GREEN BUILDERS & PLANNING
CONSULTANTS LIMITED

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED LIONS EYE HOSPITAL DEVELOPMENT ON PLOT L.R.NO.15985/1 KANYAKWAR AREA, KISUMU CENTRAL SUB COUNTY IN KISUMU COUNTY

S 0° 6'17.76392"
E 36^{0} 46'17.29812"

This Environmental Impact Assessment (EIA) Study Report is submitted to National Environmental Management Authority (NEMA) Kenya in conformity with the requirements of the Environmental Management and Coordination Act, CAP 387 and the Environmental Impact Assessment and Audit Regulations, 2003).

PROPONENT
LIONS CLUB INTERNATIONAL DISTRICT 411 CHARITABLE TRUST
REGISTERED TRUSTEES,
P.O BOX 66576-00800,
NAIROBI.

DECEMBER 2019

DOCUMENT AUTHENTICATION

This Environmental Impact Assessment study report has been prepared by Green Builders and Planning Consultants Limited (NEMA Expert Reg. No. 9571) in accordance with the Environmental Management and Coordination Act (EMCA) Cap 387 and the Environmental Impact Assessment and Audit Regulation, 2019 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 report are correct and righteous to the best of our knowledge.

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Table 1: Acronyms and Abbreviations Used in This Report

KIWASCO	Kisumu Water and Sanitation Company
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
NEMA	National Environmental management Authority
PPE	Personal Protective Equipment
OHS	Occupational Health and Safety
EHS	Environmental Health and Safety
ERPs	Emergency Response plans
NOx	Nitrogen Oxides
SOx	Sulphur Oxides
COx	Carbon Oxides
EMCA	Environmental Management Co-ordination Act
Φ	Diameter
PV	Permanent vent
Ha	Hectares
EA	Environmental Audit

EXECUTIVE SUMMARY

The purpose of EIA process is to identify potential impacts of the proposed project and then identify the avoidable and the unavoidable for the purposes of avoiding the avoidable and proposal of appropriate measures for mitigating the unavoidable for the purposes of ensuring sustainable development. In so doing, adverse impacts are attenuated while enhancing project benefits but this can only be ensured by commitment of the proponent, sound monitoring and supervision for the purposes of initiating any necessary action to limit adverse impacts disclosed by monitoring.

Lions Club International District 411 Charitable Trust Registered Trustees *Ltd hereinafter* referred to as "*the proponent*"; proposes to carry out a new development to accommodate a three (3) leveled Lions Eye hospital state of the art building, a boundary wall, gate and gate house. The proposed site is a large piece of land (approximately 5 acres) which is currently idle. The area has all the major urban services (water, electricity, and roads) except sewer line which will be provided through a wastewater treatment plant.

The proponent's decision to develop is largely fueled by the lack of readily available medical care within Kisumu City. The population in the area continues to increase, hence the desire for more medical facilities yet the current people have to go far way to seek medical attention. It is estimated that on approval; the project will take approximately 12 calendar months to implement and it is estimated that it will cost approximately **Kshs five hundred million (Kshs 500,000,000).**

There is adequate ventilation and natural lighting, parking, storm water drainage, as well as open areas. The land is registered in the name of the proponent (Please refer to the attached ownership document).

Environmental management and development problems require an integrated approach, as they are so integrated with social, demographic, economic and political elements. The scope of the assessment study covered the physical extent of the project site and its immediate environs as may be affected, proposed works and activities including installation of utilities/facilities and services.

Broadly, the terms of reference were but not limited to evaluation of project objectives, the location of the proposed project site, baseline information generation, legal provisions, technology, materials, procedures and processes to be used, in the implementation and operation of the project vis a viz the principles of environmental conservation and the prevailing legal requirements. The methodology for the study involved comprehensive physical inspection of the site and its environs, desktop studies and consultations with the proponent, his consultants and the neighbors among others.

The positive impacts of any project are in the form of sustainability indicators largely categorised into three broad classes as economic inputs, social inputs and environmental inputs. The economic inputs arising from this project come broadly in the form of real income (investments), employment and fixed capital formation. Environmental inputs include clean and healthy general environment and sustainable use of resources. However, the impacts may be more only that they are decentralized and may not be directly attributed to the project. The main include but not limited to provision of standard educational and support facilities and thus contribution towards reduction of ignorance, creation of employment throughout the project cycle, optimal use of the land and increase in land value, direct and indirect increase in government revenue, economic-investment hence increases in wealth, creation of market for goods and services and especially construction inputs and many secondary businesses are also likely to spring up during the implementation phase especially those providing foods and beverages to the construction workers.

The benefits mentioned notwithstanding, some associated costs may arise as well. There is vegetation part of which will be affected. However, most of the vegetation which includes grass and a few bushes has no significant conservation or economic value. The foreseeable negative

impacts include but not limited to impact (constraints/pressure) to the existing infrastructure i.e. water, power, surface drains (increased storm water/ run off resulting from the roof catchments and as a result of decreased recharge areas), roads among others, impact to soil especially when doing earthworks and reduction of the green areas, increased noise and vibration mostly during project implementation phase and enhanced potential for social crimes.

Others potentially include health and safety concerns especially to workers and immediate neighbours due to potential accidents, noise pollution and disturbance. Hazards associated with construction include but not limited to falling objects, risks from ladder and formwork. There is also risk of crossing live underground electric cables during excavations. Poor quality construction materials, poor workmanship and poor standards may also contribute to accidents. Inadequate skills in machinery operation and stress are serious safety hazard. Other risks involve fires.

The ideal strategy to counter identified adverse effects is avoidance and whenever not possible, alternative strategies of reduction, remediation, and compensation may be explored. Measures can therefore be divided into two categories namely primary measures that intrinsically comprise part of the development design; and secondary measures designed to specifically address the remaining (residual) adverse effects. The proactive design has provided various mitigation measures to ensuring compliance with applicable environmental laws and guidelines including but not limited to lighting, ventilation, space requirements, surface drainage, sewerage system and the structural safety among others.

Sitting, planning and design should ensure compatibility with surroundings and construction standards. To cater for surface drainage, the existing well-designed drain channels should be maintained to harmonize management of the resulting storm water within the site. Storm water/ runoff could be greatly reduced by rainwater harvesting and rainwater storage facilities. The drains should be regularly maintained and covered with gratings to avoid accidents and dirt. To reduce noise pollution, portable barriers to shield compressors and other small stationary equipment where necessary should be installed; engines should be switched off when not in use; machineries well maintained, install silencers whenever possible and ensure that the work is carried out during the day. Vehicle/machinery idling should be minimized/controlled. Encourage use of cleaner fuels such as low sulphur diesel and unleaded gasoline. The maintenance should be conducted in appropriate and designated service bays (off-site) to reduce chances of contamination of environment by resulting oils and greases. Any of such oils should be collected and disposed appropriately. For health and safety, the construction site must be shielded off to keep off students, teachers, support staff and general public for their own safety. All workers should be provided with full protective gear (PPE) and they should be trained and sensitised on health, safety and environmental conservation aspects. Qualified personnel must do all scaffolding, ladder and formwork to standards. Any live cables whether underground or overhead on site must be identified if they exist before construction. Quality materials, skilled labour (where necessary), and the set standards must be put into practice. All precautions (barriers) must be taken to prevent accidents from falling objects.

Effective emergency response plans should be adapted both during the entire project cycle. There should be a specific area for hazardous material storage. Strictly, the **Building Code** and other applicable building standards as may be in force must be adhered to and the **Occupational Safety and Health Act, 2007** must be enforced. An accident/incident record should be kept on site and under care of responsible person and a first aid kit(s) with all basic requirements and the in-charge be trained. To prevent social crimes, the workers should be vetted during recruitment and should be closely monitored and movement out of site should be restricted. Construction workers should not reside on site and should be trained and sensitised on anti-social behaviour.

Throughout the project cycle, sound waste management systems and procedures must be adopted. During the construction phase, the contractor should put in place effective and efficient waste disposal systems. Waste, including debris should be properly disposed of by backfilling or dumping in approved grounds by the Kisumu County Government or other relevant government

offices. The contractor should provide acceptable and standard sanitary conveniences to the workers during the construction. On completion, comprehensive landscaping should be done to upgrade the site to appropriate environmental standards.

The study and a cost and benefit analysis reveals that the benefits far outweigh the associated costs and the benefits can further be maximized with strict adherence to the proposed mitigation measures (the EMPs) and closely working with environmental experts and other relevant professionals, NEMA, Kisumu County Government and other relevant institutions throughout the project cycle. The importance of liaising is to ensure that variation in predicted impacts is handled appropriately during the project cycle otherwise the major concerns at any point in time should be focused towards avoidance or minimizing the occurrence of negative impacts.

1.0 INTRODUCTION

1.1 General overview, Justification and rationale for EIA

The proponent proposes to carry out a new development of a state of the art hospital on Plot L.R. No. 15985/1 off Kisumu - Kakamega Highway, Kanyakwar area, Kisumu County. The proposed project is collaborated by the need for more medical facilities in the current area. The proponent's decision to develop is largely fueled by the rising population in the area. The population continues to increase, hence the desire for more medical facilities. Besides, the project brings forth various advantages as discussed elsewhere in this report.

The rationale for the EIA project report is to integrate environmental aspects in the planning and implementation processes of the proposed project to mitigate adverse impacts and enhance the positives. Besides, environmental impact assessment (EIA) for such projects is now a legal requirement. The ultimate objective of an EIA is to provide decision makers, relevant institutions/organizations, proponent and other stakeholders with the foreseeable environmental impacts of a proposed activity and therefore enable planning ahead taking into account all predictable outcomes and adequately providing for them for sustainability.

The purpose of the study is to identify foreseeable potential impacts (physical, ecological and cultural/socio-economic) so as to enhance the benefits and at the same time avoid negative impacts (costs) or provide appropriate cost effective measures to remedy the negative impacts that cannot be completely avoided. The study is expected to raise both the potential positive and negative impacts likely to emanate from the proposed project. Integrating *Sustainable Environmental Management principles* in the planning, implementation and throughout the project cycle is vital in reducing/mitigating conflicts and enhancing environmental conservation.

