads or footpaths while construction work is undertaken. The construction period is characterized by the transport of major items and materials to the development site. Exceptional items of construction described as abnormal indivisible load (AILs) require special transporters. These slow-moving vehicles can cause congestion and the disruption of existing traffic patterns along the access route.

8.8. Traffic Impacts

During construction of the proposed project, restriction of access such as temporary footpath closures or diversions may be necessary. Poor traffic management and defective training of drivers may result in accidents and collisions. Delivery of materials and equipment to the site are likely to cause an impact on the road network, given the already existing traffic congestion in the area. Impacts are most likely to occur at periods of peak flow. The impact is anticipated to be Short-term to last only for the duration of the construction phase.

Activity and Interaction (Traffic Impacts) Pre-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Short term (2)	Will occur only during construction	Major (Negative) - 120
Extent	Local (3)	Extending only as far as the development site area.	
Intensity	Serious (4)	Ongoing serious occurrences	
Probability	Likely (5)	The impact may occur. < 65% probability	
Nature	Negative		

Mitigation Measures

- Ensure the proposed construction works is programmed to be as short a duration as possible to reduce the length of access closures and restrictions,
- The Contractor will be required to ensure that adequate access to various properties and residential premises are maintained throughout construction works,
- Construction activities will be scheduled where possible to minimize disruption to the road traffic, including the timing of works vehicles using public roads and delivery/removal of site materials,
- Road closures will be avoided where possible. No lane closures will be permitted during peak hours except in exceptional circumstances,
- Ensure adequate parking for construction machineries are provided; and
- Road diversions will be clearly indicated with road markings and signage as appropriate.
- Provide information to the public about the scope and schedule of construction activities and expected disruptions and access restrictions.
-

Activity and Interaction (Traffic Impacts) Post-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Short term (2)	Less than 1 year and the impact can be reversed with minimal management	Minor (Negative) -48
Extent	Local (2)	The impact will extend only as far as the development site area	
Intensity	Minor (3)	Minor natural and /or social impacts which are mostly replaceable. Very little change to the baseline	
Probability	Probable (4)	Likely to occur	

f) Impact Significance

Provided that the above measures are implemented, it is considered that traffic would be managed to the extent that it would not have significant impact. Traffic flows will be maintained in all but occasional circumstances, and these will be scheduled to occur when they have the least impact. Therefore, the significant impact is considered minor.

8.9. Water Resources and Quality

Construction waste and wastes from workers, if left unattended may result in forming leachate that can percolate through the soil strata and reach underground water table and hence, may end up contaminating it. There is a probability that various liquids like fuel, lubricant oil, and other oily products, which are used during the construction phase may contaminate any groundwater source, if they are not handled properly. These impacts are permanent and highly adverse in nature.

Mitigation Measures

- Water required for construction should be obtained in such a way that the water availability and supply to nearby communities remain unaffected,
- Any spills should be cleaned and disposed of properly,
- No refueling, storage, servicing, or maintenance of equipment should be allowed within 50m of drainage or other sensitive environmental resources.

8.10. Water Use

Construction water will be supplied via tankers delivering water from various licensed vendors to the Project site. An estimated 10m^3 /day will be consumed throughout the construction phase, which is expected to continue for a duration of 2.5 years. This consumption may further be increased as a result of poor management practices, such as damaged water containers, leaking water faucets, excessive washing, and cleaning. Despite this, water consumption by the Project is not likely to have an impact on surrounding water resources and/or the water supply to the surrounding communities. The impact is Short-term and will last only for the duration of the construction phase.

Mitigation Measures

- Ensure that construction activities are carried out in a manner so as to minimize water consumption as far as practically feasible,
- Install water saving fittings (taps, showerheads, urinals, etc.) in toilets of site offices,
- Monitor and record supplied water and water consumption quantities on a regular basis, and
- Water containers/tanks and hoses/connections shall be regularly inspected to ensure they are waterproof and to promptly detect any water leakage.

8.11. Other Issues of Relevance to Construction Works

8.12. Site Safety and Security (Occupational Related Incidents and Accidents)

During the construction phase, standards, and occupational safety programs applicable to construction will be implemented by the general contractor as required by *Occupational Safety and Health Act* (OSHA) 2007 including scaffolding safety, fall prevention, personal protective equipment, excavation safety, ladder safety, electrical safety, hand tools safety, crane safety, critical lifts, material handling, order and cleanliness, vehicles safety and contractors' safety. In addition, there are inherent health and safety risks associated with access to the construction site by both visitors, nearby community, and tenants.

Activity and Interaction (OSHA Risks) Pre-mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	Short term (2)	It's likely that OSH Risks will be produced for the duration of the construction phase.	Moderate (Negative) -96
Extent	Local (2)	It is expected that during construction activities OSH Risks will extend as far as the development site area.	
Intensity	Serious (4)	It is expected that during construction OSH Risks will have a serious impact.	
Probability	Highly probable (4)	It is highly probable that OSH Risks will impact on the surrounding receptors.	
Nature	Negative		

Mitigation Measures

- A record of potential hazards must be maintained and regularly updated. Mitigation measures for identified hazards and safe work procedures should be developed and communicated to all employees,
- Employees should be provided with appropriate personal protective equipment (PPEs),
- All employees should be subjected to mandatory occupational health and safety training right on site before starting work. This can be achieved through toolbox talk.
- All construction works should be limited to daytime hours and all machinery on site will be maintained in optimal operating condition to reduce noise from moving parts,
- Vehicles carrying construction materials for the project must be instructed to move below 40km/ hour on the access road going to the site through proper signage which will be posted prominently on the sides of the road,
- For work over public areas, a double-boarded platform with a polythene sheet in between the boards to prevents small items such as nails and bolts from falling shall be used,
- Provision of covered walkway to protect people below, and
- Ensure strict use of protective clothing and equipment during construction activities;
- Ensure availability of adequate signage, lightning devices, barriers and marking tape during the entire construction phase to manage traffic at construction sites and access roads.
- Provision of first aid facility and ensuring its cleanliness and disinfection.

Post-Mitigation Measures			
Duration	Short term (2)	During the construction period the impact can be reversed with minimal management.	

Post-Mitigation Measures			
Extent	Limited (2)	Will only occur within and immediately around the Project site.	**Minor (Negative) -48**
Intensity	Minor (3)	Minor impact and manageable to the receptors	
Probability	Likely (4)	It is likely that OSH risks will have an effect on the surrounding communities.	

g) Impact Significance Rating

The occupational hazards associated with operating heavy equipment will be restricted to only the site clearing and construction activities. Occupational health and safety risks will be restricted to lifting heavy things and working on heights. Considering the proposed mitigation measures, the impact significance rating on occupational related incidents and accidents is predicted to be Minor Negative.

8.13. ENVIRONMENTAL IMPACTS DURING THE OPERATION PHASE

8.14. Air Quality

The operation phase of the Project is not envisaged to release any major air pollution given the lack of onsite pollution sources. The hospital will be connected to the national electricity grid eliminating the need for an onsite generator except for a small backup generator for emergencies. Applying proper maintenance of the generator, air pollution is not expected to occur. The main source of pollution for this Project is vehicular emissions and dust emissions due to vehicular movement.

As for indoor air quality, it may be impacted by the use of chemicals, their foul odours, or the preparation of medias, which may have pungent odours. Bad odours are also transmitted by dustbins that are badly handled, are unclean, or left uncovered. If suitable ventilation systems and sanitation are not implemented and maintained, the indoor air quality may irritate patients, caregivers, and visitors, as well as increase the risk of infection. Such exposure may affect lung and kidney function after long periods of exposure or have immediate effects such as irritation to the eyes, nose, and throat. The impact is anticipated to be Long-term and will continue for the life of the project.

Mitigation Measures

- Develop an Indoor Air Quality Management Plan and a vehicle inspection and maintenance procedure,
- Ensure MSDS for all chemicals are available and shared with staff/ workers handling them,
- Ensure all areas have proper ventilation in place (active or passive),
- Ensure all machine, equipment and tools are regularly maintained and serviced, and
- Provide respirators for use where harmful dust or fumes exist.

8.15. Noise

Noise generated during the operation phase will be as a result of operating the HVAC system, imaging equipment and other equipment as well as human interactions within the hospital. Repeated and prolonged exposure to noise may result in hearing loss. Other sources of noise include standby backup generator. However, occupational, and ambient noise levels are not expected to exceed neither the Kenyan EMCA (*Noise & Vibration*) Regulation 2009 nor International (IFC; WHO) criteria for occupational health and environmental/disturbance. The impacts are anticipated to be Long-term that will continue for the life of the project.

Mitigation Measures

- All areas with high noise emitting activities should be clearly demarcated with appropriate signage,
- Apply source control techniques to reduce noise, such as reducing speed of moving parts, reducing friction,
- All equipment should be regularly maintained/serviced for better operation,
- Where applicable, install rubber platforms to reduce noise emissions from vibrations, and
- Select equipment fitted with silencers.

8.16. Water Usage

The Project is anticipated to require water for domestic use, cleaning, and disinfection in addition to landscape irrigation. The site shall be connected to the existing Kiambu County water network (Ruiru-Juja Water and Sewerage Company) during the operation phase, which may ultimately result in an increase in water demand and place more pressure on the network. Water consumption during the operation phase is estimated to be 2000m^3 per month. The impacts are anticipated to be Long-term that will continue for the life of the Project. Residual impacts post mitigation is insignificant.

Mitigation Measures

- Ensure that washing/cleaning activities (e.g., machineries washing, toilets flushing/cleaning, etc.) are carried out through methodologies requiring low water consumption or dry cleaning if possible,
- Install resource efficient fittings,
- Borehole water abstractions should be as per the Water Resources Authority (WMA) permit,
- Conduct regular audits of water systems to identify and rectify any possible water leakages,
- Develop and implement metering and measurement system for water use to enable proper performance review and management, and
- Launch a resource efficiency campaign across the hospital through (signage, posters, etc.).

8.17. Waste Generation

During the operational phase of the proposed project, non-hazardous waste is likely to be generated by the staff and visitors from non-medical activities. Because of the great potential for disease transmission, waste generated by medical activities can be dangerous, poisonous, and even fatal. Hazardous waste most likely to be generated from hospital activities includes sharps (*needles, blades, scalpels, etc.)* and biomedical (*human tissue, contaminated item, etc.*), chemicals from laboratories and the hospital pharmacy, and radioactive material. If they are not properly managed and disposed of or allowed to mix with other municipal garbage, they pose a major threat to public health and the environment. Table 8.1 below highlight handling procedures and disposal methodology.

The improper segregation, collection, storage, and disposal of non-hazardous and hazardous waste will contribute to the already existing problem of illegal dumping sites in Kenya and increase pressure on existing landfills. Improper disposal of waste may cause surficial soil contamination if disposed off and left for long periods of time directly on the ground surface. The impacts are Long-term that will continue for the life of the project operation phase however, the Residual impact post mitigation is rated minor.

Table 8-1: Classification and Color Coding of Healthcare Waste to be Adopted for Waste Segregation

Type of waste	Procedure and Disposal Strategy
Infectious waste: Includes waste suspected to contain pathogens (e.g. bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. Includes pathological and anatomical	**Waste Segregation Strategy**: Infectious waste collection bin shall be in yellow or red colored bag/container marked "infectious" with international infectious symbol. These bins will have strong, leak proof plastic bags.

Type of waste	Procedure and Disposal Strategy
material (e.g. tissues, organs, body parts, human fetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials	 **Treatment:** These wastes shall be treated at a registered hazardous handling facility (Incinerator) identified by the proponent.
Sharps: Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc.	**Waste Segregation Strategy**: Yellow or red color code marked "Sharps". Rigid, impermeable, puncture-proof container (e.g. steel or hard plastic) with cover and labeled "infectious waste" shall be used.  **Treatment Method:** Sharps shall be disinfected with chlorinated solutions and collected by hazardous waste handler.
Pharmaceutical waste: Includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (e.g. drug bottles vials, tubing etc.).	**Waste Segregation Strategy**: Brown bag /container Leak-proof plastic bag or container shall be used to handle such wastes. **Treatment Strategy:** Incineration at temperatures exceeding 1200°C. will be used to destroy these wastes. Landfilling not recommended unless encapsulated in metal drums and groundwater contamination risk is minimal.
General health care waste (including food waste and paper, plastics, cardboard)	**Waste Segregation Strategy:** Black bag/container. Halogenated plastics such as PVC will be used to separate general waste to avoid disposal through incineration and associated hazardous air emissions from exhaust gases (e.g. hydrochloric acids and dioxins).

Mitigation Measures

- Develop a waste management awareness campaign across the hospital (*signage, seminars, newsletters, etc.*),
- Provide colour coded waste receptacles across the hospital and ensure they are labelled with photographic/visual references,

- Healthcare waste shall be stored in a secured area, accompanied with a proper sign board to minimize access by staff and patients,
- Train and inform all maintenance workers and staff on waste segregation,
- Different waste bins, for different waste streams must be provided to ensure correct waste segregation,
- Strict compliance of the procedures specified in the Healthcare Waste Management Guidelines of 2019 will be implemented by the hospital management, and
- Non-recyclable waste must be removed from site on a daily or weekly basis and disposed off at a registered or licensed disposal facility by a registered and licensed waste handler.

Hazardous Wastes

- Hazardous waste shall be disposed off as per the Waste Management Plan and the provision of EMCA (Waste Regulation) 2006.The Hospital HSE Manager will identify an approved waste treatment and disposal facility for hazardous waste management and as per the outline measures in Table 8.1;
- Hazardous waste bins will be clearly marked and stored in a contained area (or located on an impermeable surface) and covered with impervious lid,
- Measures will be taken to ensure that adequate records of all the steps involved in HCW management (Collection: Waste Collection time, type of waste, waste weight, ward from which waste is collected, frequency, storage, transport, and disposal) is conducted on a regular basis, and
- All hazardous waste shall be removed from the facility on a weekly basis and disposed off at a registered or licensed hazardous disposal facility.

8.18. Effluent Discharge (Wastewater)

During the operational phase of the proposed project, municipal wastewater is anticipated to be generated by the project from sources like laboratories (e.*g. microbiological cultures, stocks of infectious agents*), operation theatre (e.*g. body fluids and excreta, anatomical waste*), pharmaceutical and chemical stores, funeral parlor, cleaning activities, kitchen, and X-ray development facilities. Depending on the effectiveness of hazardous waste management practices (in particular waste segregation strategies described in Table 8.1 above), hazardous healthcare wastes may enter the wastewater stream, including microbiological pathogens (wastewater with a high content of enteric pathogens, including bacteria, viruses, and parasitic worms). However, the proposed project will have a state-of-the-art Wastewater Treatment Plant (WTP) to handle the expected effluent. The residual impact post mitigation measures are rated minor.

Mitigation Measures

- Chlorination and disinfection of the effluent shall be performed prior to treatment,
- Engineering controls will be in place to remove active ingredients (*antibiotics and miscellaneous pharmaceutical products, among other hazardous constituents*),
- The sludge will be treated off-site in a registered hazardous waste handling facility,
- Regular inspection of wastewater handling infrastructure (e.g. *drains, pipelines, manholes, etc.*) shall be performed,
- Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated, and
- Wastewater handling procedures, rules, including liquid waste disposal and as per the provision of EMCA (Waste Regulation) 2006 shall be communicated service provision department.

8.19. Negative Social Impacts

8.19.1. Exposure to Infections/Diseases

Healthcare providers and personnel as well as community may be exposed to general infections, blood-borne pathogens, and other potential infectious materials during care and treatment, as well as during collection, handling, treatment, and disposal of healthcare waste.

Mitigation Measures

- Staff members and visitors will be provided with information on infection control policies and procedures,
- Universal/Standard and precautions shall be established to treat all blood and other potentially infectious materials with appropriate precautions, including,
    - Immunization for staff members as necessary (e.g. vaccination for hepatitis B virus)
    - Adequate facilities for hand washing shall be provided to prevent infections (e.g. *nosocomial and community disease*)
    - Provision of adequate supplies of PPEs for personnel involved in waste management including *overalls/industrial aprons*, leg protectors, boots, heavy duty gloves, helmets, visors / face masks and eye protection (especially for cleaning of hazardous spills), and respirators (for spills or waste involving toxic dust or incinerator residue) as necessary.
- Adequate washing facilities for personal hygiene shall be provided, particularly at waste storage locations.

8.20. Energy Consumption

Energy consumption during the operation phase will be attributed to the provision of lighting, cooling, as well as the operation of equipment/machine in the various departments. This will ultimately result in the release of indirect greenhouse gas emissions (GHG) primarily through the use of fossil fuels to generate power by the standby generator to operate the hospital during power outages. Substantial amount of energy from the national grid will also be required put more pressure on the grid.

Mitigation Measures

- Consider passive designs for cooling, heating, and lighting in all the buildings,
- Install energy efficient lighting system and motion sensors for lighting,
- Ensure the building is well insulated to avoid the escape of hot and/or cool air depending on season,
- Ensure all equipment and machines are only used whenever required,
- Unplug high energy demanding equipment when not in use,
- Switch off computers, printers, and all other appliances at the end of day, and
- Use timers for air conditioning and ventilation systems.

8.21. Socio-Economic Impacts during the Operation Phase

a) Potential Positive Socio-Economic Impacts

Positive impacts primarily target the economy and the health of the people, whereby the project will provide job opportunities for different labour classes throughout its life cycle. The establishment of a tertiary hospital in the area will ensure proper care is provided for people and improve the overall health of the County. Other benefits include job creation, boosting of local economic/trading activities, improved livelihoods of local artisans and revenue generation for the various government agencies.

8.22. Labour Conditions and Community Wellbeing

a) Potential Negative Socio-Economic Impacts

Improper management of human resources and working conditions could lead to violations of the national regulations on working conditions and terms of employment. Policies on workers' rights related to hours of work, wages, overtime, compensation, and benefits must be developed in line with applicable standards to avoid worker exploitation and exposure to unfair conditions.

Lack of proper engagement with the surrounding community/residents may create a sense of resentment towards the project, especially in the face of the potential risk to their well-being as a result of the presence of infection hazards around the residents. This could lead to potential conflicts between residents and project staff. The proponent will engage with area residents continually through outreach activities and a Gradience redress mechanisms will be developed.

b) Traffic Impacts

Traffic is expected to increase in the project area and especially along Kiambu road. Based on observations made during site visits, the roads and infrastructure in the area will likely support this traffic increase without significantly contributing to congestion and/or disturbance to the surrounding communities compared to the baseline and current scenario. The Project design took into consideration that patients and doctors are expected to reach the hospital using private vehicles and have thus incorporated the required parking space within the hospital compound. The proponent will also design and implement a Traffic Management Plan to minimize the unforeseen traffic impacts.

8.23. Health and Safety Impacts

a) Injuries, Infection and Diseases

Improper handling of equipment and chemicals may result in occupational diseases and injuries therefore it is imperative that appropriate awareness and training are given. When mercury-containing equipment breaks, for example, health workers, patients, and visitors are exposed to a mercury hazard. X-ray facilities also pose a radiation risk and especially for pregnant females. Emergencies such as fires or injuries must be managed properly according to a well-established procedure. Individuals who are exposed to hazardous health-care waste, including those who work in the facility (*medical physicians, nurses, health-care auxiliaries, and hospital maintenance employees, etc.*) and those exposed to these wastes outside the facility such as waste disposal workers and even scavengers are the main groups at risk.

Mitigation Measures

- Develop an infection control procedure for the project defining responsibilities, resources, and management/ mitigation measure for potential infection risks within the facility,
- Ensure only experienced and qualified staff are supervising the use of all equipment and machines,
- Ensure there is restricted access to the high-risk areas such as imaging devices,
- No worker should be allowed to operate any equipment and/or machine without the appropriate training/induction and written permission to proceed by the technician in charge,
- Risk assessments and control measures should be completed as part of the project involving injury or infection risks,
- All areas and surfaces are to be cleaned and sanitized frequently according to a pre-established schedule,
- Radioactive and Infection safety awareness campaigns (training, signage) to be prepared, and
- X-ray department to provide appropriate PPEs to operators/technicians and patients.

b) Electrical Hazards

Negative impacts of electrical hazards on patients and staff during the operation phase of the Project include electrocution, shock, and burns, as well as death in some instances. This may be a result of inexperienced technicians attempting to energize the various equipment and machines used in the hospital; during the commissioning and testing of electrical experiments and installations; exposed, poorly insulated and/or worn-out electrical wires and plugs of machines and equipment; and defective equipment shall be removed.

