ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT

FOR THE PROPOSED NAIROBI FAMILY BOTIQUE HOSPITAL along Katani Road off Mombasa road LR No. 12715/1924

This Environmental Impact Assessment (EIA) study Report is submitted to Kenya National Environmental Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Co-ordination (Amendment) Act, 2015 and the Environmental (Impact Assessment and Audit) Regulations, 2003

May 2021

LEAD EXPERT: **Kefa M. Wamicwe** **P.O. Box 76826 - 00620, Nairobi** **NEMA Reg. No. 9438**		**PROPONENT** **John Omboga** **P O Box 4537-40200, Kisii , Kenya**

DOCUMENT AUTHENTICATION

This EIA Study Report has been prepared by Kefa M. Wamicwe (registered and licensed EIA /EA lead Experts No 9438) in accordance with the Environmental Management and Coordination Act (EMCA) 1999 (amended 2013) and the Environmental (Impact Assessment) and Audit regulations 2003 which requires that every development project must have an EIA report prepared for submission to the National Environmental Management Authority (NEMA). We the undersigned, certify that the particulars in this Study Report are correct to the best of my knowledge.

EIA/EA LEAD EXPERT: Kefa Mwaura Wamicwe C/o Natural Resource Information and technology (NRIT) Ltd, P O Box 76826-00620, Nairobi, Kenya, Email; kmwamichwe@gmail.com

Signature.....Date May 1, 2021

Mr. Kefa Mwaura Wamicwe. (EIA/ EA Expert Reg. No. 9438).

PROPONENT: Dr. John Omboga, P O Box 4537-40200, Kisii, Kenya

Signature.....Date May 1, 2021

Dr John Ombogo

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SUMMARY

This study report is prepared in conformity with the requirements stipulated in the Environmental Management and Co-ordination (Amendment) Act, 1999 (amended 2018) and the Environmental Impact Assessment and audit Regulations 2003, Regulation 7 (1). **Mr John Omboga** of P O Box 4537-40200, Kisii, Kenya, has proposed to put up Nairobi Family Boutique Hospital at Katani Ward of Athi River Sub-County in Machakos County. The plot L.R No. 12715/1924 is Located at Soykimau along Katani road, off Mombasa road.

Nairobi Family Boutique Hospital (NFBH) model is based on Patient- And Family-Centered Care (PFCC). This is a concept that is changing the way hospitals provide patient care, increasing staff satisfaction, decreasing costs, and improving patient outcomes. Implementation of PFCC is correlated with a decrease in patients' emergency department visits, faster recovery, and decreased utilization of health care resources

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The design

Nairobi Family Boutique Hospital is designed to provide infrastructure to support medium size hospital located in one building block. According to the designs and drawings, the hospital building has eight floors and all necessary medical facilities provided for.

The building will have one basement and mainly dedicated to underground parking. In addition the Waste Water Treatment Plant (WWTP) will be located at the basement. The basement will be served by elevators with capacity of 2500kg (33 persons).

From 1st to 7th Floor it will house medical facilities mainly consisting of(i) administrative unit of the hospital on mezzanine floor, (ii) Patient Department (OPD) and Diagnostic Medicine Department (DMP) on first floor, (iii) gynecology and operating theatre on second floor, (iv) pediatric wards on third floor, (v) male wards on fourth floor, (vi) private wards on fifth floor, (vii) Hospital services on seventh floor and (viii) hospital CEO residence on eighth floor. This floor will also house the incinerator, ICT room, drying yard and general store.

The project will be constructed based on applicable standards of Kenya and any other standards which may be incorporated. The constructions will as well incorporate environmental guidelines, health and safety measures. All the necessary sanitary and waste disposal facilities are provided. In addition ample parking and relaxation spaces are provided and whole area secured with a boundary fence

Construction Material

The major materials required for construction of the proposed project will be stones, cement, flooring tiles/stones, wooden poles, timber, sanitary and hardware items, electrical fittings, water and roof materials. All the items to be used in the proposed project will be as per the National Building Code specifications.

Water
During the construction stage, water will be sourced from NCG water supply. To supply the anticipated demand during operations, water tanks for water storage will be constructed/ installed. Digging of borehole is envisaged in future.

Power
Kenya Power and Lighting Company (KPLC) lines supply this area and there is adequate capacity to meet the demands of the facility, as well as any future expansions. Power will be supplied via a 24 kV Primary connected to the national grid. It is proposed that a back-up power supply of Diesel Generator will be installed to power critical loads only, in the event of any emergency.

Parking Provisions
There will be adequate parking provisions consisting of one underground parking bay with a capacity of 50 parking spaces.

Waste Water Treatment
Syokimau area has no Sewer System and adjacent facilities use Septic Tank for sewer management. Nairobi Family Boutique Hospital plan to use Waste Water treatment Plant that uses Sequencing Batch Reactor (SBR) technology. SBR systems have been successfully used to treat both municipal and industrial wastewater and technology is readily available in Kenya.

Medical solid waste management
The proponent will ensure Medical wastes generated during the operation phase are disposed using approved methods. The waste will include any material that could come into contact with the body during diagnosis, research, drug administration or any type of treatment. A medical incinerator will be used to ensure that all traces of infections or pathogens are completely destroyed

Landscaping
Sustainable landscaping solutions will be used to reduce negative environmental impact by avoiding artificial landscaping. The landscape is intended to appear as natural as possible in order to blend will with the surrounding.

Summary of major impacts and mitigation measures

Expected Negative Impacts	Proposed Mitigation Measures
High demand of materials	Ensure accurate bill of quantities (BOQ).
	Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills.
Vegetation/ Grass disturbance	Ensure proper demarcation and delineation of the project area to be affected by construction works.
Increase storm water, runoff and soil erosion	Apply soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.
Increased solid waste generation	Use of an integrated solid waste management system i.e. through, recycling, reuse, Combustion. Private waste disposal company to be contracted
Dust emission	Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles. Personal Protective equipment to be worn
Noise and vibration	Ensure that construction machinery are kept in good condition to reduce noise generation
Increased energy consumption	Ensure electrical equipment, appliances and lights are switched off when not being used. Install energy saving fluorescent tubes
Increased water demand	Promote recycling and reuse of water as much as possible Promptly detect and repair of water pipe and tank leaks
Safety, health and environment (SHE)	Develop, document and display prominently an appropriate SHE policy for construction works
Sanitary conveniences	Suitable, efficient, clean, well-lit and adequate sanitary conveniences should be provided for construction workers. Provision of clean drinking water, toilets and changing rooms.
Fire protection	Firefighting equipment such as fire extinguishers and hydrant systems should be provided at strategic locations such as stores and construction areas.
Food safety	Ensure perishable/short-life food products are preserved and their quality maintained
	All contaminated products unfit for consumption should be disposed off in a manner such that it would not be used for food

Expected Negative Impacts	Proposed Mitigation Measures
Safety concerns	Provide appropriate personal protective clothing to the hospital staff
	Health and safety communication to all staff through meetings, bulletins, audio-visuals, posters, newsletters.
	Proper safety planning, rules and work procedures.
	Health and safety committee- Provisions are needed for the formation of a Health and Safety Committee, in which the employer and the workers are represented
Emergency plan	Develop Emergency Response plan incorporating external agencies
Noise generation	All machinery including air conditioners should be kept in good working condition to reduce noise levels within the premises and surrounding areas
General Solid Waste	Segregating general solid waste generated and arrange for proper disposal
Medical waste	Use medical incinerator to transform medical waste into inorganic incombustible matter
Waste water	Monitor quality of effluent released to environment after going through Waste water treatment Plant
oil spillage	The health facility will ensure proper disposal of used oil.
Policies	Develop; Environmental, Health safety policies, Fire Emergency Action Plan
Records	Maintain waste disposal records,, power consumption records, workers' health records

Conclusion

The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. It will be implemented after the approvals by among others by physical planning department and NEMA.

It is our recommendation that the project be allowed to go ahead provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close follow-up and implementation of the recommended Environmental Management and Monitoring plans (EMPs).

LIST OF ACRONYMS

CIDP	County Integrated Development Plan
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
EMS	Environmental Management System
IEA	Initial Environmental Audit
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power and Lighting Company
KPLC	Kenya Power and Lighting Company
KRA	Kenya Revenue Authority
MCG	Machakos County Government
MDGs	Millennium Development Goals
MOH	Medical Officer of Health
NCCK	National Council of Churches
NEAP	National Environment Action Plan
NEC	National Environment Council
NEMA	National Environment Management Authority
NFBH	Nairobi Family Boutique Hospital
PFCC	Patient- and Family-Centered Care
SBR	Sequencing Batch Reactor
SDGs	Sustainable Development Goals
SHE	Safety, Health and Environment
TOR	Terms of Reference
WRMA	Water Resources Management Authority

CHAPTER ONE: INTRODUCTION

1.1 Background

The development of infrastructure to support the rapid population growth in Nairobi and peri-Urban areas poses formidable environmental challenges. The major environmental problems from rapid population growth are pollution due to the concentrated discharge of residuals (gaseous, liquid and solid wastes) into the environment, and destruction of ecosystems in environmentally sensitive areas.

Mr John Omboga of P O Box 4537-40200, Kisii, Kenya, has proposed to put up Nairobi Family Boutique Hospital at Katani Ward of Athi River Sub-County in Machakos County. The plot L.R No. 12715/1924 is Located at Soykimau along Katani road, off Mombasa road.

The plot is currently an open area with grass and shrub vegetation. The proposed site is currently unoccupied and planned for this facility. The neighboring area is mainly occupied by human settlement. Majority of people in this area are ordinary workers residing in this area and engaged in employment, formal and informal businesses, or local commercial activities. The proposed site has enough space for the proposed development, while the existing service infrastructure (water supply, and power supply) are adequate to accommodate uses of the intended facility. The main activities during the construction of the proposed facility will include masonry work and installation of service lines as well as utilities relevant to a health facility. It is expected that materials to be used during construction are the typical ones (mainly cement, metal, stones and timber) used in the county and the area in particular.

By Enactment, building and construction operation under the prescribed activity is covered in the second schedule in section 58, of **Environment Management and Coordination Act, 1999** among other laws. Under these laws, any activity out of character with its surrounding which is likely to cause substantial impact to the environment in areas such as waste disposal, sustainable resource use, ecosystem's maintenance, social environment, land use and water extraction; an Environmental Impact Assessment (EIA) report is required to assess such impacts and propose mitigation measures.
By the Enactment, the Project Proponent is required to submit an EIA report to NEMA for approval before commencing implementation of the project. By this report the relevant government authorities are able to monitor impacts within the life span of the project on the immediate environment, so as to enable major stakeholders of the project including the Government agencies to manage the environment for the well being of the community.

1.2 Scoping

The scoping process was carried out with a view to identifying key issues and to help focus available resources on the issues. The first step was to identify all interested parties relevant to the project. The second step was to develop information on the resource to be affected, potential concerns and project alternatives. The scoping process involved:

- Discussions with the Proponent and consultation with relevant officials in the regulatory Authorities,
- Verbal interviews with key project beneficiaries and key stakeholders.

- Physical investigation of the site and the surrounding areas using a checklist with a view to identifying potential environmental, social and safety issues pertaining to the project
- Documentary review of the nature of the proposed activities, relevant legal and regulatory framework

1.3 Terms of Reference (TOR)

The TORs were developed based on the scoping result, field visits and information collected from both primary and secondary sources including information provided by the Project Proponent. The Terms of Reference (TOR) for conducting the EIA Study are based on the General Guidelines for Conducting EIAs in Kenya as per Environment (Impact Assessment and Audit) Regulations, 2003, which operationalizes the Environmental Management and Coordination Act, (EMCA) 1999 amended in 2018. The terms of reference included:

i. A critical look into project objectives
ii. Description of the proposed location of the project site
iii. Description of project objectives
iv. A concise description the national environmental legislative and regulatory framework, and any other relevant information related to the project
v. Evaluation of the technology, procedures and processes to be used in the implementation of the project
vi. Evaluation of materials to be used in the construction and implementation of the project and their extended sources
vii. Description, evaluation and analysis of the foreseeable potential environmental effects of the project broadly classified into physical, ecological/biological and socioeconomic aspects which can be classified as direct, indirect, cumulative, irreversible, short term and long-term effects.
viii. Evaluation of the products, by-products and wastes to be generated by the project
ix. propose/recommend a specific environmentally sound and affordable liquid and solid waste management system
x. Evaluation and analysis of alternatives including the proposed project, project alternative, project site, design and technologies
xi. An Environmental Management Plan (EMP), proposing the measures for eliminating/ minimizing or mitigating adverse impacts on the environment,
xii. Propose measures to prevent health and safety hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies. This encompasses prevention and management of the foreseeable accidents and hazards during construction phase.

1.4 Overview of health sector in Machakos County

The Kenya Health Policy, 2014–2030 focuses on ensuring equity, people centeredness and a participatory approach, efficiency, a multi-sectoral approach, and social accountability in the delivery of healthcare services. It proposes a comprehensive and innovative approach to harness and synergize health services delivery at all levels and engaging all actors, signaling a radical departure from past approaches in addressing the health agenda. It recommends that all persons shall have adequate physical access to health and related services, defined as

"living at least 5km from a health service provider where feasible, and having the ability to access the health service".

Machakos County has only one level 5 hospital situated at Machakos and four level 4 hospitals at sub-county hqs. County CIDP report noted that doctors patient ration was 160,000 with 61.5% of the residents covering over 5km to the nearest health facility. To improve provision of good health, Machakos County Integrated development Plan of 2015 recommended increasing the number of facilities, personnel and equipment as one of the strategies

1.5 Overview on Nairobi Family Boutique Hospital

Nairobi Family Boutique Hospital (NFBH) model is based on Patient- and Family-Centered Care (PFCC). This is a concept that is changing the way hospitals provide patient care, increasing staff satisfaction, decreasing costs, and improving patient outcomes. Recognizing the importance of patients' loved ones in patients' health care experiences, clinicians try to work with patients and families to ensure their health and well-being in a mutually beneficial relationship. . Hospitals where PFCC is part of the organizational culture find not only that patient, family, and staff satisfaction ratings significantly increase, but also those patients' health outcomes improve. Implementation of PFCC is also correlated with a decrease in patients' emergency department visits, faster recovery, and decreased utilization of health care resources

1.6 Scope of the study

Scope of Report

The Environmental Impact Assessment for the proposed development include: -

- Provision of a comprehensive description of all components of the project and the work to be undertaken during the project.
- Overall assessment of the existing physical and biological environment of the proposed development area.
- Present a socio-economic evaluation of the proposed development area and its surroundings.
- Identification and assessment of potential impact of the project on the surrounding area, particularly as it relates to the cumulative impacts of this project on any existing developments.

1.7 Responsibilities

While the environmental assessor provided the technical understanding on the baseline environmental status, projected impacts, management options and legal framework, the client was expected to provide the following;

i. Site map(s) /sketch showing roads, service lines, buildings' layout and the actual size of the site,
ii. Indication of the proposed location of the project,
iii. Full details of raw materials, proposed process outline and anticipated by-products,
iv. Proposed measures for handling wastes on site,
v. Land ownership documents and site history,

vi. Project budget outline.

The output from the Assessor includes the following;

- i. An EIA study report comprising of an executive summary, study approach, baseline conditions, anticipated impacts and proposed mitigation measures,
- ii. An environmental management plan that outline report recommendations

1.8 Nature and Scope of the Study

The study cover the entire development area and the surrounding environment. On physical environment it covers landscape; air quality; microclimate, and water. On socio-cultural environment it covers land use; population perception; space; safety; ambient environment. Man-made environment include; socio-economic infrastructure including water, roads, traffic flow, electricity, sewerage, telephone, space. Biological environment cover: the riverine ecology, sensitive ecosystems; important ecosystems; and ecological processes. This study includes both the direct and indirect impacts of the project. In addition it also examine these impacts in terms of: medium, immediate and long-term; cumulative impacts and impact interaction. The impacts are characterized as positive or negative. An Environmental Management Plan (EMP) has been formulated to provide viable and environmentally friendly options to mitigate adverse impacts of the development as well as enhance the positive ones.

Nexus

1.9 EIA Consultant

The project proponent has appointed Mr , Kefa Mwaura Wamicwe (EIA / EA Expert Reg. No. 9438) to lead the team conducting the EIA study. Other members of the team include Dr Ancent Kituku Nzioka, Stephen Mwangi (Associate Expert) and Harriet Wambui

1.10 Methodology outline

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

1.10.1 Community consultation

Questionnaires were administered to the locals randomly to seek their opinion on the proposed development. The questions to the respondents, contained in the questionnaire, were asked and responses recorded by the interviewer. The main objective of the Community involvement was to provide an opportunity to get "grassroots"/stakeholders concerns and recommendations on the said project. Specific objectives of community consultation were to:

(i) Provide a forum for collating community perception on environmental issues affecting them in the area
(ii) Collect information on areas where community feels that the project will affect them

(iii) Receive recommendations on mitigation measures on environmental impact of the project
(iv) Generate creative alternatives and solutions and help reach consensus on solving issues and problems in the community may identify and building on collective strengths of parties involved.
(v) Identify areas of partnership on tackling community environmental and health needs
(vi) Disseminate pertinent information to key stakeholders

Observations

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

1.10.2 Biophysical Assessment

The objectives of this assessment were to:
(a) To take an inventory of the existing biophysical conditions at the proposed site; and to;

(b) Evaluate the possible environmental impacts and change that may arise as a result of the project.

(c) Determine environmental restoration actions needed

During the field investigations, and scooping, information on biophysical and socio-economic environment of the proposed development area and its environs were collected, and discussed in the report. Land use aspects of the surrounding were also taken into account. Impacts evaluation and proposing mitigation measures to be implemented were outlined in the project report. To ensure comprehensiveness on the assessment, desktop studies and interviews were held. This involved the proponent and the consultants. Relevant reports on the construction including design works and other related sources of information were critically reviewed, described in the report.

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

1.10.3 Secondary data

Various literatures were used in aiding the successful completion of the report. They include: The Kenya Gazettes Supplement Acts 2000, Environmental Management and Coordination Act No.8 of 1999. Government printer Kenya Gazette Supplements Acts, Physical Planning Act, 1999. Government printers, Nairobi, Kenya Gazette Supplement No.56, Environmental Impact Assessment Audit regulations 2003. Government printer, Nairobi, Machakos County integrated Development Plan, Environmental Management and Coordination (Waste Management)

regulations, 2003 Legal Notice No.12, the Public Health Act, cap 242, the factories and other places of work Act and water Act 2002, draft of the wetlands policy 2008.

CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND CONSTRUCTION

2.1 Overview on project description

Nairobi Family Boutique Hospital is designed to provide infrastructure to support medium size hospital located in one building block. According to the designs and drawings, the hospital building has eight floors and all necessary medical facilities provided for. The building will comprise of rooms with large windows and well landscaped exterior and interior areas in order to enhance environmental protection and social well-being of the occupants. All the necessary sanitary and waste disposal facilities are provided. In addition ample parking and relaxation spaces are provided and whole area secured with a boundary fence.

The topography of the proposed site is generally flat and do not require leveling and/or landscaping. The construction phase will include soil excavation, earth moving and backfilling with suitable materials (mainly hardcore stones). This phase will also require suitable management for materials brought for the work. Other involvement will be construction machineries (delivery trucks, concrete mixtures, compacters, etc.), building material storage and disposal of construction materials is envisaged.

During construction, negative impacts may arise and which could become a nuisance to the neighbouring communities. Trucks delivering construction materials also have potential safety hazards to the surrounding communities. Suitable measures would have to be undertaken. Among the issues that will arise from a development such as this will be solid wastes (medical, food remains, papers, polythene materials, plastics, etc.), waste water (wash water, sewage and surface run-off). Increased volumes of each category of waste demands expanded handling capacity both on site and the final destinations.

2.2 Basic Infrastructure Requirements

The project will be constructed based on applicable standards of Kenya and any other standards which may be incorporated. The constructions will as well incorporate environmental guidelines, health and safety measures. The following are the main infrastructural requirements:

i. The structures will be founded on solid ground using reinforced concrete strips laid on concrete blinding. The laying of the foundation will follow details as given by the structural engineers on site
ii. The developments will be constructed using local undresses stones, bound by mortar of concrete and sand
iii. Drainage channels will be provided leading from surface run-off generation areas such as car parking and all paved areas into designated drainage system
iv. Water supply will be connected to the developments from NCC water supply, boreholes and water tanks
v. Waste water will be channeled to sewer More/ fine details for the development and specifications for the features of the proposed project have been given in the copies of the architectural and site drawings attached in the Annex.