1.2 Objectives

The main objective of this EIA project report was to establish the baseline conditions of the proposed site evaluate the existing and the anticipated impacts and propose measures to enhance the positive impacts and measures to attenuate the effects of the significant negative impacts

1.3 Terms of Reference (TOR)

This Environmental Impact Assessment involved the generation of baseline information, establishing the current status of the proposed site and its environs, identification of predictable effects of the proposed facilities on the environment (including infrastructure, occupational health and safety issues) and direction & magnitude of the changes, analysis of the compatibility of the proposed project with the surrounding land uses (as per the prevailing policy and legal framework) and the proposition of potential mitigation measures to be undertaken throughout the project cycle; and development of an environmental management plan with proposed mechanisms for monitoring and evaluating the compliance and environmental performance. The TOR have been approved by NEMA (NEMA/EIA/TOR/36) on 29th November, 2019 and acknowledgement attached herein.

1.4 Scope of EIA Study

The study has been conducted as per the above TOR and as set out in EMCA, CAP 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003. i.e. to evaluate the potential and the foreseeable impacts of the proposed project, generation of baseline information evaluation and recommendation of the best alternatives from the options available (if any), the nature, order of magnitude, extent, duration and reversibility of the potential changes. The geographical scope is limited to the direct and indirect physical extent as may be foreseeably affected by the proposed project.

1.5 Methodology

The methodology involved visits to the proposed site for data collection, relevant desktop study, analysis and interpretation of data collected, analysis of proposed designs, activities and schedules, public participation and consultation with professionals and other stakeholders.

2.0 DESCRIPTION OF THE ENVIRONMENT

2.1 INTRODUCTION

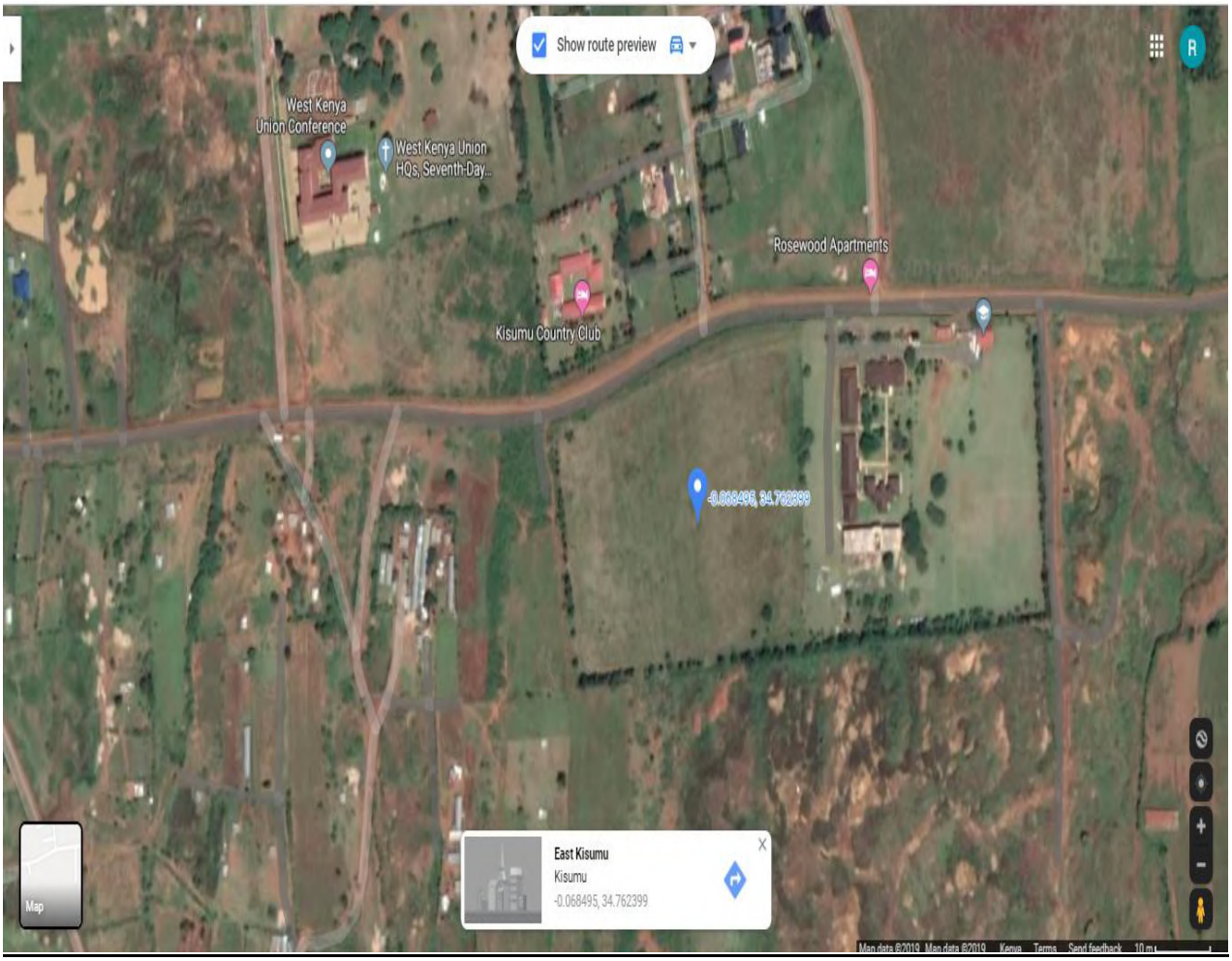
Kisumu, the third largest city in Kenya, is the headquarters of Kisumu County. The city has developed progressively from a railway terminus and internal port in 1901 to become the leading commercial, trading, industrial, communication and administrative center in the Lake Victoria basin, an area that traverses the three former provinces of Nyanza, Western and western Rift Valley. In addition, Kisumu serves as the communication and trading confluence for the Great Lakes region - Tanzania, Uganda, Rwanda and Burundi.

Kisumu County lies within longitude $33^{0}20'$E and latitude $00^{0}20'$S and $00^{0}50'$S. The county covers a total area of 918.5 km^2.

2.2 PHYSICAL LOCATION

The proposed site is located on Plot L.R. No. 15985/1 off the Kisumu - Kakamega Highway through the junction with Lake Basin Mall next to Uzima Unviersity College, Kanyakwar area, Kisumu Central Sub County in Kisumu County. The area is located approximately three kilometers from Kisumu City CBD. The GPS coordinates of the site are Latitude 0°06'17.76392"S and longitude 36°46'17.29812"E.

Plate 1: Google Maps Showing Site Location



photos showing the proposed site which is bare and devoid of any development

2.3 PHYSICAL ENVIRONMENT

2.3.1 Topography, Drainage and Hydrology

The topography is divided into two zones that is Kano plains and midland areas of Maseno and Kombewa. East of Kisumu town do have low ridges and rivers occasionally break kano plains. The Kano plains formation due to the structure on the floor of the escarpment renders itself vulnerable to flooding by heavy rainfalls especially the lower plains. The outstanding features include overhanging huge granite rocks at Kisian, the legendery Kit Mikayi which act as a tourist attraction, Lake. Victoria which is the second largest fresh water lake, Kano Plains well known for rice growing and the lake islands e.g. Ndere.

2.3.2 Soils and Geology

The dominated soil type is red soils. The outstanding features include overhanging huge granite rocks at Kisian, the legendery Kit Mikayi. The granite rocks are exploited to produce building ballets while the soil and river deposits are mined for building sand and moulding bricks.

2.3.3 Climate conditions

The low land that is the Kano plains receives low minimum annual rainfall of between 100mm-1800mm. It experiences two rainy seasons with the longer rainy seasons falling between August and September(1000mm-1800mm) while the shorter rainy seasons falls between March and May (450mm-600mm).

Mean annual maximum temperature is between 20-30 degrees Celsius while the Mean annual minimum temperature is between 9-18 degrees Celsius. Highest temperature is experienced in December to February and the lowest temperatures experienced in July to September.

Plate 3: The area's geography

Source: Field Survey

2.4 BIOLOGICAL ENVIRONMENT

2.4.1 Flora and Fauna
Kisumu County has no gazetted forests and has some wildlife at the Impala National Park.

2.4.2 Aquatic Ecosystems
The aquatic ecosystem of the County is made up of the Lake Victoria which is the second largest and the Kano Plains wetland. The wetland supports several species of fish, hippopotamus, birds and snakes.

2.5 SOCIO-ECONOMIC ENVIRONMENT
2.5.1 Land Use
Kisumu County has four major land uses namely industrial, agricultural, commercial and residential. Only 35% of total land area of the county is used for agriculture and food production, most of which is subsistence farming with maize and sorghum being the most grown crops. A small percentage is used for irrigation and mainly growing paddy rice. 14% is taken up by settlement mainly Winam and Maseno areas.
The industrial area is situated close to the lake and runs parallel to the lake shore. The area is served mainly by the railway and acts as the terminus of the two railway lines that connect Kisumu with the rest of Kenya. The average plot sizes in the neighborhoods and estates are quarter acres, which are normally freeholds with titles issued. But in some estates, the residents have an average plot size of 0.8 acres and on a freehold ownership with no titles issued.

