ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY REPORT FOR THE

PROPOSED DEVELOPMENT OF OFFICES, STAFF QUARTERS AND CONFERENCE HALL IN KAREN ON PLOT LR. NO. 3586/400 AND 29713/4

ENVIRONMENTAL CONSULTANTS	**PROPONENT**
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December 2015

SUBMISSION OF DOCUMENTATION

I, **Prof. Jacob K. Kibwage** on behalf of Africa Waste and Environment Management Centre submit the following Environmental and Social Impact Assessment Study Report for the **Proposed Development of Offices, Staff Quarters and Conference Hall** located in Karen within Nairobi. To my knowledge all information contained in this report is accurate and a truthful representation of all findings as relating to the proposed project as per project description and drawings provided by the proponent.

Signed at **NAIROBI** on this…….day of **December 2015**

Signature: .....

Designation: **Lead Environmental Consultant**

SUBMISSION OF DOCUMENTATION

I,……,on behalf of **AFRIGO Development Company Limited** submit this Environmental and Social Impact Assessment Study Report for the **Proposed Development of Offices, Staff Quarters and Conference Hall** located in Karen within Nairobi. To my knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the proposed project as per information provided to the ESIA consultants.

Signed at **NAIROBI** on this…….day of **December 2015**

Signature……..

Designation: ……..

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSSMENT STUDY REPORT FOR THE PROPOSED DEVELOPMENT OF OFFICES, STAFF QUARTERS AND CONFERENCE HALL IN KAREN

Table 1: List of Planning and Participating Consultants

NAME	QUALIFICATIONS
Prof Jacob K. Kibwage Lead Expert; **Reg. No. 0126**	PhD in Environmental Studies
Ms. Grace M. Momanyi Lead Expert; **Reg.No. 7631**	MA Project Planning and Management
Mr. Dominic Munyao Lead Expert; **Reg. No. 2203**	B. Sc Environmental Science
Mr. Davis Kilonzo Associate Expert; **Reg. No.2110**	B.Sc. Environmental Studies Planning and Management
Ms. Abida Buoro Associate Expert; **Reg. No.2967**	B Sc. Biology
Mr. Clifford Mouti Siocha Associate Expert; **Reg.No.8173**	B. Sc. Environmental Science
Mr. John Aywa Associate Expert; **Reg.No 2414**	B Sc. Environmental Science with IT
Mr. George M. Bagwasi Associate Expert; Reg. No. **6016**	B. Sc Environmental Science
Ms. Lydia Boke Associate Expert; Reg. No. **6767**	Bsc. Agroforestry and Rural Development
Gearoid Kieti Associate Expert; Reg. No.**7818**	Bsc. Environmental Science

SUPPORTING STAFF

NAME	QUALIFICATIONS
Mr. Amos Musyoki	Bachelor of Environmental Studies
Ms. Bathseba Ratemo Field Assistant	Bsc Environmental Conservation and Natural Resource Management
Beryl Ong'uti Field Assistant	Bsc. Environmental Science

ACRONYMS

CPP	Consultation and Public Participation
EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
EMP	Environmental Management/Monitoring Plan
KBS	Kenya Bureau of Standards
KLDA	Karen and Langata District Association
LHS	Left Hand Side
LPDP	Local Physical Development Plan
NEC	National Environmental Council
NEMA	National Environment Management Authority
NW&SC	Nairobi Water and Sewerage Company
OSHA	Occupational Safety and Health Act
PPG (E)	Personal Protective Gear (Equipment)
RC	Reinforced Concrete
RHS	Right Hand Side
SHE	Safety Health and Environment
SWM	Solid Waste Management
TOR	Terms of Reference
VOC	Volatile Organic Compounds
WRMA	Water Resources Management Authority

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EXECUTIVE SUMMARY

AFRIGO Development Company Limited has proposed to develop office, staff quarters and Conference hall along Langata road in Karen. The proposed site is located within Zone 4 Karen Plains-Forest Edge as defined in the Langata Local Physical Development Plan. The total project area measures about 6.856 hectares with site A comprising of about 4.318 hectares on LR No. 29713/4 and site B comprising of 2.638 hectares on L.R No. 3586/400. Site B is located on the RHS of Hillcrest Road from Langata Road while site A is located on the LHS. The total land to be developed comprises of Site A and site B as shown in figure 1. Whereas construction will begin at site B in earnest, site A will be used temporarily by the construction team after renovating the houses therein and then be developed at a later stage. Currently, there are no development plans for site A. Apart from accommodation, site A will also be used to construct recreational facilities for the construction staff. To that effect, the proponent therefore proposes to construct a basketball court on the western side of site A. As such, the description given herein for permanent construction is by and large for the development that will take place at site B.

The design for the proposed development provides for the construction of various components;

- Office zone
- Dining and recreational zone
- Staff quarters
- Green areas
- Access roads
- Basketball court

The development components described above will be constructed at site B. Site A will only have the basketball court. The abandoned houses at site A will also be renovated and used by the construction personnel.

The Kenya Government policy on projects of such nature and scale, programmes or activities requires that an Environmental Impact and Social Assessment be carried out at the planning stages of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of such projects, programmes or

activities. It is also a requirement by the Karengata LPDP to conduct EIA for similar projects. Therefore, in compliance with the law and to avoid unnecessary conflicts that may retard development in the country, the proponent undertook this Environmental and Social Impact Assessment and incorporated environmental concerns as required.

The scope of this Environmental and Social Impact Assessment Study Report, therefore, covered the following:

- The baseline environmental conditions of the area
- Description of the proposed project,
- Provisions of the relevant environmental laws
- Identification and discussion of any adverse negative impacts to the environment anticipated from the proposed project,
- Appropriate mitigation measures,
- Provision of an environmental management plan outline.

Objectives, Scope and Criteria of the Assessment

Africa Waste and Environment Management Centre, a NEMA registered firm of experts was appointed as a Consultant to conduct the Environmental Impact Assessment of the proposed development project. The scope of the assessment covered the project site, surrounding and the utilities under the project. The output of this work was a comprehensive Environmental and Social Impact and Assessment study report for the purposes of applying for an EIA licence from NEMA.

