ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT

PROPOSED VISAREN OMUYANZE FUNERAL HOME

LOCATION:

CAROL AFANDI MEMORIAL CLINIC ON A LAND PARCEL WITH PLOT NOS. KAKAMEGA/VIYALO/460 AND NORTH MARAGOLI/VIYALO/1560 AT WELIGNA ALONG STAND KISA – KHUMUSALABA ROAD IN IGUNGA SUB-LOCATION, CHAVAKALI LOCATION, CHAVAKALI DIVISION SABATIA SUB-COUNTY IN VIHIGA COUNTY

LATITUDE 0.114128^{O} N AND LONGITUDE 34.711000^{O} E

Proponent:

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JANUARY, 2017

CERTIFICATION

This is to certify that an ESIA has been carried out for the Proposed Visaren Omuyanze Funeral Home at Carol Afandi Memorial Clinic on a land parcel with plot Nos. Kakamega/Viyalo/460 and North Maragoli/Viyalo/1560 at Weligna along Stand Kisa – Khumusalaba Road in Sabatia Sub-County in Vihiga County. The study was carried out by NEMA registered EIA/EA experts in accordance with Environmental Management and Co-ordination Act (EMCA), 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003 contained in the Kenya gazette supplement No. 56, legislative supplement No. 31 Legal notice No. 101 of 13th June, 2003. The experts also compiled this report. We the undersigned hereby certify that the information and particulars given in this report are correct as at the time the study was conducted.

FOR THE CONSULTANT, ENVERTEK AFRICA CONSULT LIMITED

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LIST OF ABBREVIATIONS AND ACRONYMS

%	Percentage
Cap.	Refers to 'chapter' in the Laws of Kenya
CBO(s)	Community Based Organization(s)
CGV	County Government of Vihiga
CO	Carbon-monoxide
CO_2	Carbon-dioxide
dBA	Decibels (a unit of measuring sound)
EA	Environmental Audit
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management and Monitoring Plan
ESIA	Environmental and Social Impact Assessment
ft	Foot/feet (a unit of measuring length)
GOK	Government of Kenya
Ha	Hectare (a unit of measuring land area)
hr(s)	Hour(s) (A unit of measuring time)
KCB	Kenya Commercial Bank
KEBS	Kenya Bureau of Standard
KFS	Kenya Forest Service
Km	Kilometer(s) (A unit of measuring distance)
Km^2	Square kilometer(s) (A unit of measuring area)
KShs.	Kenya shilling(s) (a unit of measuring currency in Kenya)
KWS	Kenya Wildlife Service
LVNWSB	Lake Victoria North Water Services Board
m	Metre(s) (a unit of measuring length)
m^3	Cubic metre(s) (a unit of measuring volume)
mm	Millimeter(s) (A unit of measuring length)
NCA	National Construction Authority
NCLR	National Council for Law Reporting
NEAP	National Environment Action Plan
NEC	National Environmental Council
NEMA	National Environment Management Authority
NMK	National Museums of Kenya
^{o}	Degrees (A unit of measuring latitudes and longitudes)
^oC	Degrees Celsius (A unit of measuring temperature)
OSHA	Occupational Health and Safety Act
P. O.	Post Office
PPE	Personal Protective Equipment
PVC	Polyvinyl chloride
Reg. No.	Registration number
spp	Species
TOR	Terms of Reference
UPS	Uninterrupted Power Supply
Visaren	Vihiga Sabatia Retired Nurses
WRMA	Water Resources Management Authority

DEFINITIONS OF OPERATIONAL TERMS

Authority: Herein this report the term "Authority" shall refer to the National Environment Management Authority abbreviated as NEMA and established under section 7 of EMCA, 1999.

Decommissioning: This is the permanent withdrawal from a site or close down of a facility for restoration.

Developer/Proponent: Means a person proposing or executing a project which is subjected to an EIA or undertaking an activity specified in the second schedule of EMCA, 1999. Herein this report the term "Proponent" shall refer to Vihiga Sabatia Retired Nurses abbreviated as Visaren.

EA: The systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing in conservation or preservation of the environment.

EIA: A systematic evaluation of activities and processes of an upcoming project/facility to determine how far these activities and programs conform to the approved environmental management plan of that specific project and sound environmental management practices.

EMP: Means all details of project activities, impacts, mitigation measure, time, schedule, costs, impact or activities, including monitoring and environmental audit during implementation and decommissioning phase of a project.

Environment: Physical factors of surroundings of human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and social factor of aesthetics, culture and includes both the natural and the built environment.

Mitigation: Measures which include engineering works, technology improvement management ways and means of minimizing negative aspects, including socio-economic and cultural losses suffered by communities and individuals, whilst enhancing positive aspects of the project.

Project: Means any undertaking that may have an impact on the environment. Herein this report the term "project" shall refer to the proposed construction of Visaren Omuyanze Funeral Home.

Scoping: Is the process of determining the content and extent of the matters which should be covered in the environmental information to be submitted to a competent authority for projects which are subject to EIA.

Screening: It is a coarse analysis of the possible impacts of an action with a view to identifying those impacts which are worthy of detailed study for a project to be considered for an EIA process or not.

Standards: Means the limit of discharge or emission established under the Act or under Regulations.

Waste: Includes any matter whether liquid, solid, gaseous or radioactive, which is discharged, emitted or disposed in the environmental in such a volume composition or manner likely to cause an alteration of the environment.

EXECUTIVE SUMMARY

This document is an Environmental and Social Impact Assessment (ESIA) study report for the Proposed Visaren Omuyanze Funeral Home that is to be located at Carol Afandi Memorial Clinic on two adjacent plots registered with Nos. Kakamega/Viyalo/460 and North Maragoli/Viyalo/1560 along Stand Kisa – Khumusalaba Road at Weligna in Sabatia Sub-county in Vihiga County. The clinic is bordered by roads, homesteads and cultivated pieces of land under various crops. This report is prepared in accordance with Section 58 to Section 67 and Section 138 of the Environmental Management and Coordination Act (EMCA), 1999 (Cap. 387) that require all projects listed under the second schedule of the Act to undertake environmental assessments and submit it to NEMA for approval and licensing before commencement. The subsidiary legislation to the Act, the Environmental (Impact Assessment and Audit) Regulations, 2003 provides the framework for carrying out EIAs and EAs in Kenya by NEMA licensed experts. Environmental Impact Assessments (EIAs) should be followed by annual Environmental Audits (EAs) beginning 12 months from the date of commissioning of operations in order to determine the projects' compliance with regulations and set standards. The purpose of EIA is to identify potential positive and negative environmental impacts associated with the proposed project and thus provide recommendations on how to take advantage of the positive impacts on one hand and how to mitigate the negative environmental impacts on the other. The project Proponent, Vihiga and Sabatia Retired Nurses (Visaren) consulted the National Environment Management Authority (NEMA) registered experts to conduct an Environmental and Social Impact Assessment (ESIA) study for the proposed project and prepare a report for submission to the Authority. The objective of the proposed project is to develop a modern funeral home for the storage of human corpses as they await identification and/or removal for autopsy or disposal by burial, cremation or by any other legal method. The estimated cost of the proposed project is Kshs. 13, 765,003.56. The construction of the proposed project will employ best and modern building technologies and materials that conform to the Kenya Bureau of Standards (KEBS) and internationally accepted standards. The materials will be obtained locally through delivery contracts approved through best procurement practices. The EIA team carried out the assessment using a combination of methods including ground survey and interviews with the neighbours, project management and other interested people and parties including the area residents. From the public consultation process it was evident that the project has sufficient public support. Existing literature on statutory and other requirements was also reviewed. During the assessment, various Acts and Regulations were reviewed to gather information which would help in preparing the study report. Alternatives to the proposed project, site, technologies and construction materials were analyzed based on a cost and benefit criteria; environmental impacts, social acceptability, economics (including productivity of land-use) and design feasibility and included: no-action, relocation, alternative land-uses and proposed development alternatives. Potential beneficial and adverse environmental and social impacts associated with the proposed project were identified and discussed. The main positive contribution of the proposed project is the creation of modern funeral home. Other benefits include: capital into the economy, revenue to the government, increased demand for raw materials, creation of employment opportunities, improved aesthetics, optimal use of land and development in the area. A summary of these potential impacts and a brief description of their mitigation measures has been provided (Table I). The study report complies with the requirements of the Environmental Management and Co-ordination Act, (EMCA), 1999 and takes into consideration the County Government of Vihiga (CGV) by-laws and the applicable international standards. At the end of the report, there is an Environmental Management and Monitoring Plan (EMP) which ensures that environmental impacts are identified and mitigated during all phases of the proposed project.

Table I: Summary of potential negative environmental impacts

Potential adverse environmental impact	Proposed mitigation measures
Environmental degradation due to construction activities such as vegetation clearing, excavation and compaction	• Demarcate the project area to be affected by the construction works to prevent the effects of construction from spilling over into other areas • Rehabilitate all areas inadvertently affected by the proposed project construction • Re-establish vegetation in some or parts of the disturbed areas through implementation of a well-designed landscaping programme
Usage of construction materials	• Evaluate the project to ensure that the design optimizes the use of materials • Construction material must be tested and approved by the relevant department at the Public Works offices
Noise and vibrations	• Provide workers in noisy environments with ear muffs • Place noisy equipment in enclosures and away from sensitive environments • Keep all machinery in good condition to reduce noise generation • Maintain reasonable working durations whenever possible to reduce the number of complaints concerning noise • Operate shorter shift period for workers who come in direct contact with high concentrations of noise
Degradation of air quality	• Suppress dust by water spraying before sweeping and on dusty grounds • Dispose waste regularly and appropriately to avoid wastes decomposing at collection areas • Embalm all bodies before storage in order to prevent them from rotting • Store only enough bodies to the capacity of the mortuary to prevent congestion • Put in place rules to prevent bodies overstaying in the mortuary in order to give room for new bodies. • Follow relevant leagal procedures to remove and appropriately dispose all unclaimed • Check the refrigeration system daily to detect and repair any malfunctioning which could lead to rotting of bodies • Spray the mortuary with appropriate smell deodorizers in order to counteract foul smell
Storm water	• Install gutters to harvest rain water from the roof of the building and water tanks to store the harvested water • Construct a drainage system to direct storm water into roadside drains
Additional road traffic and safety implications	• Provide adequate signage of the site • Designate a parking space for off-loading and loading of materials
Solid wastes including excavated soil	• Use excavated soil in filling of site and potholes on access roads • Install dustbins for temporary holding of solid wastes • Separate solid wastes at the source into recyclable and non-recyclable • Regularly collect and dispose wastes to avoid accumulation • Cover solid waste collection areas to prevent habitation by scavenging animals

Potential adverse environmental impact	**Proposed mitigation measures**
Fire and accident occurrence	• Declare places with flammable materials as "NO SMOKING ZONES" and display clear notices of the same • Install fire extinguishers and other fire suppression equipment appropriately through a licensed fire officer • Mark 'FIRE EXITS' from the buildings and establish 'FIRE ASSEMBLY POINTS' at specific points outside the building • Regularly inspect the fire-fighting equipment and make it available on the site at all times • Provide enough parking space for emergency vehicles
Sewerage and waste water and sanitary conveniences	• Regularly check all drainage pipes to fix leakages, remove blockages and prevent back-flooding • Treat waste water and sewerage before they are disposed • Monitor waste water every month to ensure that such waste is disposed in accordance with controlled discharge standards
Water usage	• Provide every water supply pipe with a tap to act as a stop valve • Use water wisely • Conduct regular maintenance of pipes and taps to fix leakages • Use larger water storage tanks to cope with potential shortages • Maximize on other sources of water for some uses such as harvested rain water • Install a water meter for monitoring water use at the site
Excessive energy consumption	• Install energy efficient lighting such as fluorescent tubes and energy saving bulbs • Switch off lighting during the day and all other electrical equipment when they are not in use • Provide a meter for monitoring energy consumption
Infectious waste	• Put in place distinctive protocols for the classification and segregation of infectious diseases • Treat waste that is deemed potentially infectious prior to disposal by a number of different technologies that either disinfect or sterilize them
Impacts on ovccupational and public health and safety	• Provide workers with appropriate protective gear • Ensure machines and equipment to be used at the site are periodically checked by qualified personnel as outlined in the Occupational Health and Safety Act (OSHA), 2007 • Put in place appropriate warning signs, directions and procedures as outlined in the report • Ensure the building has ventilation openings above doors and windows to each room to prevent any chances of suffocation during the full operation of the building

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1 INTRODUCTION

1.1 Background to the proposed project

This document is an ESIA study report for the Proposed Visaren Omuyanze Funeral Home for Vihiga Sabatia Retired Nurses (Visaren). The proposed funeral home is to be established at an already existing medical facility called Carol Afandi Memorial Clinic. Carol Afandi Memorial Clinic is being developed into a fully fledged private hospital. The establishment of a maternity and out patient wings has been completed and these are operational. There is a placenta pit at the maternity wing. Other structures to be developed in future are private wards, administration block with varius offices, x-ray section, pharmacy, paediatrics ward, male wards, female wards, kitchen with yard, laundry area and public ablution block. Visaren is a group of retired nurses in Vihiga and Sabatia sub-counties of Vihiga County. The group has 15 No. active member who are all trained and retired nurses who have the common objective of giving back to the community. At present, they are involved in jigger treatment, advocacy and adherence training to the youths within Vihiga County. Below is a summary of the proposed project.