2.5.2 Social Setting
a) Settlement Patterns
The 1999 national census showed Kisumu County had a population of over 504,359 persons, with a growth rate of 2.9% per annum slightly below the national average of 3.2%. Winam has a high population density of 835 persons / km^2; an average household size of 4 persons and it is estimated that approximately 60% of the population lives in informal settlements. About 42% of the population is below 15 years while 73% is below 30 years. Those above 65 plus account for only 3.4% of the population. The County's population is very youthful with very high dependency rate of 1:118.

b) Poverty Status
It is estimated that 53% (267,310) people live below the poverty line in the county. The economically active population is estimated to be approximately 53% of the total population. The dependency ratio in the town is 1:118; this is very high, as every 100 people who are working have to support 118 dependents. Unemployment and poverty levels in the area are high, probably owing to its rurally oriented environment.

c) Health Aspect
There are few government health facilities in the county concentrated mainly within Kisumu CBD. Residents from other parts of the county must walk long distances to the government hospitals, or municipal health centers. Use of alternative or traditional medicines to cater for various health needs is common place. Several NGOs and CBOs operate in Kisumu County with programs targeting the following areas: improvement of water and sanitation conditions, poverty alleviation

and addressing the social and economic impacts of HIV/AIDS. A number of organizations including KADET, WEDCO, KWFT and the Undugu Society.

d) Economic Activities

The larger Kisumu County has four main industries: agriculture, fishing, business and manufacturing, and civil service employment. Agriculture is the main source of income for the majority of the people in the hinterland. Cash crops such as sugarcane, rice and cotton are cultivated, in addition to maize and sorghum which are grown for food. Other crops that are grown on commercial basis include beans, bananas, pineapples, citrus, simsim and green grams.

Subsistence farmers tend to produce maize, beans, millet, groundnut, sorghum, cassava, and vegetables. Livestock is farmed for meat and milk. Public sector employment accounts for the largest proportion of the total labor force. The area has seen an increase in the public sector employment due to introduction of university campuses in Kisumu town.

Private sector employment in business and manufacturing enterprises and informal sector, have both experienced substantial growth, particularly an increase in the informal transport sector (use of bodabodas or bicycle/motor cycle - taxis). Informal sector activities such as fabrication of small household items, woodcraft, and basketry also provide substantial sources of income. Fishing also constitutes an important industry in Kisumu County as both a major source of food and of household income; employment in the fishing industry accounts for a large proportion of the total labor force, either as fishermen or fishmongers. In contrast, in the suburban fringe areas, most residents work in the agricultural sector, despite the low productivity of the land.

Others engage in informal employments and/or provide cheap labor in town.

e) Gender and Equality

Gender disparity in Kisumu County is characterized by a situation in which women bear a disproportionately large share of both domestic and agricultural work. The 1999 census report indicated that women constitute the majority of the labor force in the county, providing mostly unskilled labor. This trend is predicated to remain unchanged over a period of years as more women join the local labor force whilst men migrate elsewhere in search of better employment opportunities.

Despite their considerable contributions to both family income and rural economy, women in the county continue to be faced with inhibitive cultural traditions relating to divisions of labor, lack of access to land and property, exclusion of women in decision making and restrictions on family inheritance. The result is that rather than being able to concentrate on activities that earn income, many women must spend the majority of their time undertaking domestic activities.

f) Tourism, Trade and Industry

The outstanding features include overhanging huge granite rocks at Kisian, the legendery Kit Mikayi, the Lake Victoria and its islands e.g. Ndere National Park which attract tourism to Kisumu County.

g) Social Services and Community Facilities

Social services such as community centers, health facilities, educational facilities, housing and social support are inadequate and unevenly distributed. There are large areas of low quality housing with poor access and there are no controls of rent increases, particularly in the low income areas. Housing quality varies across the municipality like in any other urban center in Kenya. Housing in the

middle and upper class residential areas in Kisumu County is characterized by permanent structures made of brick or stone walls with iron sheet or tiled roofing.
Most of the existing social facilities lack basic services such as water, sanitation, electricity and solid waste disposal. The situation is particularly grim in the informal settlements where approximately 60% of the population live.

h) Road Network and Water Supply

Roads

The road network in Kisumu County is good owing to the development of major roads. However, poor drainage is making most of the roads impassable. The roads are generally impassable due to poor drainage, inadequate spacing of houses and widespread sewers. Additionally, the roads are not clearly demarcated and structures have been erected on the road reserves. Motorcycle are the main modes of transport to access the main roads.

Water Supply

The water supply system in Kisumu can be categorized into three systems: that provided by KIWASCO, the peri-urban system and the system provided within the informal settlements. The existing water supply facilities provided by KIWASCO are in very poor condition and a large proportion of the population has no access to the service. The coverage of KIWASCO's current water supply network commands 40% -50% and is mainly concentrated within the built up urban center. The combined water supply capacity from the two water treatment systems amounts to 20,000m^3/day, which is less than half of the predicted demand of 50,000m3/day (Department of the Environment strategic plan of 04-07). Peri-urban water supply systems consist of small-scale systems, outside the KMC service area, CBOs, NGOs, etc.
Informal Settlements Systems are a combination of the Municipal System and Peri-urban Systems. Only 7% (37,232) people have access to portable water. The average distance that people cover to access water is 2km. The county water coverage is about 37% leaving the bulk of the population without safe drinking water. This reveals that coverage and accessibility to water in the county is one of the lowest. The quality of water is unacceptable for drinking from all sources except Boreholes and piped which are relatively safe.

3.0 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

3.1 Overview

For a long time, environmental conservation aspects and pollution control were scattered in the various sectoral pieces of legislation thus making coordination very difficult. This problem was overcome by the enactment of the EMCA, CAP 387, which prevails over all the other sectoral Acts.

3.2 Environment Management and Coordination Act, CAP 387

The Act entitles every person in Kenya to a clean and healthy environment and aims to safeguard and enhance the environment.

Pursuant to the prevailing legal requirements as envisaged in this Act (EMCA, CAP 387) and to ensure sustainable environmental management, *the proponent* commissioned the undertaking of EIA for the proposed project; and incorporated substantial environmental aspects as advised by NEMA.

This EIA project report thus provides relevant information and environmental considerations on how the project proponent's intends to safeguard and enhance the environment at the site and in the immediate neighbourhoods during project implementation and occupation phases.

3.3 Environment (Impact Assessment and Audit) Regulations, 2019

These are entrenched under section 147 of the EMCA. The regulations provide the framework for carrying out EIAs and EAs in Kenya. *This EIA study report is conducted in conformity with these regulations and EMCA, CAP 387.*

3.4 EMCA (Water Quality) Regulations, 2006

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources.

The regulation says that "all sources of water from domestic uses shall comply with standards set in the First Schedule of these Regulations". *For the proposed project, the proponent shall connect the entire internal wastewater system to the conventional sewer line (proposed by the proponent) to ensure safe wastewater disposal.*

3.5 EMCA (Waste Management) Regulations, 2006

Part II of the Act says "(1) No person shall dispose 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 off such waste in a designated waste disposal facility".

The contactor/proponent shall ensure that all solid waste generated on/from the site is suitably disposed into the approved waste disposal sites.

3.6 National Environmental Action Plan (NEAP)

According to the Kenya National Environmental Action Plan (NEAP, 1994) the Government recognized the negative impacts on ecosystems emanating from development programmes that disregarded environmental sustainability. Established in 1990, the plan's effort was to integrate environmental considerations into the country's economic and social development.

Under the NEAP process EIA was introduced and is nowadays a requirement for any proposed project.

3.7 The world commission on environment and development–the Brundtland Commission of (1987)

The Brundtland Commission addresses the environmental aspects of development. It has emphasized on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. In addition to environmental sustainability is the economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resource. *The proponent is committed to adhere to the proposed EMP to ensure environmental enhancement and this would first be monitored through the initial environmental audit.*

3.8 Occupational Safety and Health Act, 2007

The Act makes provision for the health, safety and welfare of persons on work places. The provision requires that all practicable measures be taken to protect persons in work places from potential Hazards. The provisions of the Act are also relevant to the management of hazardous and non-hazardous wastes, which may arise from/in workplaces.

For developments such as construction projects , the Act is important as it requires project proponents to have adequate management procedures of occupational safety and health at the work places. For safe construction works, the contractor and project managers should ensure the following:

- *Provision of personal protective equipment (PPE), fire safety, electrical safety, and other precautions essential for safe construction work.*
- *Provision of physical barriers and solid separators (dust barriers, hazard barriers, temporary walkways, among others, as explained in the extract of the Act.)*
- *Inspection of construction equipment to ensure that they are in good working condition before beginning a job. In addition, the contractor/proponent will ensure that regular inspections and maintenance of the equipment are conducted accordingly.*

3.9 Physical Planning Act, Chapter 286

The Act was promulgated for the preparation and implementation of physical development plans and for connected purposes. Under this Act, the project proponent is required to acquire a Certifiate of Compliance or approval letter from local governing council indicaing that the proposed development is in line with the physical development plan of the government of Kenya.

The proposed project has to be approved the department of the Kisumu city County Planning before commencement of the implementation works

3.10 County Governments Act, 2012

This Act specifically sets out the procedures in administration of local authorities. Section 166 mandates every municipal, county or town council to, subject to any other written law relating thereto, prohibit and control development and use of land and buildings in the interest of the proper and orderly development of its area – the proposed project falls within the jurisdiction of Kisumu County and is thus subject to development controls as per the Act. The Act, under Section 163 (a) empowers local authorities to control or prohibit all places of work that by reason of smoke, fumes, or chemical gases, dust, smell, noise or vibration or other cause may be a source of danger, discomfort, or annoyance to the neighbourhood, and to prescribe the conditions subject to which businesses, factories and workshops shall be carried on. Section 160 (a) underscores that every municipal council has the power to establish and maintain sanitary services for the removal and

disinfection, or otherwise, dealing with all kinds of refuse effluent and where any such service is established, to compel the use of such services by persons to whom the service is available.

3.11 Building code 2000

This by-law recognizes the Local authorities as the leading planning agencies. It compels the potential developer to submit development application for the approval. The local authorities are hence empowered to approve or disapprove any plans if they do or don't comply with the law respectively.

Any developer who intends to erect a building as herein proposed must give the respective local authority a notice of inspection before the erection of the structure. On completion of the structure, a notice of completion shall be issued by the local authority

to facilitate final inspection and approval. No person therefore shall occupy a building whose certificate of completion has not been issued by the County Government..

Section 214 of the by law requires that any public building where the floor is more than 20 feet above the ground level should be provided with firefighting equipments that may include one or more of the following hydrants, hose reels and fire appliances, external conations portable fire appliances, water storage tanks, dry risers, sprinkler, drencher and water spray spring protector system.

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 and all the waste water must be discharged to the sewers.