Methodology Outline

The general steps followed during the Assessment were as follows:

- Environment screening in which the project was identified as among the developments that require environmental impact assessment under schedule 2 of EMCA, 1999 and the requirements of Karengata LPDP.
- Environmental scoping that provided the key environmental issues
- Desktop studies and interviews
- Physical inspection of the site and surrounding areas
- EIA Public participation via the use of questionnaires , interviews and public meetings

- Reporting.

Description of the Project

Project site

The proposed development site hereinafter referred to as the proposed site is situated in Karen within Nairobi City along Langata road with Hillcrest road dividing the site into two parts (site A and B). Both sites border Hillcrest International School to the North. The western end of site A borders an animal orphanage (Kenya society for the protection and care of animals) and a residential estate. The southern end of the sites border Langata road and hillcrest road is on the eastern boundary of site A and western boundary of site B. The red cube restaurant is about 250 meters west of site B while Ngong forest and the southern bypass are about 1.5km north of the proposed site.

Several mature trees of diverse species were identified at the proposed site such as Grevillea *robusta*, *Eucalyptus spp* and several indigenous tree species. The proposed area of construction has housing facilities especially at site A that will be used by the contractor temporarily to host the construction staff and then be demolished later to pave way for the construction of permanent structures.

Project Cost

The estimated project cost for the proposed development is Five hundred and Ninety Three Million, Four hundred **(593,400,000)** Kenya Shillings

Key Environmental Issues

The key negative biophysical, health and safety, and socio-economic impacts of the project during the construction phase are as follows:-.

- Extraction and use of building materials leading to negative impacts on their availability and sustainability and degradation of the environment at the material sites.
- Generation of substantial amounts of solid waste from construction works and demolitions.
- Risks of release of hazardous materials including petroleum products (lubricating oils and greases), fuels (gasoline, kerosene), solvents, paints, batteries, and miscellaneous equipment maintenance supplies into the environment
- Risk of exposure to hazardous materials from the demolitions.
- Dust emissions resulting from transporting trucks and construction works

- Exhaust emissions from materials transport trucks
- Noise and vibration caused by heavy trucks, and construction machinery
- Risks of accidents and injuries to construction workers
- Externalities: Foul smell and animal noise from the animal orphanage from the western end of site A
- High levels of water use

The key negative environmental impacts of the operational phase of the project will be as follows:-

- Increased traffic and associated Impacts in the area
- Possibilities of human congestion
- Solid waste generation
- Increased demand for sanitation
- Increased levels of energy consumption
- Increased levels of water use
- Increased storm water flow

Positive Impacts

Positive environmental impacts during construction activities include:-

- Creation of employment opportunities for construction crew
- Creation of market for supply of building materials
- Increased business opportunities for small-scale traders such as food vendors and transportation activities, amongst others.

Positive environmental impacts of operational phase of the project will include:-

- Increased office space
- Increase in the residential premises in the City
- Employment opportunities Contribution of revenue to the national and county government
- Improved security around the premises, amongst others

- Improvement of the aesthetic values of the area through proper landscaping
- Provision for green areas

Table 2: Summary of potential Impacts and proposed mitigation measures

Impact	Proposed Mitigation Measure
Noise and vibration	• Formulate an inspection and maintenance program for the machines and equipment on site. • Implement both engineering and administrative controls for machines and equipment to reduce noise pollution at the site.
Air Pollution: Dust generation.	• Sprinkling of water at the site and access roads during dry conditions to suppress fugitive dust • Fix a dust proof net five (5) meters high above the hoarding
Solid waste	• Contract a licensed waste handler to manage general waste and the construction phase and operational phase • Integrated Solid Waste Management to be encouraged • Adhere to the provisions of the Waste Management Regulations of 2006
Soil pollution	• Provide spill kits on site and train workers how to use them • Provide drip trays where spills are likely to occur from machines and vehicles under repair
Air Pollution: Fumes	• Use of low sulphur diesel for diesel powered vehicles and equipment. • Proper maintenance of machinery and vehicles • Prohibit open burning of any kind of waste on site

Risk of occupational accidents and diseases.	• Set up a health and safety committee and periodic site inspections, training and annual safety audits. • Provide appropriate PPEs to workers and visitors to the site • Adhere to the provisions of the occupational Health and Safety Act of 2007.
Generation of waste water	• Construction of septic tanks and a bio digester • Identify opportunities for reuse of waste water • Formulate and implement an inspection and maintenance program for the waste water disposal system
Increased demand for water and electricity	• Incorporate rain water harvesting in the project design • Encourage water reuse and/or recycling • Consider solar energy harvesting and optimize on natural lighting in the project design • Use of energy efficient machines and appliances • Provision of a standby generator
Land degradation	• Limit excavations to areas marked for development • Apply a layer of selected backfill material on the access roads
Vegetation clearance	• Ensure vegetation is only cleared in areas where foundations are to be dug. • Trees to be protected insitu to be clearly identified on the plans and communicated to all construction staff.
Insecurity	• Employ construction workers who possess valid certificates of good conduct • Provide screening arrangements at the gate • Formulate a comprehensive security plan and implement it Contract a reputable security firm to be in charge of security at the site. • Liaise with the neighbours and the local administration in security management

Recommended Actions

Several measures have been suggested to prevent or minimize the negative environmental impacts and to maximize the positive ones using a comprehensive Environmental Management Plan. The measures mainly focus on the following points:-

- Use of alternative materials or products which are less damaging to the environment
- Reduction of impacts of waste through minimization of waste generation, recycling, reuse and responsible disposal
- Energy and water conservation
- Use of appropriate technologies to mitigate environmental impacts of various activities
- Ensuring compliance with relevant safety, health and environmental regulations
- Reduction of exhaust emissions through proper planning of vehicle movements and use of lead free fuel.
- Provision of adequate parking space for vehicles

Conclusions

Considering the positive socio-economic and environmental benefits that will accrue as a result of the proposed development, and the EIA study having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed with the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental Management Plan (EMP) to the letter. An initial environmental audit will also be carried within a period of 12 months after commencement of the operations to check compliance to the set policies, standards and laws and the proponent will contract a licensed firm to provide Environmental Health and Safety Services for the construction phase of the proposed development.