Table 1.1: Summary of the proposed project

Item	Description
Project name	Proposed Visaren Omuyanze Funeral Home
Nature of development	A morgue, one of its kind in the area
Objective	To develop a modern funeral home for the storage of human corpses as they await identification and/or removal for autopsy or disposal by burial, cremation or by any other legal method
Proponent	Visaren
Contact	Name: Mrs. Elizabeth A. Mwaniga Designation: Chairlady, Visaren Mobile phone No. + 254 720794073
Location	Existing Carol Afandi Memorial Clinic on a land parcel with plot Nos. Kakamega/Viyalo/460 and North Maragoli/Viyalo/1560 at Weligna along Stand Kisa – Khumusalaba Road in Igunga Sub-location, Chavakali Location, Chavakali Division, Sabatia Sub-County in Vihiga County
Plot size	0.31 Ha inclusive of the area under the clinic
Nature of land ownership	• The proposed land parcel belongs to one of the members of Visaren; Mrs. Gladys Alegana and the two plots are registered in the name of her husband, Raphael Adagi Alegana • She has leased space for the establishment of the proposed funeral home • Copies of land lease agreement and title deeds have been attached
Estimated project cost	Kshs. 13, 765,003.56
Neighbourhood	• The proposed site is within Carol Afandi Memorial Clinic compound • Homesteads and cultivated pieces of land under various crops • Stand Kisa – Khumusalaba Road and an access road connecting Havuyiya Area to the main road at Weligna

1.2 Rationale for the EIA process

1.2.1 Purpose of the EIA

The proposed project is among the projects listed under the second schedule of section 58 (1), (5) of EMCA, 1999. It is a morgue and therefore categorized as a High-risk Project. Its beneficial and adverse environmental impacts cannot therefore be underestimated. The project requires an EIA study carried out for it before it is implemented subject to Section 58 of the Act and Part VI, Section 31 (3) (a) (i) and (ii), of its legislative supplement, the Environmental (Impact Assessment and Audit) Regulations, 2003 which require all upcoming projects to have environmental assessments carried out for them before they are executed. EIA provides baseline information upon which subsequent environmental assessments are based. It also addresses mitigation options for potential impacts. The main purpose of an EIA is therefore to assist the Proponent, NEMA and all other stakeholders in understanding the potential environmental consequences of the project and thus provide a basis for making informed decisions on the project.

1.2.2 Objectives of the EIA

The following are the main objectives:

a) To comply with EMCA, 1999;
b) To identify and assess the likely negative and positive environmental impacts that would arise with the implementation of the proposed project;
c) To identify and plan for measures for the mitigation of the identified impacts; and
d) To provide a basis for decision-making to reviewers, the Authority and all other stake-holders.

1.2.3 Terms of Reference for the EIA

The assessment is expected to meet the objectives of ESIA in order to ensure sustainable development. Hence, TOR outlining the expectations of the ESIA were documented by the Proponent and the ESIA team in accordance with the requirements of the Environmental (Impact Assessment and Audit) Regulations, 2003 in order to lay a basis for the assessment. The following was done in order to achieve these objectives:

a) Generated environmental baseline conditions of the proposed project area.
b) Described the proposed project by giving clear accounts of its location; design; construction and operational activities; material usage; products and by-products including wastes to be generated in all phases and the methods of their disposal; and likely environmental changes.
c) Obtained views and opinions of the interested and affected persons through consultations and through public meetings with the local leaders, the neighbours, business operators and the larger area residents in the vicinity of the proposed project.
d) Reviewed legislations and regulations relevant to the proposed project and showed their relevance to the project.
e) Described and analyzed alternatives to the proposed project in relation the project site, design, technologies, processes and the reasons for preferring the proposed project's alternative.
f) Established key areas of environmental, health and safety concerns focusing on both the positive and negative effects in relation to how they affect the biophysical, social, economic and cultural components of the environment.

g) Analyzed impacts and recommended mitigation and enhancement measures for the adverse and positive impacts respectively. The analysis of potential impacts related to the location; design; applicable technologies; and construction and operation activities of the proposed project.
h) Generated comprehensive environmental management and monitoring plans for the proposed project covering all its phases. The plans form a basis upon which all mitigation/enhancement measures will be carried out and specify the parties (organizations or individuals) responsible for the implementation of mitigation/enhancement measures and the schedule for their implementation and indicate the parameters to be monitored, frequency of monitoring, indicators of performance, parties responsible for monitoring and the associated costs.
i) Generated a comprehensive EIA report in accordance with the Environmental (Impact Assessment and Audit) Regulations, 2003; filled in the ESIA study report submission form r 19; and submitted the report and necessary soft and hard copies together with the prescribed fee to the Authority for further instructions and/or approval.

1.2.4 Assessment methodology

The initial assessment was carried out in August, 2015. The EIA study was carried out in November, 2016. All assessments have been carried out in accordance with the procedures and protocols in the Environmental (Impact Assessment and Audit) Regulations, 2003. The assessments involved:

a) Extensive site tours to physically inspect and document existing facilities at the site and natural and socio-economic features of importance;
b) Environmental screening to determine the necessity and level of the EIA process;
c) Undertaking public consultations and carrying out public meetings with the local leaders, the neighbours, business operators and the larger area residents in the vicinity of the proposed project; and
d) Desktop studies for documentary review on the nature of the activities of the proposed project, proposed project related documents, plans, designs, policy and legislative frameworks as well as the environmental setting of the area amongst other things.

1.2.5 Limitations

The main limitation to the assessment is that some of the information was compiled based on responses of the owner and the stakeholders involved. There are difficulties in verification of some of this kind of information. The consultant has evaluated information obtained within the limits of the established scope of work.

2 BASELINE INFORMATION OF THE PROPOSED PROJECT AREA

2.1 Introduction

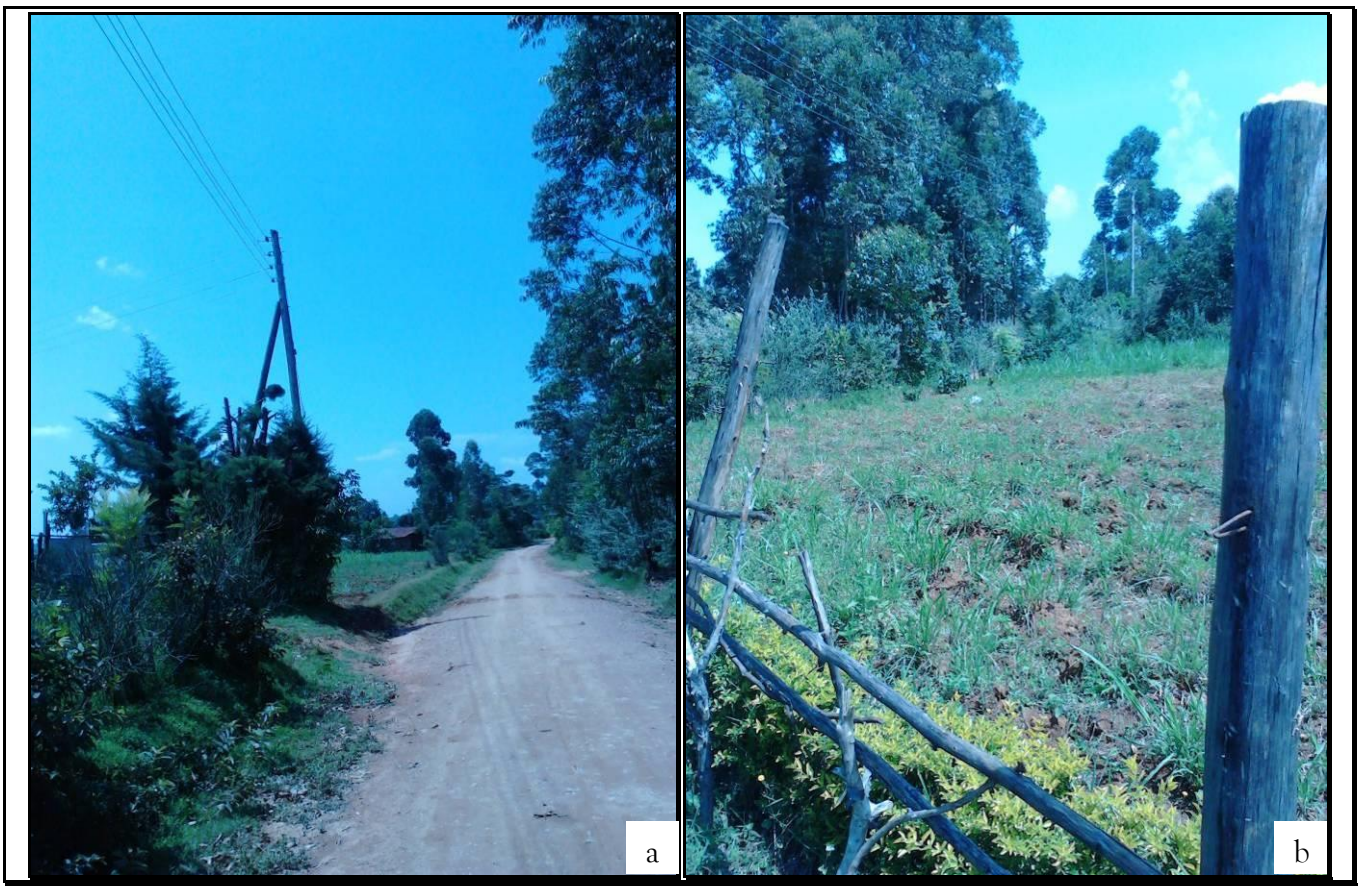
In this chapter, emphasis is placed on describing proposed project area and its neighbourhood in terms of resources, vegetation, land-use patterns, socio-economic activities, population, topography, climate and geology among others so as to provide information from which the potential impacts of the proposed project can be predicted. The proposed site setting is a rural area dominated by settlement and cultivated pieces of lands. The area faces a number of environmental challenges including:

a) The increasing population which poses pressure on the existing resources such as water, land and energy and facilities such as housing. Land fragmentation is one major problem affecting people in the area.
b) Limited access to potable water sources water.
c) The proposed site is found in an area that is not served by a public sewer line.
d) Poorly maintained storm water drainage lines which are associated with silt-filled culverts and access roads that become muddy during the rainy seasons and dusty during the dry season.
e) Lack of a funeral home in the area. The nearest mortuaries are found more than 5 Km away from the area at Mbale Town and Mukumu. Many residents wishing to have morgue services find it expensive getting these services from these far away places.

The proposes site is a cultivated land that is currently under nappier grass. It is found within Carol Afandi Memorial Clinic compound. At the time of the assessment the construction of the proposed building had not started.

Plates 3.1 (a and b): The proposed site under nappier grass at the time of the assessment

The clinic is bordered by homesteads and cultivated pieces of land under various crops; a homestead to the South, Stand Kisa – Khumusalaba Road to the North, a cultivated piece of land under nappier grass to the West and another cultivated piece of land under various crops across an access road connecting Havuyiya Area to the main road at Weligna to the East.



Plates 3.2 (a and b): An all weather road connecting Havuyiya Area to the main road at Weligna to the East of the proposed site (plate a) and a cultivated piece of land under nappier grass to the West (plate b)

2.2 Physical Environment

2.2.1 Altitude and Climate

The altitude at the project area is about 1,531 M above sea level. The climate of the proposed project site identifies with that of the wider Western Region of Kenya. Temperatures range from 14 ^{o}C to 32 ^{o}C depending on the month of the year. The mean maximum varies from 22 ^{o}C in July/August to 28 ^{o}C in March. Diurnal temperature variations are minimal. The area receives high annual precipitation. Rainfall is spread into two wet seasons. The long rains usually begin from March and end in June while the short rains span from August to October. The average annual rainfall is 1,000 mm.

The wider Western Region experiences a total of about 2,500 hrs of bright sunshine per annum, which is equivalent to annual mean of approximately 6.8 hrs of sunshine per day. July and August are characterized by cloudiness and during these months, the average daily sunshine in the region is 4 hours. The area receives Northeast and Southeast monsoons that blow very steadily but without high intensity. Both wind run and mean wind speed are at a maximum in December and remain high during January, February and March coinciding with the dry season and period of higher potential evaporation. Evaporation is affected by temperature and sunshine factors and has its peak in March.

2.2.2 Air quality and noise levels

Air quality is deteriorated due to the presence of dust particles and vehicle exhaust emissions in the air which are accelerated mainly by vehicles moving on dry and dusty roads. This is especially high during the dry season due to the drying effect of the road. Exhaust emissions from vehicles and decomposing wastes are the main threats to air quality. However, these are not common in the area. Noise is high due to the large number of vehicles.

2.2.3 Soils, geology and land formation

Soils are deep, well-drained, dark brown, friable sandy loams. Rocks in the project area range from early Precambrian to Quaternary. Land at the proposed project site is gently sloping. However, many areas are characterized by undulating pars. Most parts of the neighbourhood have gentle slopes that are covered by vegetation that helps to prevent loss of soil and soil nutrients through soil erosion and landslides. The soils are predominantly loamy fertile soils which have high humus content, high water holding capacity, high nutrient availability and therefore favour crop cultivation an activity carried out by most of the residents in the area.

2.2.4 Water resources and water quality

Due to the high rainfall throughout the year, rivers and springs are perennial. Most of Sabatia Sub-county has a high potential for groundwater. The average depths of striking water vary depending on the geology of an area. The main river flowing through the sub-county is River Lunyerere. There are numerous springs which form the sources of the various streams in the sub-county. The nearest stream is found about 150 M to the South of the proposed site. Many commercial buildings and households have access to potable water. In the rural areas, people access water from protected springs and piped water from Amatsi Water Supply Company that is affiliated to LVNWSB. Rain water is harvested by some people to supplement these supplies. However, the piped water supply accessibility has been declining due to the increasing population and frequent breakage of pipes and breakdown of pumps.

2.3 Biological environment

There are neither wildlife sanctuaries nor rare, endangered and endemic species at or within a radius of 3 Km from the proposed project site. The ecology of the project area is however very rich in diversity and is typical of modified equatorial-type vegetation. The area has both exotic and indigenous vegetation. Trees in homesteads are used mainly for shade, boundary demarcation, fencing, production of fruits, timber, fuelwood and for ornamental purposes. These trees include *Eucalyptus* spp, *Markhamia lutea, Cupressus lusitanica, Bischovia javonica, Spathodea nilotica, Croton megalocarpus*, *Pinus* sp, *Persea americana, Syzygium guminii* and *Eryobotria japonica*. Shrubs include *Lantana camara, Tethonia diversifolia* and *Solanum incanum*. The nearest forested areas are Kibiri Forest and Kaimosi Private Forest in the neighbouring Hamisi Sub-county. These two have high diversity of flora and fauna. Common trees in these forests include *Markhamia lutea, Bischovia javonica, Spathodea nilotica* and *Croton megalocarpus*. Common fruit trees are *Persea americana, Syzygium guminii* and *Eryobotria japonica*. Animals in the sub-county are mainly domestic animals such as cattle, sheep, goats, pigs and poultry. Kibiri Forest is an important tourist site with butterflies, birds, monkeys and snakes as the main groups of animals in the forest which attract tourists.