Mitigation Measures

- Ensure only experienced and qualified technicians are supervising the use of all equipment and machines,
- Ensure there is restricted access to the electrical boards,
- Regularly maintain and service equipment and machines, and
- Prepare and display clear instructions on electrical hazards and how to deal with someone who has come in contact with an electrical source. Implement Tag out/Lock out procedures in handling electrical hazards.

8.24. Fire Safety

The risk of fire in healthcare facilities is significant due to the storage, handling, and presence of chemicals, pressurized gases, and other flammable substrates. Fire safety recommendations applicable to occupational areas are presented under 'Occupational Health and Safety.

Mitigation Measures

- The facility will have smoke alarms and sprinkler systems;
- The facility will be equipped with fire safety systems including self-closing doors in escape routes and ventilation ducts with fire safety flaps,
- Proper training and a dedicated fire marshal team shall be employed to handle fire emergencies,
- The proponent will develop fire prevention or emergency response and evacuation plans with adequate guest information displayed in strategic locations and clearly written in relevant /local languages.
- Provide adequate firefighting equipment including fire Hydrant point and appropriate portable fire extinguishers.

8.25. Cumulative Impacts

Cumulative impacts are defined as impacts that act simultaneously, including those arising from existing or foreseeable third-party activities, and have an effect on the same valued ecosystem receptor as the proposed project. Therefore, cumulative impacts are those which act in a way that the sum is larger than that of any individual impact on its own. This section of the ESIA considers the cumulative impacts that would result from the combination of the proposed project and other existing or foreseeable developments in the broader of the project area. Based on the significance of the residual impacts during construction and operation the following impacts have been considered in this assessment:

a) Ambient Air
b) Noise
c) Energy, Water and Wastewater
d) Waste
e) Traffic

Cumulative impact significance is based on expert judgement, taking into consideration that cumulative effects are difficult to predict as they are the result of complex interactions between multiple projects or

activities. In this case, many of the foreseeable projects are not definitely known. Lastly, health and safety cumulative impacts have been excluded as these will be managed individually by the project.

8.26. Existing and/or Imminent Developments

Based on visual observations around the proposed project area (Kasarini sub location/Kiambu Road), both commercial and residential buildings were present in addition to Motor vehicle hubs, and upcoming service stations. Additionally, there were other ongoing infrastructural construction activities including the area where the hospital is planned to be constructed.

Aspects		Narratives
Ambient Air Cumulative Impacts	During Construction	The construction of the Project in combination with neighbouring developments, both existing and foreseeable, will result in increased dust and gaseous emissions in the Project areas. Emissions will be the result of earth works and vehicular movement on unpaved surfaces, mainly. This cumulative impact is anticipated to be temporary in nature and localized. This impact is predicted to be minor.
	During Operation	No negative cumulative impacts during the operation phase of the Project are anticipated given the nature of the Project and surrounding developments (existing and foreseeable) which do not constitute air emissions. This impact is predicted to be insignificant.
Noise Cumulative Impacts	During Construction	The construction of the Project, in addition to noise generated by the development of foreseeable projects is likely to cause an increase in noise emissions in project areas. Noise emissions will be as a result of heavy equipment and machinery on construction sites. However, noise generated by the Project and that of foreseeable Projects is anticipated to be temporary in nature and localized. This impact is predicted to be minor.
	During Operation	Noise emissions during operations are anticipated to be limited to the boundaries of the site given they are predominantly a result of human interaction, medical equipment and ventilation systems as opposed to the operation of high noise emitting equipment/machines. This impact is predicted to be insignificant.
Waste Cumulative Impacts	During Construction	Waste generated by the Project in addition to waste anticipated to generated from foreseeable developments and those existing is likely to have an impact on the municipal waste management systems, whereby the amount of waste landfilled is likely to increase. This impact is predicted to be minor
	During Operation	The cumulative impact of waste during the operation is similar to that of the construction phase, except waste quantities are likely to increase given the presence of more people within the facilities such as patients and their families. Additionally, an increase in the generation of hazardous waste from the area is expected for the project which will adds pressure on treatment facilities such as incinerators. This impact is predicted to be moderate.
Energy, Water and Wastewater Cumulative Impacts	During Construction	The construction phase of the proposed project is not anticipated to apply significant pressure on municipal services given that the number of workers on each site is considerably low in comparison to the demand of other projects. Energy consumption will also be primarily attributed to the use of fossil fuels for the operation of heavy equipment and generators onsite, while low voltage energy usage will be used for power tools. Energy consumption during this phase is temporary. This impact is predicted to be minor.
	During Operation	Existing and foreseeable developments, in addition to the proposed project are likely to increase the demand for the delivery of municipal services, such as the provision of energy, potable water and sewerage

Aspects		Narratives
		services. However, it has been observed that the infrastructure in all project areas is well established and fully functional. With regards to energy consumption and its result in GHG emissions, every source of GHG emissions is a source of cumulative impact and ultimately a contributor to the same impact. The mitigation measures, if properly implemented, will contribute to reducing the Project's GHG emissions. This impact is predicted to be moderate.
Traffic Cumulative Impacts		Traffic in project area (Kiambu Road) is likely to increase during the operation of the Project and is anticipated to face further increases as neighbouring developments are completed. The road and transportation infrastructure in the project area was observed to be adequate enough to absorb increased traffic in Project areas. This is also an aspect highly likely to be accounted for by urban development authorities. This impact is predicted to be minor.

Chapter 9 CLIMATE RISK AND VULNERABILITY ASSESSMENT

This chapter details the climate profile of the project area. Specifically, it looks at the impact of climate stressors on the project and beyond. A climate stressor is a climate factor that can affect the functioning of a system. For example, rising temperatures and greater rainfall variability may affect the infrastructure with implications for healthcare services. Climate stressors can also limit the potential success of development interventions.

9.1. Key Climate Policies

- The Constitution of Kenya (2010) stipulates that all citizens have the right to a clean and healthy environment,
- National Climate Change Response Strategy, NCCRS (2010)
- National Climate Change Action Plan, NCCAP (2013-17), currently under review for 2018- 2022,
- 2nd National Communication to the UNFCCC (2015)
- National Adaptation Plan, NAP (2015- 2030)
- Green Economy Strategy and Implementation Plan, GESIP (2016-2030)
- National Climate Change Framework Policy (2016)
- Climate Change (Amendment) Act (2023),
- National Policy on Climate Finance (2016),
- The Kiambu County Climate Change Act, 2021; and
- Low Carbon Development Strategy espoused in Kenya's Second National Communication (2015).

9.2. Kenya's Projected Weather and Climate Changes

Kenya has a complex climate that varies significantly between its coastal, interior, and highland regions and from season to season, year to year, and decade to decade. This climatic variability is influenced by naturally occurring factors such as movement of the Intertropical Convergence Zone (ICZ) and the El Niño Southern Oscillation (ENSO). In recent decades, observed mean annual temperatures have increased by 1.0°C since 1960, or an average rate of 0.21°C per decade.[11] Changes in rainfall patterns have also been noticed since the 1960s. Greater rainfall has been observed during the short rains of October to December[12], and the long rains of March to April have become increasingly unreliable in locations such as Eastern Province[13]. However, no statistically significant national trends toward wetter or drier conditions have been found.[14]

Extreme climatic events have long posed a significant risk to regions in Kenya, and they have contributed to making it one of the most disaster-prone countries in the world.[15] Of particular concern are floods and droughts, with major droughts occurring about every 10 years, and moderate droughts or floods every three to four years. Historically, these extreme climatic events have caused significant loss of life and adversely affected the national economy. Droughts have affected most people and had the greatest economic impact (Earth Institute, n.d.); it is estimated that droughts cost about 8.0 per cent of GDP every

[11] McSweeney, C., New, M., & Lizcano, G. (2009). *UNDP climate change country profile: Kenya*. Retrieved from http://ncsp. undp.org/sites/default/files/Kenya.oxford.report.pdf

[12] Government of Kenya (GOK). (2010). *National climate change response strategy: Executive brief*. Retrieved from http:// www.environment.go.ke/wp-content/documents/complete%20nccrs%20executive%20brief.pdf

[13] Awuor, C. (2009). Increasing drought in arid and semi-arid Kenya. In J. Ensor & R. Berger (Eds.), *Understanding climate change adaptation: Lessons from community-based approaches* (pp. 101–114). Rugby: Practical Action Publishing.

[14] AEA Group. (2008a). *Final report. Kenya: Climate screening and information exchange* (ED 05603, Issue 2). Retrieved from http://www.dewpoint.org.uk/Asset%20Library/DFID/Climate%20Risk%20Assessment%20Report%20-%20Kenya.pdf

[15] Ministry of State for Special Programmes (MOSSP). (n.d.). *Strategic plan 2008–2012*. Retrieved from http://www.sprogrammes.go.ke/images/plan2.pdf

five years. [16] While usually more localized, floods have led to the greatest loss of human lives[17]. Other climate-related hazards in Kenya include forest fires and landslides, the latter of which mostly affect the highland regions.[18]

Global climate change is projected to alter Kenya's mean annual climatic conditions as well as its pattern of climate extremes. Temperatures are expected to continue to rise in all seasons, with models suggesting that warming of about 1°C will occur by the 2020s, and 4°C by 2100[19]. Warming will vary from region to region within Kenya[20]. Greater uncertainty persists regarding how precipitation patterns might be altered by climate change. Analysis by the Intergovernmental Panel on Climate Change (IPCC) using global circulation models projects that East Africa will likely become wetter, particularly during the rainy seasons[21]. However, analyses focused on Kenya project that a general decrease in mean annual precipitation will occur within the country, although wetter conditions are likely during the short rains of October to December. Projections vary widely regarding how extreme weather event patterns will change[22]. Possibilities include increased flooding due to more heavy rainfall events and continued occurrence of droughts at least as extreme as at present, possibly increasing in intensity over this century. Current uncertainty regarding how climate change might manifest in Kenya reflects, in part, ongoing gaps in knowledge at the regional and international levels, such as incomplete understanding of how critical drivers such as ENSO influence Africa's climate, a severe lack of local weather data in Kenya specifically and in Africa as a whole, the granularity of global circulation models, and the limited development of regional climate models[23].

9.3. Kenya's Key Climate Impacts and Vulnerabilities

The key sectors in Kenya that are vulnerable to climate changes include agriculture, water resources, health, and ecosystems. For example, increased rain and shifts in the frequency, intensity, and duration of droughts can reduce agricultural and horticultural crop production or affect grazing potential through expansion of arid and semi-arid lands. As a result, food security will be affected through direct impacts on food availability and indirect impacts on food accessibility, livelihoods, and income. Increases in the frequency and severity of extreme events may reduce productivity of rangelands, which support millions of pastoralists and agro-pastoralists in Kenya.

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[16] AEA Group. (2008b). *Kenya: Climate screening and information exchange*. Retrieved from http://www.dewpoint.org.uk/ Asset%20Library/Climate%20Risk%20Assemment%20Flier%20-%20Kenya.pdf

[17] Earth Institute at Columbia University. (n.d.). *Kenya natural disaster profile*. Retrieved from http://www.ldeo.columbia. edu/chrr/research/profiles/pdfs/kenya_profile1.pdf

[18] United Nations Development Programme (UNDP). (n.d.a). *Kenya natural disaster profile*. Enhanced Security Unit. Retrieved from http://mirror.undp.org/kenya/KenyaDisasterProfile.pdf

[19] AEA Group. (2008a). *Final report. Kenya: Climate screening and information exchange* (ED 05603, Issue 2). Retrieved from http://www.dewpoint.org.uk/Asset%20Library/DFID/Climate%20Risk%20Assessment%20Report%20-%20 Kenya.pdf

[20] Funk, C., Eilerts, G., Davenport, F., & Michaelsen, J. (2010). *A climate trend analysis of Kenya – August 2010* [Fact Sheet 2010-3074]. United States Geological Survey. Retrieved from http://www.fews.net/docs/Publications/FEWS%20 Kenya%20Climate%20Trend%20Analysis.pdf

[21] Boko, M., Niang, I., Nyong, A., & Vogel, C. (2007). Africa. In M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, & C. E. Hanson (Eds.), *Climate change 2007: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 433–467). Cambridge, UK: Cambridge University Press.

[22] Stockholm Environment Institute (SEI). (2009). *Economics of climate change in Kenya: Final report submitted in advance of COP15*. Available from http://www.sei-international.org/mediamanager/documents/Publications/Climate-mitigation- adaptation/kenya-climatechange.pdf

[23] Conway, G. (2009). *The science of climate change in Africa: Impacts and adaptation* (Discussion Paper no. 1). London, UK: Grantham Institute for Climate Change, Imperial College London.

The availability and accessibility of water resources varies throughout the country. Water resources are concentrated in five drainage basins in areas subject to frequent droughts and floods and therefore vulnerable to further changes in climate variability. Additionally, changes in temperature and precipitation will likely affect vectors for diseases such as malaria, especially in high altitude areas. Furthermore, impacts to water supply, quality, and sanitation will further compound other health impacts. Potential environmental impacts include reduced biodiversity; increased risk of forest fires; changes in distribution of pests, pathogens, and invasive species; a shift in vegetation to higher elevations; and substantial loss of tourism income. Coastal and marine ecosystems, including mangroves, coral reefs, and fisheries, will also be affected by climate change.

9.4. Kiambu County Climate Change and Variability

The annual average temperature for the county is 15-23°C (As outlined in Section 4.4). The western areas including the upper midland semi-arid, upper midland semi-arid arid and the lower highland semi-arid agro ecological zones experience annual average temperatures greater than 20°C. Temperature values in the County for the year 2020 were higher than the average temperature for the 1981-2012 period which was used by the Kenya Meteorological Department as the base period in the state of climate 2020 report. Most stations in the country observed higher minimum temperatures than the long term means which is consistent with global observation data that recognizes 2020 as one of the hottest years on record (*Kenya Metrology Department, 2020*)[24]

The annual average precipitation in the county is 600-1300 mm. The northern region receives an annual average precipitation of more than 1000 mm. Historical annual average rainfall and temperature records show a directional-spatial trend, with peak values generally appearing in the northern parts of the county for precipitation and western parts of the county for temperatures.

In January 2020, the performance of rainfall was significantly above the long term mean and there were severe storms experienced for example the Kabete station recorded 92.5mm on 12th January. In February the Thika station recorded over 125% rainfall above the long-term mean and storms were recorded in several stations including Kabete with 23.0mm. The October, November and December short rains recorded depressed amount of rainfall with the Thika station recording 360.4mm (*Kenya Metrology Department, 2020*).

The total annual rainfall has slightly decreased since 1985 and this will continue up to 2040 for the long rainy season. The trends show that the short rainy season is becoming wetter, and projections indicate that the total annual rainfall will continue to increase. From 1985 to 2015, the number of CDD been consistent, with a few extreme years, in the range of 20-50 days. Future climatic projections indicate a slight increase in Consecutive Dry Day (CDD), suggesting it will exceed 40 days more frequently. Increased dry periods will lead to high drought risk in the long rainy seasons between 2020 and 2040. However, CDD is predicted to decrease after the year 2040 due to increases in rainfall.

9.5. Kiambu County Climate Change Risk and Vulnerability Assessment Methodology

To determine the climate change risks and vulnerability of communities in Thindigua location (Kiambu Road), relevant secondary data was reviewed.

9.6. Findings of Climate Change Risk and Vulnerability Assessment

a) Key Climate Parameters

For infrastructure development, the critical climate parameter is precipitation in terms of volume and intensity, and their impact on occurrences of flooding and landslide depending on location. In combination

[24] Climate Risk Profile for Kiambu County. Kenya County Climate Risk Profile Series. The Ministry of Agriculture, Livestock and Fisheries (MoALF), Nairobi, Kenya.

with geology and geography, a related variable is soil moisture as it affects building foundation stability. Hot days temperature is also an important consideration for housing design, particularly for glazed buildings, due to its effect on reflective and heath island. The use of glass facades in buildings can also have a direct impact on energy use and CO_2 emissions. If the glass facades are not properly insulated, they can lead to increased energy use for heating and cooling, which would result in higher CO_2 emissions.

9.7. Future Projections

Climate Projections: For the climate change projections data on maximum temperature, minimum temperature, and rainfall, was obtained for near-, mid-, and end-century. The future climate projection data is from the KMD ensemble data that was reviewed by the team (Earthcare Servies Limited) for the assessment of climate risks on the proposed project with comparison with the observed data from Kenya Metrological Data.

Population Projections: For the Future Risk and Vulnerability assessment, Kiambu township Sub County Population Projections by KNBS (2019) were used primarily. Additionally, for the Future Risk model population projections *County Integrated Development Plan* 201-2022 (CIDP) were used. In this case, internal migration in relation to several regional development projects, namely, well developed residential estate development, commercial development along Kiambu Road and amongst other development were considered based on the positive impacts from the proposed development. The new population numbers are considered by assuming the increase in in-migrants or the decrease in out-migrants by 30% towards 2030/2050 along Kiambu Road.

Socio-economic Indicator Projections: Socio-economic data points from two census years (2009 and 2019) were used. All the socio-economic indicators were projected using the absolute rate of change. While for the present and future social-economic vulnerability maps were used. Additionally, GDP growth rate projections as per the KNBS were reviewed. As per Kenya National Bureau of Statistics (KNBS) studies, the estimated average annual GDP of Kiambu County between 2013 and 2020 was about 5.7% and 10%, respectively. Considering this indicative, GDP growth rate of 5.7% was considered as a proxy indicator for increasing overall adaptive capacity.

9.8. Confidence Level and Limitations

For all the indicators, Government sources were used to avoid any data discrepancies. Analysis at temporal scales beyond 2050 was not possible due to the limited historical data since doing so may have a high forecast error. It is also understood that new development plans such Vision 2030 economic blueprint may drive the development trajectory and drive investments and future growth at national and Sub-County levels. This may change the projected risk as per this assessment. However, the indicators and framework used in this study can be used to update the assessment.

Table 9-1: List of Indicators for Indicator-based Approach Assessment

Category		Factor	Data Source
	Hazard	Consecutive dry days	Kenya Metrology Department
		Occurrence of extreme rainfall anomalies - Stranded precipitation Index (SPI)	Kenya Metrology Department
		Change in maximum temperature	Kenya Metrology Department
		Monthly Average Evaporation	Kenya Metrology Department
		Temperature Humidity Impact	Kenya Metrology Department
		Urban Heat Island	UHI study
	Exposure	Population Density	KNBS and Questionnaire administration

Category		Factor	Data Source
Risk		Population aged 65 or older	KNBS and Questionnaire administration
		Population receiving Government assistances	Questionnaire survey
		Roads	Questionnaire survey
	Vulnerability	Number of female lead households	KNBS and Questionnaire administration
		Number of households who are getting medicine through regular clinic	Questionnaire survey
		Urbanization rate	
		Population receiving Government assistances	KNBS and Questionnaire administration
	Capacity	Educational level	Questionnaire survey
		Forest cover	Kenya Forest Data
		Number of hospitals	

a) Hazard

As per the impact chain described above, three major components and its indicators were used to assess hazards for the proposed project. Climate variability, Extreme weather events (that may cause loss of life, injury, or other health impacts, as well as damage and loss of property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources) and number of deaths from these climate-induced disasters in the past decades. The climate variability profile analyses the changes in two important indicators of climate - temperature and rainfall. The standard deviation method has been used to capture the year-to-year changes from 1985 to 2019 for observed data for the two parameters (KMD).

Analysis: The average yearly temperature data for Kiambu County shows an increasing trend. Greater increase has been observed in lower/eastern of the County as compared to the rest of the County especially in high agro ecological zones. In terms of climate variability, change in maximum and minimum temperature, over the period from 1985-2015 Kiambu County has experienced significant climate change. This variability is also visible as per Figure 7.