1. INTRODUCTION

1.1 Background and Rationale for an Environmental Impact Assessment

AFRIGO Development Company Limited has proposed to construct office, staff quarters and Conference hall along Langata road in Karen, off Hillcrest road passing within the proposed area of development. The total project area measures about 6.8560 hectares with site A comprising of about 4.3180 hectares on LR No. 29713/4 and site B comprising of 2.6380 hectares on L.R No. 3586/400. Site B is located on the RHS of Hillcrest Road from Langata Road while site A is located on the LHS. The total land to be developed comprises of Site A and site B as shown in figure 1. Whereas construction will begin at site B in earnest, site A will be used temporarily by the construction team after renovating the houses therein and then be developed at a later stage. Apart from accommodation, the site will also be used to construct recreational facilities for the construction staff. To that effect, proponent therefore proposes to construct a basketball court on the western side of site A.As such, the description given herein for permanent construction is by and large for the development that will take place at site B.

The design for the proposed development provides for the construction of various components;

- Office zone
- Dining and recreational zone
- Staff quarters
- Green areas
- Access roads
- Auxiliary facilities

The development components described above will be constructed at site B. At site A, a basketball court will be constructed. The abandoned houses at site A will also be renovated and used by the construction personnel.

The office block will cover a total of 4194.72.m^2, and a floorage area of 10627.32m^2 The office block buidings will be of reinforced concrete (RC) frame.

Both the dining and the recreation blocks will be of two storeys with diverse floorage areas.

The staff quarters will comprise of blocks of three levels with diverse floorage areas.

Green areas will be established through landscaping using indigenous tree and grass species. The green area will cover 36.02% of the project area.