2.4 Socio-economic environment

2.4.1 Population

Sabatia Sub-county has continued to experience high rates of demographic transition over time. This is mainly due to migrations as well as natural population increase. The neighbourhood of the proposed site is densely populated due since it is found along a major road. It is expected that there are no more than 4,000 people live within a radius of 2 Km from the proposed site.

2.4.2 Land-use patterns

Land in the area is used primarily for settlement and agriculture though changes have been cropping due to increased reduction in soil fertility and soil degradation to accommodate businesses and other commercial establishments. Small commercial establishments, roads and public and private offices form some of the other land uses in the area.

2.4.3 Agriculture

People in the area cultivate a variety of crops including sugarcane, beans, sweet potatoes, cassava, sorghum, finger millet, maize and vegetables. Tea is the most important cash crop and is grown on small scale in many parts of the sub-county. It is sold to Mudete Tea Factory that is found at Mudete. Animals kept include poultry, cow, sheep and goats. Farmers have put in place soil conservation measures such as agroforestry that helps to prevent soil erosion. The main challenge to agriculture in the area is land fragmentation and the increasing shift in use of land from agricultural purpose to commercial purpose.

2.4.4 Business activities and employment in the area

The common businesses within the neighbourhood of the proposed site are retail kiosks that mostly sell household goods. The nearest trading centre is Kilingili along Stand Kisa – Emusutswi Road where small-scale business such as salons, barber shops, food kiosks, retail shops, carpentry shops, motor vehicle repairs, welding, bar and restaurant and Mpesa and Airtel Money shops are dominant. There is an open air market at Kilingili. The nearest financial institutions such as KCB, Family Bank and Cooperative Bank are found in Mbale Town and enhance economic activities by offering credit facilities to entrepreneurs. These businesses provide employment opportunities to many residents in the area. Other sources of employment are academic and public institutions.

2.4.5 Physical and social infrastructure

2.4.5.1 Transport and communication

The main roads in the area are Kisumu – Kakamega Highway and Stand Kisa – Emusutswi Road. There are other feeder roads that connect rural areas to the city and to the major roads. However, these feeder roads are dry weather roads and most of them become impassable during the rainy seasons. Communication in the area is excellent for mobile reception from Safaricom, Airtel, Orange, Telkom Kenya and Yu networks.

2.4.5.2 Electricity and fire safety

Kenya Power Company supplies electricity in the area. The company which is a monopoly in electrical power supply in Kenya has 33/11 sub-station at Chavakali. Some institutions have installed back-up generators and solar panels either as their main source of electrical power or to supplement the company's supply. The nearest fire engines are found in the neighbouring Kakamega and Kisumu counties.

2.4.5.3 Medical facilities and schools

Some of the learning institutions in the area are primary and secondary schools such as Weligna Primary School. Medical facilities include Carol Afandi Memmorial Clinic and Kilingili Health Centre.

2.4.5.4 Security

There is a police station at Kilingili that is found at about 2 Km from the proposed site. There are a number of security firms operating in the area. Many institutions have fenced their compounds and have provided them with lockable gates and day and night time guards. They have also installed security lighting at night to enhance ensure security.

2.4.5.5 Solid waste management

Cleaning companies contracted by CGV collect wastes from many institutions especially within urban areas in the sub-county. Many other institutions manage their own solid wastes using one or more of a number of options including recycling, reusing, reduction, incineration and decomposing for manure. In many institutions, solid wastes are collected in dust bins and are carried to central points from where they are managed. Recycling companies have contracted some people to collect wastes for recycling purposes. Such wastes that are collected for recycling purposes from residential areas include waste plastic bottles and metals.

2.4.5.6 Sewerage and storm water management

There is no public sewer system in the area. Therefore, flash toilets, bathrooms and sinks are connected to septic tanks and soak pits that are installed by institutions. Pit latrines are the common sanitary facilities in homesteads, schools and in many government institutions. Most exhauster service providers dispose wastes from septic tanks in sewer systems that are found in the neighbouring Kakamega and Kisumu counties. Drainage channels, culverts and cut-off drains have been constructed to discharge storm into rivers and stream valleys. Gutters are installed on most buildings to harvest rain water and thus reduces the amount of surface run-off from the area.

3 PROPOSED PROJECT DESCRIPTION

3.1 Projects design and components

The proposed mortuary is designed as follows:

a) The building will have:

   i. A waiting area;
   ii. A drop off zone;
   iii. A body reception area;
   iv. Staff changing rooms with bathrooms and fitted with lockers;
   v. A pathologist changing room with a bathroom and fitted with lockers;
   vi. A kitchenette with a kitchen yard and fitted with cabinets;
   vii. A body viewing area;
   viii. An autopsy room;
   ix. A body preparation and embalming area;
   x. A chapel fitted with benches and tables;
   xi. A coffin store;
   xii. A reception with a waiting lounge;
   xiii. Manager's office;
   xiv. An entry porch; and
   xv. A body storage area fitted with cabinets and whose floor will be finished in terrazzo.

b) The body storage area will have a capacity of 10 No. bodies.
c) The working areas; autopsy room and body preparation and embalming areas will have concrete working tops fitted with double *dhobi* sinks and will have flush toilets and bathrooms.
d) There will be passages within the building to provide access into the rooms within the building.
e) Other structures to be constructed at the proposed site are:

   i. A 4 No. car parking space;
   ii. A generator house;
   iii. A fence with 2 No. gate houses; and
   iv. An incinerator for management of solid wastes.

f) Subject to availability of resources, the Proponent will drill a borehole at the proposed site as a back-up to the the existing water supply.
g) Details of the design components are shown on the attached approved structural and architectural plans for the proposed building.

The facilities, utilities and services to serve the proposed project include the following:

a) Adequate storm drainage channels will be constructed to direct storm water into existing open storm drainage channels along Stand Kisa – Emusutswi Road. Gutters will be installed on the building to harvest rain water and thus reduce the amount of surface run-off from the site.
b) The site will be connected to piped water from Amatsi Water Supply Company. Rain water will also be harvested from the building for use at the site. These will form major water sources in all the phases of the proposed project.

c) The site will be fenced with a perimeter wall and will be provided with lockable gates to ensure privacy and enhance security. Security lighting will be provided at night to enhance security.
d) All effluent from the proposed mortuary will be treated in a septic tank already constructed at the site and waste water discharged into a soak pit. Upon filling with solid effluent, the Proponent will contact and contract exhauster service provider to empty the septic tank for appropriate disposal of the wastes. Pit latrines are constructed within the institution to provide back-up to the in-house sanitary facilities.
e) Different solid wastes from the site will be collected and disposed off by appropriate methods such as incineration, decomposing and collection by recycling companies and cleaning companies/agents contracted by the Proponent and/or CGV for appropriate disposal.
f) Appropriate fire management equipment such as fire extinguishers, a fire hose reel, fire alarms among others will be installed through a licensed fire officer at appropriate points inside and outside the proposed building.
g) On completion of the construction, the site will be landscaped with appropriate plants.

3.2 Description of the proposed project activities

If approved and licensed, the proposed project will have three main overlapping phases: construction, operation and decommissioning. The Proponent is advised not to continue with any construction works relating to the proposed project until the ESIA study report is reviewed and the EIA license issued. A summary of the main activities under each phase of the proposed project has been given (Table 3.1).

Table 3.1: Description of the proposed project phases

Phase	Main activities
Construction	a) Site preparation and mobilization of construction personnel, equipment and construction material b) Removal of vegetation, rubbish and unwanted and/or old structures from the construction site c) Excavation and building development d) Use of machinery, hand tools and equipment and employment of human labour e) Environmental management
Operation	a) Commissioning the proposed building for use as a mortuary b) Cleaning and refrigeration of human corpses c) Identification, postpartum; management by wrapping or clothing; displaying; viewing and removal of human corpses for autopsy or for disposal by burial, cremation or by other legal method a) Health, hygiene, safety and environmental management and monitoring
Decommissioning	a) Demolition or change of use b) Rehabilitation and/or restoration

3.3 Technology and machines to be used

The contractor will employ modern and best building technologies which are not be inferior to locally and internationally established building standards. They will use hand tools, equipment and machines in the construction. The machines to be used will include concrete mixers, power vibrators, welding machines, plate compactors and terrazzo-polishers each where applicable. Hand tools will include *jembes, pangas*, axes and general building hand tools.

3.4 Construction material input

Most construction works take in considerable amounts of artificial and natural material. The materials to be used have to conform to KEBS requirements for quality. Some building materials such as building blocks, sand and ballast will be kept outdoors at the site while others such as cement, nails and paints will be kept in indoors in lockable stores to be established at the site since they are easily destroyed by rains or direct sunshine and are vulnerable to theft because they can easily be carried away. A store will be made of iron sheet walling and roof. The iron sheets will be supported on wooden posts. Handling of all hazardous chemicals will be done in accordance with their manufacturers' instructions as outlined on their material safety data sheets. Usage of materials has both beneficial and adverse impacts on the environment. Both on-site and off-site impacts are also anticipated from extraction and usage material. The most common of these impacts are income circulation in the economy, creation of employment opportunities, off-site depletion of materials, land degradation, pollution, excessive demand on materials and health hazards. Sources of construction materials depend on the contractual agreements between the Proponent and the contractors, their availability and the priorities of the person sourcing the material. Provisional sources of construction material and their uses have been given (Table 3.2).

Table 3.2: Summary of the main construction material input into the proposed project

Materials	Sources	Uses
Sand	Suppliers near the proposed site	Preparation of concrete for joining masonry stone and aggregate
Stones	Suppliers near the proposed site	Reinforcement of the floor
Bush stones	Suppliers near the proposed site	Walling works
Soil	From site after excavations	Leveling, refilling and landscaping works
Cement	Hardware shops near the proposed site	Preparation of concrete for joinery purpose and making ballast for reinforcement concrete
Ballast and/or hardcore	Suppliers near the proposed site	Preparation of aggregate for making slabs and reinforcement concrete
Timber	Timber yards near the proposed site	Roofing and making doors
Murram	Suppliers near the proposed site	Reinforcing foundation slab
Poles	Timber yards near the proposed site	Supporting structural works
Steel bars	Hardware shops near the proposed site	Reinforcement and casement
Glass	Hardware shops near the proposed site	For glazing windows
PVC material such as pipes	Hardware shops near the proposed site	For water and waste water piping systems
Iron sheets	Hardware shops near the proposed site	Roofing
Nails	Hardware shops near the proposed site	For joinery and roofing purposes
Paint	Hardware shops near the proposed site	For colorful external and internal finishes
Water	Harvested rain water and water from Amatsi Water Supply Company	Input in the construction works for dust suppression and preparation of concrete and aggregate and cleaning

4 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

There is need to take care of the environment in order to ensure survival of human beings. The law has intervened to ensure that human beings are considerate, cautious & careful in their dealings with the environment. The laws governing the environment in Kenya include the constitution of Kenya, 2010; EMCA, 1999 (Cap. 387) and its subsidiary legislations; and other Kenyan and multilateral environmental laws. EMCA, 1999 (Cap. 387) was developed to harmonize and co-ordinate environmental management issues in Kenya by providing for the establishment of an appropriate legal and institutional framework for the management of the environment. The institution is NEMA. The Act covers all aspects of the environment. Many other institutions deal with environmental issues in Kenya and these include KFS, KWS, Nature Kenya, NMK, learning institutions and CBOs among others. EIA is also intended to meet the expectations of international supporters through the government of Kenya. Kenya is a signatory to some international legislation. Some of these are relevant to this project and were reviewed for the purpose of writing this report. Environmental management issues are addressed differently in several legal statutes, but the main objective in all of them is sustainability. It is however noted that wherever any of the laws contradict each other, EMCA, 1999 (Cap. 387) prevails.

4.2 The Constitution of Kenya, 2010

This is the sovereign law in Kenya. The constitution acknowledges the people of Kenya's respect for the environment which is our heritage in its preamble. It also points out our determination to sustain it for the benefit of future generations. This is sustainability of the environment. Environmental provisions are included in:

- Cap. 4 on Rights and Fundamental Freedoms
- Cap. 5 on Environment and Natural Resources
- Cap. 10 on Judicial Authority and Legal System
- Fourth Schedule on Distribution of functions between National and County Governments
- Fifth Schedule on Legislation to be enacted by Parliament

Chapter 5, Part 2 has the following provisions on Environment and Natural Resources

- Article 69 – Obligations in respect of the environment
- Article 70 – Enforcement of environmental rights
- Article 72 – Legislation relating to the environment

Article 42 states that, "Every person has a right to a clean and healthy environment, which includes the right to:

a) Have the environment protected for the benefit of the present & future generations through legislative & other measures, particularly those contemplated in Article 69; and
b) Have the obligations relating to the environment fulfilled under Article 70

4.3 Kenya policy papers, Acts of Parliament, codes and regulations

4.3.1 Environmental Management and Coordination Act (EMCA), 1999

The Proponent is carrying out this EIA in order to comply with sections 58 to 67 and 138 of the Act. It is a requirement that all projects listed under the second schedule of the Act undertake an environmental assessment and submit it to NEMA for licensing before commencement. The subsidiary legislation to the Act, the Environmental (Impact Assessment and Audit) Regulations, 2003 provide the framework for carrying out EIAs and EAs in Kenya by NEMA licensed experts. EIAs should be followed by EAs which should be carried out to annually to determine the projects' compliance with environmental regulations.