Finally section 196 provides that the local authority may refuse to admit to sewer any trade waste or any other effluent unless it has been treated in an approved manner. In this regard, the council may cause the occupier of the premise to construct an approved manhole connected to the pipe conveying such effluent.

In accordance with this Act, building plans for the proposed development have been approved Kisumu County.

3.12 Public Health Act- (Revised 1986)

Under this Act, the proponent and the contractor of the proposed project are required to adapt practicable measures to prevent injurious conditions in the construction site. The act requires the proponent to enhance effective management of Nuisances i.e. noxious matter or wastewater as will be discharged from the construction site and proposed project once completed.

To achieve this, systems on the management of both solid and liquid waste (effluent) will be adopted as proposed in the report. In addition, the development has been approved by the public heath office in Kisumu.

3.13 Water Act 2016

Water is the most important natural resource, indispensable for life and at the same time the backbone of growth and prosperity for mankind. Water Act 2002 is an Act of Parliament to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage service and for related purposes."

The ministry of water is vested with the duty to conserve and regulate the use of natural water resources (estuaries, surface, ground water and marine). The Act prohibits the release of waste water without a permit and also spells out penalties for pollution of water. The Ministry through the district water board regulates the use of water and the drilling of boreholes.

It is in accordance with this Act that this EIA project report has come up with necessary mitigation measures to ensure that there is no wastage and pollution of existing water sources.

3.14 Noise and Excessive Vibration pollution Control, Regulations, 2009

The Act ensures that no one makes any loud and unreasonable noise and/or vibration that disturbs or endangers the comfort and safety of others and environment.
In May 2009, the Minister for Environment and Mineral Resources promulgated the above regulations for management of noise and excessive vibration. The general prohibition states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. The regulations further provide factors that will be considered in determining whether or not noise and vibration is loud, unreasonable, unnecessary or unusual. For fixed installations, excessive vibration under these regulations is defined as any vibration emanating from the source and exceeds 0.5cm/s.
Rules 5 and 6 of the regulations define noise levels for various types of activities that generate noise. The first schedule to the regulations defines permissible noise levels. The regulation further stipulates that a noise license will be required during the construction and occupancy phase of a project if there will be equipment that will produce excessive noise during these two phases. The fourth schedule of the regulations is the application for a noise license while the fifth schedule provides a description of the issuable noise permits.

4.0 PROPOSED PROJECT LOCATION, DESCRIPTION, AND ACTIVITIES

4.1 NATURE, DESIGN AND DESCRIPTION OF THE PROPOSED PROJECT

Lions Club International District 411 Charitable Trust Registered Trustees hereinafter referred to as "the proponent"; proposes to carry out a new development to accommodate a three (3) level state of the art hospital building, boundary wall and gate house The proposed site is a large piece of land (approximately 5 acres) which is currently idle. The area has all the major urban services (water, electricity, and roads) except sewer line which will be provided through a wastewater treatment plant.

The following are a description for the different sections of the proposed project:

Level 1 which will be the **ground floor** will have:-

- ✓ The main reception/registration/cashier desk and waiting area.
- ✓ Four (4) triage rooms.
- ✓ Male general ward with associated facilities.
- ✓ Female general ward with associated facilities.
- ✓ Paediatric male ward with associated facilities.
- ✓ Paediatric female ward with associated facilities.
- ✓ Three (3) isolation rooms with associated facilities.
- ✓ General public cafeteria & hospital use cafeteria all with associated facilities.
- ✓ Pharmacy area.
- ✓ Ten (10) clinical officer offices and a waiting area
- ✓ four (4) vision testing rooms.
- ✓ Nine (9) consultation rooms, optical area and a waiting area.
- ✓ Toilets for the public and staff uses.

Level 2 which will be the **first floor** will have;-

- ✓ Private wards with associated facilities.
- ✓ Doctor's lounge area.
- ✓ Five (5) theatre rooms with associated facilities
- ✓ Laboratory area.
- ✓ Doctors lounge/cafeteria & general cafeteria all with associated facilities
- ✓ Six (6) consultation rooms with associated facilities.
- ✓ The Eye bank comprising of tissue processing & storage and tissue collection & sterilization rooms.
- ✓ ENT clinic with sound proof room, two (2) audiometry rooms and an ear mould room with associated facilities.
- ✓ Two (2) Radiology/x-ray rooms, two (2) ultra sound rooms & two (2) ECG rooms all with associated facilities.
- ✓ Dental clinic with associated facilities.
- ✓ Diabetic clinic with associated facilities.
- ✓ Toilets.

Level 3 which will be the **second floor** will have;-

- ✓ Administration offices with associated facilities.
- ✓ Two (2) recreation rooms, lecture room, library and cyber rooms.
- ✓ Toilets

- ✓ Other accompanying facilities include; lifts, CCTV cameras security system, ample inside parking, solar panels, waste water treatment plant, water tanks, and firefighting systems.

N/B:

The site will be connected to the mains electricity and water but not sewer which does not exist in the area. As such the proposed development will maximize on full utilization of the plot.

The design and orientation of the proposed buildings has left ample free space for passage, natural ventilation and lighting and open areas.

4.2 The project specifications

Ceiling:

- ❖ Rough cast plaster on R.C slab with 100 mm smooth plaster margins
- ❖ Suspended acoustic tile ceiling with inlay light fitting
- ❖ Smooth line plaster on R.C slab
- ❖ Painted 12mm on stained softwood rafters and steel purlins

Floor

- ❖ 2mm Vinyl tiles on 40mm sand cement screed
- ❖ Non-slip porcelain tiles on 40 mm sand cement screed
- ❖ 40 mm thick polished cement screed
- ❖ Interlocking tiles over A.P.P membrane

Walls

- ❖ 3 coats of washable Vinyl paint on smooth line plaster
- ❖ 8 mm thick ceramic PVC tiles up to 2100mm high

Skirting

- ❖ 100 mm high painted softwood
- ❖ 100 mm high coved cement
- ❖ 100 mm high porcelain tiles

Notes

- ❖ Building lines shall be in compliance with the planning requirements. Materials to be used will be of approved quality, which will include stones, sand, cement, timber, glass, steel, PVC products etc.
- ❖ Strip foundation (where need be) shall be used whose depth shall be determined by the structural engineer and filled with approved hardcore filling; hand packed and well compacted in layers and quarry dust.

- The ground floor concrete slab will be laid on polythene sheeting i.e. damp-proof membrane (d.p.m) and termite proofed well compacted hardcore.
- The walling will be of machine cut stones/reinforced columns and approved damp proof courses will be provided to all superstructure walls.
- Roof finish will be done using gutters and plastic rainwater outlets down pipes provided.
- All finishes will be of approved materials including parquet, ceramic, cement and clay tiles, and painting. All reinforcement shall be of standard quality to the structural engineer's details
- All soil and wastewater drainage pipes laid within the development will be of UPVC material. Those within the building structure and the parking/driveways will be encased in 150mm concrete surround.
- All branch drains to be ventilated with 110 mm diameter pipes.
- All drainage passing under slab to be encased in 150 mm concrete surround
- All internal fixtures and fittings will be to the approved standards and to specifications and will be carried out by qualified personnel
- To provide for adequate ventilation, all window and doors except those to the WCs shall have P.V.
- Other works like the landscaping, plumbing and electrical works will be executed by qualified and competent staff or reputable sub-contractors.
- A reputable contractor with experienced and skilled manpower will implement the project using suitable approved materials.
- Sewerage system to discharge to the proposed package sewage treatment plant on site.

(The finer details of the proposed project can be found in the copies of the proposed architectural drawings attached in the Annex).

4.3 SITE OWNERSHIP AND ZONING

The proposed project site (L.R No. 15985/1) is registered in the names of the proponent *(refer to the copy of the ownership document)*. The land is within an area with scattered residential settlements with new residential houses coming up. Along the highway is an industrial and commercial set-up. Services that go with residential areas include schools, commercial centers, hospitals, places of worship etc. thus the need for the proposed project. The proposed drawings/plans of the project have been presented for approval to the Kisumu County Government.

Plate 4: The site's neighborhood

Source: Field survey

4.4 PROPOSED PROJECT IMPLEMENTATION (CONSTRUCTION)

The buildings will be constructed based on applicable building standards of Kenya. These include but not limited to the Building Code and the British Building Standards *BS 4360* and *BS 5950, BS4190, BS3692 etc*. The constructions will as well incorporate environmental guidelines, health and safety measures.

The first activities will involve ground preparation where horizontal extension shall take place though minimal scale for the pillars only. Some vegetation particularly the grass shall be removed.

4.4.1 Construction Activities and inputs

The project inputs include the following:

- Construction raw materials i.e. sand, cement, rubber, bolts, nuts, among others. All these should be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies.
- Construction machines including machinery such as concrete mixers, and tools and other relevant construction equipment. These will be used for the transportation of materials, and in the construction of the project. Most of the machinery will use petroleum products as the source of energy but electricity is also available.
- A construction labor force of both skilled and non-skilled workers. These will require services such as, water supply and sanitation facilities.
- Power from the mains grid or provided by generators.

Construction activities include the following:

- Procurement of construction materials from approved dealers.
- Transportation of construction materials using heavy and light machinery.
- Appropriate storage of the construction materials.
- Site works i.e. site clearing, earth works and filling, laying of foundation for pillars, building works including roofing, finishes, fixtures and fittings.
- Disposal of the resulting waste materials. All debris and excavated materials will be dumped on approved sites but should be recycled in the project as much as is possible.
- Electrical, civil, and mechanical works. These will be done by reputable expertise.
- Landscaping works and earth works mostly on completion of the proposed development.
- Completion of the development and occupation/operation.

4.4.2 Driveway and parking

Since the site is new, the proponent will create a connecting route to bypass highway which shall be used for transportation of materials to the site.

4.5 PROJECT BUDGET

The construction is estimated to cost approximately Kenyan shillings **five hundred Million (Kshs 500,000,000)** and is estimated to take approximately twelve calendar months to implement.