2.2.1 **General design notes**

vi. All and civil works shall be subject to structural and civil engineer designs, specifications and site instructions
vii. All pipes passing under driveways and/or the buildings will be encased with 150mmm thick concrete
viii. Excavation of vegetation soil will be done to a minimum of 450mm
ix. All reinforced concrete works in particular the strip foundation footing, structural columns, base columns, beams and slab subject to structural engineer details
x. All sanitation and mechanical works to comply with MOH rules and regulations and to be subjected to mechanical engineer design , specification and site instructions.
xi. Plumbing and foul drainage fittings to be subjected to manufacturers specifications and architectural approvals
xii. Liquid waste pipes and soil pipes to be in ducts and bends to have cleaning eye with external access
xiii. Water reservoir of 5000 litres with automatic booster pump to run hose reel will be installed.
xiv. Windows will be provided with precast griill, built-in PVC pelmetbox and timber board
xv. Door flames to be rebated and to be provided with architraves matching the cornice and skirting
xvi. Rain water and down pipe gutters will be 150mm diameter with round concrete
xvii. All electrical and ICT works shall be contracted by registered persons.
xviii. Fire control equipments will include 2X9kg dry powder all purpose fire extinguisher placed on every floor

1.

2.3 Size and magnitude of the Project

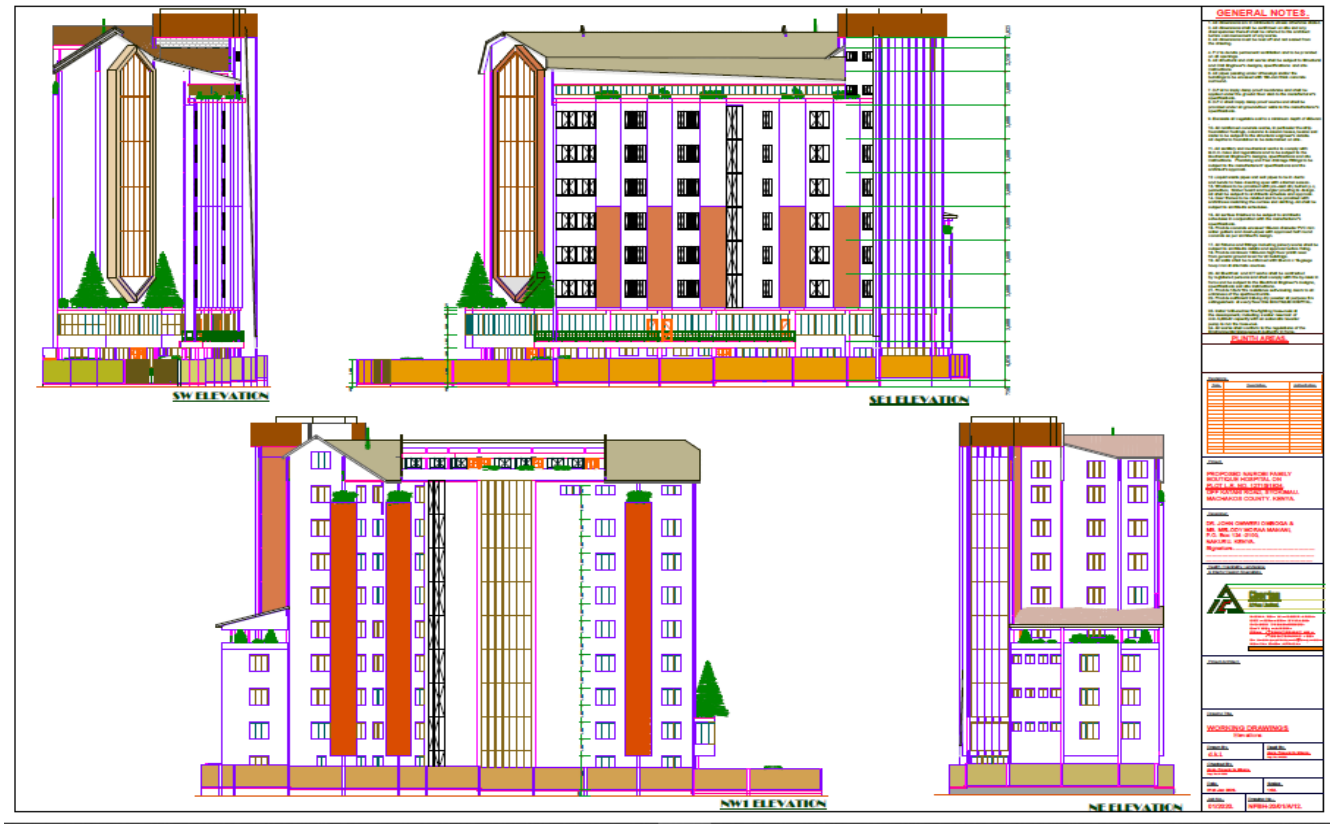
2.3.1 The Project Schedule

The proposed development is expected to start as soon as necessary approvals have been obtained. From the start date the construction and commissioning is estimated to take approximately 18 months. This is however, subject to design conditions.

Plate: Showing side view

2.3.2 Estimated Project Cost

The project is a small facility estimated to cost Kenya shillings 100 million (KES 100, 000,000) only. The cost will cover the construction, provision of services, as well as related consultancies (feasibility studies, architectural/designs among others.



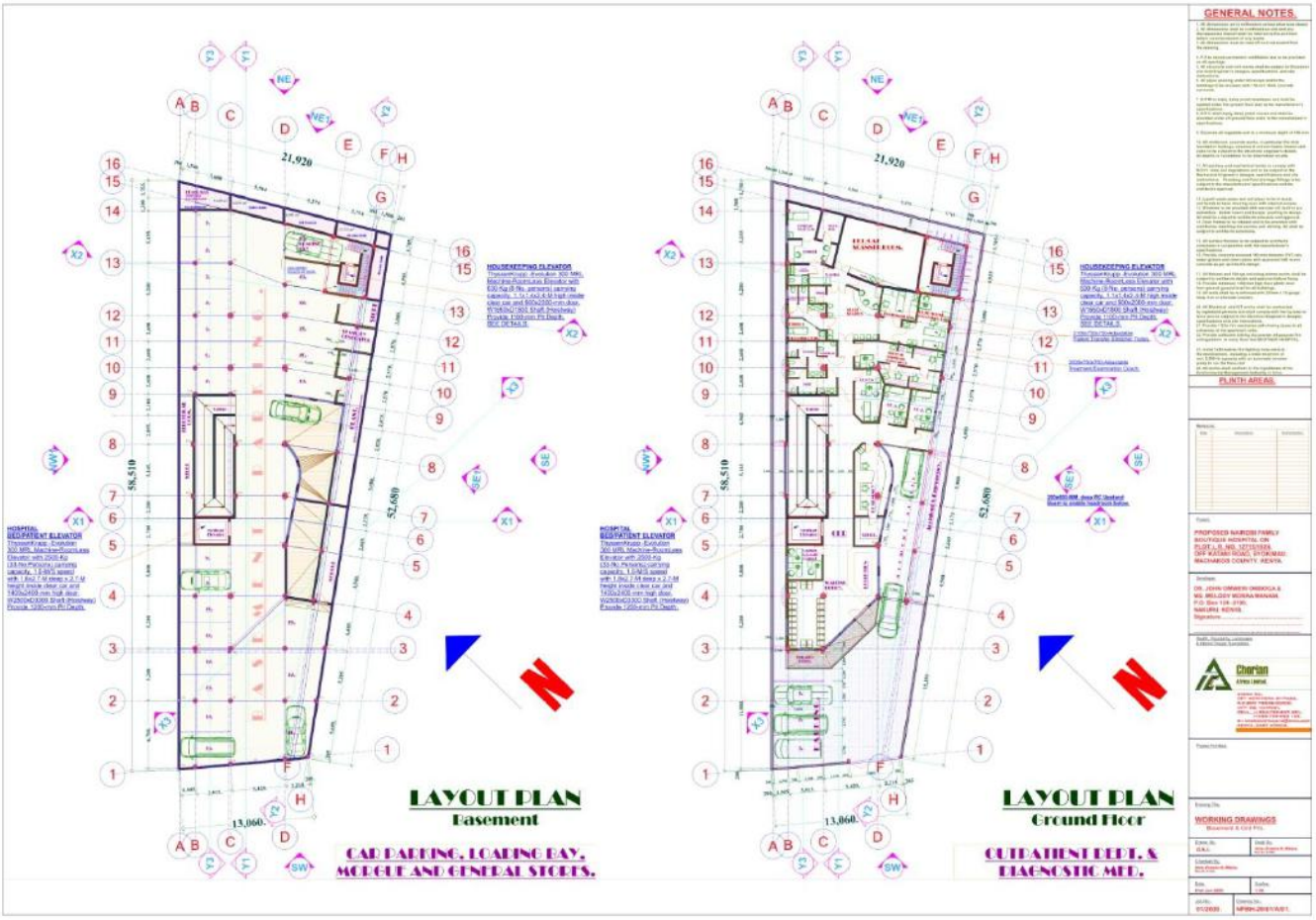
2.4 Detailed design

Basement

The building will have one basement and mainly dedicated to underground parking. In addition the Waste Water Treatment Plant (WWTP) will be located at the basement. The basement will be served by elevators with capacity of 2500kg (33 persons). The Basement also houses the Morgue with a capacity of 20 person. Floor drawing is shown below

Ground floor

This floor will house Out Patient Department (OPD) and Diagnostic Medicine Department (DMP). The floor will have main reception, pharmacy, account/ cashier offices, drug store, treatment rooms, medical diagnostic lab,PET/CAT scanner room, waiting rooms and washrooms. Floor drawing is shown below.

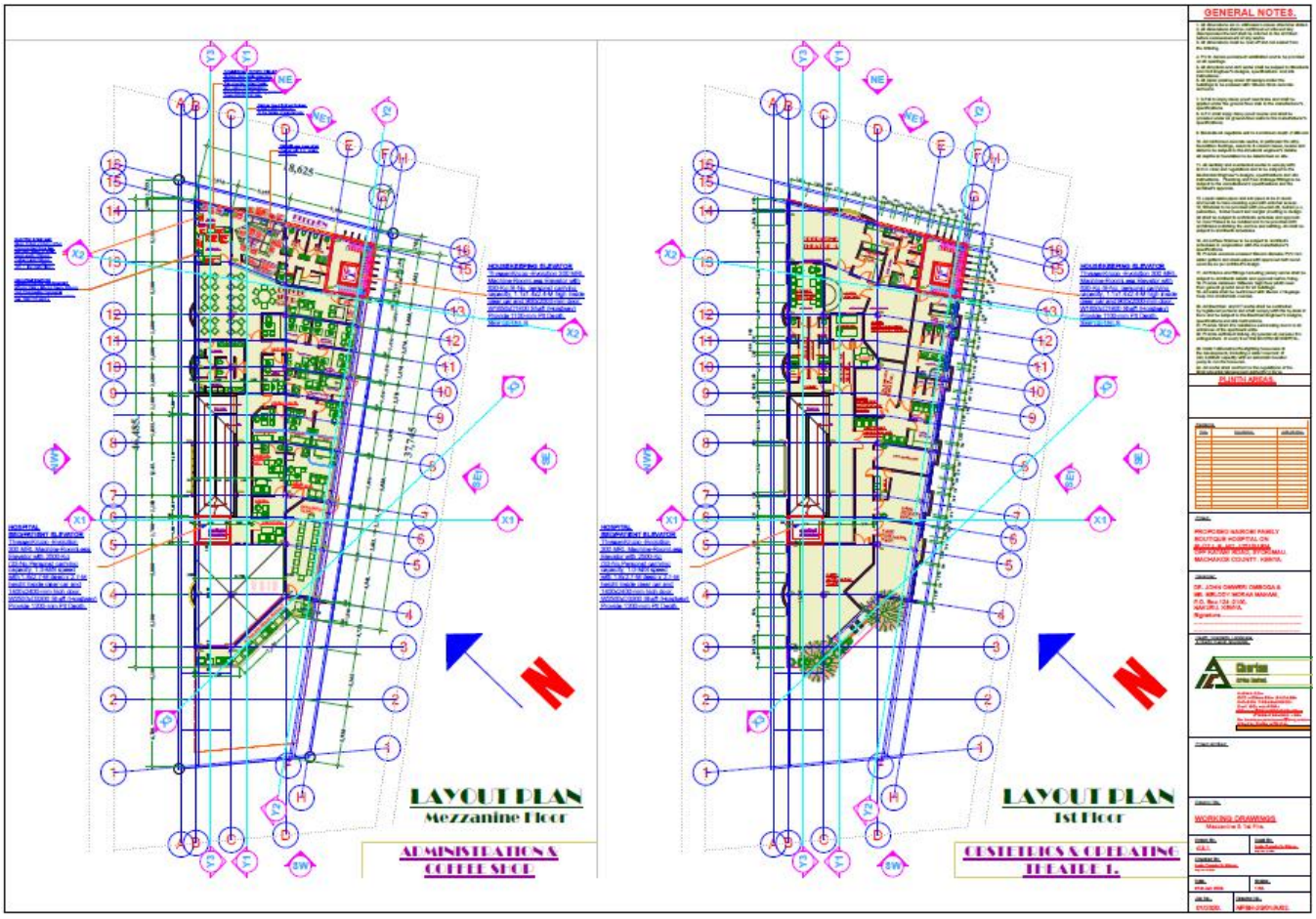


Mezzanine Floor

This floor will house the administrative unit of the hospital and will include ; Offices, meeting rooms, coffee shop and Kitchen

First floor

This floor will house the Obstetric and operating theatre 1 and will include the following facilities operating theatre, surgical rooms and wash rooms

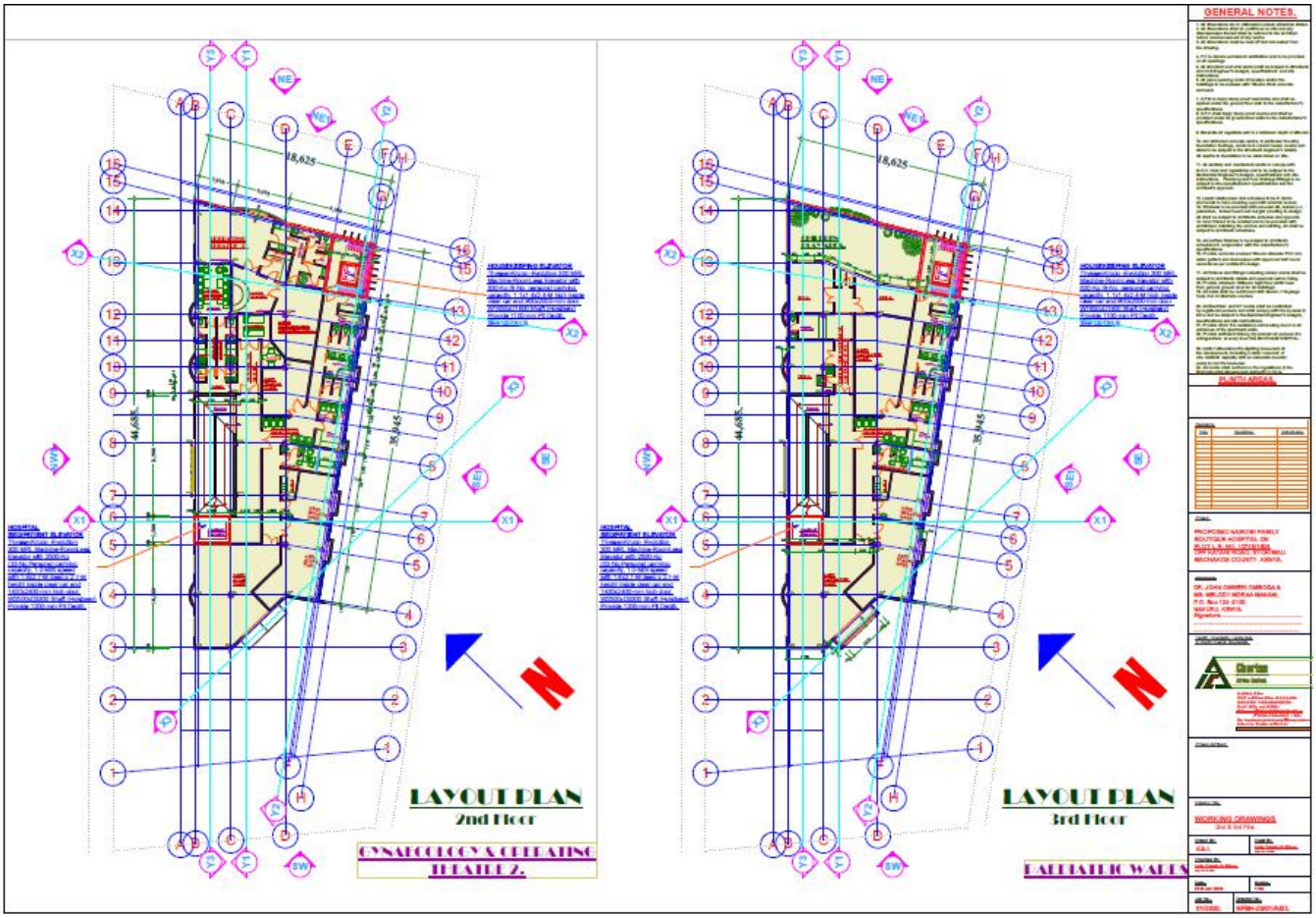


Second floor

This floor will house the gynecology and operating theatre2 and will have the following facilities; operating theatre, surgical wards and recovery rooms.

Third floor

This floor will house the pediatric wards and will have the following facilities; wards, Intensive Care Unit (ICU), wash rooms and children play area.

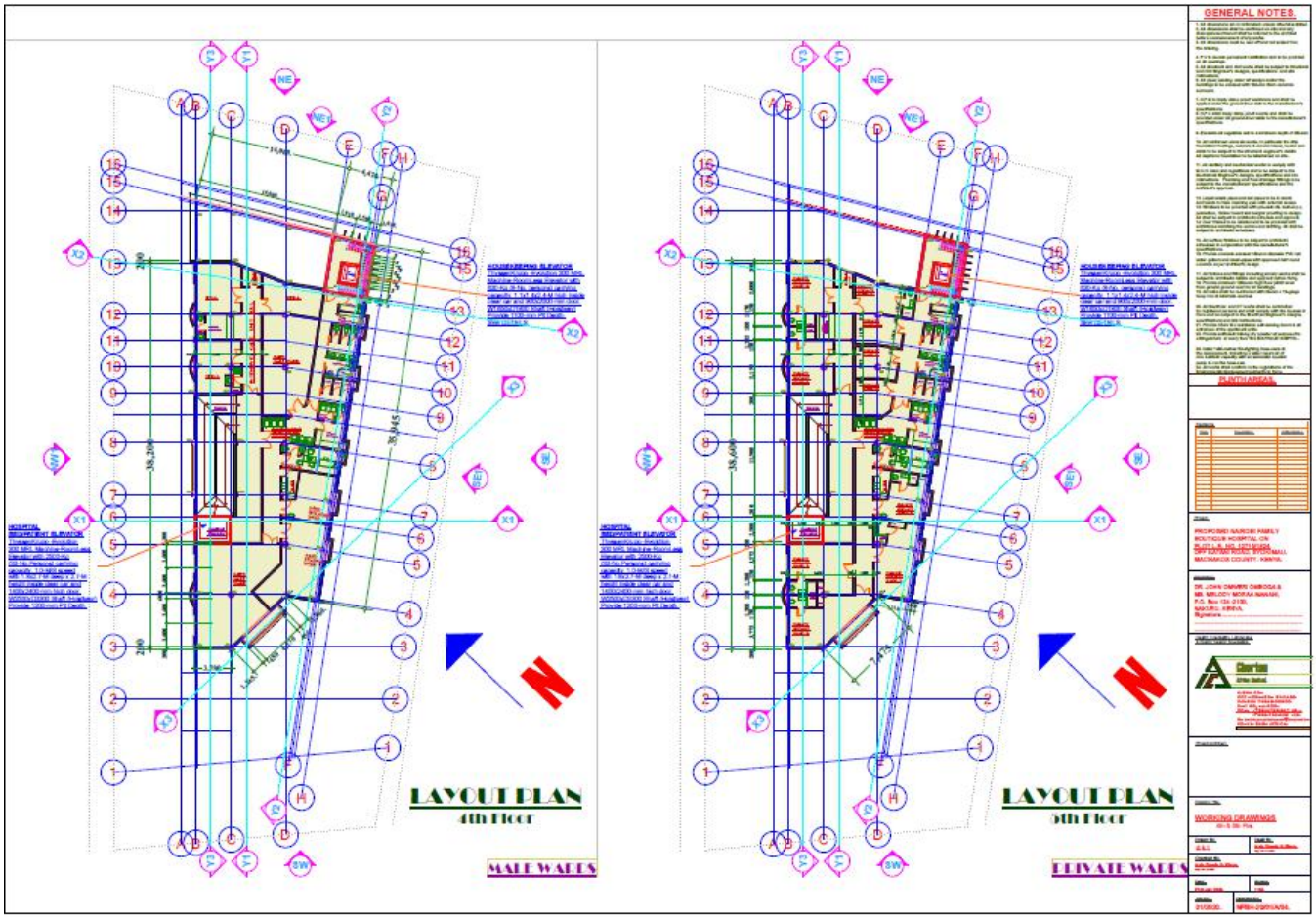


Fourth Floor

This floor will house the male wards and the facilities will include male wards, wash rooms and reception.