Section 3 (1) of the Act states that, "Every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution and relevant laws and has the duty to safeguard and enhance the environment".

Section 58 (1) of the Act states that, "Notwithstanding any approval, permit or license granted under this Act or any other law in force in Kenya, any person, being a Proponent of a project, shall before any financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the Second Schedule to this Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee".

Section 68 (3) states that, "The owner of the premises or the operator of a project for which an environmental impact assessment study report has been made shall keep accurate records and make annual reports to the Authority describing how far the project conforms in operation with the statements made in the environmental impact assessment study report submitted under section 58 (2)." The Proponent shall keep records of environmental issues, relevant licenses and permits and shall avail them to the Authority when necessary to prove compliance..

4.3.2 Public Health Act, 1986 (Cap. 242)

Part IX on Sanitation and Housing, Section 115 prohibits nuisance by stating that, "No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."

Section 118 (e), (h) and (i) defines nuisance in that order as:

- *Any noxious matter, or waste water, flowing or discharged from any premises, wherever situated, into any public street, or into the gutter or side channel of any street, or into any nullah or watercourse, irrigation channel or bed thereof not approved for the reception of such discharge;*
- *Any accumulation or deposit of refuse, offal, manure or other matter whatsoever which is offensive or which is injurious or dangerous to health; and*
- *Any accumulation of stones, timber or other material if such in the opinion of the medical officer of health is likely to harbour rats or other vermin.*

Section 121 (1) provides penalties relating to nuisances by stating that, "Any person who fails to obey an order to comply with the requirements of the medical officer of health or otherwise to remove the nuisance shall, unless he satisfies the court that he has used all diligence to carry out such order, be guilty of an offence and liable to a fine not exceeding one thousand five hundred shillings for every day during which the default continues; …"

4.3.3 Occupational Safety and Health Act, 2007

This Act provides for the safety, health and welfare of workers and all persons lawfully present at workplaces where any person is at work, whether temporarily or permanently. Part II of the Act on General Duties states the following:

- Duties of occupiers according to: Section 6 (1) that, "Every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace".
- Section 6 (2) (b), "Arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances".
- Section 6 (2) (c), "The provision of such information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed".

Part VI, Sections 47 to 54 on Health General Provisions requires work places to be kept clean, properly ventilated, have enough lighting, have floors properly drained and have sanitary conveniences. The contractors, Proponent and mortuary management will ensure the safety of employees in all phases.

4.3.4 National Construction Authority Act, 2011

The National Construction Authority (NCA) was established under an Act of parliament to oversee the construction industry and coordinate its development. Section 15 (1) of the Act states that, "A person shall not carry on the business of a contractor unless the person is registered by the Board under this Act". The Proponent will therefore select a contractor who is registered with NCA.

4.3.5 Physical Planning Act, 1996 (Cap. 286)

This Act makes specific provisions for physical planning. Section 25 (b) of the Act states that, "A local physical development plan shall consist of such maps and description as may be necessary to indicate the manner in which the land in the area may be used".

4.3.6 Urban Areas and Cities Act, 2011

This Act of Parliament gave effect to Article 184 of the Constitution by partly providing for the governance and management of urban areas and cities including the participation of all residents.

4.3.7 County Governments Act, 2012

This Act gives effect to chapter eleven of the Constitution of Kenya to provide for county governments powers, functions and responsibilities to deliver services and for connected purposes.

4.3.8 Medical Practitioners & Dentists Act, 1977

This is an Act of Parliament to consolidate and amend the law to make provision for the registration of medical practitioners and dentists and for purposes connected therewith and incidental thereto. Section 13 (1) on licensing of persons to render medical or dental services, the Act states that, "Notwithstanding any of the other provisions of this Act, the Board may, if it is satisfied that it is in the public interest to do so, confer upon any person who is not otherwise eligible to be registered as a medical practitioner or as a dentist under the provisions of this Act, by the issue, under the signature of the Director of Medical Services, of a license to do so, the right to render medical or dental services. The Proponent will employ licensed medical practitioners to carry out and/or supervise specialized operation at the mortuary.

4.3.9 Food, Drugs and Chemical Substances Act (Cap. 254)

Section 24 warns against disposal or use of chemical substances in such a manner likely to cause contamination of food or water for human consumption or in a manner liable to be injurious or dangerous to the health of any person. People who contravene this rule shall be guilty of an offence. All chemicals shall be used in accordance with their manufacturers' instructions.

4.3.10 Traffic Act (Cap. 403)

This is an Act of Parliament to consolidate the laws relating to traffic on the roads. The mortuary management shall control traffic at the site and at the access roads to the site during body collection days in order to prevent interference with other road users.

4.3.11 Building Code, 1953,

The contractor will use the best and approved building technologies for the proposed structure in order to ensure that it does not become a health and safety hazard.

4.3.12 Environmental Management and Coordination (Noise and Excessive Vibration, and Pollution Control) Regulations, 2008

These regulations prohibits under Section 3 (1) the causing of loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. The contractor, Proponent and mortuary management will put in place all applicable measures in order to manage impacts of noise, vibration and pollution. All noise to be produced at the proposed sites in all phases shall be managed in accordance with the guidelines in this report or from other authorities in control of noise.

4.3.13 Environmental Management and Coordination (Waste Management) Regulations, 2006

According to part II of the regulations, a generator of waste should:

a) *Not dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle;*
b) *Collect, segregate and dispose or cause to be disposed-off such waste in the manner provided for under these Regulations; and*

c) *Ensure that the waste is transferred to a person who is licensed to transport and dispose-off such waste in a designated waste disposal facility.*

The contractor, Proponent and mortuary management will provide appropriate solid and liquid waste handling facilities. All wastes from the proposed site will be managed in accordance with the procedures outlined in this report and subsequent EA reports and/or as may be advised by the public health office and/or other authorities.

4.3.14 National Environmental Policy, 2012

Integration of environmental conservation and economic activities in the development process is a key policy statement in the policy paper. Throughout all its phases, the Proponent of the proposed project will conserve the environment. Conservation measures at the proposed site will include a well-designed landscaping programme which will involve planting of trees, shrubs and grass at the site.

4.3.15 Sessional Paper No. 6 of 1999 on Environment and Development

The policy paper emphasizes that EIA must be undertaken by the developers as an integral part of a project preparation. It also proposes for periodic environmental auditing to investigate if developer is fully mitigating the impacts identified in the assessment report. This assessment is in compliance with this paper.

4.4 International Framework

4.4.1 Rio Declaration on Environment and Development (1992)

Principle No. 10 of the declaration underscored that, "Environmental issues are best handled with participation of all concerned citizens at all the relevant levels. The Proponent encouraged and facilitated public participation for the proposed project.

4.4.2 World Commission on Environment and Development (1987)

This commission commonly referred to as "the Brundtland Commission" focuses on the environmental aspects of development, with particular, the emphasis on sustainable development that produces no lasting damage to the biosphere and to particular ecosystems. EIA is one tool that ensures sustainable development.

4.4.3 World Bank (WB) Performance Standards on Environmental and Social Sustainability

The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment in the development process. The Proponent has carried out this EIA in compliance with Safeguard Policy 4.01 that deals with environmental assessment. The Safeguard Policy 4.12 relates to Involuntary Resettlement. No persons, businesses or facilities will be displaced from the proposed site.

5 ANALYSIS OF PROPOSED PROJECT ALTERNATIVES

5.1 Introduction

The purpose of this section is to examine feasible alternatives to the proposed project. The benefits of the proposed project will be considered against any potential environmental cost. The general principle involved in identifying alternative option(s) to a proposed development is to ensure that the option chosen would result in optimal social, environmental and capital benefits not only for the developer, but also for the environment and stakeholders in the area. This section is a requirement by NEMA and is critical in consideration of an ideal development with minimal environmental disturbance. The following feasible land-use options will be compared in terms of cost and benefit criteria: environmental impacts, social acceptability, economics (including productivity of land-use) and design feasibility.

5.2 "No-action" alternative

The selection of the "no-action" alternative would mean the discontinuation of the proposed project. Thus, the site is retained in its existing form. If this alternative is selected, the site is unlikely to undergo any major changes from its present condition and the vegetation present at the site will not be affected.

5.3 Relocation Alternative

This option would mean transfer of the proposed development to another site. If this option is selected the Proponent is required to look for an alternative site either within or outside the zone.

5.4 Alternative land-uses

The option allows the developer to explore other alternative land-uses for the site other than the proposed projects. This option requires application for change or extension of use to allow for the alternative development.

5.5 The proposed development as described in the EIA report

The impacts and mitigation measures for this alternative are discussed in detail throughout this report. The positive impacts have also been identified. The proposed project Proponent has already made financial commitments in designing and planning for the proposed project. These include application fees to the county government; professional fees to the project managers, architects, quantity surveyors, land surveyors, EIA lead experts, public health officers and physical planners among others and application for EIA approval and licensing from NEMA at 0.1 % of total project cost. The proposed design has been approved by the public health office and the physical planning officer. The proposed project will employ modern construction technologies that are approved by NCA as per the Building Code, 1953. The Merits of this alternative are as follows:

a) The property (land) value will appreciate and the investment made in the property will be productive from the optimal economic and spatial land-use.
b) Security will be alleviated as the visual and aesthetic amenities are improved.
c) The community will have a potential source of income through the supply of materials, self-sustainability, employment opportunities and better service delivery.
d) The local and national economies will improve from the revenue to be collected from the facility.

Table 5.1: Summary of alternative land-use options to the proposed project

Option	Basis for selection	Findings	Implication
No-action	• Absence of clear land ownership details and/or presence of disputes over land ownership • The site is environmentally sensitive such as having one or more threatened, rare, endangered, endemic or key stone plant or animal species or any other flora or fauna that is considered for preservation under an Act of Parliament • The site is found in an archaeological or historical site or is found to have a historically or archaeologically important material • The project will have severe implications on the environment if implemented	• There are no major issues relating to land ownership since the proposed site is found on a land parcel for which an agreement has been entered into between the Proponent and the land owner. • The proposed development will not be an impediment to any other development in the area since they are facilities that will enhance health services in the area • There are no physical, biological, cultural and socio-economic features of exceptional concern at/or near the proposed site.	• It can discourage the Proponent and any other local and international investors from investing in the area. • There will be no tax revenue to the county and central governments that the project would generate if implemented • There would be no mortuary that the proposed project is envisioned to create • The Proponent will be at a loss in terms of financial commitments already made in designing and planning for the project
Alternative land-uses	• The proposed project is a hindrance to an existing development and/or is not compatible with the existing land-uses • As in the 'no-development' option, the project will have severe implications to the environment if implemented	• The proposed development will not be an impediment to any other development in the area • There are similar developments in the neighbourhood of the proposed site	• Change of use of land might take a long time to mature since it requires approval by several authorities • The new land-use may be massively objected by the area residents • The processes of designing and planning will have to be started over again which is an extra expenditure to the Proponent • With the changing demand and supply at the market, the prices and availability of materials to be used in the new land-use may not be promising to the Proponent at the time the proposal is finally approved by the authorities

Option	Basis for selection	Findings	Implication
Relocation	• Absence of clear land ownership details and/or presence of disputes over land ownership • The proposed project is not compatible with the planning of that area for that zone and/or the project will be an impediment to future developments in the area • The proposed project is a hindrance to an existing development and/or is not compatible with the existing land-uses • As in the 'no-development' option the project site is ecologically sensitive area	• There are no major issues relating to land ownership • There are similar developments in the neighbourhood of the proposed site • There are no physical, biological, cultural and socio-economic features of exceptional concern at/or near the proposed site	• As in the 'alternative land-use' option, the Proponent will be at a loss in terms of financial commitments already made in designing and planning for the project • It might take a very long time looking for and finding a similar sized land and completing all official transactions relating to change of land ownership • There is also no guarantee that the land would be available, and if such land is available, its cost might be beyond affordable means for the Proponent • As in the 'alternative land-use' option, the processes of designing and planning will have to be started over again which is an extra expense to the Proponent • As in the 'alternative land-use' option, with the changing demand and supply at the market, the prices and availability of materials to be used may not be promising to the Proponent at the time the proposal is finally approved by the authorities

6 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Introduction

The environmental baseline information collected and the project characteristics discussed form the basis for impact identification and evaluation. Assessment of impacts depends on the nature and magnitude of the activities being undertaken as well as the type of environmental control measures that are envisaged as part of the project proposal. The impacts that are expected to arise from the proposed project could either be termed as positive or negative, direct or indirect, short-term or long-term, temporary or permanent depending on their nature, area of coverage and their duration in the environment. Impacts have been identified and discussed in all phases of the proposed project cycle; pre-construction, construction, operational and decommissioning. Currently, there are no infringements at the project site that may require relocation. In addition, there will be no shifting of public utilities such as water supply pipelines and electrical lines since these do not pass through the proposed site.

6.2 Potential adverse impacts during the construction phase

Specific impacts during any construction work of new buildings are related to vegetation, water and soil; and on extraction and/or usage of materials.

6.2.1 Impacts on vegetation, water and soil

6.2.1.1 Assessment

The impacts on vegetation and soil will be born from removal and disturbance of vegetation, movement of people and machinery, excavation and compaction. These impacts are short-lived and localized and thus of no major concern. The effects of these impacts are discussed below.

6.2.1.1.1 Removal and disturbance of flora

Parts of the proposed construction sites are under some grasses, shrubs and forbs. Some of these plants will be cleared to pave way for the construction of the proposed structures and when creating sites for storage of construction materials. Movement of vehicles, machines and people on vegetation will result in additional damage to plants because pressure will be exerted on the plants by the heavy vehicles, machines and people and will interfere with biological processes in the plants and could also lead to death of the plants. In addition, the following are likely to occur:

(a) Several species of plants will be lost.
(b) Loss of valuable food and shelter for arthropods whose life is depended on plants at the proposed site for shelter and food leading to their eventual death and/or displacement.
(c) Soil erosion and siltation.
(d) Alteration or destruction of habitats of animals due to clearing of plants.