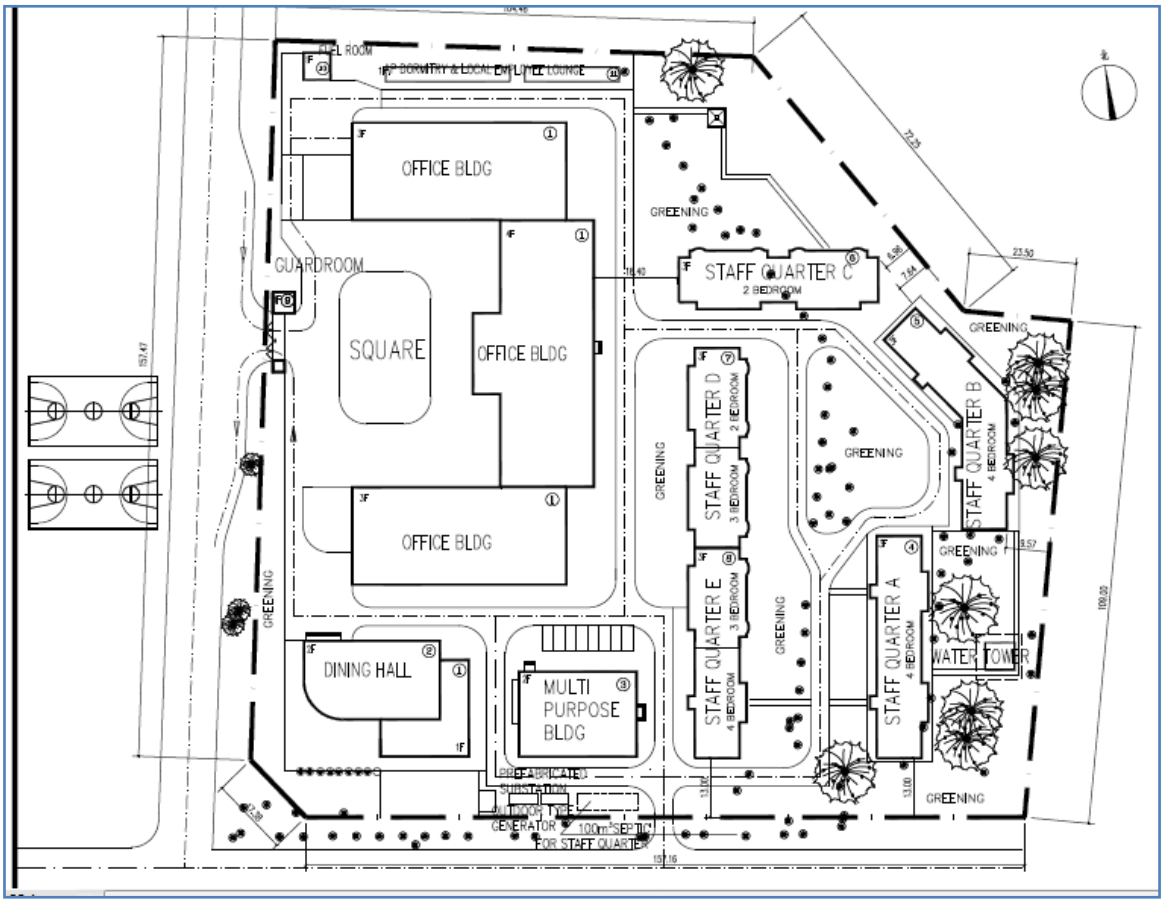


Figure 1: The plans for the proposed development at site B

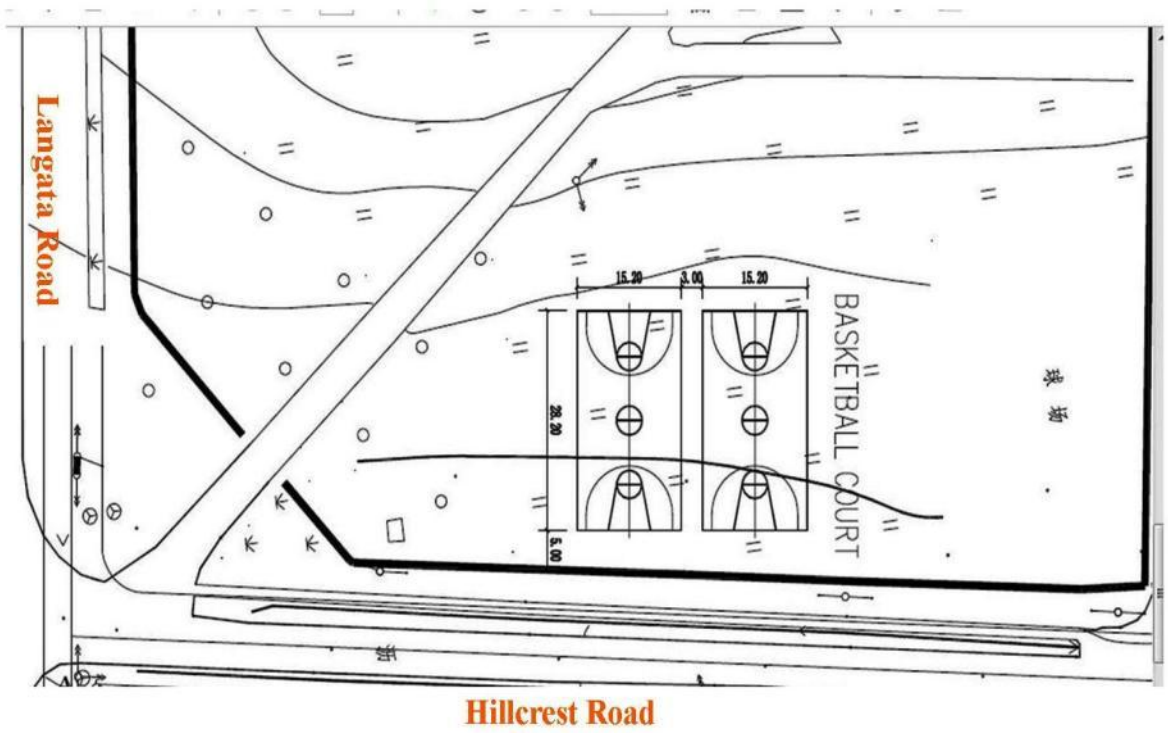


Figure 2: Plans for the proposed Basketball court at Site A

Figure 3: The location of the proposed project in Karen Assembly ward Nairobi County

The Kenya Government policy on projects of such nature and scale, programmes or activities requires that an Environmental and Social Impact Assessment Study be carried out at the planning stages of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of such projects, programmes or activities. It is also a requirement of the Karengata Local Physical Development Plan

(LPDP) to carry out EIA on such projects. Therefore, in compliance with the law and to avoid unnecessary conflicts that may retard development in the country, the proponent undertook this Environmental Impact Assessment and incorporated environmental concerns as required.

1.2 Scope and Criteria of the Environmental Impact Assessment (EIA)

1.2.1 Scope of the Report

The Kenya Government policy on all new development projects, programs or activities requires that an environmental impact assessment be carried out at the design stage of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the construction, operation and decommissioning of the facility. The scope of this Environmental Impact Assessment, therefore, covered:

- The baseline environmental conditions of the project area
- Description of the proposed project,
- Provisions of the environmental laws pertinent to the project
- Identification and discussion of any adverse negative impacts to the environment anticipated from the proposed project,
- Appropriate mitigation measures,
- Provision of an environmental management plan outline.

1.2.2 Terms of Reference (TOR) for the EIA Process

Africa Waste and Environment Management Centre a registered firm of experts was appointed as the consultant to conduct the Environmental Impact Assessment of the proposed development. The scope of the assessment covered the project site, area in close proximity to the proposed site and the utilities under the project. The output of this work is a comprehensive Environmental Impact and Social Assessment Study Report for the purposes of applying for an EIA licence.

The main objective of the assignment was to assist the proponent to prepare a study report after carrying out an Environmental Impact Assessment (EIA) of the proposed project, to ensure that the proposed development takes into consideration appropriate measures to mitigate any adverse impacts to the environment. The study identified potential environmental impacts and possible concerns that interested and/or affected parties have with the development, as well as the associated prevention and mitigation measures for the negative impacts as stipulated in the Environmental Management Plan (EMP).

The consultant on behalf of the proponent conducted the study by incorporating the following terms of reference inter alia:-

- The location of the project
- A concise description of the national and county environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the project.
- The technology, procedures and processes used, in the implementation of the project.
- The materials used in the construction and implementation of the project.
- The products, by-products and waste generated by the project.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects
- To recommend a specific environmentally sound and affordable waste management system.
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of accidents and hazardous activities in the cause of carrying out development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, customers and for the management in case of emergencies.
- Identification of gaps in knowledge and uncertainties which were encountered in compiling the information.

1.2.3 Data Collection Procedures

The data collection was carried out through questionnaires/standard interview schedules, use of checklists, observations and photography, site visits and desktop environmental studies.

1.2.4 EIA Organization and Structure

The EIA was carried out to full completion within a period two and half month from the date of undertaking. The Consultant (Lead Expert) coordinated the day-to-day functions and any related institutional support matters. Otherwise, all formal communications were directed to NEMA through the proponent.

1.2.5 Reporting and Documentation

The Environmental and Social Impact Assessment Study Report drafted from the findings was compiled in accordance with the guidelines issued by NEMA for such works and was prepared and submitted by the proponent for review. The Consultant ensured constant briefing of the client during the exercise. Description plans and sketches showing various activities are part of the Appendices.

1.2.6 Responsibilities and Undertaking

The Consultant (Africa Waste and Environment Management Centre) undertook to meet all logistical costs relating to the assignment, including those of production of the report and any other relevant material. The consultant arranged for own transport and travels during the exercise. On the site of the proposed development project, the proponent provided a contact person(s) to provide information required by the Consultant. The proponent also provided site plan(s) showing roads, service lines, buildings layout and the actual sizes of the sites, details of raw materials, proposed process outline and anticipated by-products, future development plans, operation permits and conditions, land-ownership documents and site history, and estimated investment costs. The output from the consultants includes the following:

- An Environmental Impact Assessment report comprising of an executive summary, assessment approach, baseline conditions, anticipated impacts and proposed mitigation measures,
- An Environmental Management Plan outline, which also forms part of the report recommendations.