Fifth floor

This floor will house the private wards and the facilities will include amenity wards which are self contained and a reception area. Each ward will have own wash room.

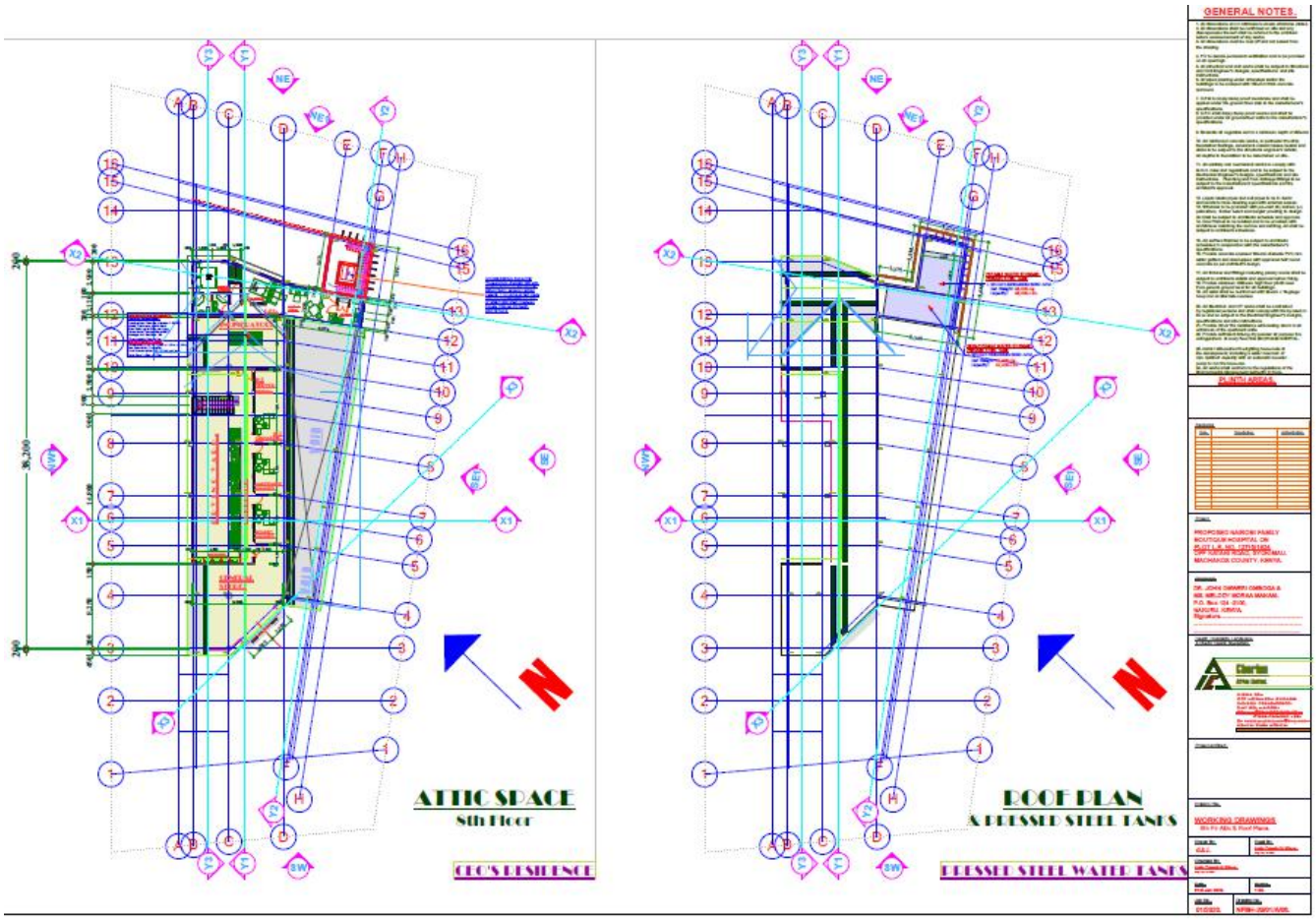


Seventh floor

This floor will house the Hospital services and will mainly be occupied by water tanks, generator and other infrastructural services

Eighth Floor

The Floor will house the hospital CEO residence (2 bed roomed house with sitting room, kitchen and washroom). The floor will also host the Incinerator, ICT room, drying yard and general store.



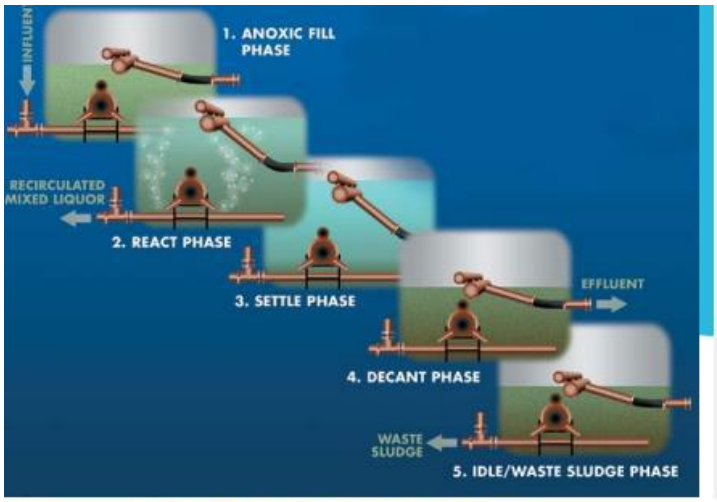
2.5 Waste Water Treatment

Wastewater treatment is a process used to remove contaminants from wastewater or sewage and convert it into an effluent that can be returned to the water cycle with acceptable impact on the environment, or reused for various purposes

Sequencing batch reactors (SBR

The sequencing batch reactor (SBR) is a fill-and draw activated sludge system for wastewater treatment. In this system, wastewater is added to a single "batch" reactor, treated to remove

undesirable components, and then discharged. Equalization, aeration, and clarification can all be achieved using a single batch reactor. To optimize the performance of the system, two or more batch reactors are used in a predetermined sequence of operations. SBR systems have been successfully used to treat both municipal and industrial wastewater. They are uniquely suited for wastewater treatment applications characterized by low or intermittent flow conditions.



The OMNIFLO® SBR Cycle effectively utilizes a single reactor

OMNIFLO® SBR Benefits

- Biological Nutrient Removal (BNR)
- High quality effluent at widely varying flows and loadings
- No sludge recycle system
- Perfect quiescent settling
- Optimum energy efficiency
- No clarifiers
- No short circuiting
- Small footprint
- Flexible design
- Retrofits of existing tanks
- Biological phosphorous removal

The SBR system consists of a tank, aeration and mixing equipment, a decanter, and a control system. The central features of the SBR system include the control unit and the automatic switches and valves that sequence and time the different operations. SBR manufacturers should be consulted for recommendations on tanks and equipment. It is typical to use a complete SBR system recommended and supplied by a single SBR manufacturer. It is possible, however, for an engineer to design an SBR system, as all required tanks, equipment, and controls are available through different manufacturers. This is not typical of SBR installation because of the level of sophistication of the instrumentation and controls associated with these systems.

The installation consists of one or more tanks that can be operated as plug flow or completely mixed reactors. The tanks have a "flow through" system, with raw wastewater (*influent*) coming in at one end and treated water (*effluent*) flowing out the other. In systems with multiple tanks, while one tank is in settle/decant mode the other is aerating and filling. In some systems, tanks contain a section known as the bio-selector, which consists of a series of walls or baffles which direct the flow either from side to side of the tank or under and over consecutive baffles. This helps to mix the incoming Influent and the *returned activated sludge* (RAS), beginning the biological digestion process before the liquor enters the main part of the tank.

2.5 Construction Material

The major materials required for construction of the proposed project will be stones, cement, flooring tiles/stones, wooden poles, timber, sanitary and hardware items, electrical fittings, water and roof materials. All the items to be used in the proposed project will be as per the National Building Code specifications.

- Construction machines will include machinery such as trucks, concrete mixers and other relevant construction equipment. These will be used for the transportation of materials, mixing of materials and clearing of the vegetation and resulting construction debris. Most of the machinery will use petroleum products to provide energy.
- Most construction materials will be sourced locally but where the contractor deems necessary will import from other authorized countries especially the finishes.
- A construction labour force of both skilled and non-skilled workers will be involved.

2.6 Water

During the construction stage, water will be sourced from NCG water supply. To supply the anticipated demand during operations, water tanks for water storage will be constructed/ installed. Digging of borehole is envisaged in future.

2.7 Power supply and use

Kenya Power and Lighting Company (KPLC) lines supply this area and there is adequate capacity to meet the demands of the facility, as well as any future expansions. Power will be supplied via a 24 kV Primary connected to the national grid. It is proposed that a back-up power supply of Diesel Generator will be installed to power critical loads only, in the event of any emergency. It is highly recommended that, these generators shall be silent sets housed in approved acoustic enclosures, so as to control the noise pollution required levels.

2.8 Parking Provisions

There will be adequate parking provisions consisting of one main parking bay with a capacity of 50 parking spaces. During construction, parking will be availed around the project site. This is crucial to accommodate vehicles and machinery delivering construction materials.

2.9 Roads and Street Lighting

The project location is accessed through murram road (0.3 km) off Mombasa road which has bitumen surface. Nairobi Family Boutique Hospital will provide adequate lighting at the gate while it is expected the ongoing street lighting project supported by NCG will cover the area.

2.10 Sewage System

The whole of Syokimau Estate is not served with a Sewer System and therefore the proposed site where Nairobi Family Boutique Hospital has no Sewer line nearby. To manage liquid waste, a Waste treatment Plant will be used. The design will provide easy connection when the area is served by a sewer-line.

2.11 General Solid Waste Management

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

2.12 Medical solid waste management

Medical waste is any waste that is generated as a by-product of healthcare work at doctor's surgeries, hospitals and laboratories. It includes any material that could come into contact with the body during diagnosis, research, drug administration or any type of treatment.

World Health Organisation (WHO) medical waste classifications:

The WHO has issued its own guidelines on the different types of medical waste, which include:

1. **Infectious Waste** – *Anything that's infectious or contaminated*
2. **Sharps** – *Waste like needles, scalpels, broken glass and razors*
3. Pathological Waste – *Human or animal tissue, body parts, blood and fluids*
4. **Pharmaceutical Waste** – *Unused and expired drug or medicines, like creams, pills, antibiotics*
5. **Genotoxic Waste** – *Cytotoxic drugs and other hazardous toxic waste, that's carcinogenic, mutagenic or teratogenic.*
6. **Radioactive Waste** – *Any waste containing potentially radioactive materials*
7. **Chemical Waste** – *Liquid waste, typically from machines, batteries and disinfectants*
8. **General/Other Waste** – *All other, non-hazardous waste.*

Some general medical waste can be disposed of in landfill. Some requires specialist treatment such as a medical incinerator. The vast majority of medical waste must be incinerated to ensure that all traces of infections or pathogens are completely destroyed.

Incineration is a thermal process that transforms medical wastes into inorganic, incombustible matter thus leading to significant reduction in waste volume and weight. The main purpose of any medical waste incinerator is to eliminate pathogens from waste and reduce the waste to ashes

Incineration is now being increasingly used to treat waste which cannot be economically recycled

2.2 Project implementation

All required kinds of works will be done by registered expertise. The project will begin after the National Environmental Management Authority (NEMA) issues an approval to the proposed project and funds are released by the financiers. The project will be implemented in phases

and scope of the phase will depend on funds available. Each phase will take approximately one year to complete.

2.2.1 Design of the incinerator

The incinerator is a modern waste disposal unit, designed to burn medical waste in a clean and environmentally efficient manner. The prescribed incinerator unit for the Nairobi Family Boutique Hospital has a worldwide application and employs a temperature based logic control system to provide optimum control of the operating conditions. To ensure the unit's effective destruct it has high capacity thermal oxidizing secondary chamber.

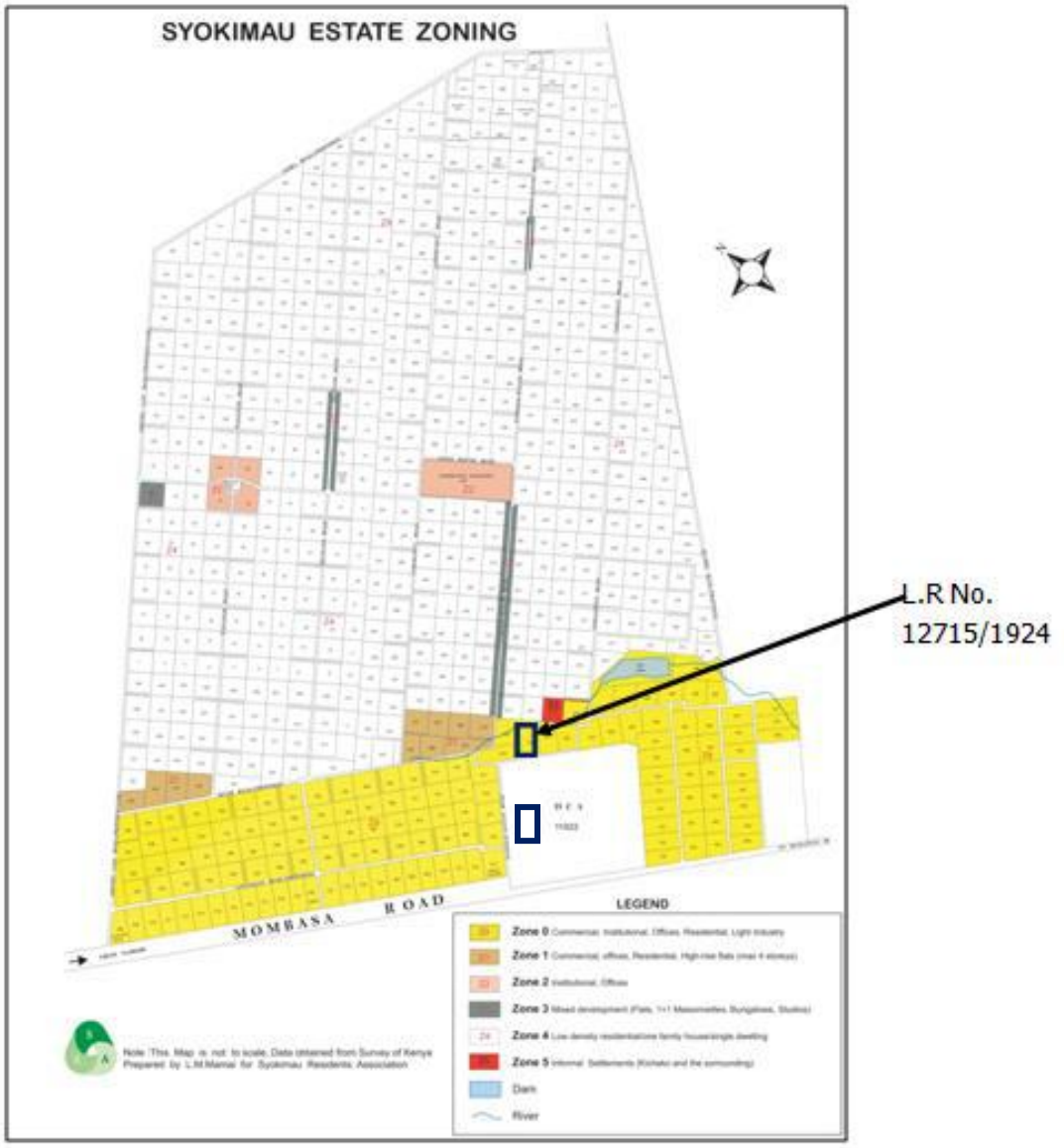
The unit will be able to handle medical and general waste Groups A, B, C, D and E and general waste generally comprising of groups 0, 1, 2, and 3 (See table 4 and 5 below for explanation of these

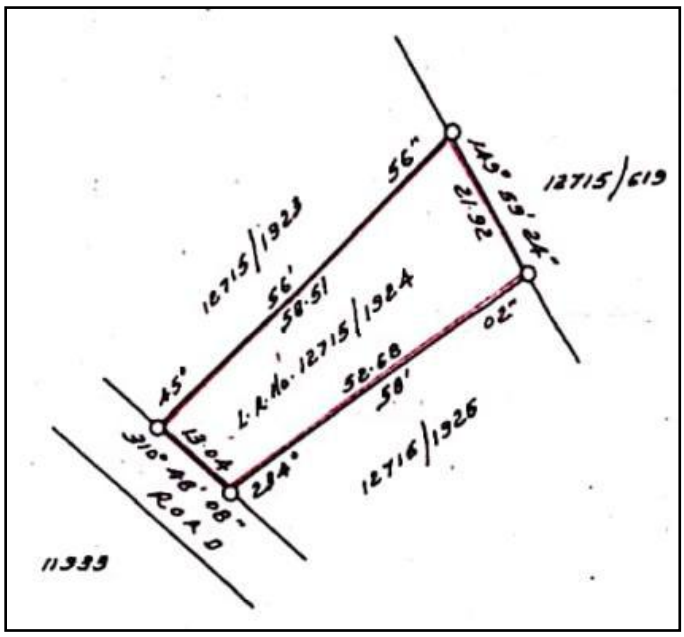
CHAPTER THREE: DESCRIPTION OF THE PROJECT AREA

3.1 General description

3.1.1 Location and ownership of land

The land earmarked for Nairobi Family Boutique Hospital plot L.R No. 12715/1924 is on a free hold land measuring 0.0955 Ha and is registered under the name **Mr John Ombogo** of P O Box 124-2100 Nakuru. Mr Ombogo plan to develop the land to a hospital to serve the adjacent community. The plot is Located at Soykimau along Katani road, off Mombasa road, Katani Ward, Athi River Sub-County in Machakos County. The proposed project site lies along latitude 1^{o} 22′ 28″ S and longitude 36^{o} 55′ 58″ E.





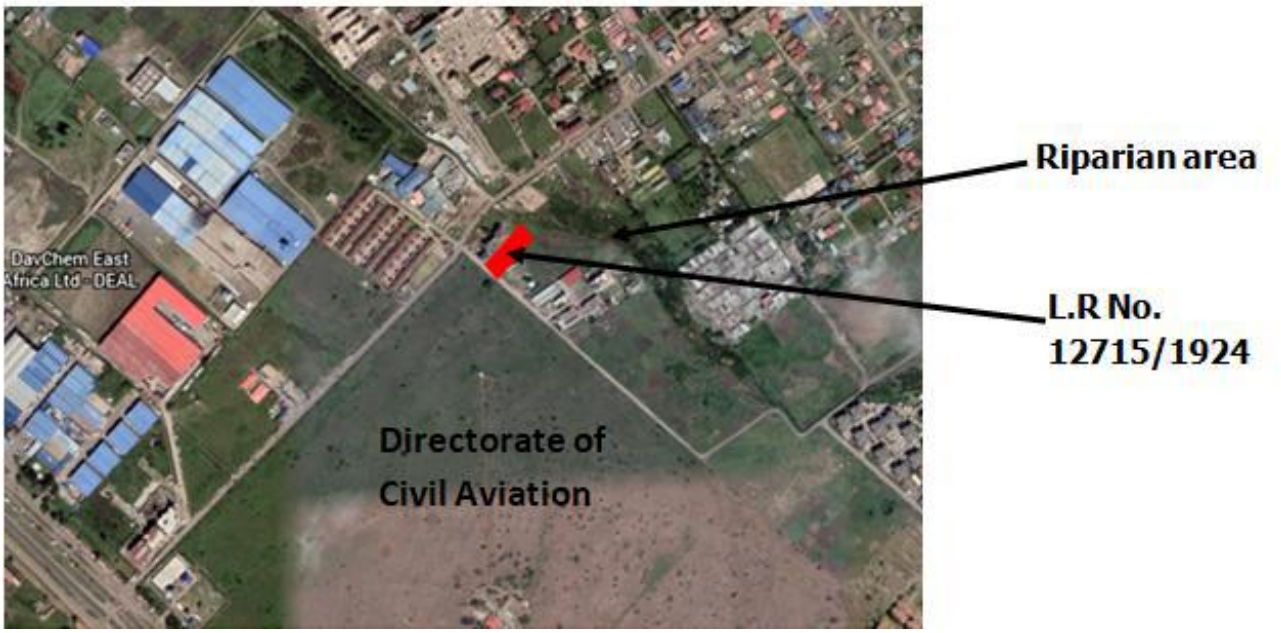
Detailed dimensions of the plot

Salient Features of the Project Influence Area. Criteria	Details
Topography	Flat
Climate conditions	Moderate to dry; semi arid grassland/woodland
Land availability	0.0955ha
Surrounding land use	Residential and commercial
Nearest road	Nairobi-Mombasa road
Surrounding towns	Mlolomgo, Soykimau, Arthi-River
National parks	None
Forests	None
Water bodies	Seasonal stream
Local advantage	High population around the of the hospital facility, availability
Locality	km from Nairobi City

3.2 Description of adjacent areas

The project site is located in medium densely populated neighbourhood. On the Southern side , it borders Kenya Department of Civil Aviation land that extend to Nairobi- Mombasa highway. Also adjacent areas on the southern side are dedicated to commercial/industrial development

On Eastern and Northern side it borders mixed development of single resident's houses and storey residential buildings that house commercial businesses. Also there are Churches nearby. On the Northern side, there is a riparian area with a seasonal stream commonly used by adjacent community for subsistence/ commercial vegetables farming. On Western side, across the kathiani Road, the area is occupied by medium size industries like DAV Chem East Africa.