6.2.1.1.2 Excavation

Excavation just like clearance of vegetation will alter and/or destroy the habitats of organisms. It will also result into loose soil which is prone to both water and wind erosion. Eroded soil silts water bodies and can flood downstream areas. Loosening of soil interferes with soil structure. Most of the excavated soil will be utilized on site to adjust levels where necessary. However, if excess soil is not properly disposed, it results into nuisance as solid wastes, dust and silt.

6.2.1.1.3 Soil compaction

As vehicles, machines and people move on ground the soil is compacted. Compaction has the undesired effect of hindering air and water penetration beneath the soil surface and thus limiting aerobic activities of soil dwelling organisms which lowers soil productivity. When water penetration into the soil is interfered with, surface run-off during the rainy season is enhanced resulting into soil erosion and siltation. Compaction will only be significant land used for cultivation will be used for movement of vehicles.

6.2.1.2 Mitigation

(a) Totally avoid encroachment into road reserves and other private or public properties by properly demarcating the project area to be affected by the construction works and restricting construction works including movement of vehicles to the actual project area to avoid effects spilling over into neighbouring areas.
(b) Re-establish vegetation in some parts of the disturbed areas through implementation of a well-designed landscaping programme by planting of appropriate plants.
(c) Drainage works for sewerage and storm water must adhere to the Public Works specifications.
(d) Rip off compacted areas in areas where compaction will have adversely affected after construction to allow aeration of soil and ease infiltration of water into the soil.
(e) Excess soil could be used in filling road potholes among many other uses. Part of the topsoil excavated from the proposed site can be re-spread in areas to be landscaped or farmlands within and/or outside the proposed site.
(f) Supervise all construction workers. All excavation and cutting to take place as instructed in the approved structural plans for the proposed structures.

6.2.2 Extraction and/or usage of consumable materials

6.2.2.1 Assessment

The proposed project will require significant amounts of materials stated under sub-section 3.3. Fuel will be consumed indirectly through machines. The overall environmental impacts depends on the amounts required. Many construction materials are components of natural resources and their extraction has an effect of depleting land resources alongside subsequent off-site degradation of the environment.

6.2.2.2 Mitigation

(a) The project and material requirements will be evaluated and quantified to ensure that the design optimizes the use of materials. This will help to prevent misuse of the materials.
(b) Material for construction such as building blocks must be taken for testing and approval by relevant departments at the Public Works offices before they are used for construction.
(c) Proper planning of transportation of materials will ensure that products of fossil fuels (diesel and petrol) are not excessively consumed.

6.2.3 Safety at the construction sites

Approved and licensed specialists will be contracted to be in charge of specialized operations at the construction sites. These include the plumbers, carpenters and masons among others. These specialists shall put the following in place in order to ensure safety at the site:

(a) Secure the construction areas with appropriate hoarding in accordance with NCA requirements for hoarding of construction sites to ensure safety of passersby and construction workers.
(b) Post notices at the site informing the public of the ongoing construction works and the need to be aware of falling and any objects other potentially dangerous things and spots at the site.
(c) Supervise all specialty works at the sites.
(d) Adopt proper working procedures and when working with chemicals, machines and equipment.
(e) Keep all passages clear at all times.
(f) Provide appropriate PPE to all workers and sensitize them to where the PPE whenever they are in environments that warrant the use of such PPE.
(g) Put in place an appropriate emergency response plan including having emergency contacts (such as ambulance, fire tender and police) conspicuously displayed.
(h) Support all structures under construction.
(i) Remove all soil, boulders and other heavy materials from the edges of excavations.
(j) Remove and dispose all wastes in designated areas whenever they are produced.
(k) Rehabilitate areas within and outside the proposed sites that will have been adversely affected by the construction through spillages of pollutants such as harmful chemicals, cement and paint among others and those that will have been destroyed in other ways.
(l) Plant appropriate plants at the sites.

6.3 Impacts cutting across phases

The following impacts will adversely affect the environment in one or more phases.

6.3.1 Noise and vibrations

6.3.1.1 Assessment

Noise is unavoidable at any construction site due to the use of machines such as concrete mixers, moving vehicles and shouting by workers. This noise is best described as part of a normal occupational hazard that workers in the construction industry face. In addition, noise levels at most building construction sites are usually below the threshold limit of 90 dBA (can be transmitted to over 30 M away) beyond which operations and people in the neighbourhood are likely to be affected. Similarly, workers are exposed to it for not more than 8 hours in a 24-hour working day. Construction noise and vibrations are short-term impacts. During operation, the long processions and hooting of vehicles that will be coming in to collect bodies will be a significant source of noise. In addition, some family members of the dead will mourn at the site thus create noise. These will likely affect the neighbourhood since the mortuary is to be located in a hospital compound where silence is expected at most times. The setting is also in a residential area. Mourning in the area is a sign of death in the village a situation that disrupts activities of the day due to people gathering at the home of the dead and therefore mourning at the mortuary will disrupt activities within the village. During operation, noise will be high due to the use of a stand-by generator and incoming and outgoing vehicles. During this period, noise will need control measures especially when carrying out repair works and/or when undertaking new projects. Noise and vibrations will be considered significant if the project will result in a substantial temporary or permanent increase in ambient levels in the project vicinity especially above levels existing without the project; and exposure of persons to the noise and vibrations. The effects of noise and vibrations include:

(a) Noise interferes with communication.
(b) Problems such as tinnitus (ringing in the ears).

(c) Vibrations can weaken adjacent buildings resulting into cracking of their walls.
(d) Nuisance; fatigue and tiredness; reduced efficiency; low working morale; and loss of hearing which may persist for several hours due to prolonged exposure to noise beyond 90 dBA.

6.3.1.2 Mitigation

a) Minimize the impacts of temporary construction noise and vibration by:

   i. Posting notices at the construction sites informing the public of the construction activities, time and day.
   ii. Planning the construction work to take place only during the day preferably between 0700 hours and 1800 hours when the neighbours are also at work and maintaining reasonable working hours of not more than 8 hours within any 24-hours working duration so as to reduce the number of complaints concerning noise from the workers and neighbours. In this case workers will work in shifts.
   iii. Providing ear protective devices to workers and visitors in noisy environments to prevent high frequency noise emitted by the high frequency machines.

b) Minimize noise at the sites and in the surrounding areas by:

   i. Sensitizing drivers and machine operators to switch off their engines while they are not in use especially when offloading and loading materials and to avoid hooting especially when passing near noise-sensitive areas such as health facilities, other educational and research institutions, courts, worship places, and residential areas among other noise-restricted areas;
   ii. Restricting hooting of vehicles and mourning at the site by conspicuously displaying warning signs and attaching penalties to the same. Placing some noisy equipment such as generators in sound-proof rooms or in enclosures to minimize ambient noise; and
   iii. Properly servicing and tuning construction machinery such as generators and other heavy duty equipment to reduce noise generation.

6.3.2 Solid wastes including bio-hazardous wastes

6.3.2.1 Assessment

During the construction phase, wastes will include excess excavated soil, removed plant material, unused construction materials, pieces of waste timber and metals, polythene papers, broken glasses and empty tins among others. During operation, solid wastes will include waste papers, packaging material, ash from incineration of medical wastes, dead plant material from cleaning the compound and inorganic wastes such as food leftovers among others. During this phase, solid wastes containing infectious materials or potentially infectious substances will be a major concern and will include the following:

(a) Sharps such as needles, broken glass and scalpels among other wastes that can cause injury when handling.
(b) Clotted human blood and body fluids and their products including serum, plasma, vaginal secretions and saliva.
(c) Micro-biological wastes including stocks of reagents.
(d) Wastes comprising outdated, contaminated and discarded medicines and drugs.
(e) Any unfixed human tissue other than the skin.

(f) Pathological wastes including tissues, organs and other body parts and fluids that will be removed during autopsy and specimens of body fluids and their containers.
(g) Chemicals containing wastes in the production of bio-reagents and other hazardous materials used in autopsy.

Below are some of the effects of these solid wastes:

(a) Some waste materials especially the plastic/polythene are not biodegradable hence may cause long-term injurious effects to the environment.
(b) When organic wastes decompose, they produce methane gas, a powerful greenhouse gas that contributes significantly to global warming.
(c) Solid wastes can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on animal health or be a potential source of disease pathogens or form breeding grounds for: disease causing vectors such as mosquitoes; rats; cockroaches and lice and other vermin leading to increase in incidence of associated diseases.
(d) Mismanagement of infectious waste is a significant risk factor for disease transmission. Contaminated needles and syringes represent a particular threat, as the failure to dispose them off safely may lead to dangerous reuse. Contaminated injection equipment may be scavenged from waste areas by children as playing equipment.

6.3.2.2 Mitigation

The contractor(s) will be responsible for efficient management of solid waste generated by the project during its construction and/or repair and maintenance while the proponent through the mortuary management will be responsible during the operation phase. In this regard they:

(a) Provide waste handling facilities such as waste bins for temporarily holding of wastes generated.
(b) Put in place an efficient waste management scheme that will ensure regular collection and disposal of the wastes to prevent the accumulation of wastes at collection areas.
(c) Install double bins at every collection point for separate collection of recyclable, non-recyclable, hazardous and re-usable wastes for ease of management.
(d) Cover solid waste collection bins and/or enclose them in a wire mesh to prevent habitation by scavenging by straying animals.
(e) Manage solid wastes using appropriate methods such as biological organic matter management by decomposition, incineration, recycling, re-use and sanitary land filling.

During operation a Bio-hazardous Waste Management Plan will be enforced to significantly cut down the infective and harmful properties of the bio-hazardous waste and therefore minimize the adverse impacts on the human, land and water environment. the plan shall provide for:

(a) Treating waste that is deemed potentially infectious prior to disposal by a number of different technologies such as steam sterilization (autoclaving), dry heat thermal treatment and chemical disinfection processes that either disinfect or sterilize them;
(b) Putting in place distinctive protocols for the classification and segregation of wastes in order for treatment systems to work properly and to ensure proper handling and therefore safety of workers handling those wastes;
(c) Ensuring access to and usage of appropriate PPE by workers to reduce injuries and infections;

(d) Carrying out a quantitative and qualitative analysis of the mortuary wastes generation to estimate the potential risk and as a basis for any waste treatment and disposal; and
(e) Regular training of personal dealing with the infectious wastes in order to make them have a basic understanding of the hazards involved and how to manage them.

The following options will be employed for the safe disposal of bio-hazardous wastes:

(a) Burning solid wastes in an incinerator to be constructed at the site.
(b) Disposing solids wastes collected at the outlet of the autopsy table drainage via an infectious waste bin.
(c) Disposing some human organs in a deep pit to be established at the site.
(d) Collecting and/or storing solid wastes including used gloves, gowns, sheets and sharps in marked and sealed plastics and disposed them off as hazardous wastes.
(e) Flushing some liquid wastes down the drain to the septic tank.
(f) Employing the services of approved medical waste contractors to collect and dispose the wastes on behalf of the management.

The following measures shall be observed in order to prevent spread of infectious diseases:

(a) All sharps shall not be re-used.
(b) All bodies labeled as 'danger of infection' will totally be enclosed in leak proof body bags and marked appropriately.
(c) Wastes shall be removed regularly and appropriately from the collection areas for disposal.
(d) All bags and containers for collection of wastes shall be filled no more than ¾ full and shall be sealed to prevent overflows and leakages into the environment or to the workers.
(e) All workers handling wastes will be provided with appropriate PPE.
(f) All workers handling wastes must be trained in safe practices and in legally-mandated requirements for managing wastes to ensure safety when handling the wastes.

6.3.3 Sewerage and waste water

6.3.3.1 Assessment

During the construction phase, workers and visitors at the construction sites will use some of the outdoor toilet facilities that are constructed at the clinic. During operation, waste water from the mortuary will include: toilet and bathroom watste water; embalming waste water which may include corporeal wash water which may contain shampoo; internal body fluids including blood and residual arterial embalming chemicals such as formaldehyde, phenol and methanol. The residual solution from embalming may consist of a mix of a small amount of blood and is mostly a water-gluteraldehyde mix. Mismanagement of mortuary waste water is a significant risk factor for disease transmission especially to sewer maintenance workers. Accidental flooding of the sewerage and waste water can flush it into the storm water drainage system thereby creating biological hazards. Sewage and waste water have associated problems when they leak into the environment. Such problems include: poor sanitation, nuisance and associated diarrhoeal diseases. Poor surface drain management or large amounts of effluents may lead to blockage of drains which in turn could result to flooding and unsanitary conditions within the neighbourhood. Blocked drains produce bad odour and are a threat to general health, hence are environmentally unfriendly. All sewerage and waste water will be directed into a septic tank that is constructed at the site.

6.3.3.2 Mitigation

(a) All effluent will be treated in septic tanks and waste water discharged in soak pits. Upon filling or whenever it will near filling with solid effluent, the proponent will contact and contract an exhauster service provider to empty the septic tank for appropriate disposal of the wastes.
(b) Designate sanitary facilities to be used by the construction workers and visitors.
(c) Construct a soak pit for the kitchen wastewater.
(d) The wastes will be moinitored every four months to ensure that such waste is disposed in accordance with controlled discharge standards. Waste water will be anaysed through NEMA-accredited laboratories and such reports presented to the Authority when called upon.
(e) Wash waters and process liquors arising from embalming and washing of body trays will be disinfected and discharged via 'slops trough' or an 'in-floor flushing ring waste water trap' into the septic tank.
(f) The autopsy table shall be fitted with screens with a maximum of 2 mm mesh size at the drainage outlet to collect hair and solids.
(g) Whereas bio-hazardous liquids and liquids that contain human blood will be disinfected at the point of production and flushed down the drain leading to the septic tank, solutions containing large amounts of blood will not be disposed in the drain to avoid clot formation in the pipes.
(h) Waste waters, process solutions and chemicals not permitted to be discharged into the septic tank such as those in (f) above and those solid wastes trapped in (e) above will be collected and stored in approved containers for storing hazardous wastes as they await off-site disposal.
(i) Inspection of the sewerage and drainage systems from the premises will be carried out daily to remove blockages, repair breakages and minimize risks of flushing.
(j) In-house toilets and pit latrines to be cleaned every day.
(k) The diameter of the waste water and sewage pipes will be made large enough and will be regularly maintained.
(l) Pit latrines and the septic tank will regularly be dis-ludged. For instance, every two years or whenever they near filling up.