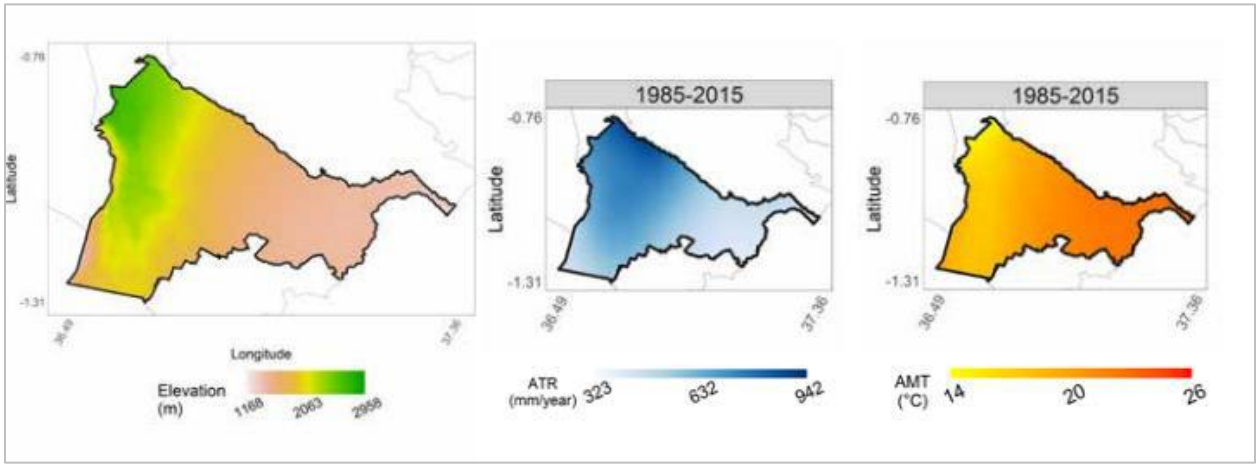

Figure 7: Elevation (left), historical (1985-2019) annual mean precipitation in mm (center), and historical (1985-2015) annual mean temperature in °C (right) for Kiambu County for the long rainy season.

Flood Risks: Flood risk as indicated by the P5D measurement. In the long rainy season, P5D has historically remained low (below 30mm) with some scattered large values. Between 1985-2015, P5D remained almost constant, oscillating around 30mm. Overall, the increase in P5D suggests heightened flood risk throughout county.

One indicator of heavy rainfall and erosion risk is the 95th percentile of daily precipitation for a season. In the long rainy season, 95th percentile intensity has historically remained high in the northern regions, with some scattered large values in the central and southern regions. Future climate projections indicate that this risk will mainly affect the northern regions, suggesting increased localized erosion risk. The spatial variation in 95th percentile intensity for future years matches closely with the P5D index, indicating increased precipitation in the central and northern regions of the County.

Analysis: Flood risks were simulated using one-dimensional hydrodynamic modelling that incorporated data on soil, geology, elevation, Land cover and the drainage systems in the area. Soil data, land cover data, elevation data and natural drainage pattern was collected, rasterized, reclassified and weighted based on an assumed percentage of influence at 30% for soil, 25% for slope and 45% for land cover. The resultant analysis indicated that (27%) of the total Kiambu Sub-County is likely to experience flooding, ranging from high to moderate possibility of flooding. About 40% of the residents in the project area are directly or indirectly affected by the urban floods. Most of the land that is highly to moderately susceptible to flooding is located in the low-lying areas along the river riparian. The assessment results indicate that slightly undulated topography is moderately to low susceptible to flood risks but highly susceptible to landslides. Flood events may occur due to an increase in precipitation as well as temperature during the medium to long term operational life of the project. The project design has assumed a maximum flood discharge of 2,400 m^3/s which is 2.8 times the flood discharge of the proposed project location.

Landslides: The risks associated with landslides are considered to be low. The proposed project location falls between the major fault lines of different geological formations. Thindigua area (Project location) has moderate to gentle gradients; with no major landslide events in Kasarini sub-location. As part of the Environmental Management Plan, the project proponent will make necessary afforestation program for a large number of tree plantation for slope stabilization in and around the project location.

b) Vulnerability

The IPCC defines vulnerability as the degree to which individuals and systems are susceptible to or unable to cope with the adverse effects of climate change, including climate variability and extremes. The vulnerability of human health to climate change is a function of:

- **Sensitivity:** which includes the extent to which the natural or socio-economic systems on which livelihood outcomes depend, are sensitive to changes in weather and climate (the exposure–response relationship) and the characteristics of the population, such as the level of development and its demographic structure. The region assessed (*Proposed Project location Kiambu road*), in particular Thindigua/Kasarini locations indicates high and strong socio-economic condition hence, low vulnerability levels.

- **Adaptive Capacity**: Ability to reduce the burden of a specific adverse health or socio-economic outcome (the adaptation baseline), the effectiveness of which determines in part the exposure–response relationship.

Plate 13: Typical Scenarios Flooding Events along River Riparian

The resultant analysis from the administered questionnaires indicates that a large household size, larger number of female-headed households, child and elderly dependency ratio add to a high sensitivity index. Households with large number of dependents have inadequate resources and hence limited resilience and recovery from hazards.

a) Effects of Climate Parameters on Infrastructure Performance and Durability

The main concern for housing and built infrastructures under climate change threat is protection from water penetration and damage to the foundation (sub-base and subgrade). Foundation support is at risk if water saturation occurs, which is then reflected onto the building as cracks and deformations. Subgrade soils with high plasticity (e.g., clay) will decrease in strength once saturated. Saturation also reduces the amount of contact and interlock in the base/sub-base layers, so the aggregates move when repetitive load is applied. This leads to foundation deformations that contribute to accelerated deterioration and collapse. The project area will be well drained to protect the facility from the effects of excessive water penetration.

9.9. Adaptation of Proposed Building for Climate Change

In 2010, buildings accounted for 39% of the world's final energy use, 19% of energy-related greenhouse gas emissions (including electricity-related), about 1/3 of black carbon emissions, and 1/8 to 1/3 of fluorine emissions. This quota is expected to increase due to climate change, urbanization, and higher standards of living comfort. This means huge energy-saving opportunities which has become a high-priority area of climate change. The proposed buildings (Hospital) will adopt feasible methods of adaptation and mitigation to deal with climate change i.e., sustainable development measures.

The project designers conducted a risk assessment to evaluate what resilience measures would be appropriate to include in the project design. The risk assessment was used to identify appropriate adaptive measures, including design features and construction materials, to provide an appropriate resilience to increased extreme weather as well as changes in average conditions experienced in the County.

The project design team considered resilience measures including:

a) Preventing the loss (total or partial) of the project or components of the project due to the (direct or indirect) effects of extreme climatic events,

b) Future-proofing the project to enable modifications in future where some resilience measures are unlikely to be required immediately e.g., putting in larger foundations to accommodate future increases to flood defense barriers.

9.10. Analysis Based on KMD Inferences

Built Environment	Factor	Effect On Adaptive Capacity	Degree of Challenge High | Moderate | Low Supportive | Do Not Know
	Infrastructure capacity	Energy: Existing infrastructure is adequate to serve existing demand but may require upgrades to reflect needs grid flexibility.	Moderate
		Water & Sanitation: Adequate.	
	Land use and Development	Current land use and development patterns in the area may hinder adaptive capacity. This is however, a localized and regional problem. Increased impervious surfacing, including surface parking lots throughout the project area will contribute to urban heat island, poor water infiltration in many areas, and disconnected riparian corridors.	High
Environment	Environmental condition	Air quality is barely within healthy limits, but future extreme and prolonged heat events could further degrade air quality and greatly impact public health.	Low
Climate Risk Screening	Temperature and Rainfall increase	The temperature profile varies across the County. Using the simulation results of eight climate models from Coupled Model Inter-comparison Project. The annual average temperature for the county is 15-23°C. The western areas including the upper midland semi-arid, upper midland semi-arid arid and the lower highland semiarid agro ecological zones experience annual average temperatures greater than 20°C.	Medium
	Landslides	The risks associated with landslides are considered to be low. The proposed project location falls between the major fault lines of different geological formations. Thindigua area (Project location) has moderate to gentle gradients; with no major landslide events in Kasarini sub-location.	Low

Conclusion: From the above analysis, the project is technologically feasible and sound. The study indicates low impact of climate change during the operational life of the project based on the mid-century scenarios. Overall climate change is unlikely to impose negative effect on building (Hospital) based on the following outcomes analyzed.

Adapting or mitigating projects or developments are possible solutions in addressing global warming effects on climate change. Adaptation measures require planning (adapting) to possible future impacts of climate change[25]. The proposed project will improve the effectiveness and backup capacity in energy, water, and sewage system capacities. The project will incorporate:

i. Green Building technology (t*o reduce carbon footprint*) which will encompass the following features:
    a. Climate resilient Design,
    b. Landscaping technology allowing water percolation (*Perforated line drainag*e),
    c. Climate resilient Roofing Materials, and
    d. Walling materials (Non glazing materials).

As part of the Environmental Management Plan, the project proponent will make necessary afforestation program for a large number of tree plantation for slope stabilization in and around the project location and for carbon sequestration.

[25] (Agrawala S., Kramer A. M., Prudent-Richard G., and Marcus Sainsbury M. 2010: 8)

Chapter 10 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

10.1. Introduction

This chapter presents the Environmental Management Plan (ESMP) which has been formulated for the proposed project to assist in the environmental management of the potential impacts identified in *Chapter 8,* to define the management framework for the Project, institutional strengthening measures, mitigation, and monitoring measures (including a timeframe and responsibilities), as well as training and budgetary considerations.

The ESMP is based on the assessment of impacts identified in Chapter 8 of the ESIA and its implementation will be the responsibility of the project proponent.

10.2. Purpose of the EMP

The purpose of the Environmental Management and Monitoring Plan (EMP) is to describe the overarching principles to be implemented to avoid and/or minimize any impacts to environmental values during construction and operation of the project. The EMP is structured around the environmental aspects identified for the project as detailed throughout the EIA report. It describes potential mitigation, controls and management strategies that should be implemented during Project construction to minimize and or avoid impacts to environmental values. The EMP also provides the framework for achieving compliance with regulatory requirements (*including the general environmental duty*), environmental protection policies, standards, guidelines, and codes of practice.

10.3. Objectives of the EMP

The specific objectives of this EMP are to:

- To provide explicit operational guidelines and environmental monitoring requirements during the construction phases so that activities are done in an environmentally responsible and sustainable manner.
- To enable the client and its contractors to use resources efficiently and effectively during the project lifecycle in order to reduce wastage and thereby reduce associated negative environmental impacts. In addition, the aim is also to handle waste streams responsibly and apply the 'reduce, re-use and recycle' principle, wherever possible.

10.4. EMP Roles and Responsibilities

Several professionals will form part of the construction team. The most important from an environmental perspective are the Project Manager, the Project HSE Officer, and the Contractor. The *Project Manager* is responsible for ensuring that the EMP is implemented during the pre-construction and construction phases of the project. The *Project HSE Officer* is responsible for monitoring the implementation of the EMP during the design, pre-construction, and construction phases of the project. The contractor is responsible for abiding by the mitigation measures of the EMP which are implemented by the Project Manager during the construction phase.

a) Project Manager

The Project Manager is responsible for overall management of the project and EMP implementation. The following tasks will fall within his/her responsibilities:

- Be familiar with the recommendations and mitigation measures of this ESMP, and implement these measures;

- Monitor site activities on a daily basis for compliance; and
- Conduct internal audits of the construction site against the ESMP.

b) Project HSE Officer

The Project HSE Officer will be responsible for the implementation of the EMP during the construction phase as well as liaison and reporting to the developer. The following tasks will fall within his/her responsibilities:

- Be familiar with the recommendations and mitigation measures of this EMP;
- Conduct weekly/monthly audits of the construction site according to the EMP and EIA License conditions;
- Educate the construction team about the management measures of the EMP and EIA License conditions;
- Regularly liaise with the construction team and the project leader;
- Recommend corrective action for any environmental non-compliance incidents on the construction site; and
- Compile a regular report highlighting any non-compliance issues as well as good compliance with the EMP.

c) Contractor

The contractor shall be responsible for the implementation and compliance with recommendations and conditions of the EMP.

- Ensure compliance with the EMP at all times during construction.
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include: -
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    - Public involvement/complaints
    - Health and safety incidents,
    - Incidents involving Hazardous materials stored on site, and
    - Non-compliance incidents.

Table 10-1: Environmental Management and Monitoring Plan

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
Construction Phase						
Air Quality	Increased dust generation impacting sensitive receptors (*Changes in ambient NO_2 PM_{10} and $PM_{2.5}$ concentrations*).	– Regular wetting of dusty surfaces of the construction areas will be performed, – Ensure all workers wear appropriate PPE to avoid the inhalation of dust and harmful gases, – Ensure that ground in areas that are heavily used by vehicles and machinery are well compacted, – Where practicable, erect solid screens or barriers around dusty activities, – Cover vehicles transporting material that could disperse dust and minimize drop heights when loaders dump soils into trucks, – Ensure any site machinery is well maintained and in full working order, – No burning of waste, such as plastic bags, cement bags and litter, is permitted on-site, – Materials will be positioned away from residential areas, places of public access or drains, and – Develop a complaint register and corrective action program.	Environmental Health and Safety Supervisor and Contractor	No complaints relating to air quality. (*Level of dust in the vicinity of project site*)	Daily inspections offsite dust deposition.	1,350,000
Noise & Vibration	Increase in noise and vibration causing nuisance to residences	– Activities that produce excessive noise will be restricted, where practical, to the hours permitted by the EMCA (*Nosie and Vibration*) Regulation 2009, – Fixed and mobile equipment (e.g., generators, compressors) will be located away from sensitive receptors, – Maintain on-site equipment including noise reduction equipment, – Where economically feasible, enclose excessively noisy equipment likely to generate community complaints,	The Contractor (*Subcontractors, foremen and other employees*) Contractor HSE	Number of non-compliance reports Noise measurement data Number of communities complaints	Periodic monitoring by a suitably competent person throughout the construction phase	200,000

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
		– Elevated noise areas and equipment emitting elevated noise emissions will be identified and all persons working on/in the elevated noise areas will be provided with appropriate PPEs i.e., hearing protection, – Consult with landowners if noise generating activities in the vicinity of residences are planned outside normal construction hours, – Construction hours will be restricted to between 07h00 and 17h00 hrs. daylight., – Site hoardings and screens, where necessary, will be used to provide acoustic screening, – Where community complaints are recorded with respect to site noise, the relevant noise source will be identified and any additional feasible and reasonable measures available will be implemented to either reduce noise emissions or reduce the impact on receptors, and – Any compressors brought to site should be silenced or sound reduced models fitted with acoustic enclosures.				
Waste Management	Environmental pollution	– Ensure all construction waste is stored onsite and properly disposed off at licensed facilities and transported by a licensed contractor, – Waste will not be stored on areas where it could contribute to the generation of contaminated runoff, – Waste management will form part of the on-site induction process, – Organize regular waste collection to minimize excessive waste storage. – All waste materials will be stored in skips or other suitable receptacles in designated areas, – Any hazardous wastes generated (*such as chemicals, solvents, glues, fuels, oils*) will be	Project Contractor	No complaints about waste storage or removal	Ongoing (Waste trucking register)	1,250,000

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
		segregated and stored in appropriate receptacles (in suitably bunded areas, where possible, and – All waste leaving the site will be recorded and copies of relevant documentation maintained. – Adhere to waste regulations {EMCA (Waste Regulation) 2006.				
Traffic	Disruption to existing traffic movements and damage to road pavements	– Develop a Traffic Management Plan prior to construction including: o Operating standards for work and rest o Designated speed limits and routes o Effective signage to raise awareness and Implement area-specific and site inductions and training, – Consult prior to construction with the appropriate roads authority regarding works which may affect roads or traffic, – Avoid peak traffic periods to minimize traffic delays to the public where possible, – Maintain access to adjacent properties or consult alternative arrangements with the nearby residents, – Provide appropriate on-site parking (*temporary parking for the duration of construction works*) to prevent overflow onto the local road network; – Ensure delivery vehicles to and from the site are spread across the course of the working day, therefore, the number of heavy vehicles travelling during the peak hours are kept at low; and – The contractor will take all necessary measures for the safety of traffic during construction and provide, erect, and maintain such barricades, including signs, markings, flags, lights, and flagmen.	Contractor, and Project HSE Officer	No complaint about traffic incidents		250,000

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
Health and Safety Risks	Risk of accidents and incidents	– Design and implement safety measures and emergency plans to contain accidents risks, – Regular training on health and safety for workers shall be conducted through toolbox talks. – Ensure fully stocked first aid kit is provided, – Emergency plans should be communicated and well understood by all contractors, – The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the OSHA 2007 through provision of safety protective equipment PPEs (N*ose and mouth masks, earmuffs, overalls, industrial/safety boots, and gloves*) and helmets, – The construction site shall be barricaded at all times with adequate markings, flags, reflectors etc. for safety of general traffic movement, workers, and pedestrians, – The contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or ready-made paint, and – The Contractor will mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce non-compliance of use of PPE with zero tolerance.	Contractor and HSE Supervisor	Number of accidents/injuries recorded.	Daily (Throughout construction phase)	500,000
Water Resources Use	Over abstraction (*Increased Water demand and availability*)	– Water conservation awareness and saving measures training should be provided to all the project workers in both phases, – Water reuse/recycling methods should be implemented as far as practicable, – Construction water should be sourced from licensed vendors, and – Groundwater abstraction permits should be applied from Water Resources Authority.	Project Contractor	Water bills and permits	Throughout the project phase	Internal cost

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
Operation Phase						
Utilities	Increased pressure on water supply.	– Ensure that washing/cleaning activities (e.g., machineries washing, toilets flushing/cleaning, etc.) are carried out through methodologies requiring low water consumption or dry cleaning if possible, – Install resource efficient fittings, and – Launch a resource efficiency campaign across the hospital through (signage, posters, etc.).	The proponent/ Hospital Management	Amount of water consumed. Per day: m^3/day	Weekly	Internal cost
	Increased surface runoff	– Landscaping to ensure there are areas where water will percolate underground (*Green areas*), – Constructing proper drains and continuous monitoring to ensure there are no blockages. This also includes ensuring the size of the drains can accommodate storm flows during the rainy season.	KWSCL/ Project Proponent	Drainage flow rate: m^3/day during heavy downpour Ratio of paved areas to landscaped areas.	Quarterly	550,000
	Increased pressure of energy.	– Consider passive designs for cooling, heating, and lighting in all the buildings, – Install energy efficient lighting system and motion sensors for lighting, – Ensure the building is well insulated to avoid the escape of hot and/or cool air depending on season, – Ensure all equipment and machines are only used whenever required, – Unplug high energy demanding equipment when not in use, – Switch off computers, printers, and all other appliances at the end of day, and – Use timers for air conditioning and ventilation systems	Project proponent/KPLC	Amount of electricity consumed per day: Kwh.	Monthly	-
Increased Traffic	Difficulties in maneuverability	– Develop a Traffic Management Plan for the operation phase,	Project proponent	Number of traffic incidents and	Daily	Internal Cost

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
		– Erect visible and clear signs to control the movement of vehicles in and out of the facility, – Having alternative entrances and exits during operations to ease movement, – Employ traffic marshals to control traffic in and out, and – Provide adequate parking lots to accommodate peak occupancy.		accidents daily/monthly		
Generation of Waste	Environmental resources degradation soil, water, and air	– Waste Management Plan (WMP) shall be developed showing the waste disposal points for every ward and department, – Colour coded waste receptacles bins shall be provided across the hospital with appropriate labelling for visual references, – Ensure Healthcare waste is stored in a secured area, accompanied with a proper sign board to minimize access by staff and patients, – Train and inform all maintenance workers and staff on waste segregation, – Segregation of waste shall comply with EMCA (Waste Regulation) 2006, – Segregation of Healthcare Waste at source will be introduced i.e. at the ward, operation theatre, medical laboratory, or any other place in the facility where waste originates, – Strict compliance of the procedures specified in the Healthcare Waste Management Guidelines of 2019, – Non-recyclable waste shall be removed from site on a daily or weekly basis and disposed off at a registered or licensed disposal facility by a registered and licensed waste handler, and – Strict adherence to the provisions of EMCA (Waste Regulations) 2006.	HCF/Waste Handling Supervisor	Adequacy/quality of waste management equipment (*Bins, etc.*)	Daily Waste segregation Checklist	300,000

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
	Hazardous Waste	– Hazardous waste shall be disposed off as per the Waste Management Plan and as per the provision of EMCA (*Waste Regulation*) 2006. – The Hospital HSE Manager will identify an approved waste treatment and disposal facility for hazardous waste management; – Hazardous waste bins shall be clearly marked and stored in a contained area (or located on an impermeable surface) and covered with a lid, and – All hazardous waste shall be removed from the facility on a weekly basis and disposed off at a registered or licensed hazardous disposal facility (Incinerator).	HCF/Waste Handling Supervisor	Adequacy/quality of waste management equipment (*Bins, etc.*)	Daily/weekly	250,000
Effluent Discharge	Health hazard to patients and staff	– Regularly inspect the wastewater infrastructure (drains, pipelines, manholes, etc.), and – Clearly display wastewater handling rules, including liquid waste disposal and as per the provision of EMCA (Waste Regulation) 2006	Project proponent	Adequacy/quality of waste management equipment (*Bins, etc.*)	Daily/weekly	Internal cost
OSH Risks	Accidents of fire and explosion	– Putting in place an Emergency Response Plan (ERP) and ensuring all tenants are aware of it and the procedures to follow commensurate with the level of emergency, – Provide adequate storage for hazardous and flammable substances and controlling access to them, – Monitoring the movement, handling, and management of waste to ensure they are safely managed and don't present any EHS risk, – Performing emergency drills on a frequent basis, setting benchmarks for response, and evaluating performance to ensure continuous improvement of response and preparedness,	Project proponent Hospital Management	Number of incidents/accidents monthly/quarterly Number of drills performed	Quarterly	550,000

Aspect	Potential Environmental Impacts	Mitigation Measures	Responsibilities	Performance Indicators	Monitoring & Reporting	Estimated Cost (Ksh.)
		– Delineating fire and emergency assembly points and creating awareness to ensure all staff and visitors are aware of them, e.g., through the use of maps on elevators, public notices, and – Provide adequate fire hydrants and portable fire extinguishers in strategic locations within the facility.				