Residential houses bordering the plot

3.3 Climatic Conditions

The Syokimau area is generally semi-arid with an altitude of about 1,795 meters above sea level. There are two rainy seasons but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. The difference between the seasons (wet season and dry season) is minimal as it is close to the Equator.

***Temperatures*: T**he sunniest and warmest part of the year is from December to March, when temperatures average the mid-twenties during the day. The mean maximum temperature for this period is 24 °C (75 °F).The minimum temperature also remains low during cloudy nights, usually hovering around 11 °C and at times reaching 8°C. Clear skies in January and February also bring colder nights. Temperatures range from a minimum of 9.1oC to a maximum of 26.7oC

***Rainfall* :** There are two rainy seasons but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. Rainfall ranges from 500 mm to 900 mm per annum.

***Wind Flows*:** The lower winds throughout the year are of the easterly type. Between October and April they shift to the northeast while as from May to September they move to the southeast .Prior to the "Long Rain" season strong winds prevail with an average speed of 22.5 Miles/hour. The rest of the year has wind speed varying from 10 to 15 Miles/hour. However, during night, the winds are usually calm.

Sunshine: Early mornings in Nairobi in general are often blue sky, but the sun peeks through by midmorning. Throughout the year, there is an average of ten hours of sunshine per day. Thirty percent more sunlight reaches the ground during the afternoon than in the morning. Of course, there is more sun shine during the summer months, when the sun is more overhead in the southern hemisphere. 47

3.4 Soils

Syokimau area comprises sensitive soils variable/inclined ground profiles. The surface is covered by black cotton clays oils. Sikes (1934) indicates that existence of swamps made some parts unsuitable for structural development. Many borings as well as trial pits beneath and around building sites show that the thickness of the soft and sensitive deposits varies from 0.8 to 21 m below the ground surface. Groundwater level varies considerably with surface topography and season and lies between 0.5 m to 18m below the ground surface. The shallow groundwater is found to flow towards nearby rivers creating underground rivers that flood foundation excavations and in a few cases it is found to recharge from the nearby rivers. The seasonal river drain into River Athi that discharges water to the Indian Ocean.

Constructors routinely use a variety of methods to minimize adverse effects on structures supported on sensitive and variable soils. The approach used is to minimize total settlement under footings to a range of 4 to 8 cm or by use of foundation types that are able to bridge over the soft spots such as strip footings or rafts. Floating rafts have rarely been utilized because of factors such as: the depth that the foundation should be placed to get full flotation, need for shoring to prevent heaving and cave-ins, the groundwater that might need lowering, and, the effect of deep excavation on adjacent foundations that cannot be adequately determined

3.5 Biological Environment

This section describes key biological elements, including the identification and distribution of dominant, rare and unique flora and fauna species within the region of concern (proposed project site and other potentially affected areas).

Flora

The site is bare and covered sparingly by grass. Landscaping will be done after completion of construction works to bring our a natural environment

Fauna

The site is situated within an area depicting mixed land users where human activities have altered the natural habitat over the years. Consequently, there are no the environs except birds, insects, and small rodents. Therefore there is no fauna threatened by the proposed project. The project's effect may seem insignificant to such lives but it is of great concern to the environment at large.

3.6 Economic Importance of Construction Industry

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

CHAPTER FOUR

4.0 POLICY, LAWS AND REGULATORY FRAMEWORK

The law has made provisions for the establishment of NEMA, which has the statutory mandate to supervise and co-ordinate all environmental activities in the country. The Environmental Management and Co-ordination Act, 1999, revised 2018 and the Environmental (Impact Assessment and Audit) Regulations, 2003, are the legislations that govern Environmental Impact Assessment (E.I.A) studies.

NEMA is the organ that has been established to exercise general supervision and coordination over all matters relating to the environment in Kenya. Furthermore, NEMA is the Government's principal instrument in the implementation of all polices relating to the environment. Policies and legislation highlighting the legal and administrative requirements pertinent to this project are presented below

4.1 The Water Act, 2012

Part II, section 18, of the Water Act, 2012 provides for national monitoring and information systems on water resources. Following this, sub-section 3 allows the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to WRA.

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

The waste water regulation, 2006 states that; No person shall:-

a) Discharge any effluent from sewerage treatment works, industry or other point sources into the aquatic environment without a valid effluent discharge license issued in accordance with the provisions of the Act. The proponent will not discharge any effluent into the environment as they plan to recycle the waste within the project.

b) Abstract ground water or carry out any activity near any lakes, rivers, streams, springs and wells that are likely to have any adverse impact on the quality or quantity of the water without an E.I.A license issued. The proponent proposes to apply for water connection from Nairobi Water Company hence there will be neither underground nor surface water abstraction.

4.2 Building code 2000

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local Authority for a permit to connect to the sewer line and all the wastewater should be discharged into sewers. The code also prohibits construction of structures or buildings on sewer lines. The above site is in an area that has sewer and connection will be done to the same

4.3 The Occupational, Health and Safety Act, 2007

The Act applies to All Workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to: Secure the safety, health and welfare of persons at work; and Protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work.

4.4 The Physical Planning Act CAP 286

The physical Planning Act has provisions to control development and use of land in particular areas, especially where a project may involve subdivisions or amalgamation of land parcels, or located in an area otherwise reserved for other uses. The proponent has already applied for a change of user from residential to offices and the same has been granted on the plot.
Sec. 36 states that a local authority may, if deemed necessary require a submission of E.I.A report together with development application if they feel the project has some injurious effects on the environment. The proponent will undertake an E.I.A report on the proposed project and has contracted qualified Experts to undertake the report.

4.5 Public Health Act (Revised 1986)

Under this Act, every local authority or health authority is mandated to take all lawful, necessary
and reasonable practicable measures to prevent all injurious conditions in premises, construction condition or manner of use of any trade premises. Nuisances under this Act include any noxious matter or waste water, flowing or discharged from any premises wherever situated, into any public street, or into the gutter or side channel of any street or watercourse, or any accumulation or deposit of refuse or other offensive matter. Every municipal council and every urban area council may make by-laws as to buildings and sanitation.

4.6 National Environmental Legislative and Regulatory Framework

This project report has been undertaken in accordance with the Environment (Impact Assessment and Audit) Regulations, 2003, operating under the Environmental Management and Co-ordination (Amendment) Act, 2015. The report is prepared in conformity with the requirements stipulated in the Environmental Management and Co-ordination (Amendment) Act, 2015 and the Environmental Impact Assessment and audit Regulations 2003, Regulation 7 (1) and the Second Schedule.

Part II of the said act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. In order to achieve the goal of a clean environment for all, new projects listed under the second schedule of Section 58 of EMCA No. 8 of 1999 shall undergo an Environmental Impact Assessment. This includes development activities such as this housing development. In addition to the legal compliance above, the following legal aspects have also been taken into consideration or will be taken into consideration before commencement of construction:

The Environment Management and Coordination Act (EMCA), 1999 provides for the establishment of an umbrella legal and institutional framework under which the environment in general is to be managed. EMCA is implemented by the guiding principle that every person has

a right to a clean and healthy environment and can seek redress through the High court if this right has been, is likely to be or is being contravened.
Pursuant to section 25 (4) of EMCA, National Environmental Management Authority (NEMA) is required to restore degraded environmental sites using the National Environmental Restoration Fund. Currently, the restoration fund consists of 0.1 % levied from industries and other project proponents through the EIA process. Section 58 of the Act makes it mandatory for an Environmental Impact Assessment study to be carried out by proponents intending to implement projects specified in the second schedule of the Act which are likely to have a significant impact on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits in order to determine the level of conformance with statements made during the EIA study. The proponent is required to submit the EIA and environmental audit reports to NEMA for review and necessary action.
Section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. According to section 73 of the act, operators of projects which discharge effluent or other pollutants into the aquatic environment are required to submit to NEMA accurate information on the quantity and quality of the effluent. Section 76 provides that all effluent generated from point sources are to be discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities.
Section 87 (1) makes it an offence for any person to discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person.

The proponent will have to ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as sewerage connections, solid waste management plans, and landscaping and aesthetic improvement programme are implemented and maintained throughout the project cycle. As well the proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water are implemented throughout the project cycle.

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

On June 13 the 2003, the Minister of Environment, Natural Resources and Wildlife promulgated the Environment (Impact Assessment and Audit) regulations 2003 (E.I.A/EA Regulations) under section 147 of the EMCA. These regulations provide the framework for carrying out E.I.As and E.As in Kenya.
The Way Leave Act

The areas zoned for communication lines, sewer lines, power lines, water pipes etc are known as way leaves. The way leave Act prohibits development of any kind in these designated areas. Thus any developer is bound by this Act to see to it that no development takes place in these areas. The proposed project will not encroach on any way leave and will leave the required space for such services.

4.8 Waste Management

Legal Notice No. 121: Section 4-6 *Part II* of the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 states that:-

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

(2) Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations.

(3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility. In addition, the Regulations state that: 5. (1) a waste generator shall minimize the waste generated by adopting the following cleaner production methods

a). Improvement of production process through:-

i. Conserving raw materials and energy;

ii. Eliminating the use of toxic raw materials; and

iii. Reducing toxic emissions and wastes

b). Monitoring the production cycle from beginning to end by:-

i. Identifying and eliminating potential negative impacts of the product;

ii. Enabling the recovery and re-use of the product where possible;

iii. Reclamation and recycling

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

6. A waste generator shall segregate waste by separating hazardous wastes from non hazardous waste and shall dispose of such wastes in such facility as shall be provided by the relevant local authority. No person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by Authority under the provisions of the Act.

4.9 Occupational Safety and Health Act 2007 No. 15 of 2007 (OSHA), revised in 2010

This Act provides for the safety, health and welfare of workers and all persons lawfully present at the workplace. It addresses the obligations of both the employer and the employee in terms of ensuring the workplace is free from any potential risks and hazards that would be detrimental to the well-being of all members of staff and visitors at any given time and at any given place within the confines of the workplace. This Act basically addresses employees' and visitors' safety whilst at Ngong Hills Forest.

4.10 The Employment Act 2007 and the Regulation of Wages and conditions of Employment act 2007

These Acts make rules governing wages, leave and rest, health and safety, the special position of children and women and the termination of employment. The Act, in addition, sets up a process through which wages and conditions of employment can be regulated by the Minister. This Act addresses employment of scouts and other employees by the Ngong Hills Metro CFA.

However, the Employment Act does not make any provisions for wages in general. The minimum wage is dealt with by the **Regulations of Wages and Conditions of Employment Act.**

4.11 Legal Notice No. 121: Waste Management Regulations, 2006.

These regulations focus on the management of solid waste, industrial waste, hazardous waste, pesticides and toxic substances, biomedical wastes and radioactive substances. They provide details on the responsibility of the waste generator, adoption of cleaner production principles, waste handling and transportation, waste treatment and disposal.

4.12 Legal Notice No. 120: Water Quality Regulations, 2006.

The regulations address pollution of water resources as well as their conservation. Any development likely to affect water resources (both the surface and ground water) through pollution or use is required by law to comply with these regulations. They provide effluent discharge control standards for both surface and underground water.

4.13 E-Waste Management Guidelines, July 2011.

These guidelines provide vital information in ensuring the development of a management framework which is needed to enable proper collection and recycling and to 'set the standards' therein. It seeks to ensure that health and safety aspects of the people involved in the operations are protected, along with issues of emissions and waste emerging from such operations. The existing e-waste management systems from different stakeholders in the private sector should be streamlined to attract recyclers who make the recycling process safe and efficient.

4.14 The Work Injury Benefits Act 2015

This Act provides for ways through which an employee who is injured when on duty may be compensated by the employer.

4.15 Relevant multilateral treaties

The following are the relevant environmental treaties to which Kenya is signatory in order of ratification:

Montreal Protocol on Substances that Deplete the Ozone Layer (1987) ratified 9 November 1988

International treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion.

WHO National Guidelines on Safe Disposal of Pharmaceuticals

The provisions of these guidelines describe a series of steps that need to be followed in order to dispose waste and or expired pharmaceuticals. The steps required include identification of pharmaceutical waste, sorting of pharmaceutical 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 incinerator for solids, semi-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 pharmaceutical wastes in the manner provided by the Kenya legal framework and the best international practice and guidelines.

CHAPTER FIVE: PUBLIC PARTICIPATION AND ANALYSIS OF PROJECT ALTERNATIVES

5.1 Methodology

To ensure a direct comparison between various impacts, standard rating scales have been defined for assessing and quantifying the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Four factors need to be considered when assessing the significance of impacts, namely:

i. Relationship of the impact to **temporal** scales – the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
ii. Relationship of the impact to **spatial** scales – it defines the physical extent of the impact.
iii. The severity of the impact – the **severity/beneficial** scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.
iv. The **likelihood** of the impact occurring: the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance. Each criterion is ranked with scores assigned to determine the overall **significance** of an activity

5.2 Analysis of Alternatives

5.2.1 The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained i.e. no construction/development of the proposed hospital project. This option is most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. However, the need for such development is of great importance and the anticipated environmental impacts resulting from constructions are less significant. This option will involve several losses both to the project proponent/land owner and the Kenya society and Government. The property will remain under-utilized or neglected. The No Project Option is the least preferred from the socio-economic and partly environmental perspective since if the project is not done: - ☐The economic benefits especially during constriction i.e. provision of jobs for skilled and non-skilled workers will not be realized. The need to have hospital to support the growing needs of medical services in Syokimau area will not have been solved and demand will continues as community members suffer as they travel long distances. Key areas of negative impact include

- Access to health facility would remain unchanged.
- The local skills would remain under utilized
- No employment opportunities will be created for Kenyans.

5.2.2 The relocation Alternative

Relocation option to a different site is an option available for the project implementation. At the moment, there are no alternative sites for the proposed development. The current site is the only land owned by the proponent and suitable for the proposed development. This means that the

proponent has to look for the land if relocation is proposed. Looking for the land to accommodate the scale and size of the project and completing official transaction on it may take a long period. In addition, it is not a guarantee that such land would be available. The project proponent would spend another long period of time on design and approvals of the plans by the relevant government departments. The project design and planning before the stage of implementation would call for costs; already incurred in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option. From the analysis above, it becomes apparent that the No Project Alternative is not the appropriate alternative to the local people, Kenyans, and the Government of Kenya.

5.2.3 Comparison of alternatives

Under the NO Action alternatives, no development would be allowed on the site. Therefore, this would contradict the proponents and also the National development goals and there would neither be benefits from the project nor the insignificant affects. Under the proposed development alternatives, the proposed development would create temporary employment for contractors. Provided the mitigation measures are implemented, including construction and best management practices, insignificant impacts on soils and water quality are anticipated. Commitments associated with this alternative would ensure that potential impacts are avoided or reduced to levels of insignificance.

5.2.4 Alternative to Construction Materials and Technology

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

CHAPTER SIX: IMPACTS IDENTIFICATION FOR CONSTRUCTION, OPERATION AND DECOMMISSIONING PHASES

The environmental baseline information and the project characteristics discussed earlier, form the basis for impact identification and evaluation. The impacts that are expected to arise from the project could either be termed as positive, negative, direct, indirect, short-term, long-term, temporary, and permanent depending on their area of cover and their stay in the environment. This assessment is done for all the project phases namely; constructions, operational and decommissioning phases.

6.1 Impact during construction phase

6.1.1 Impact on the Natural/Physical environment

During the construction phase, the following will happen to cause physical damage to the environment.

i) Impact on Soils

a) *Excavation:* Excavation of the foundation trenches will create loose soils readily vulnerable to both water or and wind erosion. This will cause a disturbance in soil quality. This is a onetime impact of a short duration and will disappear once the construction phase is over and the grass vegetation in open spaces must be re-established through landscaping.

b) *Soil Compaction:* Moving machinery will compact the soils as construction operations take place. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface limiting aerobic activities of the organisms in the process. This may have negative consequences in soil productivity though at a localized scale. Compaction will also enhance run-off during the rainy season.

ii) ***Impact on flora and fauna***

Clearing the area to effect the development means that the local flora and fauna will be affected. The existing habitat that is established will be lost with an impact on recreational activities. Accelerated run off might result if left bare that ultimately affect soil and water quality.

iii) Impact on Air Quality / Exhaust Emissions

Earth moving activities would lead to the release of dust and smoke from the moving vehicles. Exhaust emissions are likely to be generated by the construction equipment during the construction phase. Motor vehicles used to mobilize the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through exhaust emissions. Because large quantities of building materials are required, such emissions can be enormous and may affect a wider geographical area.

The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent gunning of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas. This will needless to say contribute to air pollution. The use of poorly maintained vehicles and construction equipment will exaggerate the air quality degradation problem.

iv) *Noise Generated*

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials and workers to site. People living in the neighbourhood and the site workers are likely to be affected since noise beyond some level is itself a nuisance if it can't be controlled within acceptable limits. The site must be cordoned off to hoard noise and where possible, noisy operations must be done in the absence of the pupils. However, mitigation measures are well discussed below.

v) Storm water

There is a likelihood of interference of the construction operation from the storm water runoff either from the poor drainage in the area. It is advised that operations be done during the dry season while at the same time keeping all drainages clear.

vi) Disposal of Excavated Soil

The excavation works at the site will result in the generation of small amounts of excavated material. Most of the excavated soil will be utilized on site to adjust levels where necessary and the rest disposed in authorized disposal sites.

vii) Increased Water Demand

Both the workers and the construction works will create additional demand for water in addition to the existing demand. Water will be mostly used in the creation of concrete for parking bay, construction works and for wetting surfaces or cleaning completed structures.

viii) Solid Waste Generation

During construction solid waste will be generated. These include papers used for packing cement, plastics and timber remains among others. Dumping around the site will interfere with the aesthetic status of the area. This has a direct effect to the surrounding community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic, pest breeding, pollution of physical environment, invasion of scavengers and informal recycling communities.

6.1.2 Impacts Related to Occupational Health and Safety

i) Dust

Large quantities present in the air may result in respiratory hazard especially to the neighbours. It may also cause visual intrusion hence presenting accident risks. Dust may also affect the eyes.

ii) Noise

The noise generated during the construction stage is at best described as part of a normal occupational hazard that workers in the construction industry face. However, noise levels in construction works are usually below the threshold limit that workers can be exposed in an 8 hour working day and is consequently not of any major concern. As mentioned earlier, learning activities will be impacted upon negatively. Where possible, noisy operations must be done when kids are out of school

iii) Public Health and safety

During construction the movement of construction material may result in accidents if good supervision is not provided. Accidental cuts and bruises are common among construction workers as a result of use of machinery and hand tools, an impact that need consideration. Similarly, at the same stage, flammable liquids such as fuels and lubricants will be stored at the site for use in vehicles and construction equipment. Leakage or spillage of such substances may result into fires that may cause considerable losses in terms of injury to persons and damage to property. These may also occur at any time during construction, decommissioning and operational stages of project, safety risks resulting from any left electrical cables, uncovered manholes and steel structures. These may cause injury to passers-by if this phase is not well handled.

iv) Aesthetic Value

As the proposed project incorporates well-designed plans, improved landscaping on site would greatly boost the aesthetic value of the commercial properties adjacent to this development

6.1.3 Socio-economic Impacts

Several socio-economic gains are expected from the development. Such gains are classified as either positive or negative impacts. Some of these are detailed hereunder: -

The Positive Impacts

i) Employment

During construction the contractor will deploy several workers on the site. On completion, the developments will also offer employment to several persons, such as ancillary staff.

ii) Improved living standards

There is a likelihood of food kiosks starting to appear more so close to the project site due to the meal demands of the construction workers. This would boost to some extend the

businesses of the concerned people and hence of their families. This impact is however expected to be short term.

iii) Accessibility to medical services

The proposed development is expected to boost availability of medical facilities the area.