6.3.4 Degradation of air quality: dust and foul smell

6.3.4.1 Assessment

One of the common threates to air quality in many occupational areas is dust that is generated from house-keeping activities such as sweeping. Other sources include exhaust emissions, decomposing wastes and burning of wastes. Degradation of air quality will be worsened especially if there will be indoor congestion and if the solid wastes will be left uncollected for a long time. Exhaust emissions from poorly maintained vehicles have carbon monoxide (CO) due to incomplete combustion of fuel. Of specific concern, the main cause of foul smell in a mortuary is poor sanitation which could be brought about by decomposition of bodies due to failure of the refrigeration system and as a result of congestion as bodies are placed on top of others making their management difficult. The mortuary could receive bodies of those who died as a result of road accidents. Such bodies are brought in with deep cuts and blood all over and once they dumped in the mortuary they mix with other clean bodies. More harmful emissions will be produced by the incinerator. Although the incinerator flue gases will be disposed high in the atmosphere, they may contain significant amounts of particulate matter and harmful gases. The effects of the emissions may range from respiratory problems to affecting reproduction and development. Most of the pollutants are carcinogenic while others can contaminate food chains.

6.3.4.2 Mitigation

(a) Internal access roads will be paved and/or maintained properly to reduce fugitive dust and provide for the smooth movement of vehicles.
(b) Informatory sign shall be provided to encourage vehicle owners to maintain their vehicles.
(c) Stand-by generators and other machines will regularly be serviced to ensure that they are in good conditions and that they do not produce harmful exhaust emissions.
(d) Dust shall be suppressed by water spraying before sweeping.
(e) Disposal of waste shall be done regularly and appropriately to avoid wastes decomposing at collection areas.
(f) In order to prevent foul smell from the corpses:

i. All bodies will be embalmed before storage in order to prevent them from rotting and therefore make the mortuary a place fit for working;
ii. Only enough bodies to the capacity of the mortuary will be stored in the mortuary in order to prevent congestion;
iii. To reinforce mitigation (ii) above, rules should be put in place to prevent bodies overstaying in the mortuary in order to give room for new bodies. Following relevant beaurocratic procedures, all unclaimed bodies should be removed after a specified period of time and appropriately disposed by burial in a cemetery or by cremation.
iv. The refrigeration system will be checked daily to detect and repair any malfunctioning which could lead to rotting of bodies; and

(g) The mortuary will be sprayed with appropriate smell deodorizers in order to counteract foul smell from embalming and autopsy areas and from any decomposing bodies.
(h) All workers in areas where air quality is compromised will be provided with appropriate PPE.

6.3.5 Fire

6.3.5.1 Assessment

Fire damage are unpredictable but can occur in any phase of the proposed project. Possible fire sources include:

(a) Lightening;
(b) Leaking methane gas and fumes;
(c) Leaving flammable material near fire points;
(d) Arson especially by students when they engage in strikes;
(e) Careless disposal of lighting match sticks or cigarette stabs; and
(f) Poor handling of electrical appliances which may also lead to shocks, electrocution and damage to electrical appliances;

If appropriate measures are not put in place, a fire outbreak can occur and cause great damage to property and even lead to death.

6.3.5.2 Mitigation

(a) Clearly mark “FIRE EXIT” points from the proposed building and ensure that they are visible.

(b) Declare places with flammable materials as "NO SMOKING ZONES" and display conspicuous notices of the same.
(c) Establish and mark a "FIRE ASSEMBLY POINT" and designate parking spaces for emergency management vehicles at strategic outdoor points at the site.
(d) Weather-proof all lighting and power points at the site.
(e) Install lightening arresters on the proposed building through a competent installer.
(f) Install electricity through a competent and licensed electrician and properly handle, store and use fuel and electricity.
(g) Install fire extinguishers at strategic locations and at least one fire hose reel on each floor as fire suppression measures. Areas where food is prepared will be equipped with fire blankets. All these must be available at the site at all times. The proponent will contract a licensed fire officer to install fire suppression equipment. Part of this fire management plan can include the following:

i) A roof-top 4,000 litre plastic tank for reserve water for fire-fighting tank and connected to automatic booster pumps with independent power sources.
ii) A 30 m hose reel in a fire cabinet and connected to a water hydrant at the site.
iii) Install a fire blanket together with one or more different types of fire extinguishers in the cooking area. Recommended fire extinguishers types for cooking areas are foam, CO_2 and dry powder.
iv) Assorted fire extinguishers such as water, CO_2, foam and dry powder fire extinguishers to be provided in the fire cabinet and at a strategic location within and outside the proposed building especially in flammable material storage areas and on the corridors.

(h) Subject to availability of resources install fire alarms that have smoke sensors.
(i) Regularly inspect the fire-fighting equipment as will be advised by the fire officer.
(j) Keep the compound clean and free from fire hazards and flammable litter and avoid naked fires and burning things in the open fire near flammable material.
(k) Regularly repair and maintain all equipment.
(l) Regular train personnel concerning emergencies including those involving fire out-breaks.

6.3.6 Increased storm water flow

6.3.6.1 Assessment

The building's roof and the pavements will lead to increased volume and velocity of storm water or run-off flowing across the site due to the increase in the sealed surfaces. Sealing of ground surface inhibits percolation and consequent infiltration. The increased storm flow can damage existing storm drainage lines, cause overflows that can damage adjacent structures or facilities, and can also cause soil erosion. The water may also end up stagnating and hence creating conducive breeding areas for mosquitoes and other water based vectors leading to transmission of human diseases like malaria and cholera.

6.3.6.2 Mitigation

(a) Install gutters and construct tanks to harvest and store rain water for use and thus reduce run-off.
(b) Design the storm drainage system in such a way that the storm does not mix with the waste water and sewerage system.

(c) Use pervious materials such as stones and/or spaced concrete slabs in parking areas and on pavements.
(d) Concrete sidewalks need to be abandoned in favor of grass verges to facilitate percolation.
(e) Handle storm water and/or run-off to be handled by construction and designing of curbs, channels, side inlets and road side ditches to channel water into existing drainage lines so as to prevent ponding and flooding.
(f) Keep open all drainage lines and built no obstructions within them to prevent stagnation of water that could lead to development of breeding grounds for disease causing vectors such as mosquitoes, rats, cockroaches and lice and other vermin.

6.3.7 Increased traffic flow

6.3.7.1 Assessment

During construction, there will be an influx of traffic to and from the proposed construction sites. These will include vehicles used in facilitating the construction work and people seeking employment opportunities, workers, managers, environmental inspectors and suppliers of foodstuffs to the construction workers. Though increased traffic during construction is a short term impact, it has the effect of causing congestion on the road which may subsequently results in accidents on the roads. During the operation phase, traffic flow will increase due to the increase in number of people coming to the site including workers; visitors especially those coming to store, view and collect bodies of their loved ones and environmental inspectors among others. Traffic will be highest during days designated for collection of bodies since during such moments there are usually long processions as people come in either on foot or in vehicles to collect bodies. However, it is expected that traffic flow will be controlled and thus of no major concern.

6.3.7.2 Mitigation

(a) Proper planning of transportation of construction materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road.
(b) Place clear signage at the gate to alert drivers to be cautious about the construction and to look out for entering and/or exiting vehicles.
(c) Create and designate a parking space and provide for adequate space at the turning point at the gates to the proposed sites to give drivers enough room to maneuver in and out.

6.3.8 Increased demand on water usage

6.3.8.1 Assessment

During the construction phase, both the workers and the construction works will use water in cleaning, in the concrete mixing and in curing surfaces. During operation, water will be used in general cleaning, in embalming and cleaning bodies, in preparation of meals and in discharge of wastes. The increased water-use may lead to acute shortages at the site and in the area, huge water bills and/or become a source of conflicts with other water users in the community.

6.3.8.2 Mitigation

(a) Apply for relevant permits from WRMA for the abstraction of large volumes of water such as from boreholes subject to the Water Act, 2002.
(b) Conduct regular maintenance of pipes and taps to fix leakages.

(c) Install the water supply systems in accordance with CGV and Public Works requirements.
(d) Manage water use by:

i. Maximizing on other sources of water such as rain water harvesting and storage in tanks.
ii. Installing water meters for monitoring water-use at the site.
iii. Providing every supply pipe with an approved stop tap. Subject to availability of finances, self-closing taps with shorter hand-wash cycles can be use at some washing points.
iv. Constructing or installing bigger storage facilities to help cope with stresses in supply.

6.3.9 Use of energy (electricity and fuel)

6.3.9.1 Assessment

During the construction period, electricity may be required to run machines such as soil compacting machines and drills. Fuel will be required to run generators and construction vehicles. On completion, the project shall consume large amount of electricity due to the number of electricity-depended appliances to be installed such as refrigerators/coolers, fans, lighting system both inside and outside the building, television sets and radios among others. Kenya Power Company supplies electricity to the facility. The proposed buildings will be connected to electricity and will have their main switches appropriately installed. Since the operations of a mortuary requires electricity at all times, the facility will be connected to a stand-by generator to ensure continues supply of power that ensures the continuous working of body treatment and preservation equipment. Electric and fuel are generated mainly through natural resources. Over-consumption of electricity have adverse impacts on these natural resource bases and their sustainability. On the other hand, fuels are usually inflammable and could result into fires. Leaks and spills of fuels may lead to explosions and fires leading to destruction of property injuries and deaths.

6.3.9.2 Mitigation

Possible options for minimization of energy include:

(a) Use of energy efficient night-time lighting only at the site.
(b) Light sensor switches can be used to ensure outdoor lights are not used during daytime.
(c) All energy using equipment used should be switched off when not in use.
(d) Consider installing alternative energy sources such as solar panels and automatic generators not only for power back-up but also to reduce dependency on electricity.

Control of fires and explosions is important in energy-use and management so as to: reduce damage on property, avoid injuries and accidents and protect electrical appliances and lives. In this case:

(a) Weather-proof all lighting and power points located outside the proposed building;
(b) Install lightening arresters; and
(c) Ensure proper handling, storage and use of fuel and electricity.

i. Weather proof all power points at the site;
ii. Install lightening arresters; and
iii. Properly handle, store and use fuel and electricity.

6.4 The decommissioning plan

It is expected that the proposed building will be used for as long as the proposed mortuary will be in operation. However, decommissioning could be in the form of permanent withdrawal from the site or change of use of the site. Demolition of structures is the most critical part of decommissioning as it is associated with the following among other impacts:

(a) The demolition works may lead to significant deterioration of the environment within the project site and the surrounding areas through noise and vibrations.
(b) Large quantities of dust will be generated during demolition works. Exhaust emissions will result from the machinery and equipment used in demolition.
(c) Demolition of the structure will result in large quantities of solid wastes. The wastes will contain the materials used in construction including soil, concrete and metals.
(d) Impacts associated with occupational health and safety among others.

The following will be adhered to before decommissioning.

(a) A decommissioning report will be prepared and submitted to NEMA at least three months before decommissioning takes place.
(b) The use of the site or the structures may be changed to other appropriate uses after renovation, rehabilitation and some structural changes have taken place.
(c) The decommissioning and alternative land-use options will be facilitated by appropriate professional personnel incorporating environmental experts; planners; public works officers and public health officers among others.
(d) Mitigation for decommissioning phase impacts will follow general guidelines discussed in this report and in the decommissioning report.

6.5 Impacts related to occupational and public health and safety

6.5.1 Assessment

There are three main types of occupational health and safety hazards that may be of concern. These are physical, chemical and biological. Potential physical hazards will include noise and accidents. Chemical hazards will involve exposure to harmful gases and chemicals by inhalation, ingestion and skin contact. Biological hazards involve exposure to pathogenic organisms which may cause diseases. Specific areas of concern include:

(a) Fire hazards
(b) Noise and vibrations
(c) Congestion
(d) Poor sanitation resulting from presence of potential environmental pollutants at the site including waste water, decomposing solid wastes, dust and exhaust emissions and used chemicals and equipment which could result into waterborne diseases such as typhoid.
(e) Accidents including cuts, pricks and bruises; electrocution from naked electrical cables; falling in uncovered manholes and trenches, from raised places and on slippery or poorly constructed floors and staircases and suffocation from gas accumulation or lack of oxygen in confined spaces. Accidents could result from lack of supervision and job training, improper handling of machinery and hand tools and inappropriate carrying out of tasks.