1.2.7 Methodology Outline

Since the intended development and use of the facility will be in line with what exists in the surrounding areas, an Environmental and Social Impact Assessment Study report would be seen to be adequate to draw attention to the potential positive and negative environmental impacts; provide mitigation measures for negative ones and enhance the positive impacts. The general steps followed during the assessment were as follows:

- Environment screening, in which the project was identified as among those requiring environmental impact assessment under schedule 2 of EMCA, 1999 and the requirements of Karengata LPDP.
- Environmental scoping that identified the pertinent environmental issues
- Desk Stop studies and interviews
- Physical inspection of the site and surrounding areas
- Reporting.

Environmental Screening

This step was applied to determine whether an environmental impact assessment was required and what level of assessment was necessary. This was done in reference to requirements of the EMCA, 1999, and specifically the second schedule. Issues considered included the physical location, sensitive receptors in close proximity to the site and the nature of anticipated impacts. It was concluded that the proposed project falls within the category of projects under the second schedule of EMCA that requires an EIA to be done before implementation. A review of the Karengata LPDP also justified the need to conduct and EIA for the proposed project.

Environmental Scoping

The Scoping process helped narrow down onto the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects. The site history and the facilities in close proximity to the site were considered during this stage.

Desktop Study

This included documentary review on the nature of the proposed activities, project documents, designs policy and legislative framework as well as the environmental setting of the area among others. It also included discussions with managers and design engineers as well as interviews with neighbors.

Site Assessment

Field visits meant for physical inspections of the site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts were conducted. It also included further interviews with neighbors, surrounding enterprises and key stakeholders.

Reporting

In addition to constant briefing on the environmental aspects and impacts pertinent to the project, this Environmental and Social Impact Assessment Study Report was prepared and shared with the client. The contents were presented for submission to NEMA as required by law.

2 DESCRIPTION OF THE PROPOSED PROJECT

2.1 Project background

The Proponent Afrigo Development Co. Limited intends to construct office, staff quarters and Conference hall at the proposed site. The facility so developed will solely be used by its own staff. Afrigo is an international real estate development company that is currently setting its business base in Nairobi.

2.2 Project Location

The proposed site is located in Nairobi County, Langata Constituency and within Karen Assembly ward South West of Nairobi City. The project site is within Zone 4: Karen Plains-Forest Edge as defined in the Karengata Local Physical Development Plan (LPDP).

The site is located along Langata road with Hillcrest road dividing the site into two parts (site A and B). Both sites border Hillcrest International School to the North. The Western end of site A borders an animal orphanage (Kenya society for the protection and care of animals) and a residential estate. The Southern end of the sites border Langata road and hillcrest road is on the Eastern boundary of site A and western boundary of site B. The red cube restaurant is about 250 meters west of site B while Ngong forest and the Southern bypass are about 1.5km north of the proposed site. Other neighbours to the proposed site include Marist International University College, Karen Vineyard church and Grace College. Mokoyet River which has its source in the Nairobi National park is about 500m north of the proposed site.

The reference plot targeted for immediate development (site B) has Hillcrest Road to the west and Langata Road to the south, about 25.5km from JKIA international airport, and about 14.4km from Nairobi CBD.

Site A is located about latitude -1.337120° and longitude 36.734357° while site B is located about latitude -1.337589° and longitude 36.736470°.

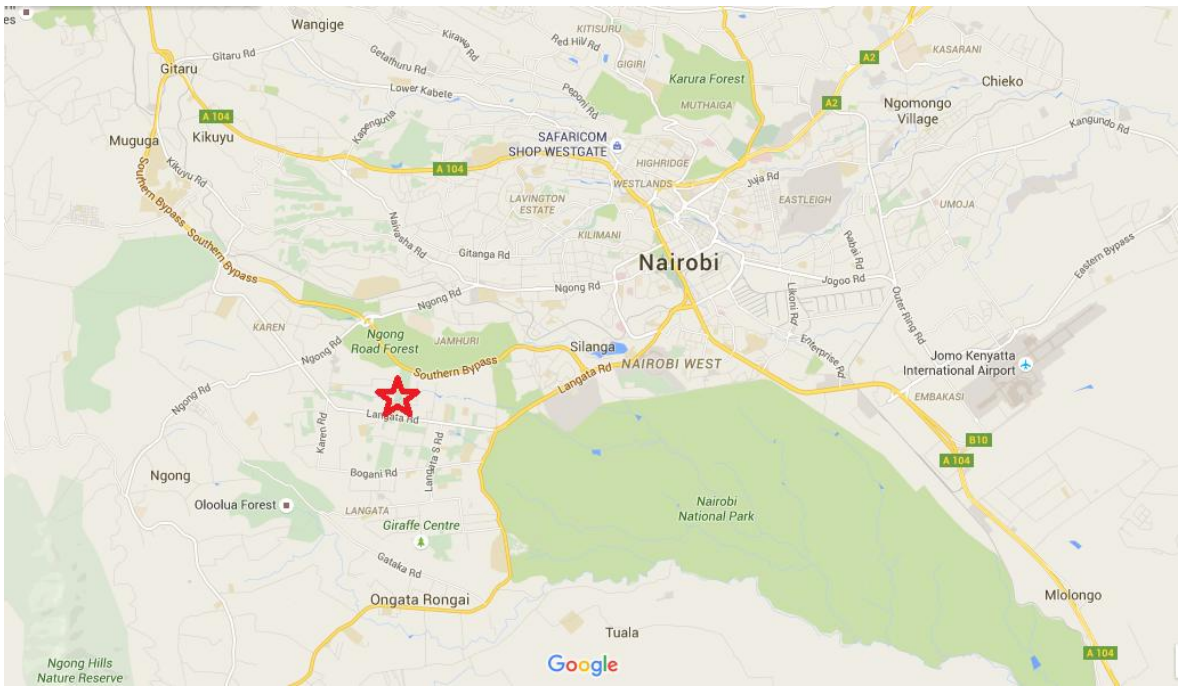


Figure 4: Map of Nairobi showing the location of the Project Site

2.3 Project investment cost

The estimated project cost for the proposed development is Five hundred and Ninety Three Million, Four hundred **(593,400,000)** Kenya Shillings.