5.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

5.1 The proposed Alternative

The EIA Project report has been prepared for submission to NEMA; facts, findings and recommendations/proposals of which are based on the proposed site, design, materials and proposed technologies. This helps in evaluating and examining the foreseeable effects of the project on the environment and therefore assisting in addressing how the proposed development has to ensure that all environmental measures are complied with during the premises preparation and during operational phase.

The alternative consists of the proponent's/applicant's final proposal with the inclusion of the legal guidelines, regulations and procedures as stipulated in the EMCA, CAP 387 which aims at reducing environmental impacts to the maximum extent practicable. Appropriate Environmental Management Plans have been prepared as per the proposed project. The proposed alternative based on the fact that the proposed works are just improvements on existing facilities already with established infrastructure and operating systems and is cost effective.

5.2 Relocation alternative

Relocation option to a different site is not an option for the project implementation. The proponent has no alternative site. The proposed project will be used by Braeburn Kisumu International School, therefore relocating the project would mean purchasing land at a different site. Purchasing another piece of land in the area would be too expensive for the proponent. If the development does not go on, the benefits of expanding the facilities of Braeburn Kisumu International School will be lost.

In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. The problem is further aggravated by the fixed characteristics of land and the bottlenecks of the planning policy.

5.3 The No Action Alternative

The No Action Alternative in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. The anticipated insignificant environmental impacts resulting from construction, and operation activities would not occur.

This option will however, involve several losses both to the project proponent and other stakeholders; society and Government. The No Project Option is the least preferred with reasons such that there will be no incremental educational facilities, forfeiture of economic benefits that would accrue to the public and the government, and it could also discourage development. The proponent will also continue paying land rent for unutilized property.

From the analysis, it becomes apparent that the No Project Alternative is not the appropriate alternative.

5.4 Alternative design and technology

Various alternative designs and technology has been evaluated by the proponent and various professionals involved i.e. the architect, engineers, and surveyors end environmental consultants. After extensive discussions and relevant considerations, the various options were assessed and the most optimal design and technology were agreed as per the proposed plans, materials and technology.

5.5 The comparison of alternatives

Under the proposed Development Alternative, the project would create more and standard educational support and would provide employment directly and indirectly to the public. It would

provide jobs for the workers during construction. Under the No Action Alternative, there would be no development at all. There would be no increased benefits from the site and neither would there be the insignificant environmental Impacts.

Provided the Environmental Impact mitigation measures are implemented as well as adoption of sound construction management practices, negative impacts will be avoided/minimized. However, commitments related to development alternative would ensure that potential impacts are minimized to levels of insignificance as envisaged in the EMP.

5.6 Mitigation for the proposed Action

Mitigation measures include sustainable environmental management. The application or adaptation of standard construction management practices is fundamental. The measures would be appropriately designed and implemented to protect the environment and especially water, soil, drainage, flora and fauna of the area/site. The statutory certificate that would be issued and the project's mitigation aspects included in the report would help to control damage to the environment. This is in relation to the Environmental Management and Co-ordination Act (EMCA), CAP 387.

5.7 Alternative materials and Inputs

The proponent of the project settled for a site that was planned and allocated for the purpose. The determinant factors for choice and acquisition of the preferred site were availability of land, suitability for the intended development and target market, existing demand, local authority zoning and minimal environmental impacts. The option of the relocation to a different site is not viable for the project as the proponent owns no alternative site. The option would mean acquiring alternative land, completion of the transaction and presenting of fresh submissions to the local authority .This would cost time and funds.

5.8 Alternative designs

The design that was selected proved to be more feasible. The design put into consideration health, safety and aesthetics requirements. The preferred design was chosen on the basis of conformity with the needs of the proponent and the market as well as materials availability. The preferred design, which has already been presented to the Kisumu County physical planning for approval, is appendences to this report.

5.9 Scale and Extent

The scale and extent of this project ensures maximum utility of land as well as satisfaction of the project objectives. The chosen scale and extent is the most feasible given the context and operational time frame of the project.

5.10 Waste water Management alternatives

Five locally available technologies are discussed below:

Alternative one - Connection to an existing sewer system

Connection to an existing sewer line is one of the likely alternatives in such projects. It solves the wastewater management issue at a very minimal cost and in an environmentally efficient manner. However, the study area is not served by any sewer line hence the alternative cannot be explored on these grounds.

Alternative two - Use of stabilization ponds/lagoons

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

Alternative three - Use of Constructed/Artificial wetland

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

Alternative four - Use of septic tanks

This involves the construction of underground concrete-made tanks to temporarily store the sludge with a soak pit. In Kenya, this option has been widely accepted in those areas without a sewer line. There is adequate knowledge among investors on this method of waste management and has been customized locally. The challenge regarding this mode of liquid waste disposal presently has been on where the exhausters dump the contents exhausted from the septic tanks. Incidents of waste from septic tanks being dumped in unauthorized dumpsites have of late been reported causing wide public outcry. Such incidents are not only a real threat to public health but also a contravention of the provisions of the Environmental Management and Co-ordination (Water Quality) Regulations, 2006. This option is viable for this project if and only if waste disposal shall be in agreement with the provisions of the Environmental Management and Co-ordination (Water Quality) Regulations, 2006.

Alternative five - Wastewater treatment plant

This involves the construction of a plant and use of chemicals to treat the effluents to locally/internationally acceptable environmental standards before it is re-used or discharged in to a nearby river. Technology has brought forth cheap technologies to construct and maintain making it an option to embrace for a project of this kind. The sludge obtained can be composted and used for agricultural and gardening purposes. This option mostly favours larger projects than this and initiated at the design stage to factor in the space element. This option for an establishment of this nature is inferior to use of septic tank hence not recommended.

EIA with/without EMP

Without

This scenario was based upon the assumption that the proposed development would go ahead without any environmental management plan/options being implemented. The total project impact for the scenario is on the appreciably adverse side. This shows that if the project goes ahead without EMP, the adverse impact on the existing environment would be several times that of the impact without the project. Thus, this assumption is disqualified and not applicable since the greatest challenge worldwide presently is geared towards sustainable developments and sustainable use of natural resources.

With

If the environmental management strategies discussed in Chapter 9 are fully implemented, the adverse impact of the project would be reduced, and there will be an overall improvement in physical, chemical, biological and socioeconomic environment of the region. Therefore, the proposed activity will be beneficial for the environment of the area, provided the EMP is in place. It is clear from the above, that the proposed project would have negative effect without implementing certain environmental management strategies. If EMP, as discussed in next Chapter is adopted and implemented, the adverse impacts will be reduced and the overall environmental quality of the area would improve hence this remains a preferred option.

6.0 SOCIAL IMPACT ASSESSMENT

This is a very important and an integral part of the EIA process, which is a legal requirement and a very important tool for collection of the data and especially the baseline/background information. The SIA helps bring out the contentious issues and gives a chance to those who may be affected by a proposed project to give their views, inputs and opinions and any significant issue is addressed at the initiation stage. This enables evaluation of the public and neighbors' views and is thus a very important part of the study. Unfortunately, the same people who are supposed to be consulted make it very difficult by dragging their feet or failing to respond totally and some of those who respond also wish to remain anonymous. None of those consulted had an objection to the proposed project. Those consulted indicated the need for compliance with retaining the area's environmental character. Respondents indicated the need to protect the area from noise during construction.

The issues raised and many others foreseeable have been adequately addressed in the report and in the EMP.
Some completed questionnaires are attached in the annex.

7.0 POTENTIAL IMPACTS

The development of the school is in line with vision 2030. Construction activities involve a series of defined physical operations, which include site preparation; excavation works, building works etc. All are potentially significant sources of particular impacts both significant and insignificant. On completion, the activities during the operational phase also have potential impacts. The following are foreseen to comprise potential impacts:

7.1 POSITIVE IMPACTS

Increased educational support facilities and income generation

Education is a basic right to every child but unfortunately it is not available to all deserving children due to various constrains among them lack of facilities and the teaching staff. The benefits of learning can never be overstated. In an area predominantly residential, such facilities are very important to cater for the children's educational need within the neighborhoods. The proposed project shall increase educational facilities in the area.

Optimal utilization of the land

The proposed project shall increase the benefits to the proponent on the piece of land thus raising the utility of the land.

Employment

The proposed project will provide direct and indirect job opportunities to a significant number of the population during construction and occupational phases thus reducing the unemployment and in the process provide livelihood.

Promotion of development

The founding father of the nation identified three main challenges in the country at independence among them, ignorance. Education is thus a key to development and has a potential to put under control poverty and diseases (good health). In the long run, the multiplier effect will lead to development and reduction of poverty.

Increase government revenue

The proposed project shall generate tax revenue for the government directly and indirectly.

Creation of market for goods and services and secondary businesses

The proposed project shall consume various materials during construction such as stones, cement, sand, steel products e.t.c. Various professionals have and shall continue giving their services during both the construction and operational phases and thus making livelihoods. Those doing commercial activities in the neighborhood shall also have their market widened by the workers.

7.2 NEGATIVE IMPACTS AND MITIGATION MEASURES

The ideal strategy to counter identified adverse effects is avoidance but when this is not possible, alternative strategies of reduction, remediation and compensation should be explored. This can be achieved through primary measures that intrinsically comprise part of the development design; or secondary measures designed to specifically address the remaining (residual) adverse effects of the proposed project. The potential impacts can be greatly reduced and this will be much determined by the technology used, nature of the materials, equipment used and level of diligence among others. The foreseeable impacts identified that may not be completely avoided are addressed here below and potential recommended measures provided. As such, the proposed measures also explore opportunities available for improving the situation wherever possible. The initial design should facilitate a high degree of mitigation, built into the scheme from the onset so that the potential for adverse effects is substantially reduced. If consideration of mitigation measures is left to the later stages of proposed project design, it can result in increased mitigation costs because early opportunities to avoid the need for such measures have been lost. In general, primary mitigation measures are likely to be more effective and less likely to cause secondary adverse effects (i.e. the mitigation measures themselves may in turn cause adverse effects.

7.2.1 Increased water demand

The importance of water can never be overemphasized and in fact is increasingly becoming a very hot issue due to the dwindling amounts and the ever increasing demand in several cases culminating to being source of fights amongst communities/users. The proposed development may cause some strain to the existing water supply since construction activities are known to be heavy water consumers and the increase in population proportionately increases water demand thus direct impact to the water supply during both the construction and occupation phases.