6.5.2 Mitigation

Mitigation options to most of the occupational health and safety impacts: noise and vibrations; fires and dust and exhaust emissions have been discussed. Additional mitigation measures to other impacts are:

(a) Ensure high standards of construction as recommended in the approved structural and architectural designs including providing a working space of at least 10 m^3 excluding the space above 4 m high as per OSHA, 2007 and regular maintenance to increase the life of the building making it safe for occupation and to reduce the degree of pollution in the water supply system.
(b) Avoid excavation works in areas with loose materials in extremely dry weathers to prevent dust.
(c) Fence the site for protection; provide privacy; reduce cases of trespass and theft; and control entry by straying animals and therefore avoid conflicts between people at the site and the people in the neighbourhood.
(d) Have a fully equipped First Aid Kit at the site at all times and ensure that trained first aid personnel are available to handle any incidents due to pollution at site. A typical First Aid Kit contains a first aid manual and is equipped with sterile adhesive bandages, safety pins, cleansing agent/soap, latex gloves; sterile gauze pads triangular bandages, non-prescription drugs, scissors, tweezers and antiseptic amongst others. First aid can assist in containing blood loss among other emergency occurrences before medical attention is given.
(e) Provide workers with appropriate PPE including masks, goggles, scarfs, boots and overalls among other protective clothing as spelt out under section 101 (1) of OSHA, 2007. These must be worn in all situations where the body and skin are potentially exposed to hazards such as chemicals, harmful dusts, highly infectious wastes, sharp objects, burns and extreme temperature and/or when working in areas that present threatening experiences.
(f) Ensure adequate water supply for high standards of sanitation that keeps to the minimum chances of disease outbreaks.
(g) Ensure that trained first aid personnel are available on site at all times to handle emergencies.
(h) Provide hazard notifications, signage and warnings to warn visitors and staff of potential dangers that may exist in different areas of the facility, or warn the persons on potential consequences of their actions should be put in place.
(i) Dispose wastes from the site regularly and ensure high standards of cleanliness of all waste disposal facilities.
(j) Control of waterborne diseases by conducting regular maintenance of pipes and taps to fix leakages and prevent underground leakages which contaminates water; ensuring sanitation at the site as outlined in this report; regularly conducting chemical and bacteriological quality of the water to ascertain its suitability for consumption and treating water before drinking using approved home-based treatment methods such as filtration using life-straw, boiling and use of chemicals such as water guard.
(k) Ensure presence of emergency sanitary facilities such as a pit latrine or an outdoor toilet that can be used by the tenants when the indoor facilities fail due to blockages or lack of water. Such facilities can also be used by workers.
(l) Always keep sanitary facilities clean.
(m) Clearly display emergency contacts such as ambulance, fire tender and police at the site.
(n) Frequently train personnel in order to make them have a basic understanding of the tasks under them, the hazards involved, and how to manage them.
(o) Allow only purposeful and controlled burning at the site.

(p) Ensure employee welfare including provision of free or subsidized medical attendance if injured on work, making provisions for leaves and offs, and operation of shorter-shift period for workers in highly polluted working areas.
(q) Open windows and use exhaust fans at strategic points to allow good air circulation into and out of the building.
(r) Advice workers and visitors to take precautions not to cause any effect on their own health or to the health of other persons.
(s) Conduct regular maintenance of the proposed site and facilities therein to increase the life of the proposed building making it safe for occupation.
(t) Clean all spilt hazardous using an appropriate disinfectant.
(u) Cover all trucks hauling loose material with tarpaulin and/or requiring these trucks to maintain at least two feet of freeboard.
(v) Suppress dust by water spraying before sweeping.

6.6 Potential beneficial impacts

6.6.1 Immediate impacts during the construction phase

(a) Demand for raw materials: It is estimated that 70 % of the cost of the proposed project will be used in the procurement of construction materials and operation equipment. The supply of these materials and equipment translates into boosting both the local and national economies and increased revenue to the county and national governments in terms of tax and other service charges.
(b) Creation of employment opportunities: It is estimated that 30 % of the cost of the proposed project will be used in employment of professional services and labour. These includes professional services of physical planners, environmental experts, land surveyors, architects, agriculturists, engineers and skilled and unskilled labour for about 20 – 30 people. Indirect employment will be created where suppliers of foodstuffs and other goods and products will gain income by supplying their services and products to the construction site. The income to be earned will be used for the betterment of peoples' lives and families thus improving their living standards.
(c) Capital into the economy: The proposed project is estimated to cost millions of Kenya shillings over their construction periods. It will therefore inject some capital into the economy.

6.6.2 Long term impacts during the operation phase

(a) Mortuary facility and services: The proposed mortuary is a modern one and the only one of its kind in the area. It will provide storage space for human corpses as they await identification or removal for autopsy or disposal by burial, cremation or by any other legal method.
(b) Employment generation: People will be employed to work at the site ranging from casual to permanent employees including morticians, managers, cleaners and security personnel. Indirect employment will be created where suppliers of food stuffs and other goods and products will gain income by supplying their commodities.
(c) Optimal use of land: The proposed project site has not been productively utilized for a number of years. The establishment of the proposed project will enhance the returns on the land and land value in the area.

(d) Improved aesthetics and development of the area: Spill-off infrastructure development will entail drainage improvements, as well as an improvement to the general aesthetic of the area through landscaping. This will add value to land in the area and attract new residents in the area.
(e) Investment: The project leads to increased capital investment for the Proponent. Through provision of mortuary services, the project Proponent is able to earn substantial income.
(f) Increased revenue: The project translates into increased revenue to both the county and the national governments in terms of tax and other charges.
(g) Improved living standards: The Proponent, business people and employees will earn income and use it to improve their living standards.

6.6.3 Enhancement of socio-economic benefits

(a) The Proponent, contractor and mortuary management are urged to consider area residents when offering job opportunities at the site.
(b) The Proponent, contractor and mortuary management are advised to maintain good relations with area residents and especially their immediate neighbours in order to make them live in harmony with the community.
(c) The Proponent will properly fence the site using a perimeter to secure it, prevent trespass and to remove fear from the area residents.

7 PUBLIC PARTICIPATION

7.1 Introduction

Members of the public are supposed to participate and get involved in decision making concerning development projects because they affect them. Reference is made to Section 17 of the Environmental (Impact Assessment and Audit) Regulations, 2003, which states that the proponent shall in consultation with the authority, seek the views of persons who may be affected by the projects. The role of public consultation and involvement in EIA process is to assure the quality, comprehensiveness and effectiveness of the assessment and ensure that the public views are adequately taken into consideration in decision making process. This public participation was conducted through a public meeting organized at the site. The meeting was attended by the Proponent representatives, EIA/EA expert, the area leaders including the assistant chief, the village elders and the area residents including immediate neighbours of the proposed site.

Plate 7.1: Community members during the public consultation meeting at the site

7.2 Findings

(a) During the meeting, the locals appreciated that the Proponent had given them a chance to participate in the decision making process concerning the proposed project.

(b) The Proponent explained that the site was chosen for the establishment of a mortuary since it was in a hospital compound and this followed a directive from the public heath office that the facility be established in a compound where there is a medical facility or be constructed together with a health facility. The Proponent added that there was no other facility in the area and that the establishment of the mortuary would ease the community members the high expenses involved in storing the bodies of their loved ones in similar facilities far away. The nearest mortuaries were public mortuaries at Vihiga County Hospital at Mbale, Kakamega County Hospital in Kakamega Town and others in public hospitals in Kisumu City. The nearest private mortuary is found at St. Elizabeth Mission Hospital Mukumu. All these facilities are often congested hence compromising body handling.

(c) It was realized that the people in the area have total respect for the dead and they also fear the dead. There were objections to the proposed mortuary project in the area from a number of the attendants. These people claimed that since it was a mortuary they would be harassed by ghosts of the dead. It was made clear that dead bodies have no life and therefore have no capability of harassing people.

(d) The members of the public were concerned about the level of cleanliness and foul smell from the facility. The Proponent told the people that the in mind was a modern mortuary with modern equipment and storage facilities that will ensure proper preservation of the bodies. The Proponent added that they would employ qualified embalmers and morticians who would attend to the bodies therefore presenting no threats of foul smell.

(e) After a lengthy discussion on the outcome of the proposed mortuary, the locals allowed the Proponent to carry on the proposed project.

(f) The meeting was concluded as follows:

i. The Proponent would put up a perimeter fence of at least 6 ft high around the site in order to enclose the site and make it less scaring to the people.

ii. That the Proponent should give priority to the community members when offering job opportunities at the proposed site an issue that was reinforced by the area leaders.

This comments can be verified from the EIA public participation minutes that are attached on this report

8 ENVIRONMENTAL MANAGEMENT AND MONITORING

8.1 Environmental management

This section is intended to provide a concise structure of actions with specific priority levels for the management of the environment in all phases of the proposed project. Environmental management is best achieved by preparation and implementation of an EMP. The plan ensures that environmental impacts are identified and mitigated by outlining corresponding management strategies that need to be implemented to mitigate potential adverse environmental impacts and assigns responsibility for the implementation of the mitigation measures. All costs are estimates and may change in time and space. As project commencement and scheduling plans are developed and changed, components of the EMP might require amending. The EMP is generally prepared to ensure that the components of proposed project are operated in accordance with the approved design. If the proposed development is implemented without any environmental management options the total project impact will be on the appreciably adverse side. However, if the environmental management strategies discussed in the EMP are fully implemented, the adverse impact of the project would be reduced and there will be an overall improvement in the environment.

8.2 Environmental monitoring and audits and record keeping

Environmental monitoring and audits are conducted to establish if project implementation has complied with established environmental management standards. Environmental audits (EAs) are conducted annually beginning twelve months from the date of commissioning of the project to ensure that identified potential negative impacts are mitigated. EA reports will be submitted to the Authority in accordance with Section 68 (3) of the EMCA 1999 (Cap. 387). Environmental monitoring will best be achieved by keeping proper records of the progress of the facility. Some of the records to be kept include:

a) Staff health records;
b) List of materials according to approved classification schedule;
c) Emergency management procedures such as fire response plans;
d) Staff training records in environmental issues and periodic review notes; and
e) Records of violations and notification of authorities' correspondence in relation to the environment.

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Table 8.1: Proposed EMP for the construction phase of the proposed project

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
Removal of vegetation, excavation and compaction			
• Interference with plant and animal life • Change in aesthetic characteristics of the site	Demarcate the project area to be affected by the construction works to prevent the effects of construction from spilling over into other areas	Proponent and contractor	–
	Fence the demarcated areas appropriately in accordance with the requirements of NCA for hoarding of construction sites	Contractor	Covered in cost of construction
	Re-establish vegetation through implementation of a well-designed landscaping programme	Proponent	50,000
Solid wastes			
• Environmental contamination • Nuisance • Health hazard	Collect and appropriately dispose all solid wastes including excavated soil and materials that will not have been used up from the site daily or regularly as appropriate through an integrated solid waste management system that comprises of recycling, re-use, combustion, decomposition of organic matter and sanitary land filling in order to prevent accumulation at the sites	Contractors	Covered in cost of construction
Extraction and usage of construction materials			
• Misuse of materials	Evaluate and plan for the proposed project including purchasing of construction materials to ensure that the design optimizes the use of these materials. Some materials can be re-used or recycled	Contractors, proponent and quantity surveyor	Done
Noise and vibration			
• Hearing problems • Damage to the ears	Keep all machinery in good condition to reduce noise generation	Machine operators	Cost vary with service extent
	Construct a housing enclosing generators and other noise-generating equipment	Proponent and contractor	30,000
	Advice drivers to avoid hooting vehicles unnecessarily at the site and when passing through noise-sensitive areas such as religious places, learning areas and hospitals and all machine operators to switch them off when they are not in use	Site managers	–
	Provide workers in noisy areas with ear muffs	Contractors	500 per worker

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
Dust and exhaust emissions			
• Health hazard • Visual obscurity	Sprinkle water on all dust-active areas to suppress dust and/or pave or apply non-toxic soil stabilizers on all unpaved access roads and parking areas	Contactors	100 per day
	Provide workers in dust and/or exhaust concentrated areas with nose masks	Contractors	500 per worker
	Properly service, maintain and tune all equipment and machinery to minimize exhaust emission	Contractors and all machine operators	Cost vary with service extend
Water usage			
• Over-extraction of water resources • Conflicts over water-use • Increased demand on water resources • Wastage of water	Install meters to monitor water consumption	Contractors and proponent	LVNWSB rates apply
	Recycle and re-use water and use water wisely by ensuring that taps are not running when not in use	Contractors and all workers	–
	Conduct regular checks, inspections and maintenance of pipes, taps and storage containers and tanks to fix leakages	Site managers and all workers	Cost vary with damage extent
Water shortage	Construct or install bigger storage facilities (such as 5,000 litre plastic tanks**)** to be able to cope with potential stresses in supply	Contractors and proponent	35,000 per 5,000 litre plastic tank
Waste water and sewerage and sanitary conveniences			
• Sanitary inconveniences • Poor sanitation	Provide lockable washrooms for the construction workers and separate them based on gender into ladies and gents	Proponent and contractors	Done
	Properly use and clean sanitary facilities daily	Site managers and all workers	300 per day
Increased traffic flow			
Risks of accidents	Regularly service vehicles to ensure that they are in good condition	All drivers	Cost vary with damage extent
	Place prominent signage alerting the presence of the construction sites and a parking area	Contractors and proponent	1,000
	Provide enough space at the gate to allow vehicles to get in and out of the construction sites easily	Contractors	–

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
Energy consumption			
Over consumption of electricity	Install meters to monitor energy consumption and clearly mark distribution board switches to indicate respective circuits	Contractors and proponent	Kenya Power rates apply)
	Switch off electrical appliances including lights when they are not in use	Site managers and all workers	–
Damage to electrical appliances	Weather-proof all lighting and power points and install lightening arrestors and ensure there are no live electrical wires are exposed	Contractors and proponent	Covered in cost of construction
Power black-outs	Install alternative energy sources such as solar panels and automatic generators not only for power back-up but also to reduce dependency on electricity	Proponent and contractors	10,000 per solar panel and 35,000 per generator
Fires			
• Injuries and deaths • Destruction of property	Prominently display 'NO SMOKING' signs at the sites especially in areas where flammable materials are stored or used and emergency telephone numbers (such as ambulance, fire tenders and police) where everybody at the site can see them	Site Managers	1,000
	Regularly train personnel in relation to fire emergencies (Do this at least once for every employee during the construction period)	Contractors and all workers	5,000 per trainee
	Install fire suppression equipment through a licensed fire officer (fire extinguishers on the corridor, fire blankets in the kitchen and at least one fire hose reel on each floor or as may be appropriate)	Contractors and proponent	3,000 per fire blanket, 7,000 per 9 Kg fire extinguisher
Safety, health, hygiene and sanitary conveniences			
• Food contamination • Accidents • Sanitary conveniences	Provide workers with appropriate PPE such as aprons, ear muffs, nose masks and gloves	Contractors	500 per worker
	Make distinctions in all stores in such a way that non-food or poisonous materials are not stored together or mixed with food	Contractors and all specialty supervisors	–
	Train workers in emergency management at least once before the construction works	Contractors	50,000 per session in a group