10.5. Environmental and Social Monitoring Plan

To ensure that the prescribed management measures are being implemented, and that the Project continues to comply with Kenya environmental laws and regulations, periodic environmental and social monitoring will be carried out by both the proponent, contractor, and subcontractors. Table 9.2 presents the recommended environmental and social monitoring to be performed during the various phases of the proposed project. Monthly reports are to be prepared summarizing the outcomes of each of the monitoring requirements during construction and operation.

Table 10-2: Environmental and Social Monitoring Plan

Component	Parameter to be Monitored (i.e., activity)	Method	Location	Monitoring Indicators	Estimated Cost
Air	Dust particles $PM_{2.5}$	Instrument and observation	Nearest sensitive receptor (at least one upwind and one downwind of site)	Number of complaints from workers/third parties Dust and particles	50,000
Ambient Noise	Sound level in dBA	Instrumentation	Nearest sensitive receptor (at least one upwind and one downwind of site)	Number of complaints from workers/third parties	75,000
Water-Usage	Quantity of water consumed in m^3	Water bills	m^3 of consumed water per month	-	Overhead cost
Waste	Non-hazardous and hazardous quantity, type, transportation method, disposal method, manifests	Receipt/records inspection	Office/administration.	Quantity of hazardous and non-hazardous waste generated.	Overhead cost
Wastewater (Effluent)	BoD, CoD, E. coli, Turbidity, Ammonia, oil, and grease	Laboratory	Effluent discharge point	Number of non-compliances	30,000
Staff Health and Safety	Inspection of all equipment and machines	Visual	Areas were equipment/machines are being used.	Number of incidents/near misses/injuries	Overhead cost

10.5.1. Training

In order to effectively implement the ESMP, the Project staff and their contractors (and subcontractors) are recommended to be trained in the relevant environmental and social management procedures during all phases of the proposed project. Finally, regular delivery of toolbox talks and inductions by project contractors during the two phases of the proposed project is encouraged.

10.6. DECOMMISSIONING PHASE

At the end of the life of the proposed facility, there is need for decommissioning and restoration of the site to a safe condition that minimizes potential residual environmental impact and permits re –instatement of activities. Decommissioning is however the strategic approach to deactivating a project or facility from service. The nature of a facility process(s), operational practices and waste management system employed during the facility's operation may result in contamination of the environmental media within and around the facility.

10.7. Potential Impacts

Prior to the decommissioning and rehabilitation activities, a decommissioning plan shall be developed and submitted to the NEMA for approval, as a part of the final decommissioning plan. This shall be done to cover proposed monitoring during and after the closure of the facility.

a) Air Quality Impact

The decommissioning work will inevitably lead to dust (TSP) emissions, mainly from excavation, filling activities, truck haulage, demolition, and material handling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e., soil, and the weather. With implementation of the proposed mitigation measures, dust suppression measures stipulated in the EMCA (Air Quality) Regulation 2014, good site practices and comprehensive dust monitoring and audit, the dust impact would be further managed.

Other Mitigation Measures

- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods,
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary, and
- All decommissioning related traffic will have speed restrictions on un-surfaced roads to 15-kph.

b) Noise and Vibration Impact

The operation of plant and machinery during decommissioning, including site vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures, which are the same as those proposed for the construction phase, to control noise include:

- Plant and machinery with low inherent potential for generation of noise and/or vibration will be used during demolition works,
- Regular maintenance of plant will be carried out in order to minimize noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers,
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works,
- Compressors will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools will be fitted with suitable silencers, and
- Machines, which are used intermittently, will be shut down during those periods when they are not in use.

c) Traffic Impacts

A Traffic Management Plan will be prepared in advance of any decommissioning works. The removal of fittings and foundation from site will be undertaken by a specialist contracted haulier. The traffic

management arrangements, although similar to those that will be implemented during construction as outlined in the report will be agreed in advance of decommissioning with Kiambu County traffic department and traffic department (Kenya Police).

d) Waste Management

A Waste Management Plan (WMP) which outlines the best practice procedures during the decommissioning will be developed. The Waste Management Plan (WMP) will outline the methods of waste prevention and minimization by recycling, recovery, and reuse at each stage of decommissioning. Disposal of waste will be a last resort. The relevant components of the facility will be removed from site for re-use, recycling, or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner as per the provision of the Environmental Management and Coordination Act (Waste Regulation) 2006.

a) Non-hazardous Waste

Based on waste management principles, non-hazardous wastes shall be managed through the following options:

- Re-use of equipment or parts at different similar facilities; and
- Recycling of unserviceable equipment and uncontaminated or non-hazardous demolition wastes as scrap.

b) Hazardous/Scheduled Waste

Hazardous/Scheduled waste shall be managed in accordance with the waste management principle and relevant environmental regulations EMCA (Waste Regulation) 2006.

10.8. Implementation

c) Roles and Responsibilities

Prior to the commencement of the decommissioning, a Decommissioning Waste Manager will be appointed by the Contractor. The Decommissioning Waste Manager will oversee the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorizations and that the waste management hierarchy is adhered to. The person nominated will have sufficient authority so that they can ensure everyone working on the decommissioning adheres to the management plan.

d) Training

It is important for the Decommissioning Waste Manager to communicate effectively with different sub-contractors in relation to the aims and objectives of the waste management plan. All employees working on site during the decommissioning phase of the project will be trained in materials management and thereby, will be able to:

- Distinguish reusable materials from those suitable for recycling,
- Ensure maximum segregation at source, and
- Separate materials for recovery.

e) Record Keeping

The Waste Management Plan (WMP) will provide systems that will enable all arisings, movements, and treatments of decommissioning waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated during the decommissioning phase. The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site.

Table 10-3: Decommissioning Phase ESMMP

Potential Negative Impact	Mitigation Measures	Responsibility	Performance indicator	Frequency	Estimated Cost
Air quality impact from dust and fugitive emissions from demolition machinery.	• Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods, • The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary, and • All decommissioning related traffic will have speed restrictions on un-surfaced roads to 15-kph. • The use of appropriate Personal Protective Equipment (PPE) such as dust masks, in particular, for the site workers.	Contractor	Site inspections records Issuance of PPE	Daily	1,200,000
Solid Waste Generation and Soil Contamination	• Demolition Waste should be stored separately and be periodically collected by an authorized treatment and storage facility; • All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels, and • Waste materials shall be disposed off at designated sites through licensed waste handlers.	Contractor	Weekly Records of Audits and Visual Inspection Licensed waste Collector Hired	Weekly	2,500,000
Noise Pollution	• Plant and machinery with low inherent potential for generation of noise and/or vibration will be used during demolition works, • Regular maintenance of plant will be carried out in order to minimize noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers, • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works, • Compressors will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools will be fitted with suitable silencers, and • Machines, which are used intermittently, will be shut down during those periods when they are not in use.	Contractor	Daily inspections of the vehicles and machinery Adherence to working hours	Daily	1,000,000

Potential Negative Impact	Mitigation Measures	Responsibility	Performance indicator	Frequency	Estimated Cost
Soil environment/ Compaction	• Vehicles will utilize the existing roads to access the site, • Enclose the demolition site and protect the soil to prevent the waste soils and other debris from being washed away by surface runoff and wind, • Any soil potentially contaminated by chemicals, oils, fuels to be collected and disposed of by a NEMA authorized waste handler.	Contractor	Weekly site inspections NEMA authorized waste handler hired	Weekly	500,000
Occupational Safety & Health	• All workers (regular and contracted) should be provided with training on Health and Safety management system of the contractor during decommissioning stage, • Appropriate safety harnesses and lowering/raising tools should be used for working at heights, and • A safety or emergency management plan should be in place to account for natural disasters, accidents, and any emergency situations.	Contractor	Daily inspection of incident reporting forms	Daily	2,000,000
Traffic impacts	• Design and implement a traffic management plan that includes e.g. vetting or trucks and operators, refresher training, supervision protocol, disciplinary actions, driving guidelines, etc. • Regularly maintain Project vehicles and equipment as per the manufacturers' recommendations	Contractor	Driving for work policy Number of drivers trained Vehicle maintenance records	Quarterly	Internal Cost
Site Restoration	• Remove all debris, excess construction material, scraps, and other wastes, and • Restore the site by planting indigenous tree species.	Contractor/Proponent	On-Site monitoring	(weekly)	5,000,000

10.9. Contractual Obligation

In order to ensure that this ESMP and/or derivatives thereof are enforced and implemented, these documents must be given legal standing. This shall be achieved through incorporating the ESMP and/or derivative documents as an addendum to the contract documents for the Contractor and sub-contractors (if any) and specifying that the requirements of this ESMP and/or derivative documents apply and must be met. This will ensure that the obligations are clearly communicated to Contractors.

Chapter 11 CONCLUSIONS & RECOMMENDATIONS

11.1. Conclusion

The ESIA process has identified and assessed a range of potential impacts to the bio-physical and socio-economic environments. Where impacts have been identified, mitigation and enhancement measures for those impacts have been outlined in this ESIA. Most of the identified negative impacts are either of moderate or minor significance, even prior to the application of appropriate mitigation/management measures. Moreover, with proper implementation of the recommended mitigation/management measures, the significance of the potential or likely residual negative impacts looks set to be reduced to a minor or negligible level.

Given the medium potential for negative impacts and the high potential for significant positive benefits (both direct and indirect, particularly on the employment and improved healthcare services), the project is deemed to have a high level of environmental and social acceptability.

11.2. Recommendations

ESIA consultant (Earthcare Services Limited) is confident that every effort will be made by the Proponent to accommodate the mitigation measures recommended during the assessment process without compromising the economic viability of the project or risking a lasting negative impact on the environment and people. The implementation of mitigation measures detailed in Chapter 8 and listed in the ESMP (Chapter 9) will provide a basis for ensuring that the potential positive and negative impacts associated with the project are enhanced and mitigated respectively, to levels deemed adequate for the project.

All stakeholders engaged during the ESIA process affirmed the potential project benefits. They also noted the anticipated potential adverse/negative impacts that can be easily mitigated/managed through implementing an ESMP.

In summary, based on the assessment findings, there's no reason why the project should not be authorized, contingent on the mitigations and monitoring for potential environmental and socio- economic impacts as outlined and recommended in the ESMP.

Chapter 12 APPENDICES

NEMA Practising License

FORM 7 (r.15(2))

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NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/18756
Application Reference No: NEMA/EIA/EL/23806

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in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: 1/31/2023 Expiry Date: **12/31/2023**

Signature

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

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THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

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Director General
The National Environment Management Authority

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

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Issued Date: **1/12/2023** Expiry Date: **12/31/2023**

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NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/18711

Application Reference No: NEMA/EIA/EL/23814

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THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

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

License No : NEMA/EIA/ERPL/18369

Application Reference No: NEMA/EIA/EL/23831

M/S **OMOLO ELLY ORWE**
(individual or firm) of address
P.O Box 22433 - 00100 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Associate Expert** registration number **6507**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **1/12/2023** Expiry Date: **12/31/2023**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2015 Certified

Personal Identification

KENYA REVENUE AUTHORITY

www.kra.go.ke

PIN Certificate

For General Tax Questions
Contact KRA Call Centre
Tel: +254 (020) 4999 999
Cell: +254(0711)099 999
Email: callcentre@kra.go.ke

Certificate Date : 24/06/2015

Personal Identification Number
A002611998C

This is to certify that taxpayer shown herein has been registered with Kenya Revenue Authority

Taxpayer Information

Taxpayer Name	RUTH WANJIKU GAKUNJU
Email Address	RGAKUNJU@YAHOO.COM

Registered Address

L.R. Number :	**Building** EVERGREEN CENTER
Street/Road WESTLANDS	**City/Town :** NAIROBI CITY (WEST)
County : Nairobi	**District** Westlands District
Tax Area Westlands	**Station** South of Nairobi*
P. O. Box 74414	**Postal Code** 00100

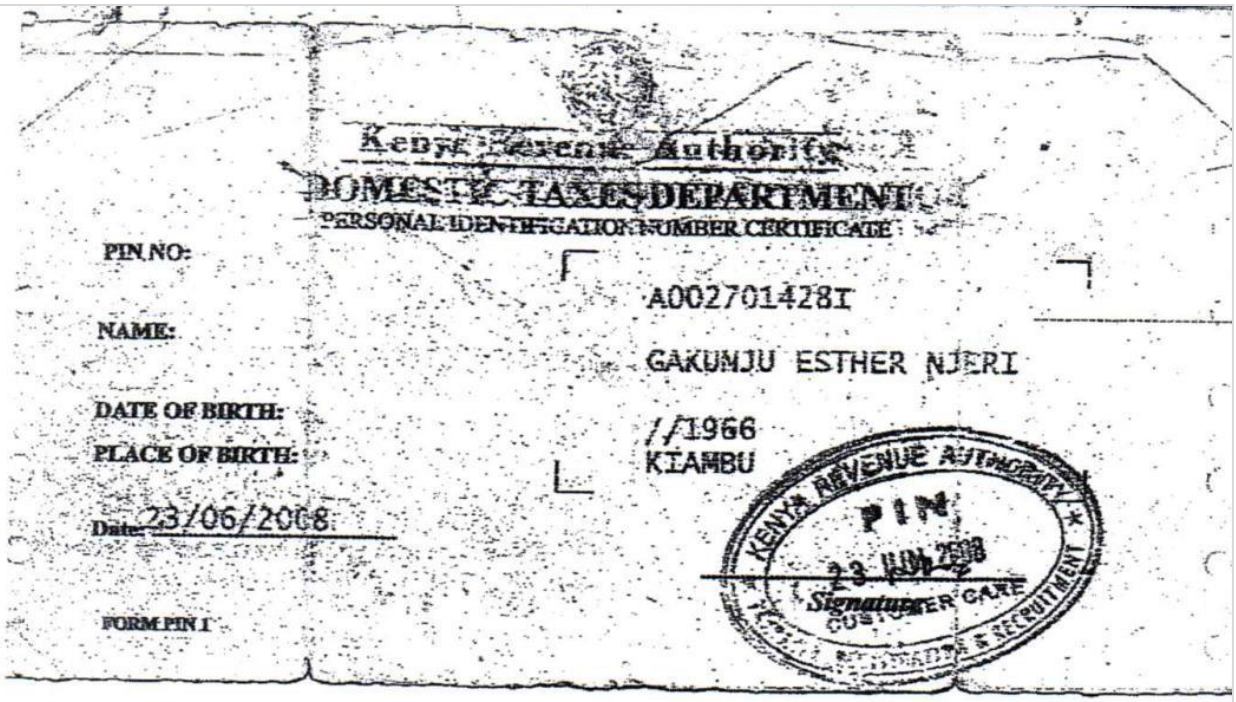
Tax Obligation(s) Registration

Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till	Status
1	Income Tax - Resident Individual	22/02/1999	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Kenya Revenue Authority. Your accounting end date is 31st December as per the provisions stated in the Income Tax Act unless a change has been approved by the Commissioner-Domestic Taxes Department.The status of Tax Obligation(s) with 'Dormant' status will automatically change to 'Active' on date mentioned in "Effective Till Date" or any transaction done during the period. This certificate

* The station is subject to change based on the verification done by Commissoner.

Disclaimer : This is a system generated certificate and does not require signature.



Kenya Revenue Authority

DOMESTIC TAXES DEPARTMENT

PERSONAL IDENTIFICATION NUMBER CERTIFICATE

PIN NO: A002701428I

NAME: GAKUNJU ESTHER NJERI

DATE OF BIRTH: /1966

PLACE OF BIRTH: KIAMBU

Date 23/06/2008

FORM PIN 1

KENYA REVENUE AUTHORITY PIN 23 JUN 2008 Signature CUSTOMER CARE & RECRUITMENT

CERTIFIED TRUE CO
OF THE ORIGINAL.
9/6/15

JAMES K. THUKU
P. O. Box 41546-00100
NAIROBI
ADVOCATE & COMMISSIONER FOR OATHS

KENYA REVENUE AUTHORITY

Taxpayer Registration Certificate

Document Number: 9084540

General Data of the Taxpayer

Name	PAUL NDIRITU NDUNGU		
Taxpayer PIN	A000116843I	**TaxPayer Category**	DOMESTIC
Registration Date	Jan 8, 1993		
Activity	Legal activities		

Contact Information

District	NAIROBI WEST	**City/Town**	NAIROBI CITY (WEST)
Street / Road	MAMA NGINA STREET	**Building**	INTERNATIONAL LIFE HOUSE
Area Name		**LR Number**	
P.O. Box	20 00100 - 41546		
Main Email Address	NNK@NNKADVOCATES.co.KE		

Tax Obligation

INCOME TAX INDIVIDUAL (IT1) — **Obligation Register Date** JAN 8, 1993

*This certificate is computer generated and therefore not signed. It is valid certificate issued under the authority of KRA.

CERTIFIED TRUE COPY
OF THE ORIGINAL.
9/6/15

JAMES K. THUKU
P. O. Box 41546-00100
NAIROBI
ADVOCATE & COMMISSIONER FOR OATHS


JAMHURI YA KENYA
REPUBLIC OF KENYA
SERIAL NUMBER : 240652715
ID NUMBER : 7347450
FULL NAMES
RUTH WANJIKU GAKUNJU
DATE OF BIRTH
28. 08. 1963
SEX
FEMALE
DISTRICT OF BIRTH
STAREHE
PLACE OF ISSUE
MUNICIPALITY
DATE OF ISSUE
23. 10. 2015
HOLDER'S SIGN.