Negative Impacts

i) Increased Vehicle traffic

Vehicular traffic will be more pronounced at construction stage. During the operational phase it is expected to be minimal with guided traffic expected.

6.2 operational phases

6.2.1 Impact on the Natural/Physical environment

General Solid Waste Generation

The project is expected to generate solid waste during its operation phase. The bulk of the solid waste generated during the operation of the project will consist mainly of paper and foodstuffs. Others will probably include plastics and organic waste in small proportions. Such wastes can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on animal health. Some of these waste materials especially the plastic/polythene are not biodegradable hence may cause long-term injurious effects to the environment if appropriate care is not taken. Even the biodegradable ones such as organic wastes may be injurious to the environment because as they decompose, they produce methane gas, a powerful greenhouse gas known to contribute to global warming.

Medical waste

The hospital is expected to generate Medical waste during the operation phase. The waste will include any material that could come into contact with the body during diagnosis, research, drug administration or any type of treatment.

The different types of medical waste classified by World Health organization include:

i. **Infectious Waste** – *Anything that's infectious or contaminated*
ii. **Sharps** – *Waste like needles, scalpels, broken glass and razors*
iii. Pathological Waste – *Human or animal tissue, body parts, blood and fluids*
iv. **Pharmaceutical Waste** – *Unused and expired drug or medicines, like creams, pills, antibiotics*

v. **Genotoxic Waste** – *Cytotoxic drugs and other hazardous toxic waste, that's carcinogenic, mutagenic or teratogenic.*
vi. **Radioactive Waste** – *Any waste containing potentially radioactive materials*
vii. **Chemical Waste** – *Liquid waste, typically from machines, batteries and disinfectants*
viii. **General/Other Waste** – *All other, non-hazardous waste.*

Some general medical waste can be disposed of in landfill. Some requires specialist treatment such as a medical incinerator that transforms medical wastes into inorganic, incombustible matter thus leading to significant reduction in waste volume and weight.

Table on Regulatory limits for pollutant emissions from incinerators

Pollutant	*Units*	*EPA LIMITS-New Units*			*EPA LIMITS - Existing Units*				*EU Limits*			*AP42*
		Small	*Medium*	*Large*	*Rural*	*Small*	*Medium*	*Large*	*Daily*	*Hourly*	*4 hr*	*Emissions*
Particulate Matter	mg/dscm	69	34	34	197	115	69	34	5	10		223.0
	gr/dscf				0.086	0.05	0.03	0.015				
Carbon Monoxide	ppm(v)	40	40	40	40	40	40	40	50	100		127.0
Dioxins/Furans	ng/dscm total	125	25	25	800	125	125	125				
	ng/dscm total TEQ	2.3	0.6	0.6	15	2.3	2.3	2.3			0.1	4.1
PCB TEQ	lscm total TEQ											2329.8
Organics	mg/dscm								5 total Cl	10		15.0
Hydrogen Chloride	ppm(v)	15	15	15	3100	100	100	100	5	10		1106.2
	or % reduction	99%	99%	99%		93%	93%	93%				
Sulfur Dioxide	ppm(v)	55	55	55	55	55	55	55	25	50		54.6
Nitrogen Oxides	ppm(v)	250	250	250	250	250	250	250	100	200		93.0
Lead	mg/dscm	1.2	0.07	0.07	10	1.2	1.2	1.2				3.6
	or % reduction	70%	98%	98%		70%	70%	70%				
Chromium	mg/dscm											
Cadmium	mg/dscm	0.16	0.04	0.04	4	0.16	0.16	0.16			0.05	0.3
	or % reduction	65%	90%	90%		65%	65%	65%				
Mercury	mg/dscm	0.55	0.55	0.55	7.5	0.55	0.55	0.55			0.05	5.4
	or % reduction	85%	85%	85%		85%	85%	85%				

a) Increased Storm Water Flow from the parking bay

The building roofs and parking bay pavements will lead to increased volume and velocity of storm water or run-off flowing across the area covered. This will lead to increased amounts of storm water entering the drainage systems, resulting in overflow and damage to such systems in addition to increased erosion or water logging in the neighboring estate.

b) Water Pollution

If the sites for dumping solid wastes are not well taken care of, they may cause contamination to ground water sources if any and also form breeding areas for mosquitoes; this may cause human diseases like malaria and cholera. The proponent will put in place an efficient waste management scheme that will prevent the accumulation of uncontrolled waste, as well as an efficient collection system and off-site disposal.

c) Air Pollution

Poor solid waste management could lead to blocking of drains especially when they clog the pipeline, and this can lead to flooding and unsanitary conditions within the block and more so to its environ. Blocked drains produce bad odour hence are environmentally unfriendly. The proposes to have good controlled and well management waste management to avoid this from occurring.

d) Noise Pollution

Substantial amount of noise is expected during operation of the facility though to a minimum. Low music from the background might be played on some occasions but this impact is negligible as the proponent does not look forward to playing any pitched music in the facility

6.2.2 Impacts Related to Occupational Health and Safety

a. Fire hazard

Fire hazard is a reality during the operation phase since use of electricity and related appliances will be used within the building. If appropriate measures are not put in place, fire outbreaks can cause great damage to property and even death to humans. The proponent has accepted to take all the measures against this as shall be seen in the next chapter and in the EMP.

b. Accidents

The facility will have a basement and six (6) floors up. Poorly constructed stairs, floors etc. may lead to accidents to the occupants of the building and the necessary measures shall be put in place to avoid such incidents.

c. Congestion

As per the Factory and Other Places of Work Act, every person in a working space is entitled to at least $10m^3$ of space excluding space above 4m high. Congestion is evident in similar settings if measures to curb the same are not put in place.

d. Ventilation

Free circulation of air in any work environment is necessary. If natural ventilation in any structure is not adequate, artificial ventilation is advisable.

6.2.3 Socio-economic Impacts

Employment Generation

Employment opportunities are one of the long-term major impacts since people will be employed to work in these offices and the hotel facility. These will involve security personnel and other ancillary staff as may be required.

I. Optimal use of Land

Construction of the facility shall greatly render it economically useful which is in line with the government's call to utilize idle land. Land is a scarce resource in Kenya and through construction of the proposed development; the project will ensure optimal use of land to the great benefit of the country and its people.

6.3 decommissioning phase

6.3.1 Positive Impacts decommissioning phase

1) Rehabilitation

Upon decommissioning the project, rehabilitation of the project site will be carried out to restore the site to its original status. This will include replacement of topsoil and re-vegetation which will lead to improved visual quality of the area. Alternatively, a new different structure may be put up.

2) Employment Opportunities

Several employment opportunities will be created for the demolition staff.

6.3.2 Negative Impacts

1. Solid Waste

Demolition of the project buildings and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

2. Medical waste

The hospital is expected to generate Medical waste during the operation phase. The waste will include any material that could come into contact with the body during diagnosis, research, drug administration or any type of treatment.

3. Dust

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighbouring residents.

4. Noise and Vibration

The demolition works will lead to significant deterioration of the environment within the project site and the surrounding areas through noise and vibrations.

CHAPTER SEVEN: PROPOSED MITIGATION MEASURES AND MONITORING PROGRAMMES

This section highlights the mitigation measures for the expected negative impacts of the proposed project. The potential impacts and the possible mitigation measures have herein been analyzed under the three phases: Construction, Operational and Decommissioning.

7.1 MITIGATION OF CONSTRUCTION RELATED IMPACTS

7.1.1 Air quality

Controlling dust during construction is useful in minimizing nuisance conditions. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (NOx, CO_2, SOx, and diesel related PMB_{10B}) that would occur in the exhaust from heavy equipment are also included.

The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the project will be sensitized prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips and minimize idling of engines.

Dust emissions will be controlled by the following measures:

- Watering all active construction areas as and when necessary to lay dust.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.

7.1.2 Noise Pollution

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.

- A substantial permanent increase in ambient noise levels (more than five dBA) in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

This impact is of significance given that learning activities will carry on alongside. The proponent shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimize the impact of temporary construction noise at the project site to safeguard the pupils.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Limit pickup trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use and encourage workers to shut off vehicle engines whenever possible.

7.1.3 Generation of Exhaust Emission

In order to control exhaust emissions, the following measures shall be implemented during construction.

- Vehicle idling time shall be minimized
- Alternatively, fuelled construction equipment shall be used where feasible
- Equipment shall be properly tuned and maintained

This will also be achieved through proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.

7.1.4 Worker accidents

The proponent is committed to adherence to the occupational health and safety rules and regulations stipulated in Occupational Health and Safety Act (Cap 514). In this regard, the proponent is committed to provision of appropriate personal protective equipment, as well as ensuring a safe and healthy environment for construction workers as outlined in the EMP e.g. well stocked first aid kit on site.

7.1.5 Populations of disease vectors

Disease vectors such as rats, flies, and cockroaches increase where refuse is exposed or uncollected and can be a hazard. Complete refuse collection and handling service will be provided by the proponent so that this is not a hazard.

7.1.6 Possible exposure of workers to diseases

Possible exposure of workers to diseases from building materials at construction site shall be mitigated by occupational health and safety standards enforcement.

7.1.7 Worker accidents during construction and operation

Workers accidents especially in deep trenching operations and from gas accumulation in sewers and other confined spaces shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response in addition to safety education and training shall be emphasized.

7.1.8 Reduction of Impacts at Extraction Sites and Efficient Use of Raw Materials

The proponent must source building materials such as sand, ballast and hard core from registered quarry and sand mining firms, whose projects have undergone satisfactory environmental impact assessment/audit and received NEMA approval. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated.

To reduce the negative impacts on availability and sustainability of the materials, the contractor must only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the proponent will ensure that wastage, damage or loss (through run-off, wind, etc.) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

7.1.9 Minimization of Run-off and Soil Erosion

The proponent will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off. Parking bay will be constructed in such a manner that spaces are allowed between the slabs so as to allow infiltration of storm water as opposed to continuous concrete slab.

7.1.9 Minimization of Construction Waste

It is recommended that demolition and construction waste be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed of. In addition, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects.

Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community groups, institutions and individual residents or home owners.

Additional recommendations for minimization of solid waste during construction of the project include:-

i. Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time
ii. Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
iii. Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials
iv. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
v. Use of construction materials containing recycled content where possible and in accordance with accepted standards.

7.1.10 Minimization of Noise and Vibration

Noise and vibration must be minimized given the quiet environment required by the neighbouring residential areas through sensitization of construction truck drivers to switching off vehicle engines while offloading materials. In addition, they will be instructed to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, mosques, residential areas and hospitals. In addition, construction machinery shall be kept in good condition to reduce noise generation. It is recommended that all generators and heavy duty equipment be insulated or placed in enclosures to minimize ambient noise levels. Where possible, noisy construction activities must be avoided during class hours.

7.1.11 Reduction of Energy Consumption

The proponent shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. In addition, proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the proponent shall monitor energy use during construction and set targets for reduction of energy use.

7.1.12 Minimization of Water Use

The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use.

7.2 MITIGATION OF OPERATION PHASE IMPACTS

7.2.1 Ensuring Efficient Solid Waste Management

The proponent will be responsible for efficient management of solid waste generated by the project during its operation. In this regard, the proponent will provide waste handling facilities such as waste bins for temporarily holding waste generated at the site. In addition, the proponent will ensure that such is disposed off regularly and appropriately. It is recommended that the proponent puts in place measures to ensure that the occupants of the offices manage their waste efficiently through reuse and proper disposal procedures.

7.2.2 Ensuring proper disposal of medical waste

The proponent will ensure Medical wastes generated during the operation phase are disposed using approved methods. The waste will include any material that could come into contact with the body during diagnosis, research, drug administration or any type of treatment. A medical incinerator will be used to ensure that all traces of infections or pathogens are completely destroyed.

Incineration will be installed on the 8th floor to transforms medical wastes into inorganic, incombustible matter thus leading to significant reduction in waste volume and weight. The main purpose of any medical waste incinerator is to eliminate pathogens from waste and reduce the waste to ashes. The proponent has identified PYROFLAME biomedical waste incinerator which is approved by NEMA. The incinerator is available in Nairobi including its parts.

7.2.2 Minimization of Sewage Release

The proponent will ensure that the sewer lines are well connected to the Waste Water Treatment Plant while at the same time making sure that the lines are not blocked or damaged since such vices can lead to release of the effluent, resulting in land and water contamination. Such blockages or damages will be fixed expeditiously.

7.2.3 Ensure Efficient Energy Consumption

The proponent plans to install an energy-efficient lighting system in the facility which will contribute immensely to energy saving during the operational phase of the project. Occupants will also be sensitized to ensure energy efficiency in their operations. To complement these measures, it will be important to monitor energy use during the operation of the proposed development and possibly set targets for efficient energy use.

7.2.4 Ensure Efficient Water Use

The proponent must install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified plumber. In addition, the occupants of the offices will be sensitized to use water efficiently.

7.3 MITIGATION OF DECOMMISSIONING PHASE IMPACTS

7.3.1 Minimize noise pollution

Refer to section 7.1.2

7.3.2 Reduce workers accidents

Refer to section 7.1.4

7.3.3 Reduce possible exposure of workers to diseases

Refer to section 7.1.6

7.3.4 Minimize noise on vibration

Refer to section 7.1.10

7.3.5 Efficient Solid Waste Management

Solid waste resulting from demolition or dismantling works will be managed just as in Section 7.7.2

7.3.6 Reduction of energy consumption

Refer to section 7.1.11

77.3.7Minimization of water use

Refer to section 7.1.12

CHAPTEREIGHT: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 Introduction

Environmental Management Plan (EMP) for proposed projects provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. As defined in EMCA, 1999, the EMP assigns responsibilities, cost and a timeframe within which mitigation measures and monitoring can be done. The objectives of the Environmental Management Plan are:

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

8.2 Costing

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

8.3 Plan Period

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

Table 1: Environmental management Plan (EMP)

The table below gives a summary of the environmental health and safety impacts that the project has on the proposed site and the possible mitigation measures monitoring actions required ensuring minimal damage of the environment.

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
1. Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High demand of materials	Ensure accurate bill of quantities (BOQ).	Contractor	Throughout	5,000
	Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills.	Contractor	Throughout	0
2. Minimize vegetation and grass disturbance at and or around construction site				
Vegetation/ Grass disturbance	Ensure proper demarcation and delineation of the project area to be affected by construction works.	Contractor	1 month	0
	Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage.	Site engineer	1 month	0
	Designate access routes and parking within the site.	Site engineer	1 month	5000
	Design and implement an appropriate landscaping programme to help maintain the environmental aesthetic	Proponent	2 months	10,000
3. Reduce storm-water, runoff from parking bay and soil erosion				
Increase storm water, runoff and soil erosion	Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.	Contractor	1 months	20,000
	Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site.		Throughout	
4. Minimize solid waste generation and ensure efficient solid waste management during construction				

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Increased solid waste generation	Use of an integrated solid waste management system i.e. through, recycling, reuse, Combustion.	Contractor	Throughout construction period	20,000
	Comprehensive BOQ	Contractor	One-off	0
	Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of.	Site engineer & Contractor		
	Ensure that damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects	Site engineer & Contractor		-
	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Site engineer & Contractor	One-off	-
	Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials	Site engineer & Contractor	Throughout construction period	0
	Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste	Site engineer	Throughout construction period	0
	Waste collection bins to be provided at designated points on site			20,000
	Private waste disposal company to be contracted to transport and dispose the solid waste from site			
5. Reduce dust emissions				
Dust emission	Ensure strict enforcement of on-site speed limit regulations	Site engineer & Contractor	Throughout construction	-
	Avoid excavation works in extremely dry weathers			5,000 per

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles		period	month
	Personal Protective equipment to be worn			
6. Minimization of exhaust emissions				
Exhaust emission	**1.** Vehicle idling time shall be minimized	Site engineer & Contractor	Throughout construction period	0
	Equipment shall be properly tuned and maintained	Site engineer & Contractor	Throughout construction period	0
	Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points			
7. Minimization of Noise and Vibration				
Noise and vibration	Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used, to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and hospitals	Site engineer & Contractor	Throughout construction period	-
	Ensure that construction machinery are kept in good condition to reduce noise generation	Site engineer & Contractor	Throughout construction period	5,000
	Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels.	Site engineer & Contractor	Throughout construction period	5,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Trees around the site will provide some buffer against noise propagation	-	Throughout construction period	0
	The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.	Site engineer & all site foremen	Throughout construction period	0
8 Minimization of Energy Consumption				
Increased energy consumption	Ensure electrical equipment, appliances and lights are switched off when not being used	Site engineer & Contractor	Throughout construction period	0
	Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy	Site engineer & Contractor	Throughout construction period	5,000
	Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts	Contractor	Throughout construction period	6,000
	Monitor energy use during construction and set targets for reduction of energy use.	Contractor	Throughout construction period	-
9. Minimize water consumption and ensure more efficient and safe water use				
Increased water demand	Promote recycling and reuse of water as much as possible	Site engineer & Contractor	Throughout construction period	0
	Promptly detect and repair of water pipe and tank leaks	Site engineer & Contractor		1,000 per month

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
	Ensure taps are not running when not in use			0
10. Minimize release of liquid effluent				
Generation of wastewater	Provide means for handling sewage generated by construction workers	Site engineer	One-off	20,000
	Conduct regular checks for sewage pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies		Throughout construction period	0
11. Minimize occupational health and safety risks				
Approval of building plans	Ensure that all building plans are approved by the Local Authority and the local Occupational Health and Safety Office	Machakos County Government	One-off	-
Registration of the premises	Registration of the premises under the Factories and Other Places of Work Act Cap 514, Laws of Kenya is mandatory	DOHSS	One-off	5,000
General register	A general register should be kept within the facility as stipulated in Sec 62 (1) of the Factories and Other Places of Work Act.	Site engineer & Contractor	One-off	1,000
Factories and other places of work Act abstract	The abstract of the Factories and Other Places of Work Act must be displayed at prominent places within the site	Site engineer & Contractor	One-off	2,000
Incidents, accidents and dangerous occurrences.	Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Site engineer, DOHSS & Contractor	Continuous	500/month
	Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.	The Contractor, Site engineer & Site Safety Officer	Continuous	50,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Insurance	Ensure that the premises are insured as per statutory requirements (third party and workman's compensation)	MCG	Annually	_
Safety, health and environment (SHE) policy	Develop, document and display prominently an appropriate SHE policy for construction works	Site engineer, DOHSS & Contractor	One-off	1,000
Sanitary conveniences	Suitable, efficient, clean, well-lit and adequate sanitary conveniences should be provided for construction workers	Site engineer	One-off	5,000
	Provision of clean drinking water, toilets and changing rooms.	Site engineer	Throughout construction period	15,000
Machinery/equipment safety	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Site engineer	One-off	_
Storage of materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Site engineer	Continuous	10,000
Safe means of access and safe place of employment	All floors, steps, stairs and passages of the premises must be of sound construction and properly maintained	Contractor	Continuous	_
Emergency preparedness and evacuation procedures	Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency	Contractor	One-off	1,000
First Aid	Well stocked first aid box which is easily available and accessible should be provided within the premises	Contractor	One-off	5,000
	Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Contractor	One-off	10,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Fire protection	Firefighting equipment such as fire extinguishers and hydrant systems should be provided at strategic locations such as stores and construction areas.	Site engineer & Contractor	One-off	30,000
	Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained	Site engineer & Contractor	Every 3 months	5,000
	Signs such as "NO SMOKING" must be prominently displayed within the site, especially in parts where inflammable materials are stored	Site engineer & Contractor	One-off	_
Ventilation	Enough space must be provided within the premises to allow for adequate natural ventilation through circulation of fresh air	Contractor	One-off	_
Lighting	There must be adequate provision for artificial or natural lighting in all parts the premises in which persons are working or passing	Contractor	One-off	_
Electrical Safety	Circuits must not be overloaded	Contractor	Continuous	_
	Distribution board switches must be clearly marked to indicate respective circuits and pumps	Contractor	One-off	_
	There should be no live exposed connections	Site engineer	Continuous	_
	All electrical equipment must be earthed	Site engineer	One-off	_
11. Vector Borne and Water Borne Disease Incidence	Complete refuse collection and handling service to be provided	Contractor	Continuous	5,000
12. Insecurity	Appoint security personnel operating 24 hours	Security guard	Continuous	50,000
	Security alarms should be installed		Continuous	

13. Air Pollution	Suitable wet suppression techniques need to be utilized in all exposed areas	Site manager	Continuous	
	All unnecessary traffic must be strictly limited on site speed controls are to be enforced	Site manager	Continuous	
OPERATION PHASE				
Guests and Workers Health and Safety				
Food safety	Ensure perishable/short-life food products are preserved and their quality maintained	Food and Beverage department	Continuous	50,000
	Product display should be well thought out to prevent contamination of foodstuff			
	There should be a procedure for handling contaminated or expired products which is available to responsible staff			
	All contaminated products unfit for consumption should be disposed off in a manner such that it would not be used for food			
	Ensure products bear the Kenya Bureau of Standards (KEBS) logo where applicable			
	Avoid product expiry by controlling the purchase of short-life products			
	Conduct regular checks for product expiry or contamination			
Safety concerns	Provide appropriate personal protective clothing to the hotel staff			
	Train staff on first aid and firefighting.			
	Follow proper work guidelines			
	Hiring of competent staff with			
	Induction courses for new staff.			