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
	Install and safeguard machinery, equipment, PPE, appliances and tools appropriately and carry out regular maintenance services in accordance with their manufacturer's safety data information	Contractors	Cost vary with service extent
	Maintain First Aid Kits at the site in easily accessible areas	Contractors	1,500 per kit
	Indicate dangerous spots at the sites	Contractors	–
Compliance with legislations			
• Non-compliance with legislations	Conduct inspections and self-audits for application of relevant permits and licenses from respective authorities and renew them as required • Certificate of a Workplace of the construction site pursuant to OSHA, 2007	Contractors	3,000
	• Register construction site with NCA in accordance with NCA requirements	Proponent	Current NCA regulations apply
	• Document and keep records of all environmental and health matters in accordance with Section 68 (3) of EMCA, 1999 (Cap. 387) and OSHA, 2007	Contractors	500 per month

Table 8.2: Proposed EMP for the operation phase of the proposed mortuary

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
Increased run-off			
Damage to drainage lines	Carry out periodic checks and maintenance of all drainage channels to remove obstructions	Mortuary management	Vary with damage extend
Sanitary conveniences, waste water and sewerage			
• Social inconveniences • Health hazard • Pollution	Separate sanitary rooms based on gender unless they are to be used by one person	Mortuary management	–
	Conduct regular checks to detect and correct sewage pipe blockages, damages and leakages	Mortuary management	Vary with service extend
	Properly use and clean sanitary facilities daily	All users	300 per day
	Empty the septic tank and/or the pit latrines whenever they near filling-up	Mortuary management	10,000 per service
Degradation of air quality			
Fugitive dust	Suppress dust by sprinkling water on all dusty ground surfaces	Workers	100 per day
	Maintain all internal roads to reduce fugitive dust and provide for the smooth movement of vehicles	Mortuary management	20,000
Foul smell	Provide all workers in areas where air quality is compromised with appropriate PPE	Mortuary management	500
	Dispose wastes regularly and appropriately to prevent wastes from decomposing at collection areas	Mortuary management	500
	Provide adequate ventilation in the rooms in the facility by opening windows and using exhaust fans	Workers	–
	Inspect the refrigeration system daily to detect and repair any malfunctioning which could lead to rotting of bodies	Mortuary management	Costs vary with damage
	Embalm all bodies before storage in order to prevent them from rotting	Morticians	100 per body

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
	Spray the mortuary with appropriate smell deodorizers in order to counteract foul smell from the mortuary	Morticians	500 per spary
	Provide all workers in areas where air quality is compromised with appropriate PPE	Mortuary management	400 per worker
Disorder at the mortuary			
• Unclaimed bodies • Congestion	Set and display and/or make known mortuary rules to ensure people collect bodies of their loved ones on time to prevent bodies overstaying in the mortuary	Mortuary management	500
	Store only enough bodies to the capacity of the mortuary in order to prevent congestion	Mortuary management	–
	Remove and appropriately dispose all unclaimed bodies after a specific established period and after following relevant legal procedures	Mortuary management	10,000 per body
Bio-hazardous wastes			
• Inappropriate handling of wastes • Infections • Environmental degradation • Public health risks • Dangerous recycling and repackaging and unsafe re-use • Use by children as playing equipment	Carry out a quantitative and qualitative analysis of the mortuary wastes at least every month in a year to estimate the potential risk and as a basis for any waste treatment and disposal	Mortuary management	10,000
	Provide all workers handling wastes with appropriate PPE to reduce accidental injuries and infections	Mortuary management	10,000
	Train personnel dealing with the infectious wastes at least two times in a year in order to make them have a basic understanding of the hazards involved and how to manage them	Mortuary management	5,000 per trainee
	Treat waste that is deemed potentially infectious prior to disposal in order to disinfect or sterilize them using methods such as steam sterilization (autoclaving), dry heat thermal treatment and chemical disinfection processes	Mortuary management	Cost vary with method
	Put in place distinctive protocols for the classification and segregation of wastes in order for treatment systems to work properly and to ensure proper handling and therefore safety of workers handling those wastes	Mortuary management	1,000

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
	Remove bio-hazardous wastes immediately they are produced and dispose them using appropriate methods such as incineration, collection in an infectious waste bin, throwing in a deep pit, flushing down the drain to the sewer system and through an approved medical waste contractor	Mortuary management	–
	Do not re-use sharps	Mortuary management	–
	All bags and containers for collection of wastes shall be filled no more than ¾ full and shall be sealed to prevent overflows and leakages into the environment or to the workers	Mortuary management	–
Solid wastes			
• Environmental contamination • Nuisance • Health hazard	Install two or more waste bins at each collection point to ensure separation of wastes into recyclable and non-recyclable wastes or other appropriate categories (covered or auto-closing bins are preferred to minimize invasion by pests and rodents or other animals and for hygienic purposes respectively)	Mortuary management	800 – 5,000 depending on size of bin
	Collect and dispose all solid wastes from the site appropriately and regularly as appropriate in order to prevent wastes accumulating and decomposing at the site	Mortuary management	1,000 per month
Noise			
• Hearing problems • Damage to the ears • Lowering the strength of buildings	Switch off machines and vehicles that are not in use	Mortuary management	–
	Keep all machinery in good condition to reduce noise generation	Mortuary management	5,000 per service
	Properly tune sound systems to prevent interference with the neighbours	Mortuary management	–
	Keep all machinery in good condition to reduce noise generation	Machine operators	Cost vary with service extent
Water-use			
• Wastage of water • Increased demand of water	Recycle and re-use water where possible	Mortuary management	–

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
	Ensure taps are not running when not in use	All water user	–
	Conduct regular checks, inspections and maintenance of pipes, taps and storage containers and tanks to fix leakages	Mortuary management	5,000 per maintenance
Energy consumption			
• High mains-electricity consumption • Health hazard • Risks of damage to electrical appliances	Use only energy-saving lighting such as fluorescent tubes and energy saving bulbs	Mortuary management	400 per bulb
	Provide electrical appliances such as fridges, computers and television sets with shock guards such as fridge guards and UPS and ensure that electrical circuits are not overloaded	Mortuary management	2,000 – 3,000 per guard/UPS
	Switch off all electrical appliances when they are not in use	All workers	–
Material storage and usage			
• Spillages and food contamination • Health hazard	Store and use all materials as outlined on their manufacturers' data safety labels	Morticians	–
	Make distinctions in all stores in such a way that non-food or poisonous materials are not stored together or mixed with food	Morticians	–
Fires			
• Injuries and deaths • Destruction of property	Conduct inspection of the fire-fighting equipment every three months	Mortuary management	50,000 per service
	Display emergency telephone numbers (such as ambulance, fire tenders and police), 'NO SMOKING' signs especially in areas where flammable materials are stored or used, and 'FIRE EXIT' points in the building where everybody can see them	Mortuary management	1,000
Safety, health and hygiene			
• Food contamination • Accidents	Provide workers with appropriate PPE such as aprons, ear muffs, nose masks and gloves	Mortuary management	500 per worker
	Install and safeguard machinery, equipment, PPE, appliances and tools appropriately and carry out regular maintenance services in accordance with their manufacturer's safety data information	Mortuary management	Cost vary with service extent

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
	Conduct annual trainings of employees on matters relating to emergencies such as fire management	Mortuary management	70,000 per group session
	Clean the premises regularly	Mortuary management	300 per day
	Maintain First Aid Kits at the site in easily accessible areas	Mortuary management	1,500 per kit
	Store food in clean containers, preferably in covered containers	Mortuary management	–
	Employ security personnel that will be at the facility for all hours of the day (security officers can work in shifts of 8 hrs per day) and where financial resources are available install security alarms and/or surveillance systems	Mortuary management	40,000 per month
Compliance with legislations			
Non-compliance with legislations	Conduct inspections and self-audits for application of relevant permits and licenses from respective authorities and renew them as required. These include the following		
	• Certificate of Occupation in accordance with the Public Health Act (Cap. 242, Section 117)	Mortuary management	3,000
	• Keep records of all environmental and health concerns including those listed under sub-section 8.5 of this report and make annual reports to the Authority subject to Sub-section 68 (3) of EMCA, 1999, OSHA, 2007 and the Environmental (Impact Assessment and Audit) Regulations, 2003 as may be required	Mortuary management	1,000 per month
	• Annual Environmental Audits (EA) in compliance with Sub-section 68 (3) of EMCA, 1999 (Cap. 387) and the Environmental (Impact Assessment and Audit) Regulations, 2003	Mortuary management	50,000

Table 8.3: Proposed EMP for the decommissioning phase of the proposed mortuary

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
Impacts to the aesthetic characteristics of the site			
Change in aesthetic characteristics of the site	Demarcate the project area to be affected by the demolition works and hoard the area appropriately in accordance with NCA requirements to prevent impacts from spreading to other areas	Proponent and contractor	–
	Re-establish vegetation through implementation of a well-designed landscaping programme and rehabilitate the site	Proponent	20,000
Solid wastes			
• Environmental contamination • Nuisance • Health hazard	Collect and dispose all solid wastes from the site through an integrated waste management system that comprises of recycling, re-use, combustion, decomposition of organic matter and sanitary land filling in order to prevent accumulation at the site	Contractor	10,000
Noise			
• Hearing problems • Damage to the ears	Keep all machinery in good condition to reduce noise generation	Machine operators	Cost vary with service extent
	Advice drivers to avoid hooting vehicles unnecessarily and when passing through noise-sensitive areas such as religious places, learning areas and hospitals and all machine operators to switch them off when they are not in use	Contractor	–
	Provide workers in noisy areas with ear muffs	Contractor	500 per worker
Dust and exhaust emissions			
• Health hazard • Visual obscurity	Sprinkle water on all dust-active areas to suppress dust	Contactor	100 per day
	Provide workers in dust and/or exhaust concentrated areas with nose masks	Contractor	500 per worker
	Properly service, maintain and tune all equipment and machinery to minimize exhaust emission	Contractor and all machine operators	Cost vary with service extend
Waste water and sewerage and sanitary conveniences			
• Sanitary inconveniences • Poor sanitation	Properly use and clean sanitary facilities daily	Site manager and all workers	300 per day

Area of concern	Recommended measures	Responsible party	Approximate cost (Kshs.)
Interference with traffic flow			
Risks of accidents	Regularly service vehicles to ensure that they are in good condition	All drivers	Cost vary with damage extent
	Place prominent signage on the road alerting the presence of the site and a parking area	Contractor and proponent	1,000
Fires			
• Injuries and deaths • Destruction of property	Use fire suppression equipment such as fire extinguishers and sand buckets for fire management (remove these from the site later in the decommissioning process)	Contractor	–
Safety, health and hygiene			
• Food contamination • Accidents • Sanitary conveniences	Provide workers with appropriate PPE such as aprons, ear muffs, nose masks and gloves	Contractor	500 per worker
	Prominently display 'NO SMOKING' signs, indicate dangerous spots at the site and conspicuously display contacts of emergency service providers such as ambulance, fire tenders and police	Contractor	1,000
	Make distinctions in all stores in such a way that non-food or poisonous materials are not stored together or mixed with food	Contractors and all specialty supervisors	–
	Train workers in emergency management at least once during the decommissioning period	Contractor	50,000 per group
	Install, store, use, maintain and safeguard machinery, equipment, PPE, tools and appliances appropriately in accordance with their manufacturer's safety data information	Contractor	Cost vary with service extent
	Maintain First Aid Kits at the site in easily accessible areas	Contractor	1,500 per kit
Compliance with legislations			
Non-compliance with legislations	Conduct an environmental assessment and prepare a decommissioning report for application of a decommissioning permit from NEMA	Contractor and proponent	40,000
	Document and keep records of all environmental and health matters in accordance with Section 68 (3) of EMCA, 1999 (Cap. 387) and OSHA, 2007	Contractor	500

9 RECOMMENDATIONS AND CONCLUSION

9.1 Recommendations

(a) Adopt high standards of construction and ensure regular maintenance practices of the proposed building in order to ensure long life for the proposed buildings.
(b) Clinical information accompanying bodies should not be made available to anyone other than the responsible mortician.
(c) Develop an Environmental Policy stating commitment, intentions and principles of action with respect to the environment including compliance with relevant environmental regulations. This is to form a basis upon which the management of the facility is to set its environmental objectives and targets as in the environmental management plan.
(d) Ensure record keeping and documentation are appropriately carried out to assist in building of self-auditing capacity.
(e) Food and chemicals to be handled with care.
(f) For security purposes, the proponent can insure the premises as per statutory requirements (comprehensive, third party and workman's compensation policies).
(g) High standards of construction and regular maintenance practices are strongly recommended to ensure durability of the facility.
(h) Implement and follow the EMP.
(i) Measures shall be put in place for proper handling of infectious wastes and labeling of bodies.
(j) Proper management of water and drainage channels around the proposed project will greatly improve quality of sanitation around it.
(k) The contractors, the proponent through the mortuary management are advised to maintain good relations with area residents and especially their immediate neighbours in order to make them live in harmony with the community. This includes purchasing locally produced food stuffs and other locally produced products in order to enhance local development in the area and considering the area residents when offering job opportunities at the site.
(l) The management of the mortuary shall ensure the occupational health of its staff in all aspects.
(m) The morticians need to wash and dress all bodies and enclose them in leak proof bags.

9.2 Conclusion

The proposed development will have numerous positive impacts as has been outlined in this report. The negative environmental impacts that will result from establishment of the project can be mitigated with the options provided for in this report. The report concludes that if all the suggested mitigation measures and the above recommendations are put in place and if the proposed EMP is followed, the proposed project will not adversely impact on the environment. From the foregoing, it is clear that since the proposed project has actively involved the key neighbourhood stakeholders who did not object the development it has sufficient public support and if it is implemented with the proposed mitigation measures, adverse environmental impacts will be mitigated.

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APPENDICES

Copy of title deed

Copy of land lease agreement

Copy of approved architectural and structural design drawings for the proposed structures

Copy of certified bills of quantities

Minutes of public meeting during public consultation

Copy of current EIA/EA expert licenses