DISTRICT
GATUNDU SOUTH
DIVISION
NGENDA
LOCATION
NGENDA
SUB-LOCATION
GATHAGE
PRINCIPAL REGISTRAR'S SIGN.
T0210485693
IDKYA2406527152<<22B1<<<<<2211
6308281F1510232<B007347450C<<4
RUTH<WANJIKU<GAKUNJU<<<<<<<<<<

JAMHURI YA KENYA

REPUBLIC OF KENYA

SERIAL NUMBER: 210509266

ID NUMBER: 7030306

FULL NAMES

ESTHER NJERI GAKUNJU

DATE OF BIRTH

1966

SEX

FEMALE

DISTRICT OF BIRTH

KIAMBU

PLACE OF ISSUE

KIAMBAA

DATE OF ISSUE

12.02.1997

HOLDER'S SIGN

DISTRICT

THIKA

DIVISION

GATUNDU

LOCATION

NGENDA

SUB-LOCATION

GATITU

N. B0070303O6Y

SIGNATURE OF REGISTRATION OFFICER

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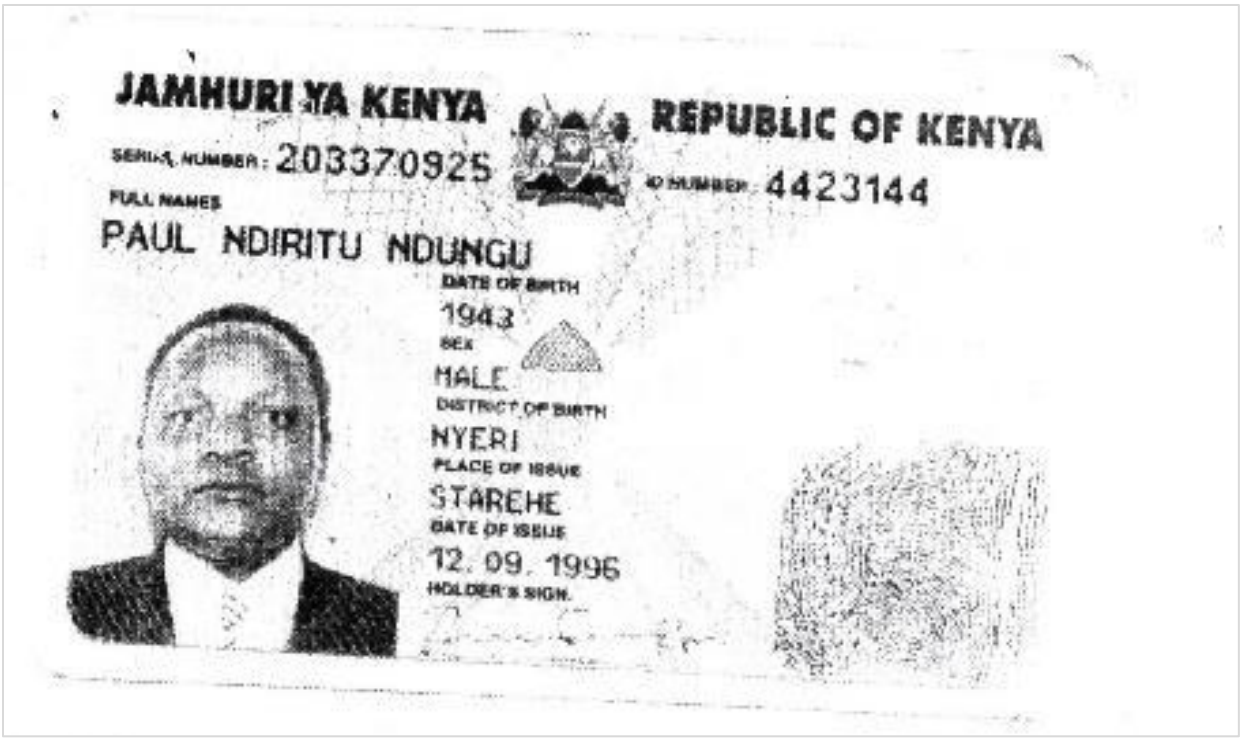
6600000F9702123<B0070306Y<<6

ESTHER<NJERI<GAKUNJU<<<<<<<<<<



JAMHURI YA KENYA

REPUBLIC OF KENYA

SERIAL NUMBER: 203370925

ID NUMBER 4423144

FULL NAMES

PAUL NDIRITU NDUNGU

DATE OF BIRTH

1943

SEX

MALE

DISTRICT OF BIRTH

NYERI

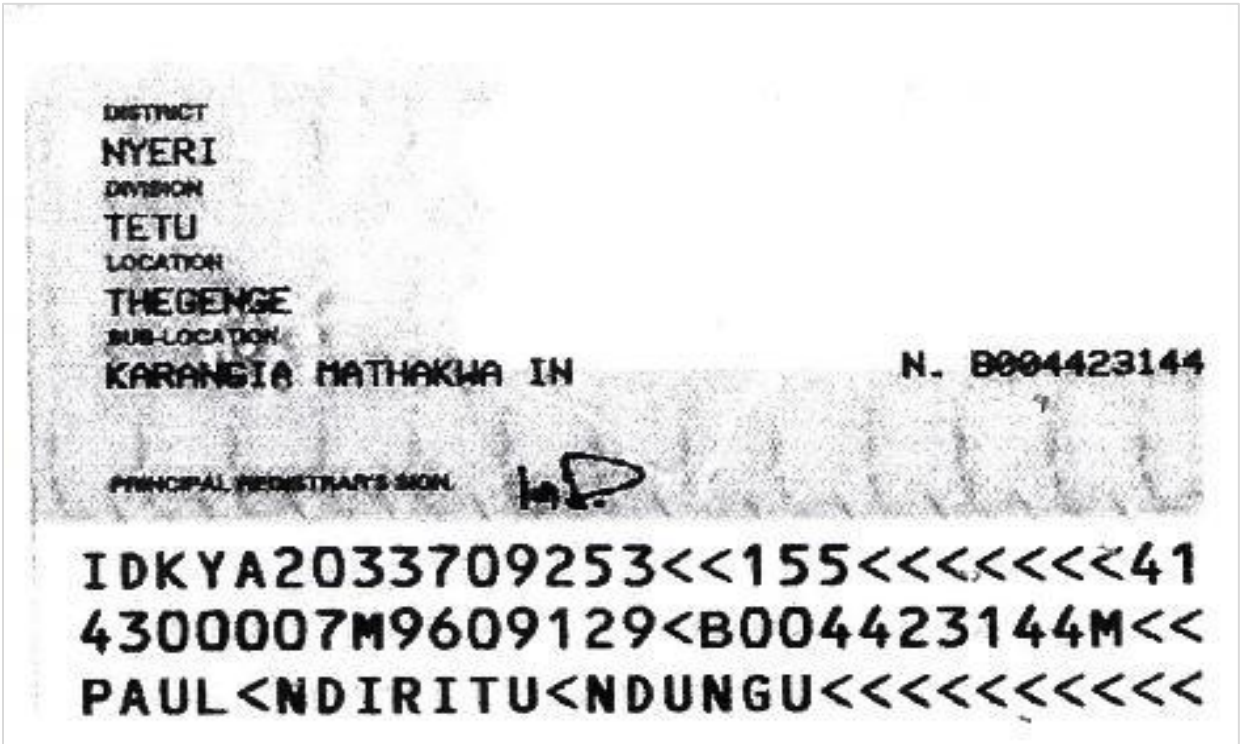
PLACE OF ISSUE

STAREHE

DATE OF ISSUE

12.09.1996

HOLDER'S SIGN.



DISTRICT

NYERI

DIVISION

TETU

LOCATION

THEGENGE

SUB-LOCATION

KARANGIA MATHAKWA IN

N. B004423144

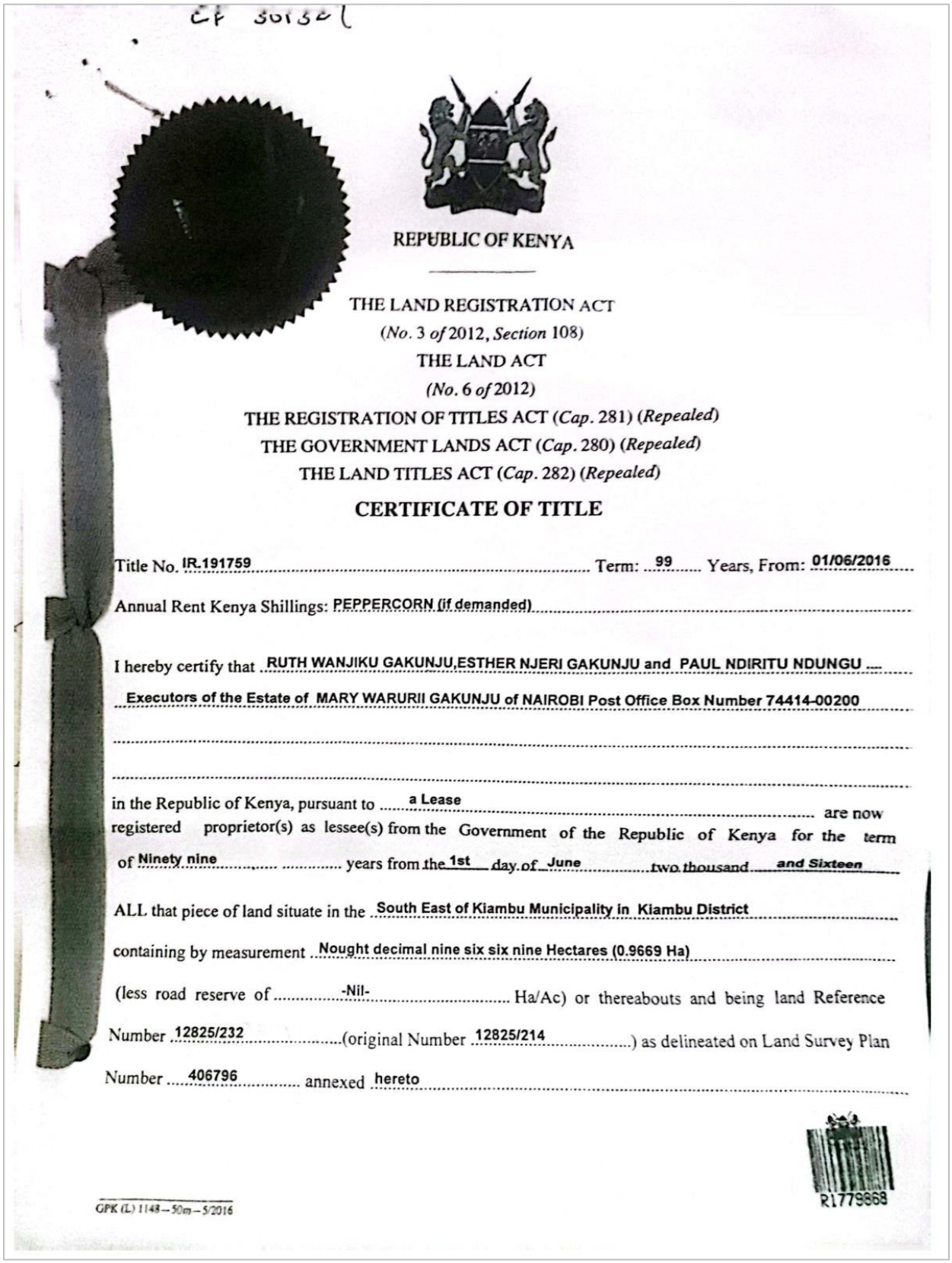
PRINCIPAL REGISTRAR'S SIGN.

IDKYA2033709253<<155<<<<<<<41

4300007M9609129<B004423144M<<

PAUL<NDIRITU<NDUNGU<<<<<<<<<<

Land Documents



Cf 30132

REPUBLIC OF KENYA

THE LAND REGISTRATION ACT
(*No.* 3 *of* 2012, *Section* 108)
THE LAND ACT
(*No.* 6 *of* 2012)
THE REGISTRATION OF TITLES ACT (*Cap.* 281) (*Repealed*)
THE GOVERNMENT LANDS ACT (*Cap.* 280) (*Repealed*)
THE LAND TITLES ACT (*Cap.* 282) (*Repealed*)

CERTIFICATE OF TITLE

Title No. IR.191759 Term: 99 Years, From: 01/06/2016

Annual Rent Kenya Shillings: PEPPERCORN (if demanded)

I hereby certify that RUTH WANJIKU GAKUNJU,ESTHER NJERI GAKUNJU and PAUL NDIRITU NDUNGU ....
Executors of the Estate of MARY WARURII GAKUNJU of NAIROBI Post Office Box Number 74414-00200

in the Republic of Kenya, pursuant to a Lease are now registered proprietor(s) as lessee(s) from the Government of the Republic of Kenya for the term of Ninety nine years from the 1st day of June two thousand and Sixteen

ALL that piece of land situate in the South East of Kiambu Municipality in Kiambu District

containing by measurement Nought decimal nine six six nine Hectares (0.9669 Ha)

(less road reserve of -Nil- Ha/Ac) or thereabouts and being land Reference Number 12825/232 (original Number 12825/214) as delineated on Land Survey Plan Number 406796 annexed hereto

R1779868

GPK (L) 1148—50m—5/2016

SUBJECT however to the revisable annual rent of shillings PEPPERCORN (if demanded) ..... and to the Act(s) special conditions, Encumbrances and other matters specified in the Memorandum hereunder written.

IN WITNESS whereof I have hereunto set my hand and seal this 18th day of December Two Thousand and Seventeen

Registrar of Titles

P. K. Tonui *250

MEMORANDUM

1. The Land Registration Act, *No. 3 of* 2012
2. The Land Act *No. 6 of* 2012
3. The Special conditions contained in Lease No IR.191759/1
4. The Government Land Act *(Cap. 280) (Repealed)*
5. The Registration of Titles Act *(Cap. 281) (Repealed)*
6. The Land Titles Act *(Cap. 282) (Repealed)*

LAND TITLES REGISTRY – NAIROBI REGISTRY
REGISTRATION OF TITLE ACT
REGISTERED AS No. LR 191759/1
PRESENTED 18th December 2017
TIME 1000 Hrs ③ *Registrar of Titles*

P. K. Tonui *250

I hereby certify this to be a true copy of the Original
① stamp duty Nil
Copying A/c Nil
shs.....
Date: 12-05-2023

REGISTRAR OF TITLES
A. W. Karimi *250

CHANGE OF DEED

REPUBLIC OF KENYA

DISTRICT OF KIAMBU

Locality South East of Kiambu Municipality

Reference Map Sath A 27

Land Reference No 12825/232

(Orig No 12825/214)

Sub division No (Orig No

of section No

Area = 0.9889 HA (APPROX)

Bearings	Distance Metres

N

K-2013/4

W. N. Mbugua
Licensed Surveyor

F.R. No. 423/24

COMPS NO C 8928

Traced by

Compared by

VERIFIED
Serial No: 17/10/1991
Verified By:
For Director of Surveys
9TH OCTOBER 2017.

Scale 1 in 2500

P.F NJOROGE
for Director of Surveys

Nairobi 26TH AUGUST 2016

DEED PLAN No. 406796

S1779867

Approved Change of Use

FORM PLUPA/DC/8(r.8(3)(i))

№ 002111

COUNTY GOVERNMENT OF KIAMBU

LAND, HOUSING & PHYSICAL PLANNING SECTOR
THE PHYSICAL AND LAND USE PLANNING ACT (No. 13 of 2019)

NOTIFICATION OF APPROVAL/REFUSAL/DEFERMENT OF APPLICATION (PLANNING)

Registered Number of Application ...KBU/2023/091/Cou/144...

To...Ruth Wanjiku Gakunju Esther Njeri & Paul Mburu...

Through Registered Planner ...Plan. Eric K. Mumbi... Reg no. 0191...

Your application number as above, submitted on...14/9/2023...

For permission to ...Change of use from Residential to Public Purpose (Hospital)...

L.R. Parcel No...12.825/232..... With co-ordinates ...0.9665 ha...

Situated in...Evergreen... Road/Street ...Kiambu road...

Has been ...Approved... by the County Executive Committee Member through

technical meeting held on (date) ...18/10/2023... vide minute number CPTC/098/2023/286

for the following reasons/subject to the following conditions:

(a).....

(b).....

(c).....

(d).....

Name ...Hannah Maranga...

Signed ..... Date ...15/11/2023...

County Director of Physical Planning.....

c.c.

The National Land Commission, Nairobi.
The Land Registrar.
The City/Municipal/Town Manager.
The Director-General-Physical and Land Use Planning, Nairobi.
The Director of Surveys, Nairobi.

COUNTY DIRECTOR OF PHYSICAL PLANNING
15 NOV 2023
KIAMBU COUNTY

FORM PLUPA/DC/8(r.8(3)(i))

Conditions of approval

I.	Submission of satisfactory buildings plans and commencement of building works within three years otherwise this approval lapses
II.	Submission of civil engineering drawings for approval by the county engineer
III.	Reservation of 10% of the land for public amenities (excluding road reserves)
IV.	Undertaking an EIA and obtain NEMA Licęnse before commencement of any works
V.	Compliance with WRA guidelines on appropriate River Riparian Reserve
VI.	Payment of revised rates as will be determined by the County Director of Land Valuation
VII.	Submission of a traffic study report
VIII.	Subject to the land not constituting part of the disputed public/private utility land/allocations
IX.	Compliance with sections 55 of the physical and land use planning act of 2019
X.	Subject to Compliance with County Spatial Plan Zoning Guidelines
XI.	Subject to provisions of appropriate setback(s) as per zoning the plan
XII.	Subject to provisions of adequate and functional onsite parking to the satisfaction of the County Government of Kiambu.
XIII.	PPA 2 Valid for three years
XIV.	The Land and building shall be used for Public purpose (Hospital) purposes only, excluding sale or storage of alcohol.
XV.	Observe ……6……Meters building line
XVI.	Observe maximum of ……6…… Stories (ground plus ……5……)
XVII	Observe …….m frontages for lounge windows, …….m frontages for bedroom and ……m for kitchen and washroom windows.
XVIII	Observe …50.% ground coverage and …3….plot ratio
XIX.	Subject to surrender of……m along the ……..m road(s) for road expansion
XX.	Subject to compliance with KENHA requirements
XXI.	Subject to compliance with WRA requirements
XXII	Subject to approval by NLC
XXIII.	Subject to approval by……

BOQ and Architectural Desing Plan

RLB Rider Levett Bucknall

THIS IS AN ORDER OF MAGNITUDE ESTIMATE OF CONSTRUCTION COST BASED ON PRELIMINARY INFORMATION AND ASSUMPTIONS AND IS SUBJECT TO REFINEMENT AS THE DESIGN, SPECIFICATIONS AND PROGRAMME ARE FURTHER DEVELOPED

Rider Levett Bucknall (SSA) Ltd
90, St Jean Road
Quatre Bornes
Mauritius 72218
T: +230 467 7000
Co. No: 152596 C1/GBL