	Health and safety communication to all staff through meetings, bulletins, audio-visuals, posters, newsletters.			
	Accidents investigation by top management in the hotel			
	Proper safety planning, rules and work procedures.			
	Periodic training programmes.			
	Emergency plan should be communicated and well understood by all.			
	Forming partnerships with the local authorities the body charged with the responsibility of taking care of the local communities.			
	Health and safety committee- Provisions are needed for the formation of a Health and Safety Committee, in which the employer and the workers are represented			
Emergency plan	Develop Emergency Response plan incorporating external agencies	Management	Immediately	100,000
Fire Risk	Form special firefighting team Conduct fire drills Label fire assembly point	Management	Continuous	20,000
2. Noise				
Noise generation	All machinery including air conditioners should be kept in good working condition through regular repairs, servicing and maintenance to reduce noise levels within the premises and surrounding areas Regular servicing of the vehicles Use unleaded fuel for the vehicles	Management	Continuous	50,000
3. Waste management				
General Solid Waste	Segregating general solid waste generated and arrange for proper disposal	Management	Continuous	50,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Ksh)
Medical waste	Use medical incinerator to transform medical waste into inorganic incombustible matter			
Waste water	Monitor quality of effluent released to environment after going through Waste water treatment Plant			
oil spillage	Proper handling of oil. The company that services the machines should ensure proper disposal of used oil.			
General				
Policies	Develop; Environmental, Health safety policies. Fire Emergency Action Plan A summarized SHE policy statement should be displayed prominently within the premises	Management	Immediately	150,000
Records	Maintain waste disposal records Maintain power consumption records Maintain workers' health records Maintain fuel oil usage records Maintain records of accidents Maintain records of regular servicing of the vehicles.	Management	Continuous	10,000

CHAPTER NINE: CONCLUSION AND RECOMMENDATION

9.1 Conclusion

The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. It will be implemented after the approvals by among others by physical planning department and NEMA. During the project construction phase, the proponent and contractor will avoid inadequate/inappropriate use of natural resources, conserve nature sensitively and guarantee a respectful and fair treatment of all people working on the project, general public at the vicinity and inhabitants of the project area. In relation to the proposed project, mitigation measures that will be incorporated during construction phase, the development's input to the society and cognition that the project proponent is economically and environmentally sound, this development will be considered beneficial and important. It is our conclusion that the proposed development is a timely venture that will increase health facilities within the country.

9.2 Recommendations

It is our recommendation that the project be allowed to go ahead provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close follow-up and implementation of the recommended Environmental Management and Monitoring plans (EMPs). We recommend this:

1. The proponent should follow the guidelines as set by the relevant departments to safeguard and envisage environmental management principles during construction and operations/occupation phases of the proposed project.
2. It is important that warning or informative sign (bill boards) be erected at the site. These should indicate the operation hours and when works are likely to be started and completed. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.
3. The Waste Water Treatment Plan construction and commissioning should be authorized by relevant authorities
4. All solid waste materials and debris resulting from construction activities should be disposed off at approved dumpsites.
5. All construction materials and especially pipes, pipe fittings, sand just to mention should be sourced/procured from *bonafide* /legalized dealers.

6. During construction all loose soils should be compacted to prevent any erosion by storm water, rain and wind.
7. Other appropriate soil erosion control measures can be adapted. Any stock piles of earth should be enclosed, covered or sprinkled with water during dry or windy conditions to minimize generation of dust particles into the air.
8. Once earthworks have been done, restoration of the worked areas should be carried out immediately by backfilling, landscaping/leveling and planting of suitable ornamental species.
9. Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of metal bodies. Maintenance should be conducted in a designated area and in a manner not to interfere with the environment.
10. A fully equipped first aid kit should be provided within the site
11. Workers should get food that is hygienically prepared. The source of such food should be legalized or closely controlled.
12. The contractor should have workmen's compensation cover and is required to comply with workmen's compensation Act as well as other relevant ordinances, regulations and Union Agreements
13. The contractor should provide adequate security during the construction period.

11.0 REFERENCES

1. Kenya gazette supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. *Government printer, Nairobi*
2. Kenya gazette supplement Acts *Building Code 2000 by government printer, Nairobi*
3. Kenya gazette supplement Acts *Local Authority Act (Cap. 265) government printer, Nairobi*
4. Kenya gazette supplement Acts Penal Code Act (Cap.63) *government printer, Nairobi*
5. Kenya gazette supplement Acts *Physical Planning Act, 1999 government printer, Nairobi*
6. Kenya gazette supplement Acts *Water Act, 2002 government printer, Nairobi*
7. Kenya gazette supplement number 56. Environmental Impact Assessment and Audit Regulations 2003. *Government printer,* Nairobi
8. Pollution prevention and abatement handbook – Part III, (September, 2001)
9. ELAW:EPA Emission Standards for Medical Waste Incinerators (1997)
10. Small-scale Medical Waste Incinerators: Evaluation of Risks and Best Management Practices: paper presented in Fogarty International Center meetings in Zambia and Durban (2003).
11. world Health Organisation (2005), Preparation of National Health Care Waste Management Plans in Sub-Saharan Countries, Geneva, Switzerland. 10.
12. World Health Organisation (2005), Management of Solid Health Care Waste at Primary Health Care Centres – A Decision Making Guide, Geneva, Switzerland.
13. GoK (2016) : Health care waste management plan 2016–2021
14. GoK (2011) National Guidelines for Safe Management of Health Care Waste Ministry of Medical Services and Ministry of Public Health and Sanitation, Kenya: Government of Kenya, January 2011

APPEDICES

Appendix1: Land ownership document

REPUBLIC OF KENYA

THE REGISTRATION OF TITLES ACT
(*Chapter* 281)

CERTIFICATE OF TITLE

TITLE NUMBER I.R. 124421

TERM: 99 YEARS FROM 1.11.1983

ANNUAL RENT SHILLINGS 1,790/=
(*Revisable*)

I HEREBY CERTIFY that DIVISIONAL INTEGRATED DEVELOPMENT PROGRAMMES COMPANY LIMITED

of Post Office Box Number 75564, NAIROBI

in the Republic of Kenya ~~pursuant to a Transfer registered as Number I.R.~~ is/are now registered proprietor(s) as Lessee(s)

from the Government of the Republic of Kenya for the term of Ninety Nine

years for the First day of November ~~one~~ Two thousand Nine Hundred

and Eighty Three of ALL that piece of land situate North West of Athi River Township

in the Machakos District containing by measurement Nought Decimal Nought Nine Five Five

hectares/~~acres (less road reserve of~~ (0.0955 Ha.)

~~hectares/acres)~~ or thereabouts and being Land Reference Number 12715/1924

(Original Number 12715/618/19)

as delineated on Land Survey Plan Number 232621

annexed ~~to the said Transfer~~ hereto

SUBJECT however to the revisable annual rent of Shillings One Thousand Seven Hundred and Ninety

and to the Act Special Conditions Encumbrances and other matters specified in the Memorandum hereunder written.

IN WITNESS whereof I have hereunto set my hand and seal this Seventh

day of July Two thousand and Ten

Registrar of Titles

MEMORANDUM C. S. Maina*235

(1) The Government Lands Act (Chapter 280).
(2) The Special Conditions contained in a Grant registered as Number I.R. 46943/1

GPK 5395—15m—7/2008

This certificate of Title is issued under section 70 of the Registration of Titles Act and is in part substitution of the Grant Registered as IR. 46943/1

LAND TITLES REGISTRY - NAIROBI REGISTRY
REGISTRATION OF TITLE ACT
REGISTERED AS No. I.R. 124421/1
PRESENTED 7th July 2010
TIME 1610HRS 3
Registrar of Titles
C. S. Maina*235

THE FOLLOWING INSTRUMENT HAS BEEN REGISTERED AGAINST THE TITLE

Transfer to John Omboga Owner

(2)

Presentation No: 1390 Date of Registration: 14-5-2013

B. F. Ateno "209

18

REPUBLIC OF KENYA

IR 124424

DISTRICT OF MACHAKOS

Locality N.W. of Maroko Municipality

Reference Map South. A. 37 / G.II.d

Bearings °	Distances Metres

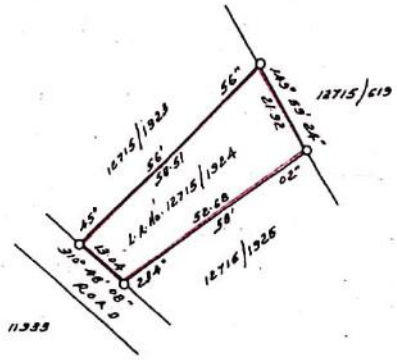
Land Reference No. 12715/1924

(Orig No. 12715/618/19)

Sub division No. (Orig No.

of Section No.

Area = 0.0955 Ha. (Approx.)



J.D. Obal

Licensed Surveyor

VERIFIED
Serial No: 10/7/2210
Verified By:
For Director of Surveys
21/7/10

for Director of Surveys

Scale 1 in 1000

Nairobi 7TH Nov. 2000

Traced by

Compared by

DEED PLAN No. 232621

THE FOLLOWING INSTRUMENT HAS BEEN REGISTERED AGAINST THE TITLE
Transfer to John Omboga Onwer

(2)

Presentation No: 1390 Date of Registration: 14-5-2013.

B. F. Atieno *203

18

REPUBLIC OF KENYA

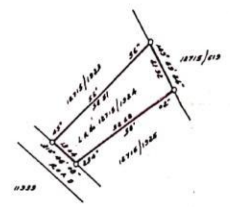
DISTRICT OF MACHAKOS
Locality N W of Maraka Municipality
Reference Map South A-37 / 6.II.d 9

Bearings	Distances Metres

Land Reference No 12715/1324
(Orig No 12715/618/13)

Sub division No (Orig No
of Section No

Area = 0.0355 Ha (Approx.)



LANDS DEPARTMENT
626
RECEIVED

T.D. Obel
Licensed Surveyor

VERIFIED
Serial No: 10/7/2210
Verified by:
For Director of Surveys
21/7/10

for Director of Surveys

Scale 1 in 1000

Nairobi 7th Nov: 2000

Traced by
Compared by

DEED PLAN No. 232621

FORM 7 (r.15(2))

nema
mazingira yetu | uhai wetu | wajibu wetu

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/12792

Application Reference No: NEMA/EIA/EL/17016

M/S **Kefa Mwaura Wamicwe**
(individual or firm) of address

P.O. Box 76826-00620, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead expert**
registration number **9438**

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

Issued Date: **6/10/2020** Expiry Date: **12/31/2020**

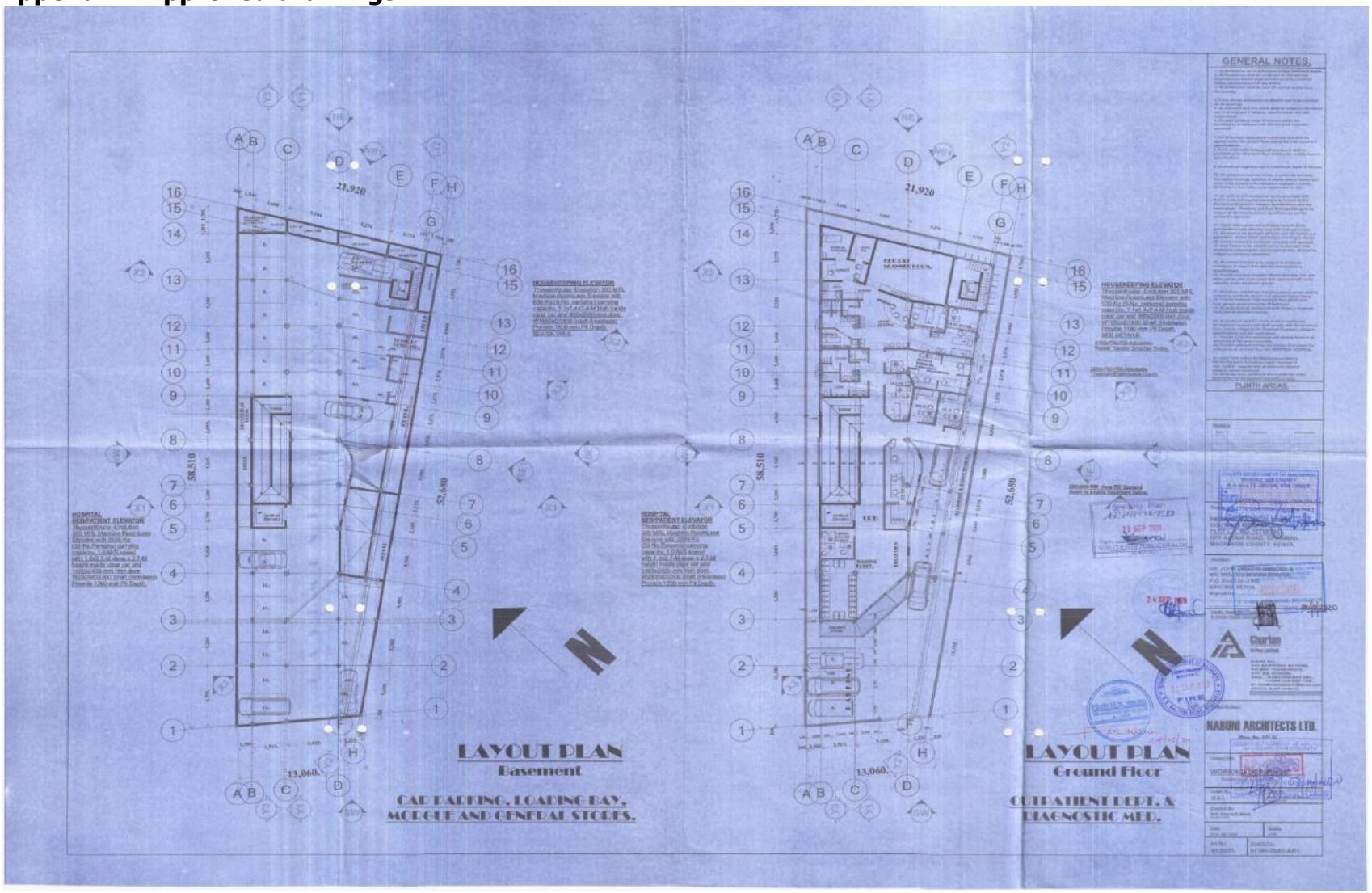
Signature.....

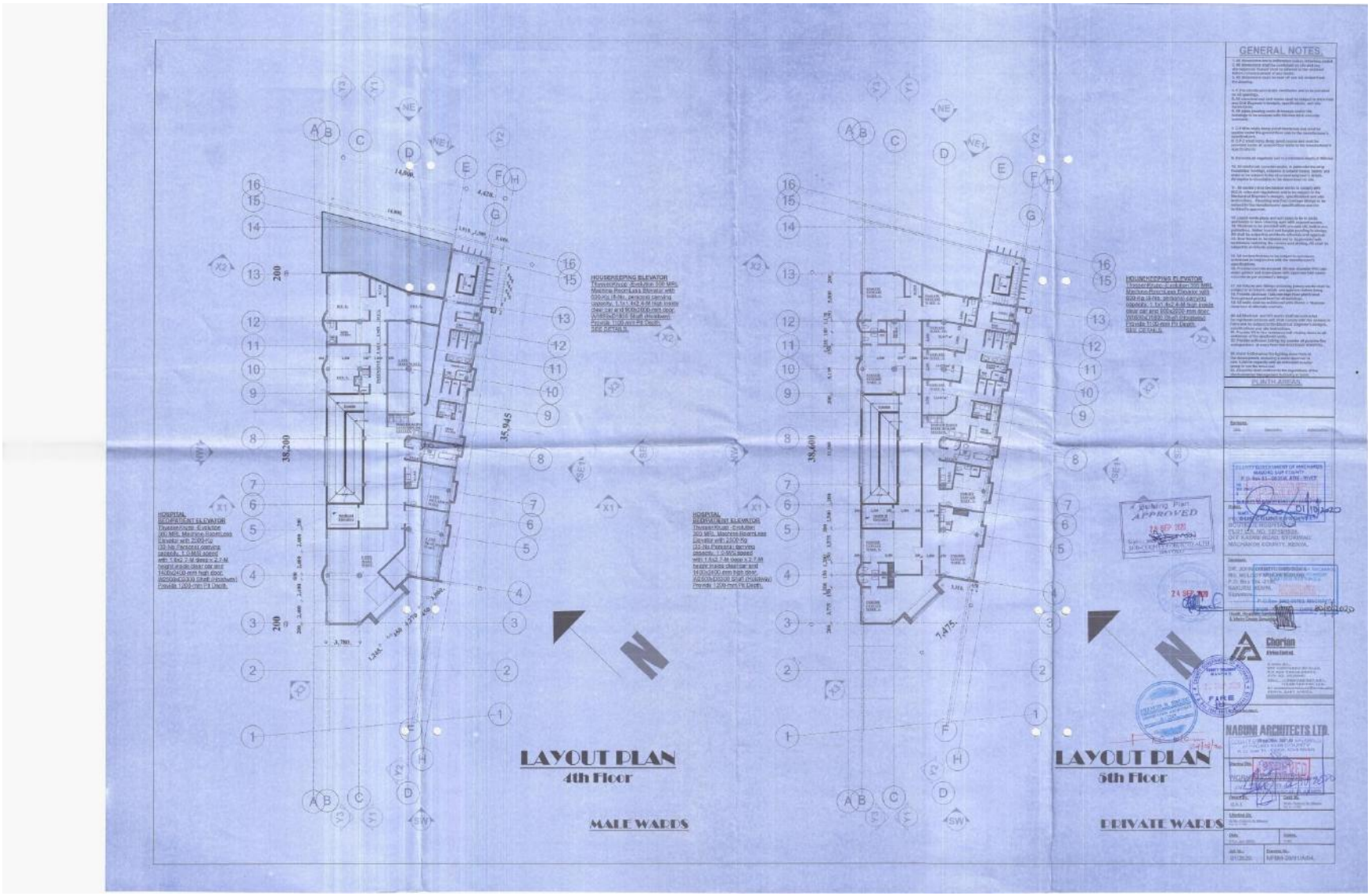
(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2008 Certified