2.4 Project size/specifications

The proposals as put up by a team of consultants (project planners, project managers, urban planners, engineers, quantity surveyors, environmentalists, physical planners, hydro geologists; and other ancillary consultants) are the most economically sound, environmentally sound; technologically savvy as envisaged by the client. The current site has a well-developed network of existing structures (telecommunications, electricity lines, and access infrastructure and service lines), natural systems (riverine wetlands). The proposed developments will be put up in such a manner as to maximize the intended benefits.

The intended development will include Staff Quarters, Offices, Dining and recreation area and support infrastructure such as waste disposal facilities, and water systems.

The principles to be integrated into the public space network are the following:

✓ All public space will be interconnected to provide a continuous system of green and hard space, including road reserve to facilitate pedestrian movement together with vehicular and separate the two to ensure safety to the pedestrians and conservation of environment and natural habitats present at the site.

✓ Green spaces will be distributed to provide green relief to dense built environments as evenly as possible.

2.5 Project Vision, Goal, Principles and Objectives

Reinforcing and strengthening existing population growth patterns to create a new development that will spur economic growth and improve living standards both locally and at regional level. This development will take into consideration both social and environmental aspects and create a serene environment for all.

Goal

Enhancing sustainability and quality of the built and landscaped environment capturing land value for investors and to provide housing facilities for AFROGO staff.

Project Objectives

I. Creating a conducive living environment with ecological and social diversity as a development approach for Nairobi County

II. Develop a new regional office, Staff Quarters, conference hall and other auxiliary development supporting these, providing a WORK, LIVE, PLAY quality environment.

III. Provide a friendly pedestrian environment with quality, safe public environment for those working and entertaining in the area and surroundings, and offer a nested security for the residents

2.5.1 *Site access and circulation*

The site will be accessible from the Hillcrest Road or the Langata Road. The primary access to the site will be off Hillcrest Road. More description on this is given in 2.9.3: Traffic plan.

2.5.2 *Demolitions*

A number of structures will be demolished to pave way for the permanent constructions. Minimal demolitions are expected at the site during construction as most of the development space is clear open land.

Plate 1: Buildings and road inside the site planned to be demolished.

2.6 Development Components: Land Use Plan

In reference to the proposed land use map in figure 7, the site comprises of diverse components to cater for a range of community needs. The key to the figure is shown below;

Blue: Office zone

Yellow: Staff Quarters zone

Black: Roads

Purple: Dining and recreation zone

Green: Green area

Office Zone

The office zone is represented by the blue color in the land use plan shown in figure 7. The office block will cover a total of 3194.72.m^2, and a floorage area of 10627.32m^2. The main office block will be 16.35m high (4 floors) and the two wing blocks will be 12.75m high(3 floors). The office block buidings will be of reinforced concrete (RC) frame.

There will be an underground parking area under the office blocks with a capacity for 36 vehicle and a total floorage area of 3183.84m^2.

Figure 5: Artist's impression of the office zone

Dinning and Recreation zone

The dinning and recreation zone is represented with the purple color in the land use plan shown in figure 7 and the yellow (dining) and green (recreational) block in figure 8. The dining will cover an area of 763.52. m^2 and a floorage area of 1284.82m^2 while the recreational section will cover an area of 491.47m^2 and a floorage area of 740.49 m^2. The two buildings for the dining and recreation zone will be of two levels with a maximum height of 8.25m. The structure of the buildings fo this zone will be RC frame.

Figure 6: Artist's impression of the dining and recreation area

Staff quarters

The Staff Quarters will comprise of five blocks of staff quarters (yellow in figure 7). The five blocks will cover a total area of 2714.57m^2 and a total floorage area of 7411.86m^2 . All the buiding blocks under this zone will be a maximum height of 9.75m and their structure will be of RC frame.

Green Area

Green areas will be established through landscaping using indigenous tree and grass species. The green area will cover a total area of 9501.6m^2.

Roads

There is space allocated for the road and its complementary elements, e.g. sidewalks, cycle lanes, pavements etc. The total area to be covered by roads and pavements will be 6908.14m^2.

Plaza

There is provision for open spaces around the buildings for improved ventilation in the buildings and penetration of natural light in the structures and provision of surface parking space.

Auxilliary facilities

There will be other support services such as drainage systems and sewarage systems. There will be also be domitory facilites for theAdministration Police (AP) who will be offering security at the site and provision for a lounge for local employees. There will be also a sentinel room and fuel storage area/room.