Mitigation

- Avoid wastage of the water. Approvals for water supply and use should be sought from the relevant authorities. The contractor should use water bowsers and tankers to bring in water for construction activities i.e. during periods of high water demand (i.e. during slab formation) subject to authorization.
- Roof catchments should be provided with rainwater harvesting systems (gutters, down pipes and water storage facilities) to enhance collection and storage of the would be run-off.
- Sensitize all stakeholders on means and need to conserve water resource. Water conserving taps should be installed that turn-off automatically when water is not in use. They should be encouraged on water reuse/recycling during both construction and occupation phases.

7.2.2 Surface drainage

Run-off generated by rainfall may cause a myriad of consequences in various facets including flooding and its consequences, which may include damage to property, health and safety hazards. However this will not be a major issue since a building has been on the proposed site. The drainage layout should ensure effective flow of the anticipated surface run-off emanating from the roof catchments and other areas within the site. The proponent will ensure all drainages are well designed.

Mitigation

- Storm water generated from roof catchments should be harvested, stored and made use in various activities i.e. general cleaning and garden watering. This will reduce run-off.
- The designs should ensure that surface flow is drained suitably into the public drains along the roads effectively. The internal channels should be designed with regard to the peak volumes and must ensure the safe final disposal of run-off /surface water and must be self-cleaning.

- Drainage channels should be installed in all areas that generate or receive surface water. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off.

7.2.3 Soil disturbance

It is anticipated that some excavations especially for laying of foundation pillars though in a small section and hence soil disturbance; exposing and setting it loose to the agents of soil erosion. However, the issue is not as significant because the land is level and the soils are stable and strip foundation will be used so no need to scoop out resulting to minimum disturbance to soil.

Mitigation

- Avoid unnecessary movement of soil materials from the site and provide soil conservation structures on the areas prone to soil erosion mostly to reduce impact by the run-off.
- Depending on the period, monitor construction activities for appropriate and effective control measures of erosion e.g. during rainy/wet conditions, ensure suitable barriers on potential water erosion paths while avoiding wind erosion during dry conditions.
- Conduct standard landscaping after project completion i.e. introduce suitable and well-managed vegetation to generate surface covers on the open areas; to control soil movement by erosion agents i.e. water, animals and wind. It is recommended that landscaping be done on completion of proposed works and introduce appropriate vegetation in open surfaces

Ensure suitable storm water drainage channels to effectively discharge water safe to existing public drainage channels. Such channels need to be regularly maintained and repaired to avoid point discharges (have pronounced effect to soil erosion) in case of breakages or blockages.

7.2.4 Noise and vibration

Construction activities generally generate noise and hence affecting the immediate environment i.e. the learning environment. Such noise emanate from the construction personnel, machinery and equipment.

Mitigation

- Construction works should be carried out only during the specified time i.e. from 0800 hrs to 1700 hrs.
- Sensitize construction vehicles' drivers and machinery operators to switch off engines of vehicles or machinery when not in use
- Machineries should be maintained regularly to reduce noise resulting from friction.
- The generators and other heavy duty equipment (if present) should be insulated or placed in enclosures to minimize ambient noise levels
- There should be no unnecessary horning of the involved machinery and vehicles.
- Provision of bill boards at the construction site gates notifying of the construction activity and timings.
- Workers should be provided with relevant personal protective equipment (PPE)/ materials.

7.2.5 Increased Energy Demand

There will be increased use of energy due to increased energy uses during construction phase and potential wastage. Construction machineries will require fuels (petroleum or electricity) during construction phase.

Mitigation

Energy conservation involves optimum use of petroleum products (diesel and gasoline), electrical appliances (equipment), lighting systems and other electric machinery as used for different purposes. It also includes use of renewable energy sources.

- Switch electrical appliances when not in use and optimize operations of electrical equipment or energised machinery to enhance energy conservation.

7.2.6 Air Quality

Construction activities have the potential to generate air pollutants in the form of gas emissions (fumes) from machinery and vehicles. Some Construction machinery and trucks (including small vehicles) generate hazardous exhaust fumes such as Carbon Oxides (CO_x), Sulphur Oxides (SO_x) and Nitrogen Oxides (NO_x).

Mitigation

- Provide personal protective equipment (PPE)/full protective gear to workers. They should also be trained on occupational health and safety and should be encouraged to go for regular health check-ups
- Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of noxious gases and other suspended particulate matter.
- Regular air monitoring and tests to analyze the quality of air.

7.2.7 Oil Leaks and Spills

It is important to note that oil/grease spills/leaks are prevalent in construction sites and in most areas that make use of petroleum products, which contain hard/hazardous elements that are detrimental to the environment.

Mitigation

- All machinery must be keenly observed not to leak oils on the ground. Maintenance must be carried out in a designated area (protected service bays more suitably outside) and where oils are completely restrained from reaching the ground. Such areas should be covered to avoid storm water from carrying away oils into the soil or water systems by installation of oil interceptors and other suitable facilities.
- All oil products and materials should be stored in site stores or in the contractor's yard and should be handled appropriately to avoid spills and leaks.
- Car park areas and other places handling oil activities in the site must be well managed. Oil interceptors should be installed in the channels leading from such areas.

7.2.8 Solid Waste

Millions of tonnes of solid waste is generated annually by human beings and may therefore pose great hazard if there are no proper disposal and handling systems. Construction activities contributes to increased solid wastes including stones, containers, metal rods, pieces of iron sheets, sharp objects (nails) etc.

The current waste management system is adequate and shall be maintained but in addition, the following should be adopted:

Mitigation

- The contractor or proponent should work hand in hand with private refuse handlers, NEMA and the Kisumu County Government to facilitate sound waste management as per the prevailing regulatory provisions.
- The wastes should be properly segregated to encourage recycling of some useful waste materials. This calls for source reduction, recycling, composting and reuse.
- Provide garbage bins and train or educate the involved stakeholders on the importance and means of waste (garbage) management and handling especially during occupation phase.

7.2.9 Disturbance to Flora and Fauna

Vegetation has a great effect on the general and localized environment and normally can modify microclimate. Usually, the flora creates a good environment for habitats thus the two may go together more often than not. In consequence, de-vegetation may result to negative effects on the fauna. Singly, the proposed project may appear of no significant impact but the cumulative effect in concert with other current and future projects are capable of significant and serious effects including but not limited to soil erosion, hydrological regime imbalance, decreases in air purifiers (carbon sinks) and thus contribution to global warming etc.

Mitigation

- Avoid unnecessary clearing of vegetation by conserving vegetation not in the sections being built up
- Landscape and plant vegetation in all open areas after the completion of the project and manage the introduced vegetation on completion of the development to restore or improve the site.

7.2.10 Construction materials

Various construction materials are required for execution of the various respective activities. Poor quality materials, substandard and those materials that pose health or safety hazards should be avoided.

Mitigation

- All materials should be of the appropriate quality and should be sourced from licensed dealers and suppliers who are compliant especially with environmental requirements. Quality should be thoroughly controlled through regular tests.
- Procurement of the materials should follow specifications by the respective consultants such as structural, mechanical and architectural engineers.

7.2.11 Visual Intrusion

Visual impacts occur during earthworks for the foundation of projects and throughout to the completion of the project. However, the proposed project will not by far be out of scale with the existing developments. The visual impact will therefore not be significant and will have very little effects to the neighboring activities and the general public. However, great care should be taken to protect the neighborhood character.

Mitigation

This may be unavoidable during construction but fortunately the effects are insignificant due to the low magnitude and the small effect relative to the general area.

- Shield off the particular areas of construction with suitable materials. On completing the earthworks, the worked area should be restored through backfilling, leveling and planting of more vegetation so as to blend in a way to merge with existing environment. The building and the choice of colors should be attractive to match the general environment.
- All solid waste and debris from construction site must be cleared on completion.
- Ensure compliance with planning policy for uniformity

7.2.12 Occupational Health and Safety (OHS) and traffic

During construction, there are chances for increased dust, air and noise pollution. These plus other safety hazards such accidents, falling objects, risks from poor scaffolding, ladder and formwork are considered negative impacts. There is also risk of coming across live electric cables during excavation. Poor quality construction materials, poor workmanship and poor standards may also contribute to accidents. Inadequate skills in machinery operation and stress are serious safety hazards. Most of the contractors hire on casual basis and therefore do not take responsibility of training the workers on health and safety. The entry and exit points to the development may also pose the danger of imminent accidents if not properly designed.

The immediate neighbours and workforce involved would be exposed to these hazards. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This can compromise health of the workers especially if such foodstuffs are prepared in unhygienic conditions. There is also the potential risk of traffic accidents along the road around the entry point due to the heavy trucks and machinery entering and leaving the site. It is important to note that the proposed design has taken care of all the basic set standards in a work place such as space, lighting, ventilation etc.

Potential Mitigation Measures

- All working areas must be shielded with appropriate materials. All workers should be provided with full protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks, and gloves among others. Factories Act abstract should be posted at a strategic point on site. The requirements of the **Occupational Safety and Health Act, OSHA 2007** and should be strictly adhered to, the **Building Code** and other relevant regulations. Only specialised machine operators should operate machinery and specialised equipment and all moving parts should be provided with appropriate guards.
- Properly design to allow for deceleration and acceleration to the site. Clearly indicate direction of traffic especially during construction
- A first aid kit(s) should be provided within the site. This should be fully equipped at all times and should be managed by a trained person. The contractor should not expose workers to stress inducing factors.
- The contractor should have workmen's compensation cover. It should comply with workmen's compensation Act, as well as other ordinances, Regulations and union Agreements.
- Sanitary facilities should be provided and standard cleanliness of the facilities maintained.
- Individuals preparing food for the workers at the site should be controlled and monitored to ensure that food is hygienically prepared.
- Workers should always be sensitised on social issues such as drugs, alcohol, diseases particularly HIV/AIDs etc. There should be a training program to facilitate this by the contractor.
- Billboards should be suitably elected on the onset of the project. The signs should indicate and inform the school fraternity and general public e.g. 'DANGER! HEAVY VEHICLES TURNING'. The traffic along the connecting road and within the compound should be controlled especially during construction phase.