PROJECT : SUPER-SPECIALTY HOSPITAL

LOCATION : NAIROBI, KENYA

P20135/A1/N12R2

INDICATIVE DEVELOPMENT COST : NUMBER 12 REVISION 2
SUMMARY

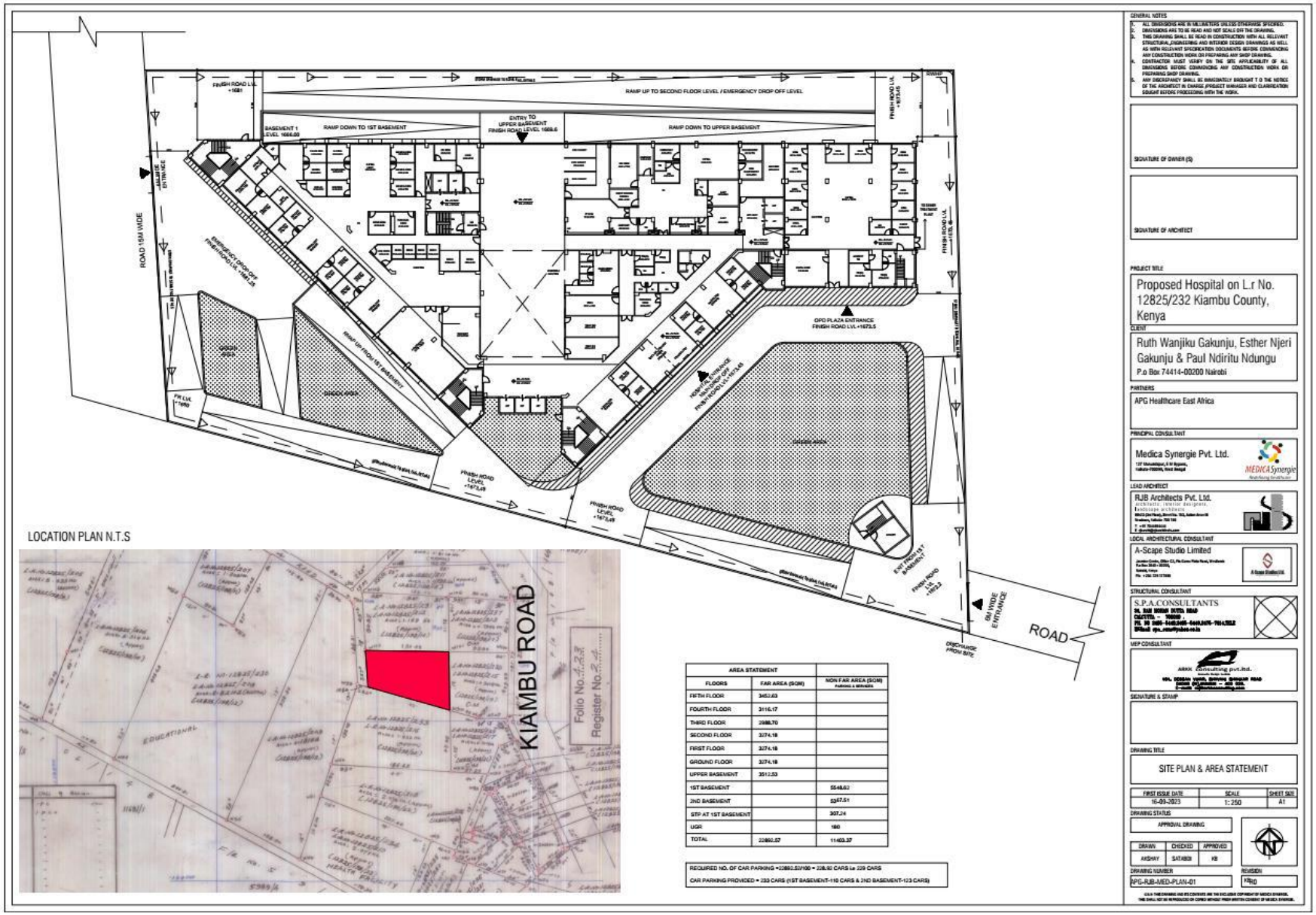
	BASEMENT	EXTERNAL WORKS	TOP STRUCTURE	TOTAL
GROSS EXTERNAL AREA (GEA)	16 951 m²	N/A	16 756 m²	33 707 m²
BEDS	N/A	N/A	300 no	300 no
GEA PER BED	57 m²	N/A	56 m²	112 m²
COVERED PARKING	318 bays			318 bays
OPEN PARKING		61 bays		61 bays
TOTAL PARKING	318 bays	61 bays		379 bays
GEA PER PARKING BAY	42 m²	N/A		42 m²
PARKING RATIO				1,26 bays per bed
SITE AREA				11 236 m²

	ELEMENT / ITEM		% OF CONST COST	% OF DEV COST	BASEMENT US$	EXTERNAL WORKS & COMMON SERVICES US$	TOP STRUCTURE US$	TOTAL US$
1	SHELL & CORE	295 /m²	22%	14%	3 897 900	-	6 052 300	9 950 200
2	FIT-OUT	228 /m²	17%	11%	1 067 900	-	6 615 300	7 683 200
3	MEPF	674 /m²	51%	33%	5 536 400	-	17 191 700	22 728 100
4	EXTERNAL WORKS	74 /m²	6%	4%	-	2 488 900	-	2 488 900
5	PRELIMINARIES & GENERAL	64 /m²	5%	3%	525 100	124 400	1 493 000	2 142 500
ESTIMATED CURRENT CONSTRUCTION COST			100%		11 027 300	2 613 300	31 352 300	44 992 900

ANNEXURE

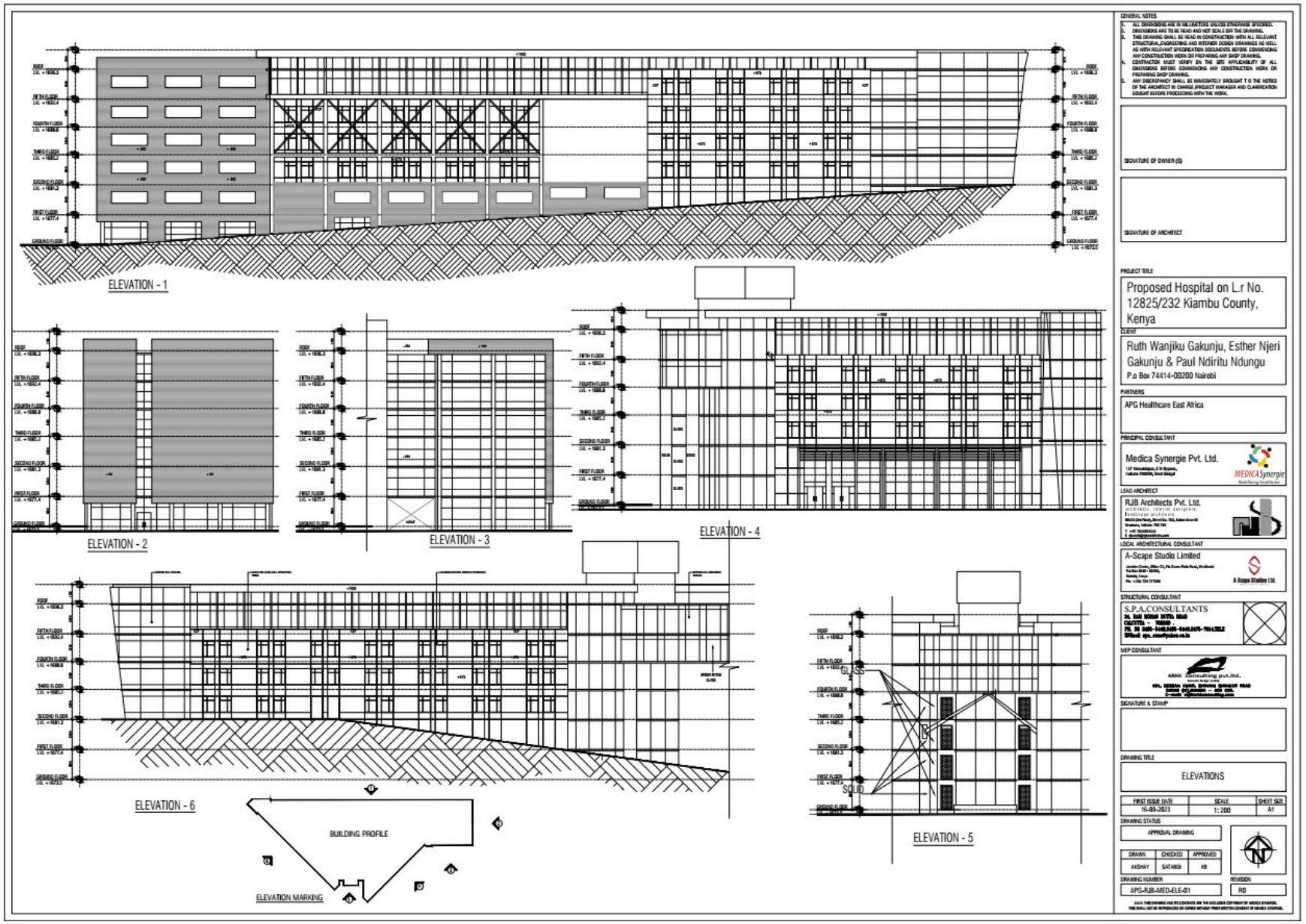
DEVELOPMENT COST BREAKDOWN

	ELEMENT / ITEM				BASEMENT	EXTERNAL WORKS & COMMON SERVICES	TOP STRUCTURE	TOTAL (US$)
A1 : BUILDING WORKS:								
SHELL & CORE		33 707	m² @	295				
1	Basement	16 951	m² @	230	3 897 900			3 897 900
2	Top structure	16 756	m² @	361			6 052 300	6 052 300
FIT-OUT		33 707	m² @	228				
3	Basement	16 951	m² @	63	1 067 900			1 067 900
4	Top structure	16 756	m² @	395			6 615 300	6 615 300
				SUB TOTAL A 1	4 965 800	-	12 667 600	17 633 400
A2 : SERVICES INSTALLATIONS:								
MEPF		33 707	m² @	674				
5	Basement - parking	13 441	m² @	144	1 935 600			1 935 600
6	Basement - hospital	3 510	m² @	1 026	3 600 800			3 600 800
7	Top structure	16 756	m² @	1 026			17 191 700	17 191 700
				SUB TOTAL A 2	5 536 400	-	17 191 700	22 728 100
				SUB TOTAL A (A1 + A2)	10 502 200	-	29 859 300	40 361 500
B : EXTERNAL WORKS:		33 707	m² @	74				
8	Site works	11 236	m² @	7		73 000		73 000
9	Cut to fill allowance	11 236	m³ @	15		168 500		168 500
10	Bulk earthworks (excavations, filling, etc.)	72 682	m³ @	15		1 090 200		1 090 200
11	Roads, parking, walkways, etc.	5 515	m² @	40		220 600		220 600
12	Perimeter fencing	395	m @	250		98 800		98 800
13	External lighting	5 515	m² @	15		82 700		82 700
14	External civil services		Item	200 000		200 000		200 000
15	Landscaping		Item	100 000		100 000		100 000
16	Covered parking bays	31	no @	1 200		36 600		36 600
17	Signage	33 707	m² @	5		168 500		168 500
18	Ancillary buildings		Item	250 000		250 000		250 000
				SUB TOTAL B	-	2 488 900	-	2 488 900
				TOTAL (A + B)	10 502 200	2 488 900	29 859 300	42 850 400
C: PRELIMINARY AND GENERAL ITEMS:		33 707	m² @	64				
19	Main contractors' P & G Items	5,00%	on	42 850 400	525 100	124 400	1 493 000	2 142 500
				SUB TOTAL C	525 100	124 400	1 493 000	2 142 500
PRINCIPAL CONTRACT				TOTAL (A + B + C)	11 027 300	2 613 300	31 352 300	44 992 900



AREA STATEMENT		
FLOORS	FAR AREA (SQM)	NON FAR AREA (SQM)
FIFTH FLOOR	3452.63	
FOURTH FLOOR	3116.17	
THIRD FLOOR	2988.70	
SECOND FLOOR	3274.18	
FIRST FLOOR	3274.18	
GROUND FLOOR	3274.18	
UPPER BASEMENT	3512.53	
1ST BASEMENT		5548.62
2ND BASEMENT		5347.51
STP AT 1ST BASEMENT		307.24
UGR		180
TOTAL	22992.57	11403.37

REQUIRED NO. OF CAR PARKING = 22992.57/100 = 229.92 CARS i.e 229 CARS
CAR PARKING PROVIDED = 233 CARS (1ST BASEMENT-110 CARS & 2ND BASEMENT-123 CARS)


ELEVATION - 1
ELEVATION - 2
ELEVATION - 3
ELEVATION - 4
ELEVATION - 5
ELEVATION - 6
BUILDING PROFILE
ELEVATION MARKING
GENERAL NOTES
SIGNATURE OF OWNER (S)
SIGNATURE OF ARCHITECT
PROJECT TITLE
Proposed Hospital on L.r No. 12825/232 Kiambu County, Kenya
CLIENT
Ruth Wanjiku Gakunju, Esther Njeri Gakunju & Paul Ndiritu Ndungu
P.o Box 74414-00200 Nairobi
PARTNERS
APG Healthcare East Africa
PRINCIPAL CONSULTANT
Medica Synergie Pvt. Ltd.
LEAD ARCHITECT
RJB Architects Pvt. Ltd.
LOCAL ARCHITECTURAL CONSULTANT
A-Scape Studio Limited
STRUCTURAL CONSULTANT
S.P.A.CONSULTANTS
MEP CONSULTANT
SIGNATURE & STAMP
DRAWING TITLE
ELEVATIONS
FIRST ISSUE DATE
16-03-2023
SCALE
1: 200
SHEET SIZE
A1
DRAWING STATUS
APPROVAL DRAWING
DRAWN
AKSHAY
CHECKED
SATHISH
APPROVED
KB
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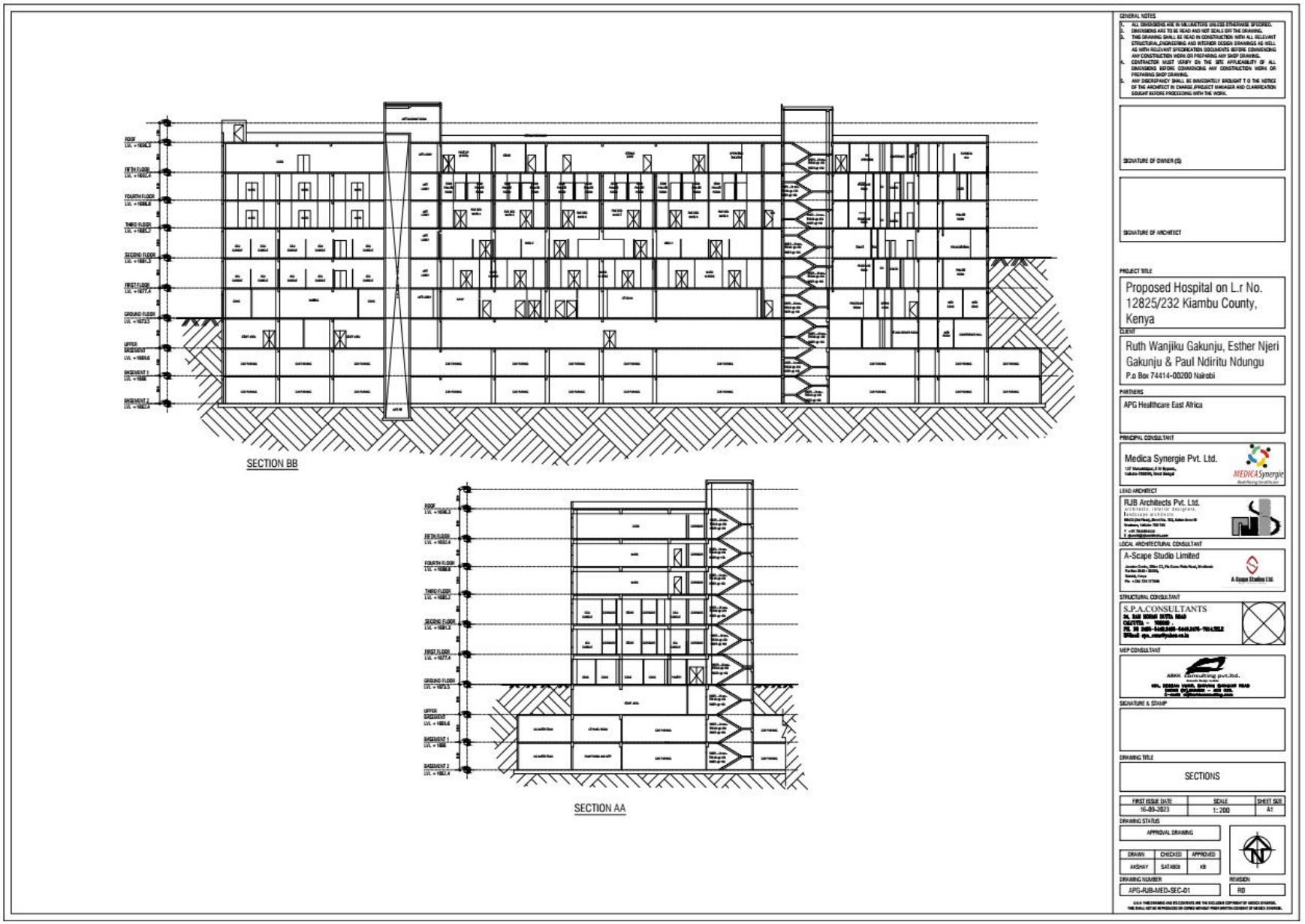
APG-RJB-MED-ELE-01
REVISION
R0


SECTION BB
SECTION AA
GENERAL NOTES
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Ruth Wanjiku Gakunju, Esther Njeri Gakunju & Paul Ndiritu Ndungu
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SECTIONS
FIRST ISSUE DATE
16-03-2023
SCALE
1: 200
SHEET SIZE
A1
DRAWING STATUS
APPROVAL DRAWING
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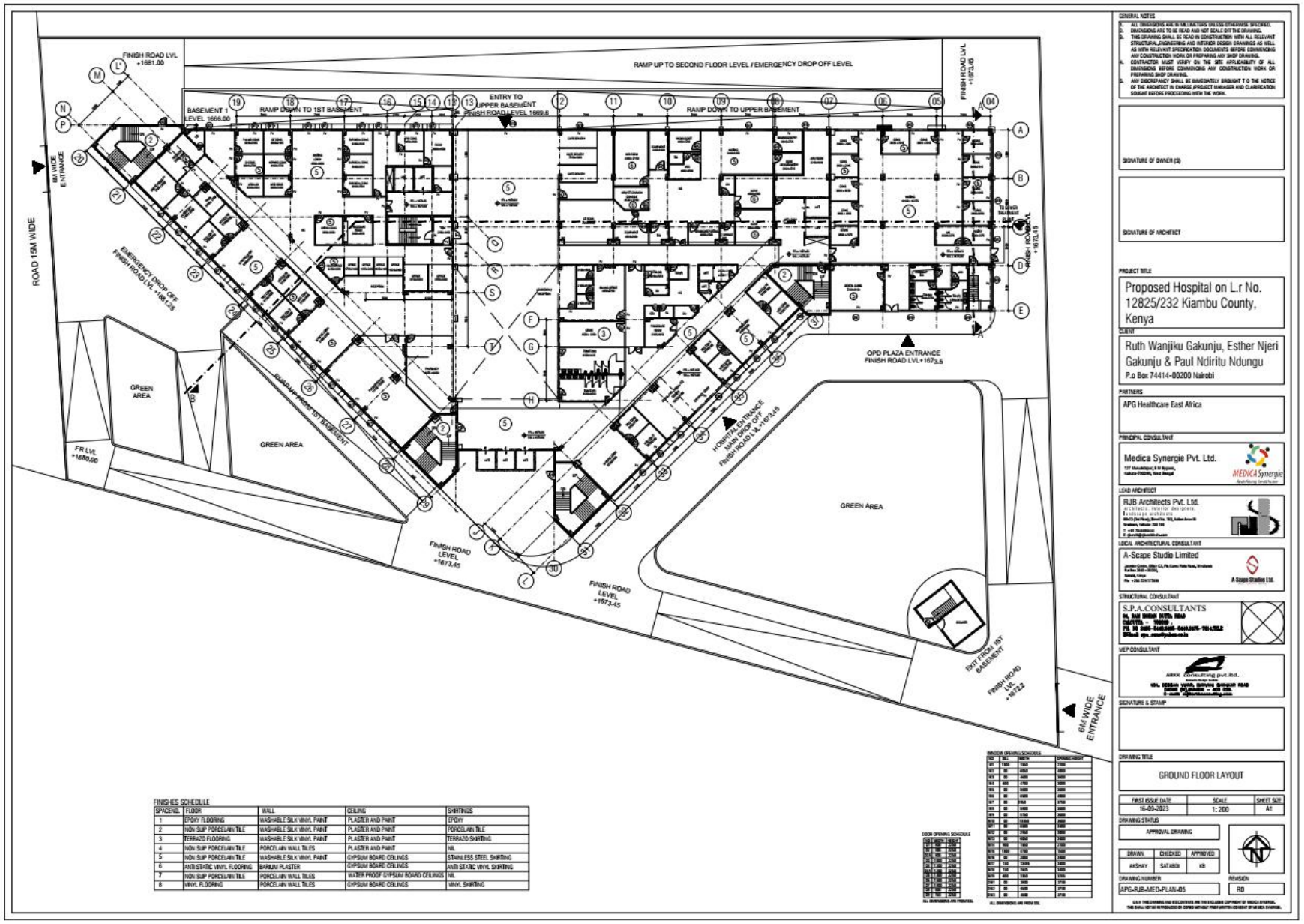
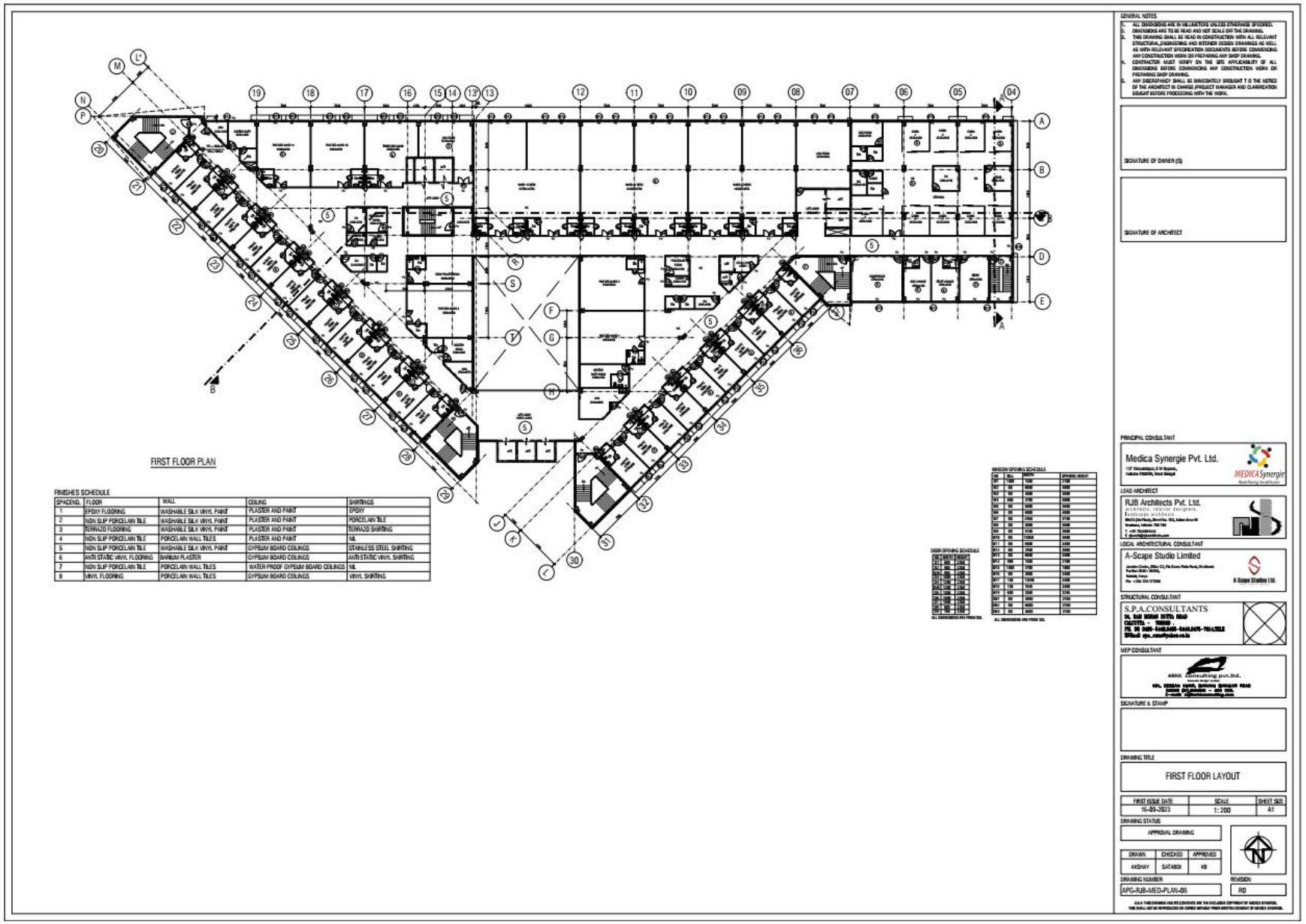
AKSHAY
CHECKED
SATHISH
APPROVED
KB
DRAWING NUMBER
APG-RJB-MED-SEC-01
REVISION
R0