Appendix2 Approved drawings

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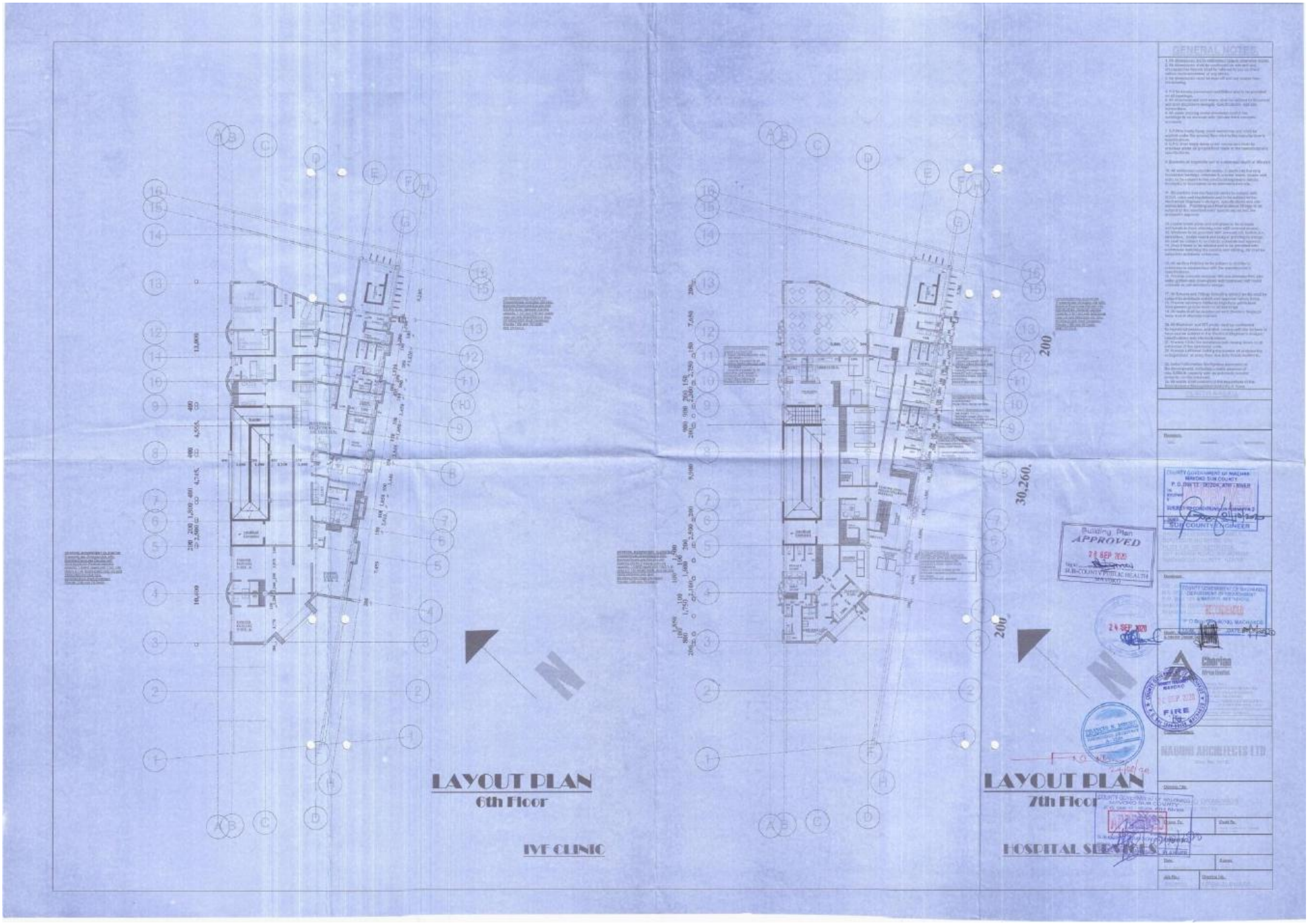
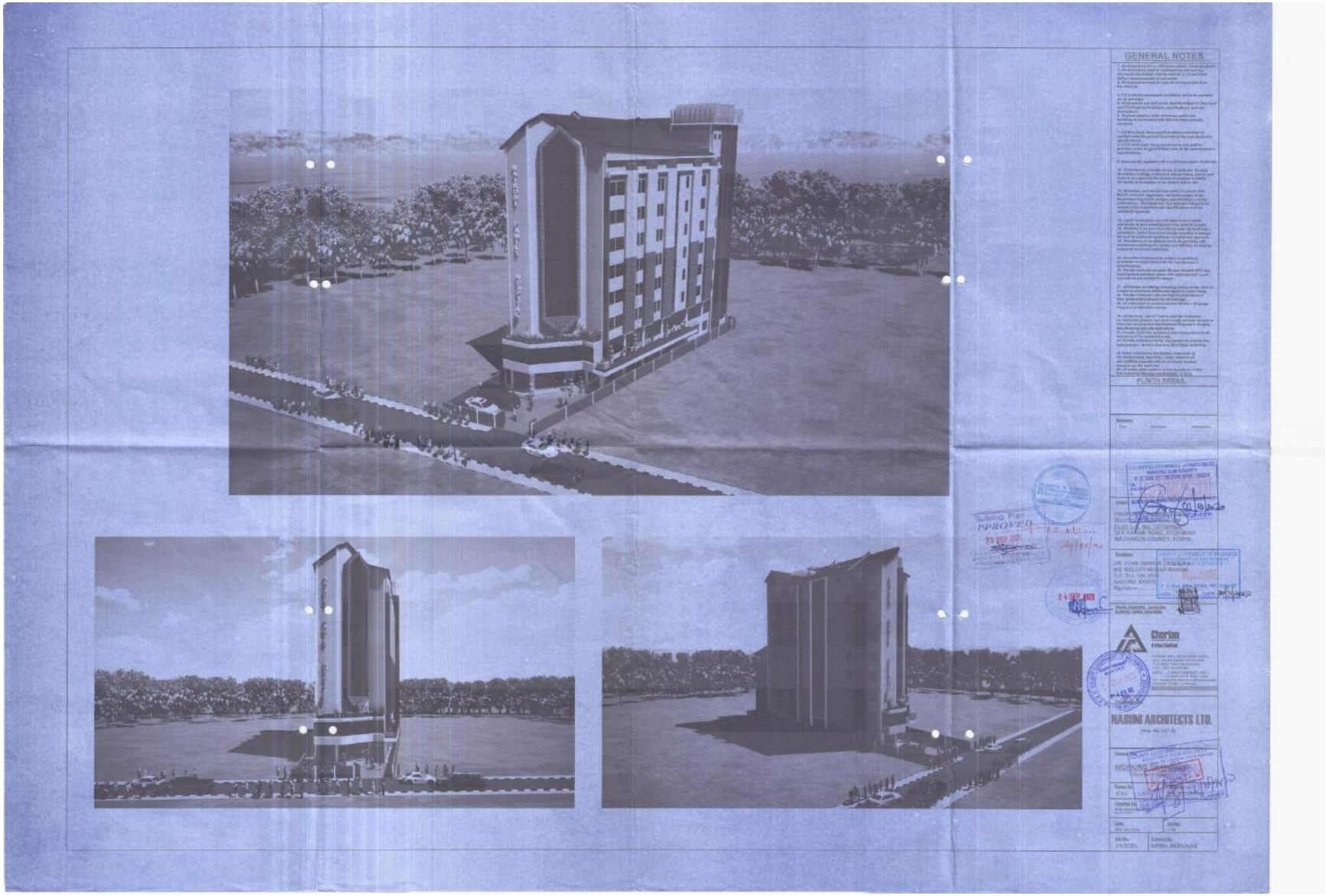
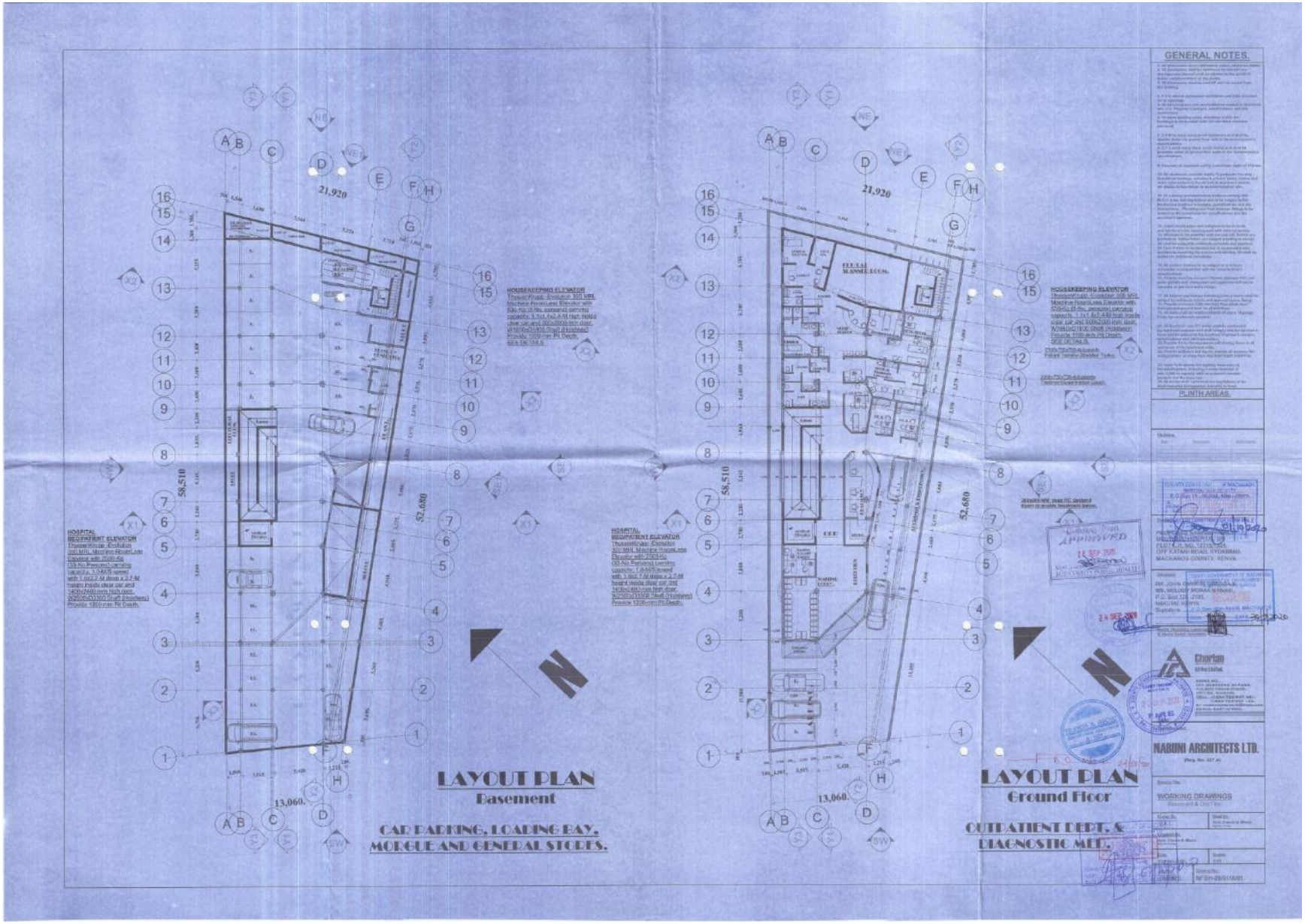
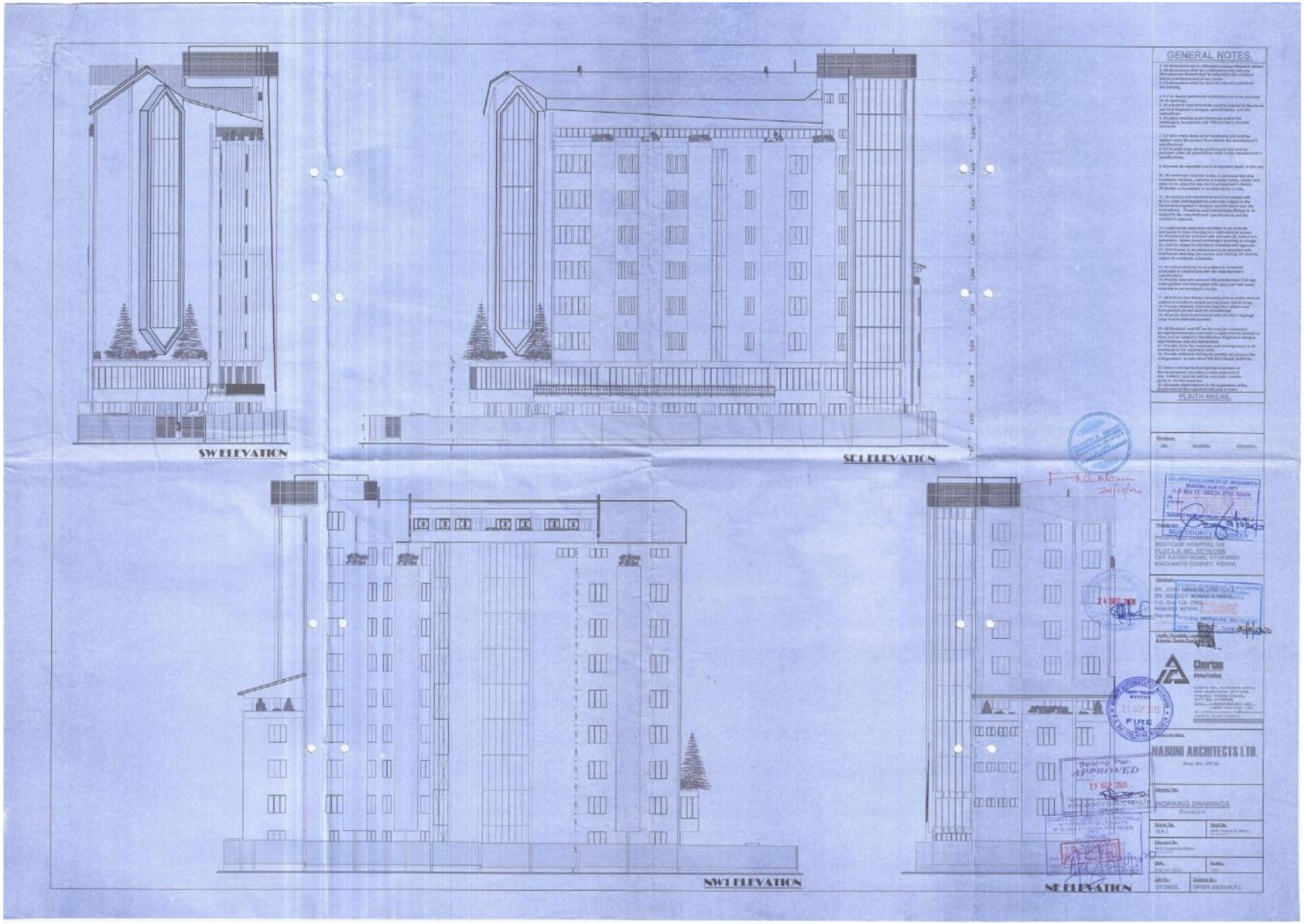
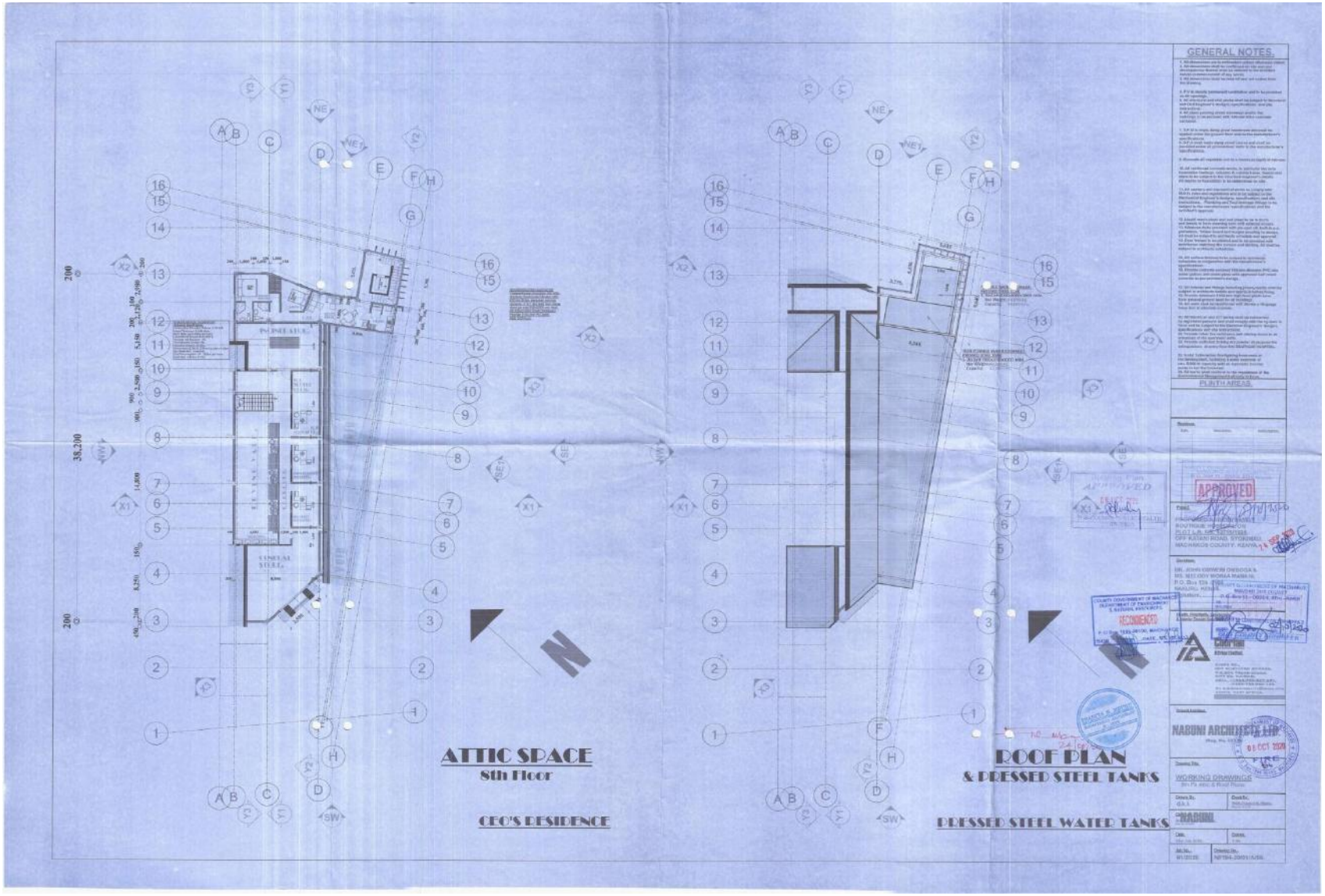
LAYOUT PLAN
4th Floor
MALE WARDS
LAYOUT PLAN
5th Floor
PRIVATE WARDS
NABUNI ARCHITECTS LTD.


LAYOUT PLAN
6th Floor
IVF CLINIC
LAYOUT PLAN
7th Floor
HOSPITAL SERVICES
GENERAL NOTES
Building Plan
APPROVED
24 SEP 2020
SUB-COUNTY ENGINEER


GENERAL NOTES
PLINTH AREAS
NABUNI ARCHITECTS LTD.


GENERAL NOTES.
PLINTH AREAS.
LAYOUT PLAN
Basement
CAR PARKING, LOADING BAY, MORGUE AND GENERAL STORES.
LAYOUT PLAN
Ground Floor
OUTPATIENT DEPT. & DIAGNOSTIC MED.
NABUNI ARCHITECTS LTD.
WORKING DRAWINGS
21.920
58.510
52.680
13.060.


SW ELEVATION
SE1 ELEVATION
NW1 ELEVATION
NE ELEVATION
GENERAL NOTES.
PLINTH AREAS.
NABUNI ARCHITECTS LTD.
WORKING DRAWINGS
Elevations
APPROVED


GENERAL NOTES.
PLINTH AREAS.
ATTIC SPACE
8th Floor
CEO'S RESIDENCE
ROOF PLAN
& PRESSED STEEL TANKS
PRESSED STEEL WATER TANKS
APPROVED
RECOMMENDED
NABUNI ARCHITECTS LLP
WORKING DRAWINGS

Appendix 2 Approval letters

Republic of Kenya

GOVERNMENT OF MACHAKOS COUNTY
ENERGY, LANDS, HOUSING AND URBAN DEVELOPMENT

MAVOKO MUNICIPALITY

Office of The Chief Officer, Lands & Physical Planning,
P.O. Box 1996-90100 **MACHAKOS**
Tel: 0756799905/0748079565/0740669780/ 0722153627

County Director of Physical & Land Use Planning
P.O. Box 11-00204 **ATHI RIVER**
Email: buildingapproval@machakosgovernment.co.ke

PHYSICAL AND LAND USE PLANNING ACT, 2019

S/No. **46/51** Registered Number of Application. **MVK/1270/09/2020**

NOTIFICATION OF APPROVAL OF DEVELOPMENT PERMISSION

TO: DR.JOHN OMBOGA OMWERI
P.O BOX 124-2100,NAKURU-KENYA

Your application, numbered as above, submitted on **11/09/2020** for Permission to build a **HOSPITAL** on **LR NO 12715/1924,** situated in **SYOKIMAU** has been granted **APPROVAL** on **15/09/2020** subject to the following/appended condition(s):

a) **Issuing the County with commencement notice at least 30 hours prior to.**
b) **To obtain authority for excavation and construction of site house before commencement of works.**
c) **Renewing your approval if your construction is not completed within THREE (3) years and completed within FIVE (5) years.**
d) **The land not constituting part of disputed public land**
e) **Abiding by all details and specifications of your approval**
f) **Abiding with all other legal requirements of your application.**
g) **Observe the recommended setbacks and building lines.**
h) **Erection of a construction sign board (see overleaf for instructions)**
i) **Developer to construct a conservancy tank/septic tank at owner's risk and ensure that no spillage of waste water flows along the road or adjacent properties.**
j) **Approval issued under certificate of workmanship**
k) **To ensure a copy of this form NOTIFICATION is attached to the original plan on site always.**
l) **To ensure public utilities along way-leaves are not tampered with during excavation and/or construction**
m) **Obtaining certificate of occupation from county before the building is occupied**

NOTE: The implementation of the structural works remains the sole responsibility of the project Structural Engineer.