7.2.13 Construction Safety

Construction work can be particularly hazardous. Personal protective equipment, fire safety, electrical safety, and other precautions are essential for safe construction works. Follow these guidelines when visiting or working at construction sites:

- ❖ Do not walk, stand, or work under suspended loads. If you raise a load, be sure to crib, block, or otherwise secure the load as soon as possible.
- ❖ Avoid placing unusual strain on equipment or materials.
- ❖ Be prepared for unexpected hazards. BE ALERT!

- Proper personal protective equipment, (i.e. safety shoes, hardhat, goggles, Respiratory Equipment and gloves) must be used at all times on the site or as conditions warrant. Jewelry should be avoided.
- Prior to the start of construction, all areas should be inspected for the presence of potentially hazardous energy in the area should be located and precautions taken.
- Workers should be trained on the proper use of tools and protective equipment.
- Great care must be given to excavations and the safety of the machinery, tools and other equipment such as scaffolding, ramp or ladder must be guaranteed. Accident prevention should be the overriding safety precaution. A qualified person should always be on site to oversee the working.

Contractors and project managers should use barriers and guards as necessary to protect employees, and visitors from physical hazards. Areas that typically require permanent or temporary protection include the following:
Open Manholes, Elevated platforms, Areas with moving machinery, Excavation sites, Construction sites, and Temporary wall or floor openings, Doors opening into construction.

7.2.14 Emergency Response Plans- ERPs

Emergencies and disasters are a reality of everyday life. The school fraternity, workers/ people must therefore be sensitized and prepared on how to react during both the construction and operational phases. Absence of such plans may be risky since there would be no guidelines to handle or control emergencies should they occur.

Mitigation

- The contractor/proponent should initiate and develop effective ERPs to cater for various eventualities such as fire outbreaks, and other accidents/incidents that are likely to occur. Training is prerequisite in planning ahead. Such plans must be properly documented and made available to all
- Regular drills should be conducted on possible incidences

7.2.15 Enhanced Social crime risks

Due to the influx of construction workers on site, there are chances of introduction of individuals with potentially anti-social behaviors such as thieves/thugs, drug users and traffickers and may pose a risk to the school community and the neighbors both during the implementation and operational phases.

Mitigation

- Adopt strict hiring guidelines to lock out the bad elements and limit movement outside the site. The contractor has a responsibility of sensitising the workers on social issues such as HIV/AIDS, drugs and other social issues through regular training and social gatherings and strict monitoring. Workers should not be housed on site.

7.2.16 Security

The need for security can never be overemphasized whether personal or for property. During construction, security is very important in any site. This ensures that materials are in order. It also controls movement within the site especially for the intruders who might be injured by the materials and other hazardous features available within the site. Security is also of paramount importance during the operational phase of the project.

Mitigation

- Control movement as proposed in the design and employ security guards who must always guard the site/property and document movements on the site/ property

7.2.17 Fire Preparedness

Potential causes of fire are many and varied electrical faults, smoking, gas leaks, carelessness etc. Fire incidences result to economic and social drawbacks. It is therefore always important to consider the issue of fire by bringing in the element of preparedness. In this regard, the design should provide and recommend implementation of fundamental firefighting measures and control facilities. Though there are existing firefighting facilities the following should be adopted to cater for the extensions

Mitigation:

- Provide a fire alarm system, 2No. 30m hose reels and ensure adequate fire reserve water storage tanks with the existing booster pump for hose reel and 2No. 9kgs water fire extinguisher. Provide 2No. powder or carbon dioxide extinguishers
- Provide appropriate Fire Hydrant Ring main with suitable outlet points.
- All installation to follow Kisumu County's Fire Masters requirements approval.
- Conduct regular firefighting drills/simulations to sensitize workers/residents and adapt an emergency response plan for the entire project during occupational phase.
- Ensure that all firefighting equipment are strategically positioned, regularly maintained and serviced.
- Provide fire hazard signs such as 'No Smoking' signs, Direction to exit in case of any fire incidence and emergence contact numbers should be provided as well as the assembly points.

7.2.18 Project Completion

At one point in time, the proposed project, if approved will be completed after the first phase of the project (implementation) which will pave way for the second phase (occupation). At this point, the contractor will leave the site after officially handing over the completed project to the proponent. Before leaving the site, the proponent should ensure that the contractor does or causes to be done the following:

- Comprehensive landscaping of open areas should be done.
- All waste materials must be cleared and removed from the site. However, these should be disposed appropriately and to the approved dump sites in accordance to the laid down regulations.
- The structures should be cleared, cleaned and rubbed of any dust particles before occupation.

7.2.19 DECOMMISSIONING PHASE

Decommissioning is an important phase in the project cycle and comes as the last to wind up the operations/activities of a particular project. The main purpose of decommissioning is to restore/rehabilitate the site to acceptable standards.

Quality and standard buildings of the proposed nature have a lifespan of between 50 and 100 years which is much dependent on the maintenance quality. This is long period of time and there may be many changes which may not be foreseeable including the technological and legal aspects. The decommissioning may also come earlier than the lifespan of the buildings again due to various reasons like change in physical planning policy or the discovery/realization of a more optimal use of the land. It is therefore recommended that an EIA be conducted when the time for decommissioning comes so that all aspects will be looked at against the prevailing conditions and requirements. However, the purpose of decommissioning is mainly to rehabilitate the project site to an acceptable standard and all efforts should be geared to making the site as close as possible to its original state before the project was implemented. The decommissioning will in brief involve demolitions of the structures, removal of debris and landscaping. It is highly recommended that an EIA be prepared when the time comes since quit may come earlier or later due to the vagaries of weather, human behavior and policy changes among other factors and quantification and accurate prediction of the likely potential impacts is quite difficult.

In view of the foregoing and in line with the principles of sound environmental management, it is paramount that the appropriate controls and procedures be put in place at the design, implementation and operational phases of the proposed project to control environmental degradation as this is the only way of simplifying the decommissioning. These measures are recommended elsewhere in the report and in the EMP.

8.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

The environmental management plan involves risk management strategies that should be undertaken by the project proponent and all the stakeholders to mitigate environmental degeneration. They are approaches to monitor, control, reclaim and restore the environment to a sustainable state. EMPs for projects thus provide logical frameworks within which the identified issues of environmental concern can be mitigated or monitored i.e. provide a checklist for project monitoring and evaluation. The EMP is meant to address the existing impacts and the potential foreseeable impacts. Currently, there are no significant existing impacts on the proposed site.

Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve *environmental quality*.

The environmental management and monitoring plans have been developed and outlined to bring home the key findings of the *Environmental Impact Assessment*; recommending necessary mitigation actions, defining roles, monitorable indicators and the estimated cost.

The EMPs outlined hereinafter addresses the identified issues of concern (potential negative impacts) and mitigation measures as well as roles, costs and monitorable indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMPs have considered both construction and occupation phases.

Table 2: EMMP FOR CONSTRUCTION AND OCCUPATION PHASES

Environmental/ Social Impact	Proposed Mitigation and Aspects for Monitoring	Responsibility during design, construction and defects liability period	Responsibility after defects liability period	Monitoring means (c) = Construction (o) = Occupation	Estimated Costs (Kshs)	Monitoring indicators and frequency
Soil disturbance	• Control earthworks & compact loose soils. • Install drainage structures properly. • Landscaping on project completion. • Control and manage excavation activities. • Control activities especially during rainy conditions. • Provide soil erosion control and conservation structures/means where necessary.	Contractor	Proponent	(c) Inspection (o) Routine maintenance (c) Inspection (o) Routine maintenance	500,000	• Vegetation cover • Type of machinery and equipment • Paved area
Changes in land use- extent	• Ensure compliance with existing planning policy	Proponent and contractor	Proponent	Inspection and records inspection	270,000	• Maintenance of area character
Changes in hydrology/ impended drainage	• Proper Installation of drainage structures. • Install cascades to break the impact of water flowing in the drains. • Ensure efficiency of drainage structures through proper design and maintenance. • Provide gratings to the drainage channels.	Contractor	Proponent	(c) Inspection (o) Routine maintenance	280,000	• Amounts of storm water
Air pollution	• Control speed and operation of construction vehicles. • Prohibit idling of vehicles. • Ensure sound condition of construction machinery and equipment. • Engage sensitive construction workers. • Ensure a dust proof net is placed on site.	Contractor	Proponent / Contractor	c) Inspection/ observation	500,000	• Extent of paved area • Type of machinery
Noise pollution	• Sensitize drivers of construction machinery on effects of noise. • Maintain plant equipment (if present). • Construction activities to be restricted to daytime when many residents are away at work. • Workers in the vicinity of or involved in high-level noise to wear safety & protective gear.	Contactor	Proponent / Contractor	c) Inspection/ observation	500,000	• Ear muffs/ Buffers/ Mufflers
Oil pollution	• Proper storage, handling and disposal of new oil and used oil wastes. • Maintain plant and equipment to avoid leaks. • Maintenance of construction vehicles should be carried out in the contractor's yard (off the site).	Contractor	Contractor	(c) Inspection/ observation	150,000	• Incidences of spillage • Poorly disposed wastes • Composition of runoff