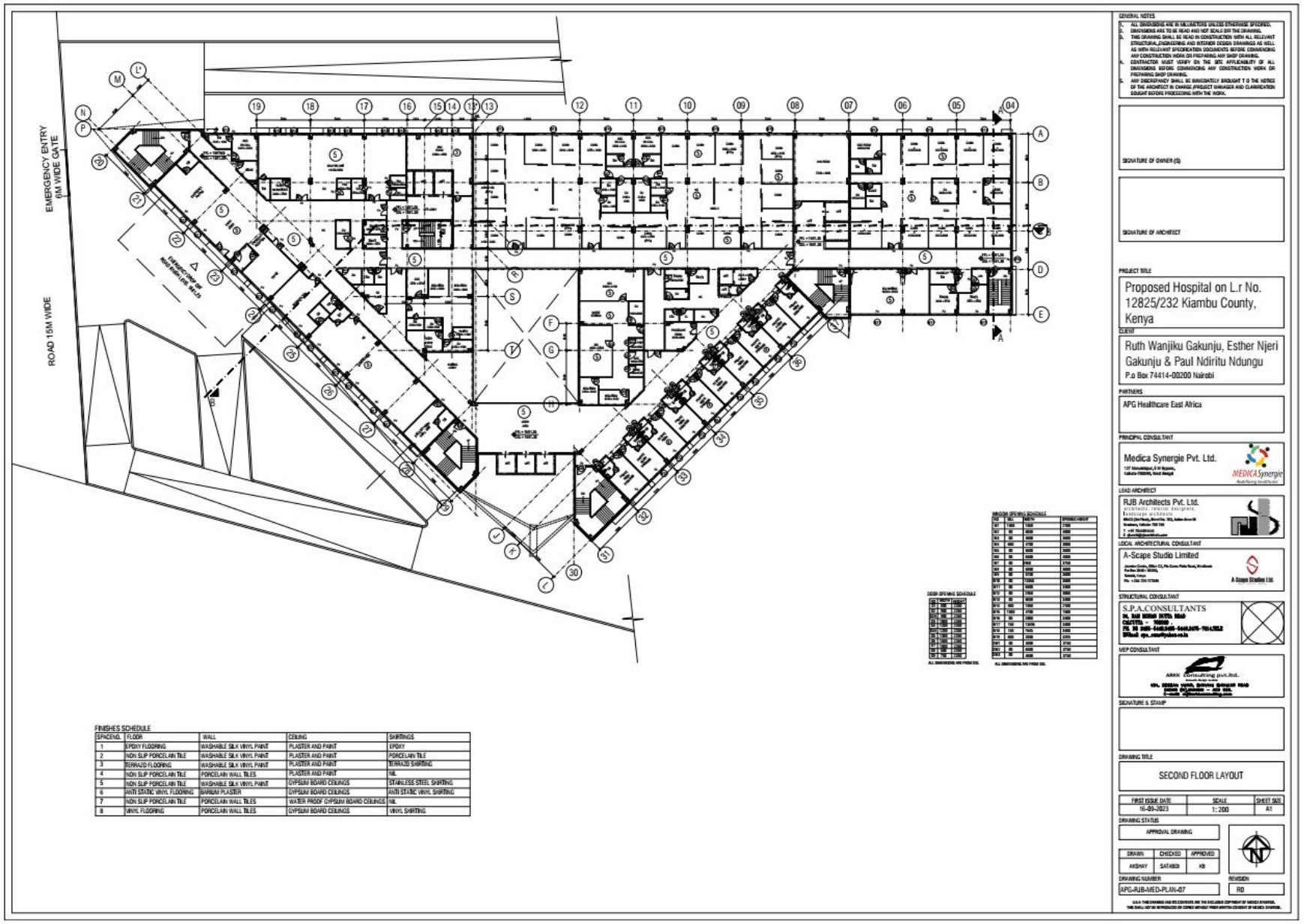


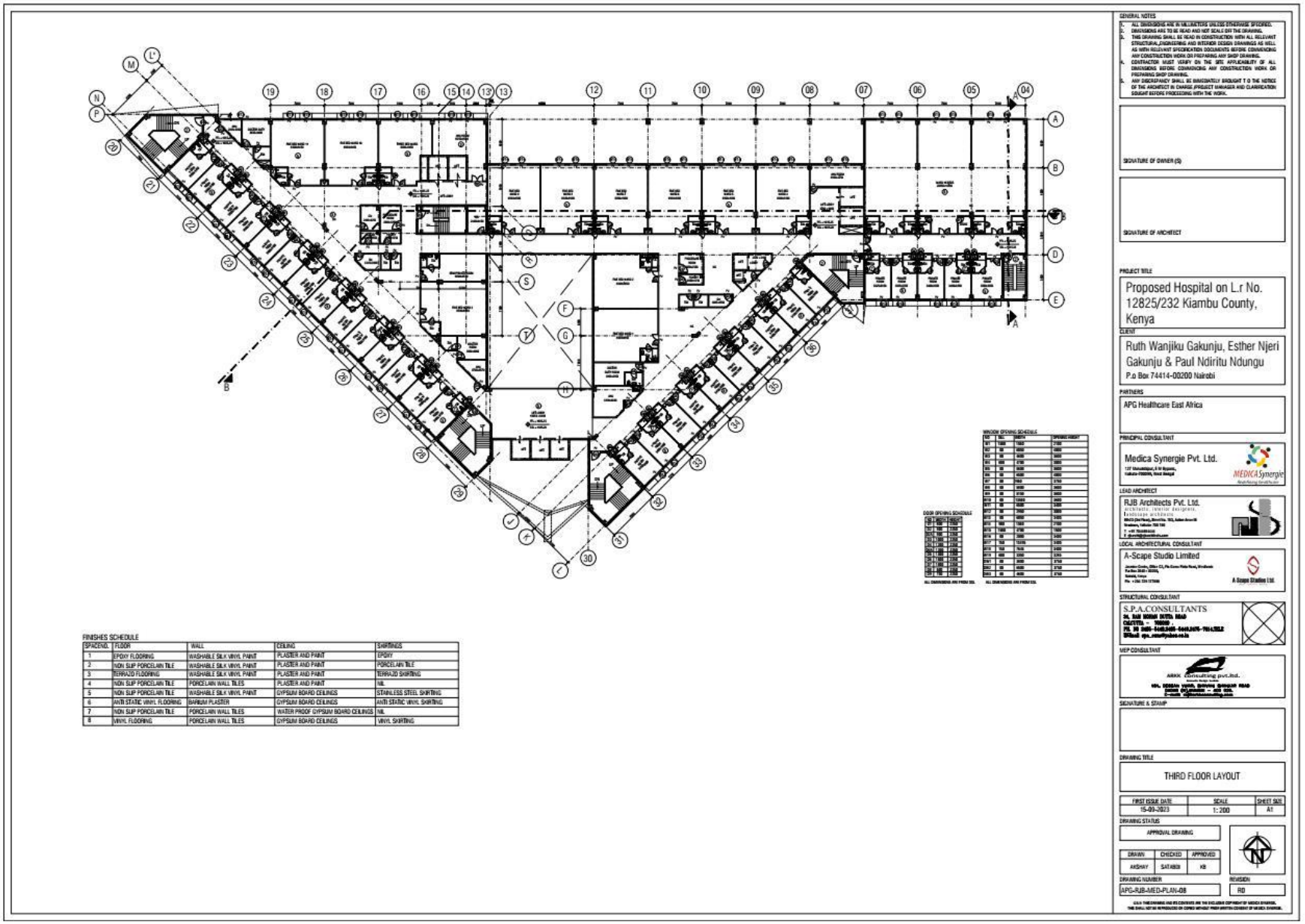
FINISHES SCHEDULE

SPACENO.	FLOOR	WALL	CEILING	SKIRTINGS
1	EPOXY FLOORING	WASHABLE SILK VINYL PAINT	PLASTER AND PAINT	EPOXY
2	NON SLIP PORCELAIN TILE	WASHABLE SILK VINYL PAINT	PLASTER AND PAINT	PORCELAIN TILE
3	TERRAZO FLOORING	WASHABLE SILK VINYL PAINT	PLASTER AND PAINT	TERRAZO SKIRTING
4	NON SLIP PORCELAIN TILE	PORCELAIN WALL TILES	PLASTER AND PAINT	NIL
5	NON SLIP PORCELAIN TILE	WASHABLE SILK VINYL PAINT	GYPSUM BOARD CEILINGS	STAINLESS STEEL SKIRTING
6	ANTI STATIC VINYL FLOORING	BARIUM PLASTER	GYPSUM BOARD CEILINGS	ANTI STATIC VINYL SKIRTING
7	NON SLIP PORCELAIN TILE	PORCELAIN WALL TILES	WATER PROOF GYPSUM BOARD CEILINGS	NIL
8	VINYL FLOORING	PORCELAIN WALL TILES	GYPSUM BOARD CEILINGS	VINYL SKIRTING



SPACEND.	FLOOR	WALL	CEILING	SKIRTINGS
1	EPOXY FLOORING	WASHABLE SILK VINYL PAINT	PLASTER AND PAINT	EPOXY
2	NON SLIP PORCELAIN TILE	WASHABLE SILK VINYL PAINT	PLASTER AND PAINT	PORCELAIN TILE
3	TERRAZO FLOORING	WASHABLE SILK VINYL PAINT	PLASTER AND PAINT	TERRAZO SKIRTING
4	NON SLIP PORCELAIN TILE	PORCELAIN WALL TILES	PLASTER AND PAINT	NIL
5	NON SLIP PORCELAIN TILE	WASHABLE SILK VINYL PAINT	GYPSUM BOARD CEILINGS	STAINLESS STEEL SKIRTING
6	ANTI STATIC VINYL FLOORING	BARIUM PLASTER	GYPSUM BOARD CEILINGS	ANTI STATIC VINYL SKIRTING
7	NON SLIP PORCELAIN TILE	PORCELAIN WALL TILES	WATER PROOF GYPSUM BOARD CEILINGS	NIL
8	VINYL FLOORING	PORCELAIN WALL TILES	GYPSUM BOARD CEILINGS	VINYL SKIRTING


EMERGENCY ENTRY
6M WIDE GATE
ROAD 15M WIDE
GENERAL NOTES
SIGNATURE OF OWNER (S)
SIGNATURE OF ARCHITECT
PROJECT TITLE
Proposed Hospital on L.r No. 12825/232 Kiambu County, Kenya
CLIENT
Ruth Wanjiku Gakunju, Esther Njeri Gakunju & Paul Ndiritu Ndungu
P.o Box 74414-00200 Nairobi
PARTNERS
APG Healthcare East Africa
PRINCIPAL CONSULTANT
Medica Synergie Pvt. Ltd.
LEAD ARCHITECT
RJB Architects Pvt. Ltd.
LOCAL ARCHITECTURAL CONSULTANT
A-Scape Studio Limited
STRUCTURAL CONSULTANT
S.P.A.CONSULTANTS
MEP CONSULTANT
SIGNATURE & STAMP
DRAWING TITLE
SECOND FLOOR LAYOUT
FIRST ISSUE DATE
16-09-2023
SCALE
1: 200
SHEET SIZE
A1
DRAWING STATUS
APPROVAL DRAWING
DRAWN
AKSHAY
CHECKED
SATHISH
APPROVED
KB
DRAWING NUMBER
APG-RJB-MED-PLAN-07
REVISION
R0
DOOR OPENING SCHEDULE
FINISHES SCHEDULE
SPACENO.
FLOOR
WALL
CEILING
SKIRTINGS
1
EPOXY FLOORING
WASHABLE SILK VINYL PAINT
PLASTER AND PAINT
EPOXY
2
NON SLIP PORCELAIN TILE
WASHABLE SILK VINYL PAINT
PLASTER AND PAINT
PORCELAIN TILE
3
TERRAZO FLOORING
WASHABLE SILK VINYL PAINT
PLASTER AND PAINT
TERRAZO SKIRTING
4
NON SLIP PORCELAIN TILE
PORCELAIN WALL TILES
PLASTER AND PAINT
NIL
5
NON SLIP PORCELAIN TILE
WASHABLE SILK VINYL PAINT
GYPSUM BOARD CEILINGS
STAINLESS STEEL SKIRTING
6
ANTI STATIC VINYL FLOORING
BARIUM PLASTER
GYPSUM BOARD CEILINGS
ANTI STATIC VINYL SKIRTING
7
NON SLIP PORCELAIN TILE
PORCELAIN WALL TILES
WATER PROOF GYPSUM BOARD CEILINGS
NIL
8
VINYL FLOORING
PORCELAIN WALL TILES
GYPSUM BOARD CEILINGS
VINYL SKIRTING