Dated.....

Signed.....

Issued by ANTHONY WAMBUA
MUNICIPAL PHYSICAL PLANNER
MAVOKO

for County Director of Physical & Land Use Planning
Government of Machakos County

APPROVED

Government of Machakos County, Mavoko Municipality Physical Planning Office

SITE SIGNBOARD DESIGN
PROJECT:

CLIENT:

PLOT NO:

ARCHITECT:

STRUCTURAL ENGINEER:

MECHANICAL ENGINEER:

ELECTRICAL ENGINEER:

CONTRACTOR:

APPROVAL REF NO:

CONTRACT DURATION:

NOTE: Any other necessary information can be included on the signboard

c.c.

1. Department of Lands & Physical Planning (Survey)
2. Department of Transport, Roads & Public Works
3. Department of Health & Emergency Services (Public Health)
4. Department of Environment & Natural Resources
5. Department of Housing & Urban Development

COUNTY GOVERNMENT OF MACHAKOS
MAVOKO SUB COUNTY
PHYSICAL PLANNING OFFICE
11 SEP 2020
RECEIVED
P. O. Box 11 - 00204, ATHI

Republic of Kenya

GOVERNMENT OF MACHAKOS COUNTY
ENERGY, LANDS, HOUSING AND URBAN DEVELOPMENT

Office of The Chief Officer, Lands & Physical Planning
P.O. Box 1996-90100 **MACHAKOS**

County Director of Physical & Land Use Planning
P.O. Box 11-00204 **ATHI RIVER**

PHYSICAL AND LAND USE PLANNING ACT, 2019

S/No.....

Registered Number of Application.....
PDAIRGGNO7355/12715/1924/2020

APPLICATION FOR DEVELOPMENT PERMISSION

(To be submitted in TRIPLICATE in respect of each transaction and sent to or left at Physical Planning Office of the Mavoko Sub County).

To the **COUNTY EXECUTIVE COMMITTEE MEMBER, ENERGY, LANDS HOUSING & URBAN DEVELOPMENT**

I/We hereby apply for permission to develop the land and/or building as described in this application and on the attached plans and drawings.

Date 13/9/20 Signature of Applicant/Developer..... I.D. No. 20205791

Physical Planner/Architect/Engineer:
Name. NABUNI ARCHITECTS LTD. (ARCHT. FRANCIS N. MBURU)
Address. P.O. BOX 79248-00200 NAIROBI
Practicing/Registered Serial No. 327A ..... (Attach Endorsed Valid Practicing Certificate)

Sign.....

FRANCIS N. MBURU
REGISTERED ARCHITECT
A-1329

13/9/20

SECTION A—GENERAL INFORMATION

1. Owner's name and address. JOHN OMBOGA BOX 124 NAKURU
2. If applicant is not the owner, state interest in the land e.g. leasee, prospective purchaser, etc. and whether the consent of the owner to this application has been obtained.
N/A

4. (a) L.R. or Parcel No. 12715/1924.
(b) Ward, Town, and Road. SYOKIMAU, KATANI ROAD.
(c) Acreage. 0.0955-Ha.
(d) Location (**X, Y**) Geographic Coordinates. -1.374540, 36.933496

5. If an application has been previously been submitted state the registered number of the application.
N/A

COUNTY GOVERNMENT OF MACHAKOS
MAVOKO SUB COUNTY
PHYSICAL PLANNING OFFICE
11 SEP 2020
RECEIVED
P. O. Box 11 - 00204, ATHI

SECTION B—SUBDIVISION

6. Describe briefly the proposed subdivision including the purposes for which land and/or buildings are to be used..... N/A .....
7. State the purpose for which land and/or buildings are now used. If not now used, the purpose for which and the date on which they were last used..... N/A .....
8. State whether the construction of a new or an alternative of an existing means of access to or from a road is involved..... N/A .....

9. State method of:-

(a) Water supply ..... COUNTY GOVERNMENT OF MACHAKOS.
(b) Sewerage disposal..... WATER TREATMENT ECO-CYCLING
(c) Surface water disposal..... OPEN STORM DRAIN.....
(d) Refuse disposal..... INCINERATOR.....

10. Give details of any relevant easements affecting the proposed subdivision.....
..... N/A .....

SECTION B—BUILDING PLAN DETAILS/EXTENSION OF LEASE/USE OR CHANGE OF USER

11. State whether subdivision is involved and if so whether permission has been applied for and if so give registered number of the application.....
12. Describe briefly the proposed development including the purpose for which land and/or buildings are to be used..... PROPOSED BOUTIQUE FAMILY HOSPITAL
13. State the purpose for which land and/or buildings are now used. If not now used, the purpose for which and date on which they were last used..... NOT IN USE .....
14. State whether the construction of a new or alternative of an existing means of access to or from a road is involved..... NONE .....
15. If the proposed development consists only of a change of user and does not involve building operations state the exact nature of such change..... N/A .....
16. If the site abuts on road junction, give details and height of any proposed walls, fence, etc., fronting thereon..... 1.8-M CHAIN-LINK FENCE. .....

17. State method of:

(a) Water supply ..... COUNTY GOVERMENT OF MACHAKOS.
(b) Sewerage disposal..... WATER TREATMENT ECO-RECYCLE.
(c) Surface water disposal..... STORM DRAIN OPEN CHANNELS.
(d) Refuse disposal..... INCINERATOR. .....

18. Give details of any relevant easements affecting the proposals
..... N/A .....

19. State the:

(a) Area of land affected..... 0.0955-Ha. .....
(b) Area covered by buildings..... 475-SQ-METRE
(c) Percentage of site covered..... 5.0% .....

(i) By existing buildings..... N/A .....
(ii) By proposed buildings..... 475-SQ. METRE. .....

Note.—Drawing and specifications must be prepared and signed by the respective licenced professionals.

MAVOKO SUB-COUNTY

ATHI RIVER
TELEPHONE 22406/7

TOWN HALL
P.O BOX 11-00204
ATHI RIVER

INDEMNITY FORM

To be signed by all developers at submission of structural designs and plans for approval (to be signed in triplicate)

We,I,Mr/Mrs/M/s..... I.D NO.....of P.O BOX.....
Being the developer of a proposed building plan Registration No.....
Plot No..... do hereby indemnify the sub-county of Mavoko and The Sub-County Engineer/Planner approving the plan from any claims that might arise as a result of the above building construction during or after the construction including building collapse or loss of life(s) as a result.
The approval of the structural drawings shall NOT relieve me and my structural engineers of full responsibility for errors or omissions in the design, which may subsequently be discovered. This Sub-County shall be absolved from any negligence whatsoever.
We/I shall maintain the services of a qualified and registered structural engineer, Eng. BARAKA O OKOTH Registered Architect Mr. FRANCIS N. MBURU and experienced contractor(s) M/S.....

We /I shall also employ the services of an experienced qualified resident engineer or clerk of works (minimum qualification Diploma in Building Construction or equivalent) or general foreman who is capable of reading the particulars of working drawings showing the details of structural design and ensuring that the work is carried out in accordance therewith and as stipulated in clause126 Building Code, the County Government (Adoptive by-laws) (Building) Order 1968 and the County Government (Adoptive By-laws) (Grade 11) Guiding Order 1968.

Any changes in the engineering professionals involved of the said construction shall be reported to the Sub-County Engineer immediately.

I shall also ensure that materials testing of all structural elements are done, concrete tests results (certified copies) shall be submitted to the Sub-County Engineer for further action.

FRANCIS N. MBURU
REGISTERED ARCHITECT
A - 1228

Developer JOHN OMBOGA Signed .... Date 28/8/2020

Architect FRANCIS N. MBURU Signed .... Date 28/08/2020. 11/Sept./2020

Structural Engineer Eng. BARRICK O. Kenyan A2934 Stamped & Signed .... Date 28/08/2020

PROFESSIONAL ENGINEER
28 AUG 2020
NO. A2934

For Official use only
Accepted........

Date........

COUNTY GOVERNMENT OF MACHAKOS
MAVOKO SUB COUNTY
P. O. Box 11 - 00204, ATHI - RIVER
THIS PLAN
REG. No:........ is recommended for Approval subject to Compliance with Local Government (Adoptive By - Laws) (Building) Order 1968 (LN 15/1969) and Physical Planning Act Cap 286 of 1996 and Structural Engineers Details.

APPROVED

Sign:........ Date: 01/10/2020
SUB COUNTY ENGINEER

Appendix 3: Public participation

ENVIRONMENTAL IMPACT ASSESSMENT ToR FOR THE PROPOSED NAIROBI FAMILY along Katani Road off Mombasa road LR No. 12715/1924

PUBLIC CONSULTATION REPORT

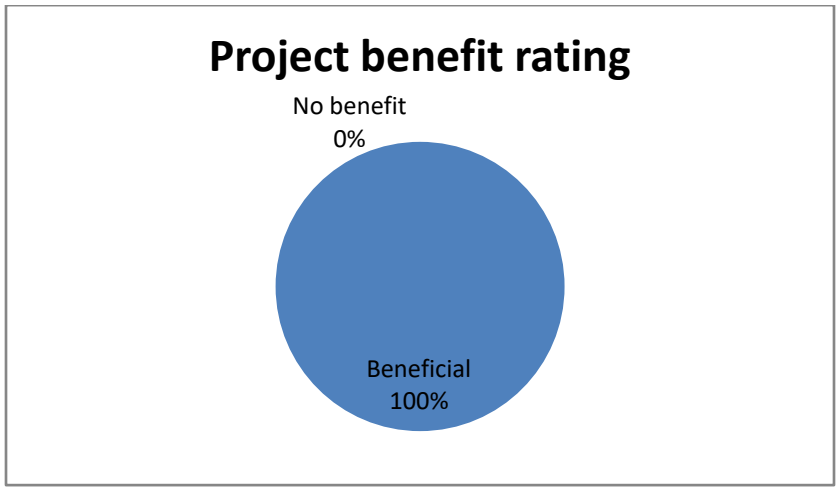
The public consultation was conducted on 23rd and 24th July 2020 through questionnaire from a sample comprising of adjacent homes and institutions. The process was conducted during a very difficult period when there was partial lockdown due to COVID-19 pandemic. Most of homes visited, they were not willing to be interviewed and if it were not the intervention of local administration who accompanied us, we would not have received even what we managed to get.

List of community members consulted

Name of Owner/ Premise	LR No.	Date	Name of respondent
360 degree phase I	Not provided	23/7/2020	Makale Benson
Robert Maina K	12715/100	24/7/2020	Robert Maina K
Crystal Park	Not provided	23/7/2020	Crystal Park
Gikawa	12715/1921	23/7/2020	Joseph Mbuthia
Darga Court	Not provided	23/7/2020	Agness Mutie
Darga Court	Not provided	22/77/2020	Fredlick Ojwang
Mary Mwangimi	12715/145	24/7/2020	Mary Mwangimi
Homestand Shop	1215/1076	24/7/2020	Ashkenaze Nyaora
Elijah Wanyoike	12715/118	24/7/2020	Elijah Wanyoike
Mwangi Julius	12715/102	24/7/2020	Mwangi Julius
Julius Gitonga	12715/1064	24/7/2020	Julius Gitonga
Peter Njenga	12715/1070	24/7/2020	Peter Njenga
Bemal Holdings	Not provided	22/77/2020	Eric O. Manono
Christ Salvation Ministry	Dam Estate (Great wall rd)	23/7/2020	Pastor Luke B. Kewet
James Mwanzia **	Maji fresh route	22/77/2020	James Mwanzia **
Crystal Park	12715/5324	23/7/2020	Esther Nanjala
Thomas O Were	12715/4410	22/77/2020	Thomas O Were
Pure Fresh Company	Katana Area	23/7/2020	Ronald Keter
James Mwanzia **	Not provided	23/7/2020	Gastone Tongolo
Maji Fresh	Not provided	22/77/2020	Francis Mutune
Joseph M. Ngunjiri	12715/1068	24/7/2020	Joseph M. Ngunjiri
Samuel Mwangi	12775/147	24/7/2020	Samuel Mwangi
Joyce Wairimu Kibe	12715/677	24/7/2020	Joyce Wairimu Kibe

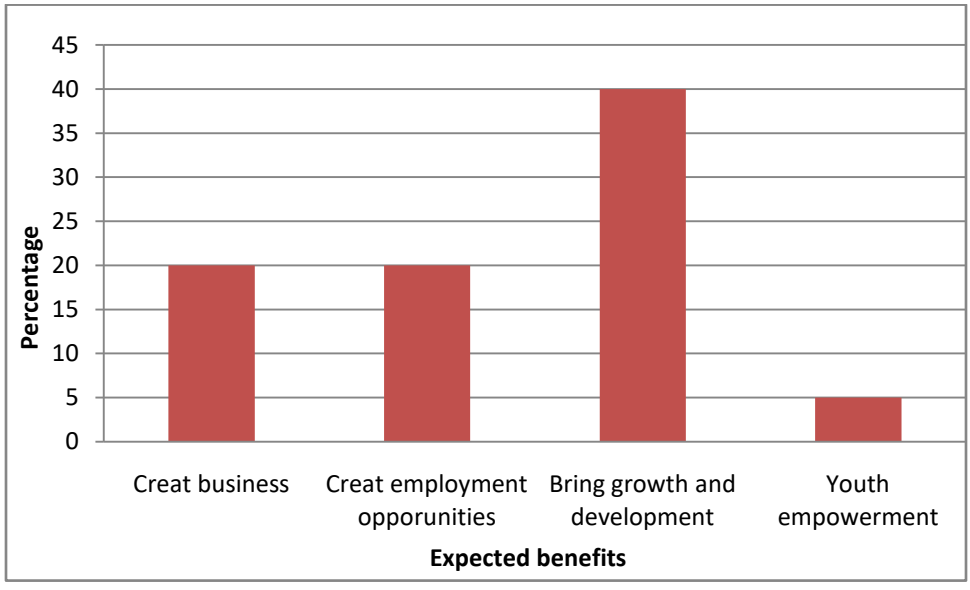
Analysis of project rating

All the respondents consulted were of the view that the project is necessary and benefits outweigh their concerns and should continue.



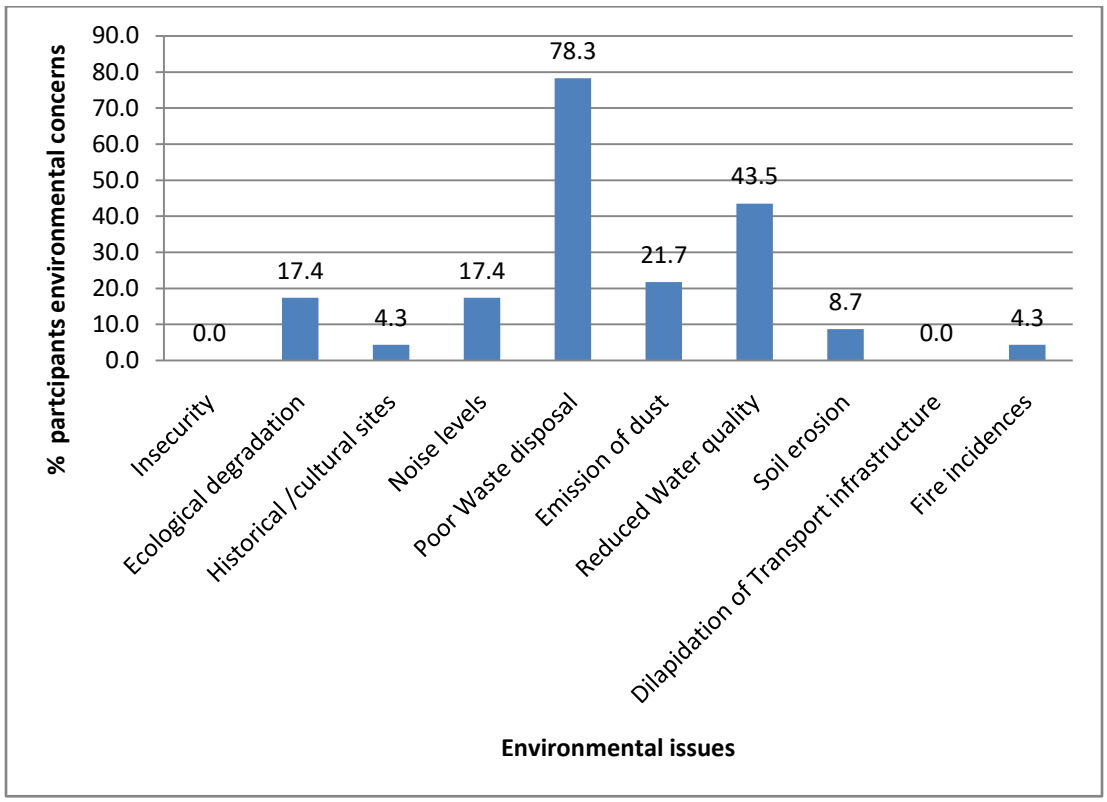
Analysis on expected benefits from the project

The analysis reveals that majority of adjacent community members identified growth and development as main benefit as shown in table below.



Analysis of adjacent community environmental issues concerns

Analysis of environmental issues concerns by the adjacent community, poor waste disposal came at the top followed by reduced water quality.



All the above concerns are addressed in the report. The waste water disposal is addressed through installation of Waste Water treatment plant. This will also address concerns on water quality

Public participation and consultation questionnaire

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED NAIROBI FAMILY BOTIQUE along Katani Road off Mombasa road LR No. 12715/1924

Mr John Ombogo of P O Box 124-2100 Nakuru, Kenya, has proposed to put up Nairobi Family Boutique Hospital at Katani Ward of Athi River Sub-County in Machakos County on L.R No. 12715/1924 Located at Soykimau along Katani road, off Mombasa road. The project proponent has contracted Natural Resource Information and Technology (NRIT) Ltd to conduct EIA study for the project.

Section 58 (2) of the Environmental Management and Coordination Act (EMCA 1999), and the Environment Impact Assessment/Environmental Audit Regulations, 2003, require that an Environmental Impact Assessment be conducted on such proposed projects. In respect to this, the neighbor/ public and affected parties shall be consulted to give their views on the proposed project so as any negative impact existing or anticipated can be highlighted and mitigated. We hereby request you to respond to the brief questions below.

1.0 Details of the Respondent

Name of Owner/ Premise		Date	
Plot No.			
Name of Respondent		Telephone No. of respondent	

2.0 In your perception/ opinion, is this project suitable for the area? **YES** ☐ **NO** ☐

3.0 If **Yes**, what are the reasons/ benefits? (**Give positive impacts**)

……

……

.....

4.0 If **No**, what are the reasons? (**Negative impacts**)

1……..

2. ……

3. ……

5.0 Do you think the project will have any **Negative Effect** on any of the following items?

	ITEMS	**YES**	**NO**
a.	Security		
b.	Natural ecology of the area		
c.	Areas of historic or cultural importance, recreational and leisure facilities (if any)		
d	Noise level		
e	Waste disposal (Solid and liquid)		
f.	Emissions to the air, dust or smells		
g.	Quality of water resources		
h.	Soils		
i.	Transport infrastructures		
j	Fire protection		
k	Others (Please specify)		
l			

6.0 If your answer to any of the above questions is **YES**, state the reason.

……
……
……

7.0 What mitigation measures would you recommend to counter negative impact? [i]

1…….

2. ……

3. ……

Wish to thank you for your time and contribution.

Questionnaire administered by _____*Tel* _____

Date _____ *Signature* _____

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Appendix 4: EIA Expert license

FORM 7 (r.15(2))

nema
mazingira yetu | uhai wetu | wajibu wetu

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/12792

Application Reference No: NEMA/EIA/EL/17016

M/S **Kefa Mwaura Wamicwe**
(individual or firm) of address

P.O. Box 76826-00620, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead expert**
registration number **9438**

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

Issued Date: **6/10/2020** Expiry Date: **12/31/2020**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001: 2008 Certified

[i] *For further information can contact, NRIT, Tel 0722863364 Email kmwamichwe@gmail.com*