Road safety	• Enforce speed limits for construction vehicles especially along roads leading to the site. • Provide bill boards at the site/entrance to notify motorists about the development.	Contractor	Traffic & roads Dept/transporters	(c) Inspection/ observation	100,000	• Bill boards • Safe access
Public health, occupational health and safety	• Shield off the working areas with appropriate materials. • Train staff/workers on occupational health and safety. • Provide full protective gear & workmen's compensation cover in addition to the right tools and operational instructions & manuals during construction. • Adopt sound waste management system to ensure proper solid waste disposal and collection facilities. • Adopt sound housekeeping practices. • Sensitize stakeholders on environmental management. • Engage the services of qualified personnel and/or ensure training. • Ensure use of standard construction materials and to the specifications. Avoid undesirable, substandard, hazardous or unauthorized materials during construction & maintenance. • Sensitized staff on social/health issues such as drugs. • Ensure machinery and equipment servicing and maintenance as per schedules & legal requirements. • Post strategically the Occupational Safety and Health Act Abstract & provide material safety data sheets and ensure adherence. • Provide fully equipped First Aid kits & train staff on its use. • Sensitize the store users on environmental management. • Ensure the County Government certifies and issues completion certificates.	Contractor, supervising Foreman	Proponent where relevant	(o) Observation (o) Observation	980,000	• Training records • Waste receptors • First aid kits and training • Sensitive workers
Vegetation	• Landscaping and planting vegetation in all disturbed areas.	Contractor	Proponent	(o) Observation (o) Observation	190,000	• State of waterways • State of landscape vegetation
Record Keeping	• Collection and analysis of relevant environmental data of the site.	Proponent/contractor	Proponent	Data collection & analysis	100,000	• Relevant environmental records
Fire safety and preparedness	• Install firefighting equipment as provided elsewhere in the report. • Conduct training on firefighting, evacuation and emergency response. • Sensitize the residents on fire risks i.e. conduct regular fire drills. • Adapt effective emergency response plan. • Maintain/service firefighting machinery regularly. • Provide emergency numbers at strategic points.	Contractor	Proponent	(o) Observation	640,000	• Firefighting equipment • Training records • Display of emergency numbers
Waste	• Follow NEMA regulations.	Proponent	Proponen	Data collection	100,000	• Proper systems

management			t			
Security	• Provide security guards and facilities during the entire project cycle. •	Contractor	Proponent	(o) Observation	200,000	• Security guards • Security lights and records
Waste Water Management	• Provide portable toilets for workers • Construct a waste water treatment plant for handling toxic liquid waste from the hospital building	Construction	Inspection	Contractor/ Proponent	500,000/ month	
	• Provide adequate and safe means of handling sewage generated within the building. The waste water from the premises will be connected to the existing sewer line that serves the area. • Conduct regular inspections for waste water pipe blockages or damages and fix appropriately • Ensure regular monitoring of the waste water discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated. • All drain pipes passing under the building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete all round. • All manholes on drive ways and parking areas should have heavy duty covers set and sealed airtight as approved by specialists. • All waste pipes should be accessible from outside and free to every part of the system for inspection, cleaning and repair.	Operation	Inspection	proponent	250,000	
Incineration of hazardous waste.	• The kilns/combustion chambers should be designed with provisions for flue gas trapping, smoke interception and stacks fitted with scrubbers (for gases) and filters for removal of particulate matter. • Seek NEMA's permit for installation and operation of incinerator • Conduct annual air quality surveys within the site of the incineration plant and maintain such records on site. • Fly ash and other incineration residuals should be disposed of in landfills or other NEMA approved dumping sites. • Holding yards for hazardous waste should be kept moist at all times to prevent dust emission into the atmosphere and the windward side of the site. • The waste holding and sorting area should be compartmentalized to allow for segregation of various waste categories as classified on source. • Observe good housekeeping at all times with particular focus on waste management. • Training and induction of all employees and visitors on site to enhance safety. • Provide employees with appropriate PPE and enforce	Construction and operation	Proponent	Proponent	400,000	

	their usage within the work area. • Implement energy saving measures by accumulating hazardous waste first before incineration to reduce frequency of incineration. • Establish public relation strategies with the stakeholders for enhanced co-existence and tolerance. • Invest in corporate social responsibility initiatives.					

Occupational Safety and Health EMP for the proposed project during construction and operational phase				
Key Issues	**Mitigation Measure**	**Responsibility**	**Time Frame**	**Cost Ksh.**
Registration of the premises	Register the premises under the Occupational Health and Safety Act Cap 514, of the Laws of Kenya is mandatory	Proponent	One-off	5, 000
General register	Keep a general register of all workers within the facility as stipulated in Sec 62 (1) of the Occupational Health and Safety Act	Proponent, contractor	Construction	500
Incidents and accidents	Report any incidents and accidents using prescribed forms obtainable from the Occupational Health and Safety Office	Site Safety Officer	Continuous	500/month
	Conduct regular safety education and training	Site Safety Officer	Quarterly	4,000
	Prepare a contingency plan for emergency response before the start of the project.	Site Safety Officer	One-off	10,000
Insurance	Insure the premises as per statutory requirements (third party and workman's compensation)	Proponent and all occupants	Annually	
Safety healthy environment (SHE) policy	Develop, document and display prominently an appropriate Safety and Healthy Environment policy	Site Safety Officer	One-off	2,000
Sanitary conveniences	Provide suitable, efficient, clean, well-lit and adequate sanitary amenities at the site taking care of gender division	Contractor, proponent and all occupants	One-off	50,000
Machinery/ equipment safety	Ensure that machinery, equipment, PPE, appliances and tools to be used comply with the prescribed safety and health standards and be appropriately installed, maintained and safeguarded		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		Continuous	-

Occupational Health and Safety EMP for the proposed project during construction and operational phase				
Key Issues	**Mitigation Measure**	**Responsibility**	**Time Frame**	**Cost Ksh.**
Emergency preparedness and evacuation procedures	Design suitable documented emergency preparedness and evacuation procedures for emergencies	Site Safety Officer	One-off	1,000

First Aid	on site a stocked first aid box which is easily available and accessible	Site Safety Officer	One-off	2, 000/kit
Fire protection	Regularly inspect and service fire-fighting equipment by a reputable service provider and maintain inspection records	Site Safety Officer	Every 3 months	5,000
	Prominently display signs such as "NO SMOKING" at the site especially in parts where inflammable materials are stored	Site Safety Officer	One-off	500
Ventilation	Provide adequate space within the premises to allow for adequate natural ventilation through circulation of fresh air	Contractor, occupants	One-off	-
Lighting	Provide adequate artificial or natural lighting in all parts of the premises where persons are working or passing	Contractor, all occupants	One-off	-
Electrical safety	Do not overload circuits	Proponent and all occupants Contractor,	Continuous	-
	Clearly mark distribution board switches to indicate respective circuits and pumps		One-off	-
	Ensure that no live electrical wires are exposed		Continuous	
	Earth all electrical equipment		One-off	5,000
Diseases	Provide complete refuse collection and handling service		Continuous	5,000
Security	Fence the site and employ security personnel operating 24 hours Install security alarms and/or surveillance systems.		Continuous	50,000

Table 3: EMP FOR THE DECOMMISSIONING PHASE

Recommended Mitigation Measures	**Responsible Party**	**Time Frame**	**Cost (Ksh)**
1. Demolition waste management			
a) Any component related with the project that will not be used for other purposes must be removed and recycled/reused as far as possible.	Contractor, Proponent	One-off	-
b) All wastes must be removed and recycled, reused or disposed of as per a licensed methods.			
c) Where recycling/reuse of the project components, gadgets and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site.	Contractor, Proponent	One-off	-

Recommended Mitigation Measures	**Responsible Party**	**Time Frame**	**Cost (Ksh)**
d) Donate reusable demolition waste to any willing party.	Contractor, Proponent	One-off	-
2. Rehabilitation of project site			
a) Implement an appropriate re-vegetation program to restore the site to its original status.	Contractor, Proponent	One-off	-
b) Consider use of indigenous plant species in re-vegetation.	Contractor, Proponent	One-off	-

9.0 CONCLUSION AND RECOMMENDATIONS

The necessity for medication facilities in human lifes can never be overemphasized. Everyone has a right to adequate medical facilities but unfortunately; having everyone access medical attention remains a dream due to various factors among them inadequate medical facilities. The proponent wishes to provide medical facilities in an effort to provide the much necessary medical attention to reduce ignorance and eventually reducing poverty and promoting development. The proponent proposes to construct a three (3) level state of the art hospital building.

This study indicates that the construction and occupation/operation of the proposed development will have positive impacts, which include employment, increase in the school facilities, and improvement of standards of living. However, despite the outlined positive impacts, the proposed development will come up with some negative impacts mainly increased pressure on existing infrastructure. Other impacts include potential safety and occupational hazards during construction, potential pollution (to air, water, soil) mostly during construction phase, enhanced security risks and social crimes, and increased waste (solid and liquid) generation among others.

The proposed project design has integrated mitigation measures with a view to ensuring compliance with the applicable laws and procedures. The structures should be built to the required planning/architectural/structural standards of the Kisumu County Government. During project implementation and occupation, sustainable environmental management should be ensured; avoiding inappropriate use of natural resources, conserving nature and guaranteeing health and safety of all people, working on the project, general public and inhabitants of the project.

From the foregoing and taking into consideration of all the foreseeable and relevant aspects, the proposed project is a timely venture with a positive and significant contribution to the millennium development goals. It is thus our recommendation that the project be allowed to go ahead with the implementation provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be focused towards avoidance or minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close following and implementation of the recommended Environmental Management and Monitoring Plans (EMPs).

We also recommend that the proponent work closely with the environmental experts, Kisumu County Government, and other bodies to enhance the facilitation of the issues of concern identified. This will also help in solving any problem arising and which may not have been foreseeable during the EIA project report study. This will ensure that environmental concerns are integrated into the project at every stage of the implementation phase. It will enhance the co-existence of the proposed project with the environment, during the entire project cycle. The various service providers (power, water, garbage collection etc.) must assess the respective requirements. The proposed design has met the basic requirements such as the minimum habitable room sizes and basic social services; the reason why they have been approved by the relevant authorities. It is recommended that on approval, the proponent should implement the extensions on the proposed drawings and if alterations are necessary, approval should be sought. Conservation resources such as energy and water within the project during construction and occupation phases should be encouraged. Sound construction practices aimed at environmental conservation should also be adopted and special attention should be paid to the extended sources of raw materials such as water, sand, stones, and energy. Some construction 'waste' materials can be re-used in other areas and forms

Wastes should be reduced to the minimum as this will save on costs and at the same time preventing environmental pollution. The operators during both the construction and operational phases should exercise diligence in all activities to ensure environmental sustainability.

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ATTACHMENTS