GENERAL NOTES
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
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5. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT T O THE NOTICE OF THE ARCHITECT IN CHARGE (PROJECT MANAGER AND CLAIMS) BEFORE PROCEEDING WITH THE WORK.
SIGNATURE OF OWNER (S)
SIGNATURE OF ARCHITECT
PROJECT TITLE
Proposed Hospital on L.r No. 12825/232 Kiambu County, Kenya
CLIENT
Ruth Wanjiku Gakunju, Esther Njeri Gakunju & Paul Ndiritu Ndungu
P.o Box 74414-00200 Nairobi
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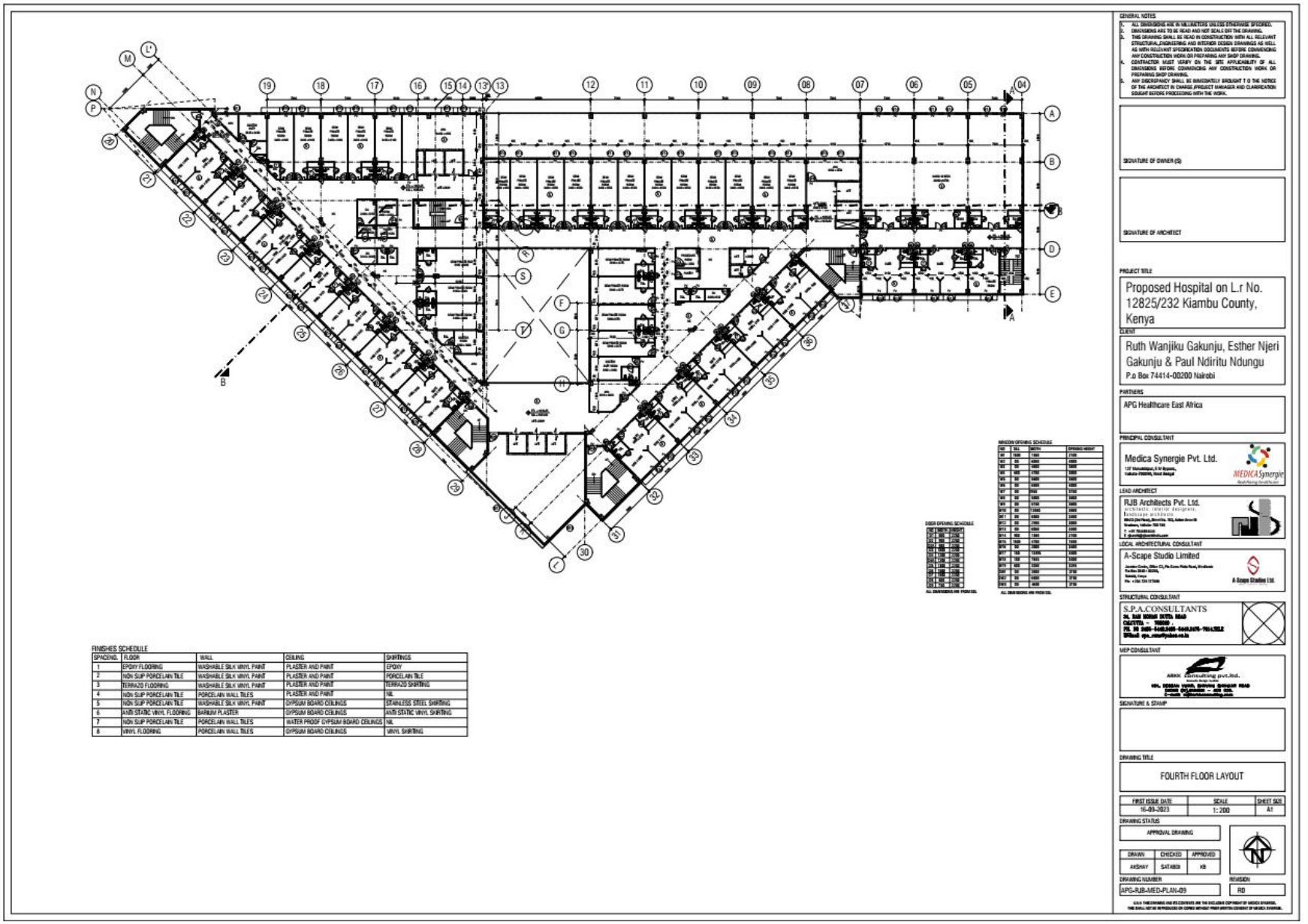
LEAD ARCHITECT
RJB Architects Pvt. Ltd.
LOCAL ARCHITECTURAL CONSULTANT
A-Scape Studio Limited
STRUCTURAL CONSULTANT
S.P.A.CONSULTANTS
MEP CONSULTANT
ARKK consulting pvt.ltd.
SIGNATURE & STAMP
DRAWING TITLE
THIRD FLOOR LAYOUT
FIRST ISSUE DATE 15-03-2023
SCALE 1: 200
SHEET SIZE A1
DRAWING STATUS
APPROVAL DRAWING
DRAWN AKSHAY
CHECKED SATHISH
APPROVED KB
DRAWING NUMBER
APG-RJB-MED-PLAN-08
REVISION
R0
FINISHES SCHEDULE
SR.NO. FLOOR WALL CEILING SKIRTINGS
1 EPOXY FLOORING WASHABLE SILK VINYL PAINT PLASTER AND PAINT EPOXY
2 NON SLIP PORCELAIN TILE WASHABLE SILK VINYL PAINT PLASTER AND PAINT PORCELAIN TILE
3 TERRAZO FLOORING WASHABLE SILK VINYL PAINT PLASTER AND PAINT TERRAZO SKIRTING
4 NON SLIP PORCELAIN TILE PORCELAIN WALL TILES PLASTER AND PAINT NIL
5 NON SLIP PORCELAIN TILE WASHABLE SILK VINYL PAINT GYPSUM BOARD CEILINGS STAINLESS STEEL SKIRTING
6 ANTI STATIC VINYL FLOORING BARIUM PLASTER GYPSUM BOARD CEILINGS ANTI STATIC VINYL SKIRTING
7 NON SLIP PORCELAIN TILE PORCELAIN WALL TILES WATER PROOF GYPSUM BOARD CEILINGS NIL
8 VINYL FLOORING PORCELAIN WALL TILES GYPSUM BOARD CEILINGS VINYL SKIRTING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SIGNATURE OF ARCHITECT
PROJECT TITLE
Proposed Hospital on L.r No. 12825/232 Kiambu County, Kenya
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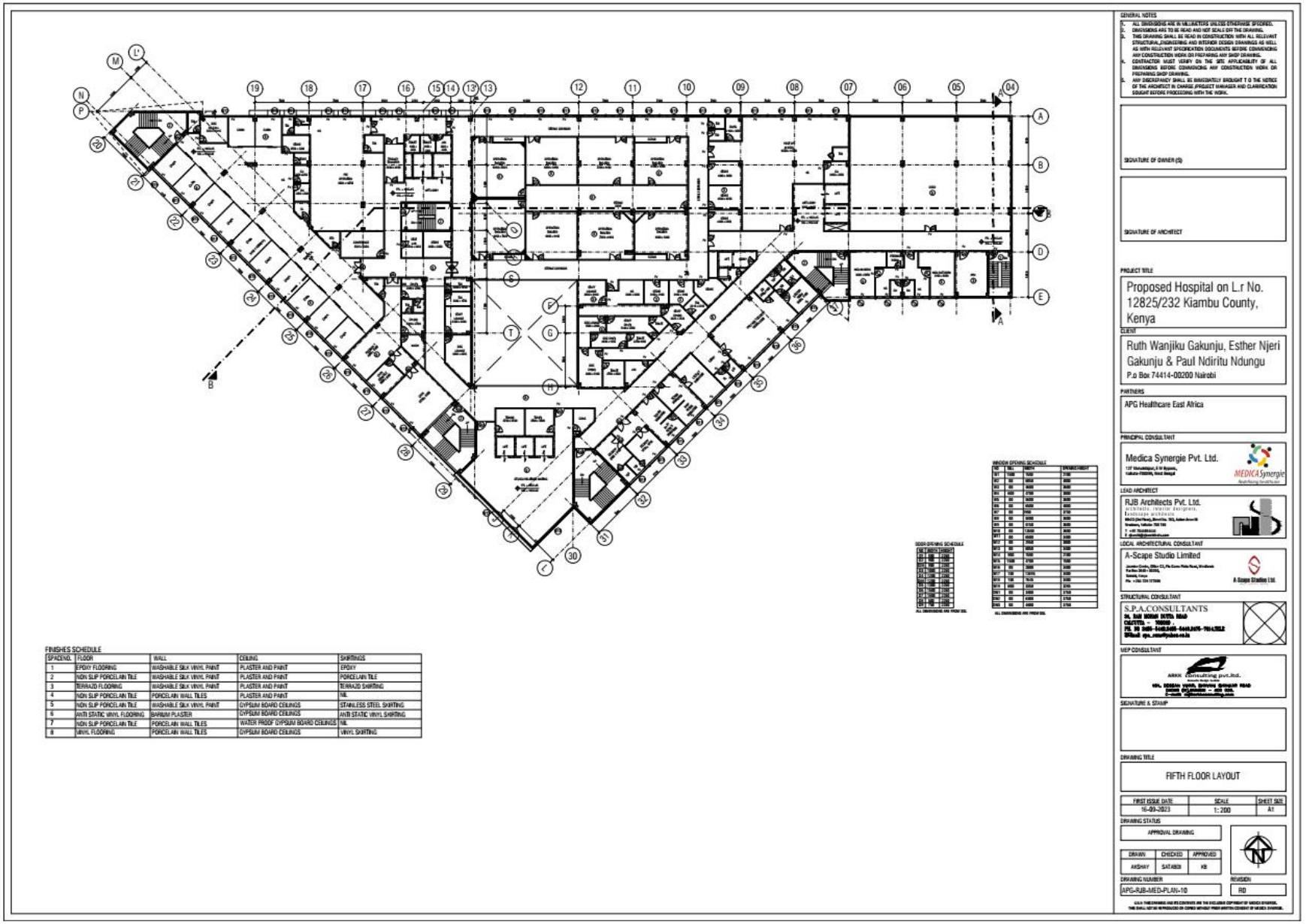
LOCAL ARCHITECTURAL CONSULTANT
A-Scape Studio Limited
STRUCTURAL CONSULTANT
S.P.A.CONSULTANTS
MEP CONSULTANT
SIGNATURE & STAMP
DRAWING TITLE
FOURTH FLOOR LAYOUT
FIRST ISSUE DATE 16-09-2023
SCALE 1: 200
SHEET SIZE A1
DRAWING STATUS
APPROVAL DRAWING
DRAWN AKSHAY
CHECKED SATHISH
APPROVED KB
DRAWING NUMBER
APG-RJB-MED-PLAN-09
REVISION
R0
FINISHES SCHEDULE
SPACENO. | FLOOR | WALL | CEILING | SKIRTINGS
1 | EPOXY FLOORING | WASHABLE SILK VINYL PAINT | PLASTER AND PAINT | EPOXY
2 | NON SLIP PORCELAIN TILE | WASHABLE SILK VINYL PAINT | PLASTER AND PAINT | PORCELAIN TILE
3 | TERRAZO FLOORING | WASHABLE SILK VINYL PAINT | PLASTER AND PAINT | TERRAZO SKIRTING
4 | NON SLIP PORCELAIN TILE | PORCELAIN WALL TILES | PLASTER AND PAINT | NIL
5 | NON SLIP PORCELAIN TILE | WASHABLE SILK VINYL PAINT | GYPSUM BOARD CEILINGS | STAINLESS STEEL SKIRTING
6 | ANTI STATIC VINYL FLOORING | BARIUM PLASTER | GYPSUM BOARD CEILINGS | ANTI STATIC VINYL SKIRTING
7 | NON SLIP PORCELAIN TILE | PORCELAIN WALL TILES | WATER PROOF GYPSUM BOARD CEILINGS | NIL
8 | VINYL FLOORING | PORCELAIN WALL TILES | GYPSUM BOARD CEILINGS | VINYL SKIRTING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SIGNATURE OF OWNER (S)
SIGNATURE OF ARCHITECT
PROJECT TITLE
Proposed Hospital on L.r No. 12825/232 Kiambu County, Kenya
CLIENT
Ruth Wanjiku Gakunju, Esther Njeri Gakunju & Paul Ndiritu Ndungu
P.o Box 74414-00200 Nairobi
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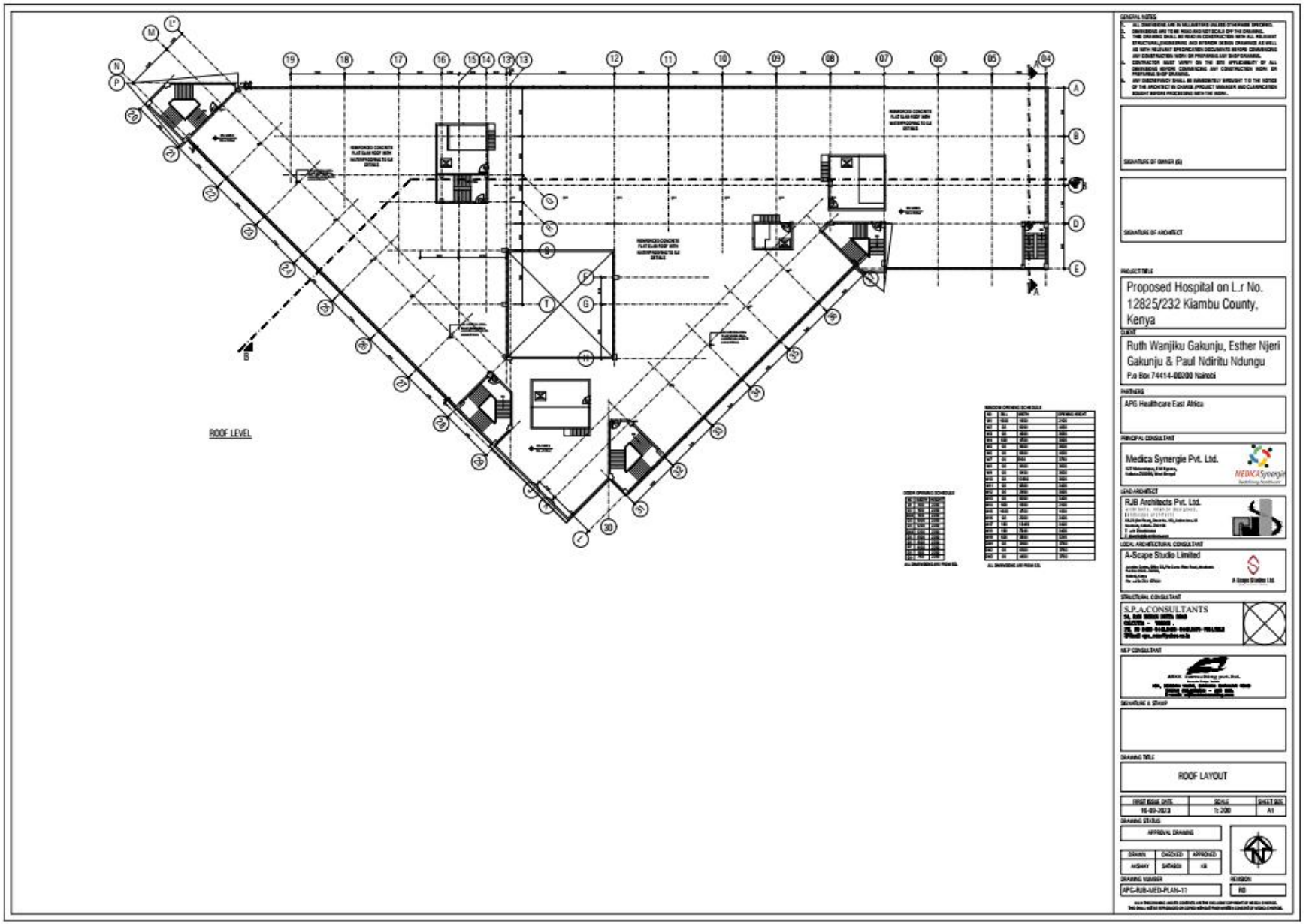
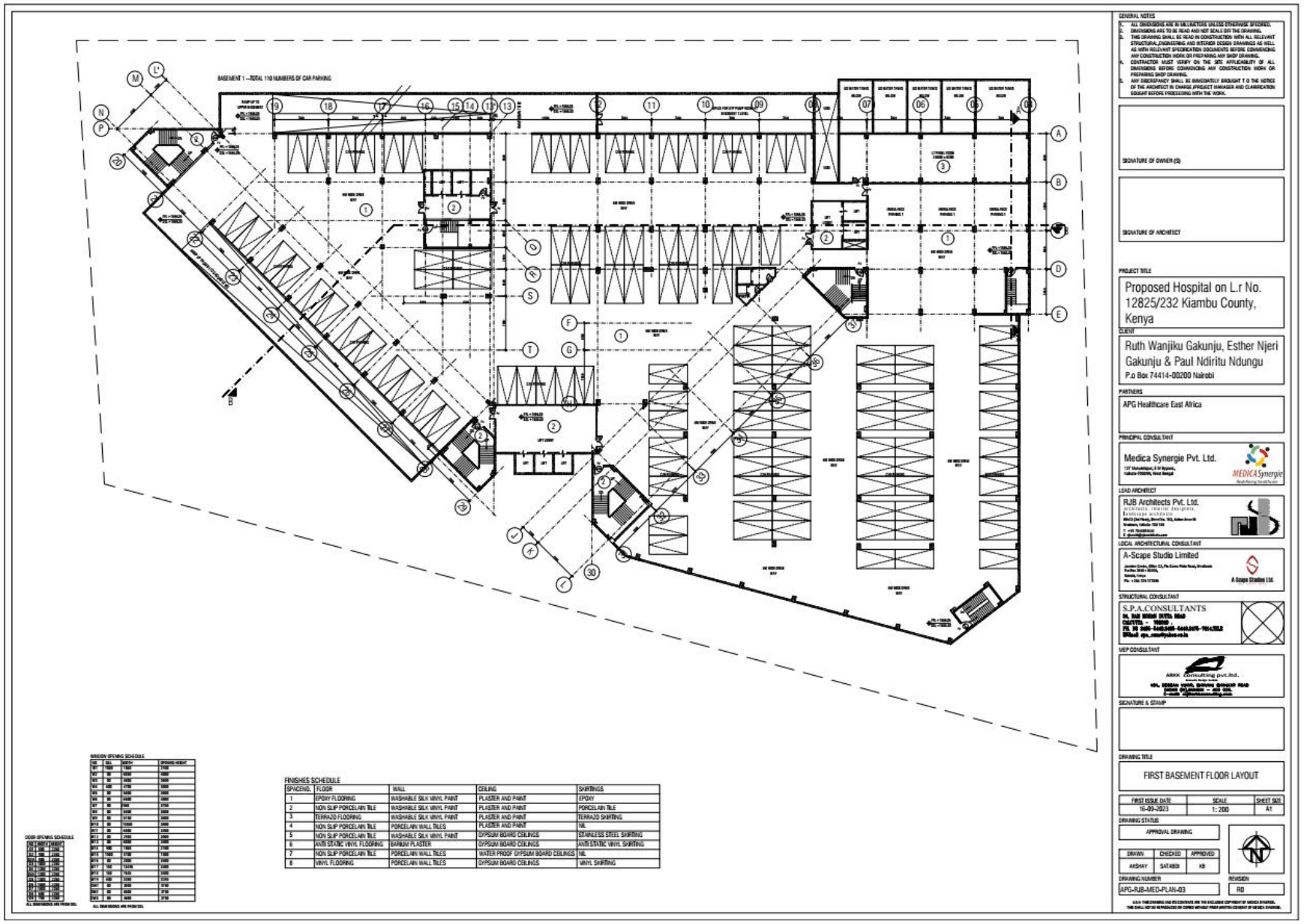
LOCAL ARCHITECTURAL CONSULTANT
A-Scape Studio Limited
STRUCTURAL CONSULTANT
S.P.A.CONSULTANTS
MEP CONSULTANT
SIGNATURE & STAMP
DRAWING TITLE
FIFTH FLOOR LAYOUT
FIRST ISSUE DATE 16-03-2023
SCALE 1: 200
SHEET SIZE A1
DRAWING STATUS
APPROVAL DRAWING
DRAWN AKSHAY
CHECKED SATHISH
APPROVED KB
DRAWING NUMBER
APG-RJB-MED-PLAN-10
REVISION
R0
FINISHES SCHEDULE
SPACENO. | FLOOR | WALL | CEILING | SKIRTINGS
1 | EPOXY FLOORING | WASHABLE SILK VINYL PAINT | PLASTER AND PAINT | EPOXY
2 | NON SLIP PORCELAIN TILE | WASHABLE SILK VINYL PAINT | PLASTER AND PAINT | PORCELAIN TILE
3 | TERRAZO FLOORING | WASHABLE SILK VINYL PAINT | PLASTER AND PAINT | TERRAZO SKIRTING
4 | NON SLIP PORCELAIN TILE | PORCELAIN WALL TILES | PLASTER AND PAINT | NIL
5 | NON SLIP PORCELAIN TILE | WASHABLE SILK VINYL PAINT | GYPSUM BOARD CEILINGS | STAINLESS STEEL SKIRTING
6 | ANTI STATIC VINYL FLOORING | BARIUM PLASTER | GYPSUM BOARD CEILINGS | ANTI STATIC VINYL SKIRTING
7 | NON SLIP PORCELAIN TILE | PORCELAIN WALL TILES | WATER PROOF GYPSUM BOARD CEILINGS | NIL
8 | VINYL FLOORING | PORCELAIN WALL TILES | GYPSUM BOARD CEILINGS | VINYL SKIRTING


ROOF LEVEL
GENERAL NOTES
Proposed Hospital on L.r No. 12825/232 Kiambu County, Kenya
Ruth Wanjiku Gakunju, Esther Njeri Gakunju & Paul Ndiritu Ndungu
P.o Box 74414-00200 Nairobi
APG Healthcare East Africa
Medica Synergie Pvt. Ltd.
RJB Architects Pvt. Ltd.
A-Scape Studio Limited
S.P.A.CONSULTANTS
ROOF LAYOUT
1:200
A1
APPROVAL DRAWING
APC-RJB-MED-PLAN-11


BASEMENT 1 – TOTAL 110 NUMBERS OF CAR PARKING
GENERAL NOTES
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PROJECT TITLE
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CLIENT
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STRUCTURAL CONSULTANT
S.P.A.CONSULTANTS
MEP CONSULTANT
ARKK consulting pvt.ltd.
SIGNATURE & STAMP
DRAWING TITLE
FIRST BASEMENT FLOOR LAYOUT
FIRST ISSUE DATE 16-03-2023
SCALE 1: 200
SHEET SIZE A1
DRAWING STATUS
APPROVAL DRAWING
DRAWN AKSHAY
CHECKED SATHISH
APPROVED KB
DRAWING NUMBER
APG-RJB-MED-PLAN-03
REVISION
R0
WINDOW OPENING SCHEDULE
DOOR OPENING SCHEDULE
FINISHES SCHEDULE
SPACENO. FLOOR WALL CEILING SKIRTINGS
1 EPOXY FLOORING WASHABLE SILK VINYL PAINT PLASTER AND PAINT EPOXY
2 NON SLIP PORCELAIN TILE WASHABLE SILK VINYL PAINT PLASTER AND PAINT PORCELAIN TILE
3 TERRAZO FLOORING WASHABLE SILK VINYL PAINT PLASTER AND PAINT TERRAZO SKIRTING
4 NON SLIP PORCELAIN TILE PORCELAIN WALL TILES PLASTER AND PAINT NIL
5 NON SLIP PORCELAIN TILE WASHABLE SILK VINYL PAINT GYPSUM BOARD CEILINGS STAINLESS STEEL SKIRTING
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Public Consultation Questionnaires and Minutes