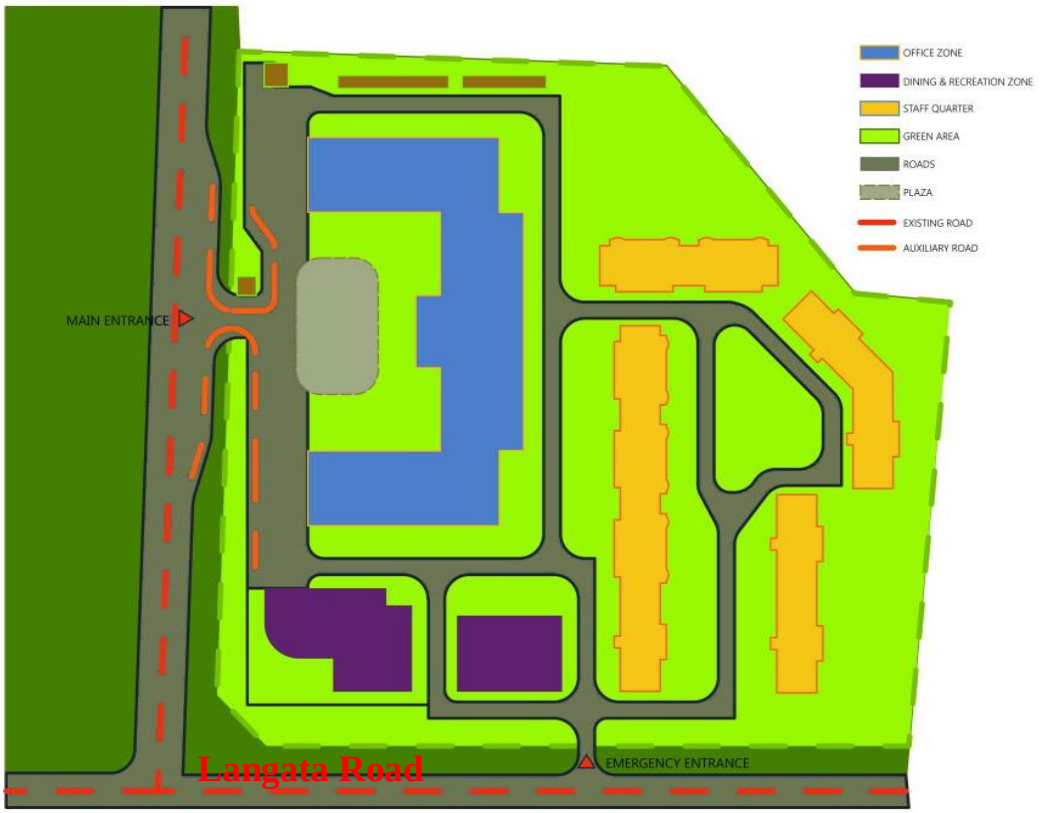


Figure 7: Land use plan

2.7 The Design of the project

The designs of the proposed development will take into consideration the activities of the existing facilities in close proximity to the proposed site. Staff quarters will be constructed as far as possible from either Langata road or Hillcrest road because of the noise that is generated by the traffic. The northern end of both site A and B borders Hillcrest International School and therefore, noisy facilities such as dining and recreation zone should be located away from this end.

The accesses to the building will be designed to ensure no traffic congestion. Acceleration/deceleration lanes will be provided and any recommendations by the traffic expert will be incorporated into the civil access roads design. The storm water will be discharged through municipal drains along the roads adjacent to the development. Where necessary, the drains should be improved to cater for the expected increased storm water to ensure that no flooding into roads or neighboring properties takes place.

Areas with a potential high noise levels will be utilized for the dining and recreation zone while areas with potential low noise levels will be utilized for the staff quarters.

Foul sewage will be connected to the municipal sewer line and is expected to comprise of domestic waste and office type waste, free of any industrial effluent.

The civil/structural materials anticipated to be used on the project are;

Structural concrete out of cement, river sand and/or rock dust and ballast with approved additives if proposed by contractors. Before a connection to a sewer line is made, the waste water will be channeled to septic tanks which will be connected to a bio digester.

The development will have the following environmentally sound characteristics:-

- Power conservation e.g. enhancing natural lighting during the day and instructions on switching off lights in unoccupied rooms.
- Reduced need for air conditioning by enhanced natural cross ventilation and reduction of solar glare/heat gain through natural
- Water conservation by use of sanitary fittings, recycling of waste water for irrigation and cleaning etc.
- Rain water harvesting.

2.7.1 Proposed sustainability features

Sustainability features proposed include the following:

Natural Ventilation

The building is being designed to encourage and maximize the use of natural ventilation by providing good internal comfort conditions throughout the year. Even where supplementary comfort cooling is installed in some areas, to save energy the building will be designed for 'mixed-mode' so that the cooling can be implemented only under very warm external conditions with natural ventilation for the remainder of the year.

Water Services

The potable water service will be provided from bulk storage tank that will be mounted on site. The tank will be fed with mains (NW&SC) water and water from an onsite borehole. Potable water will be boosted to serve potable water outlets throughout the building including wash hand basins, the equipment rooms, lift shafts, small washrooms and cupboards. For office areas the proponent will install risers with subsequent fit-out design and installation by tenant to suit space planning. Hose reels will be provided for the use of occupants in event of fire. Various protection systems including oil leak detection, local water leak detection, major water leak protection, water supply protection and high temperature alarms will be installed for critical installations and where required

Lighting Systems

The proponent proposes to maximise the use of natural light in the general design of the rooms and install energy saving lights in all rooms. Instructions to switch off lights in unoccupied rooms will be issued to the occupants and enforced.

Back-up Power Supply

Whereas the proponent proposes to get electricity supply from the KPLC, provisions will be made for a standby generator to supply power when there are power outages. Separate space has been provided for fuel storage and generator installation.

2.7.2 Building Heights

The building heights for various components of the proposed project are shown in the figure bellow:

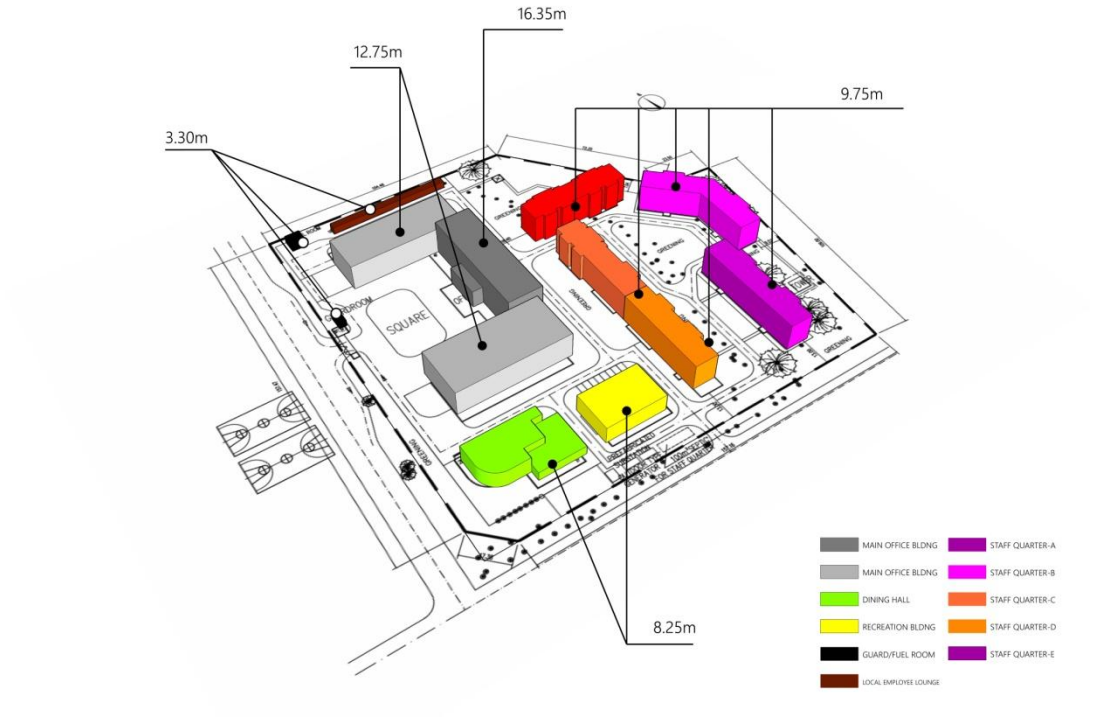


Figure 8: Proposed Heights

Figure 9: Artist impression of the proposed development

The stretch between Galleria and Karen Shopping Centre is characterized by mixed use developments; offices, petrol stations, hospitals, shopping malls among others. By

and large, this stretch along Langata road is a mixed use (commercial/offices) zone. A number of infrastructure that were identified along Langata road as described in subheading 3.2 of this report.

2.8 Infrastructure Strategy

Portable Water

Normally more than one day consumption will be required as storage on site. The proponent proposes to construct a water tower for mounting of water storage tanks.

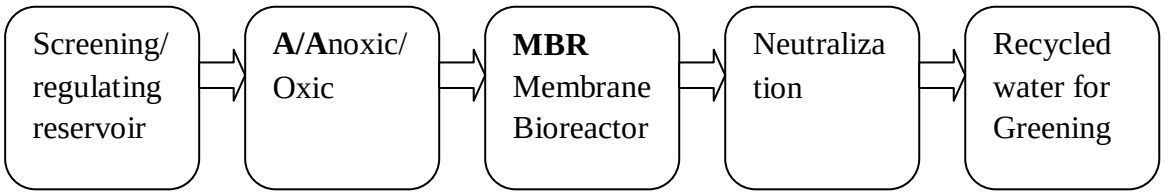
To ensure continuous supply of water the proponent plans also to have a municipal connection and at least one borehole be sunk for at the begining of the development. WRMA requirements and the provisions of the Karengata Local Phyisical Development Plan will be complied with when establishing the boreholes.

A preliminary design of the water reticulation has been undertaken. It will consist of PE pipes ranging in diameter between 50mm diameter and 125mm. Water from boreholes will be used during the construction and operation phases of the project. The proponent plans to have a water tank placed on a tower of a height of 25m.

2.8.1 Sewerage system, treatment and recycling technology

Wastewater from the project site will be connected to the expected waste water treatment works while storm water will be channeled to the open storm water drainage system. Liquid effluents may contain domestic waste, organic matter, salts and detergents, oils and fats. The effluent may also contain some pathogens. The effluent will be treated according to the provisions of the Environmental Management and Coordination (Water Quality) Regulations, 2006. The estimated total volumes of sewer effluent to be generated by the development are calculated in table below.

The wastewater through MBR Landscape &Buried underground sewage processing facility using Siemens control system, the handling capacity could reach $5m^3/h$.



Average Influent and Effluent Constituent Concentrations and Percent Reduction During the Post Acclimation Period (1)			
Parameter	**Feed**	**Effluent**	**% Reduction**
COD, mg/l	475	89	81
BOD5, mg/l	140	3.8	97
TOC, mg/l	92	8.5	91
NH3-N, mg/l	16	0.7	96

(1) This data was collected curing the period when the chiller was operating to reduce the activated sludge system temperature to below 32°C

The water Standard for greening：

COD≤50mg/l

BOD≤10mg/l

SS≤10mg/l

oil≤10mg/l

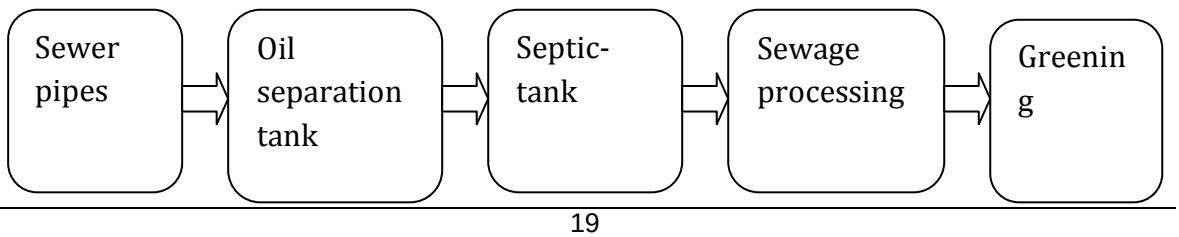
pH:6-9

TN≤10mg/l

TP≤1.0mg/l

A preliminary sewer reticulation was designed for the development and UPVC Solid Wall sewer pipes will be installed for this purpose. The proposed sewerage pipe will be of an external diameter of 315mm.

One 100m^{3}septic-tank will be made to handle all the sewage generated on the site. Such septic-tank will be positioned at the lowest position on the development, which is at the south-easterly corner. The sewer reticulation will consist of 110mm and 315mm diameter pipelines. The effluent of septic-tanks will be go to the MBR Landscape &Buried underground sewage processing.



2.8.2 *Storm Water Management*

All storm water will be intercepted and channeled into the storm water drains and appropriate landscaping will be undertaken to check the runoff and soil erosion.

2.8.3 *Roads and Traffic plan*

In order to protect pedestrians and cyclists, it is recommended that barrier kerbing be installed for all roads within the site. The road surfacing for the roads will be asphalt or concrete or paving slabs.

The main entrance to this site will be via the Hillcrest Rd., which has a relatively low traffic flow. Entrance by the Langata Rd. will be for emergency use and will be closed in most cases. Maximum parking capacity will be kept under 36 vehicles on site to minimize the impact to the current traffic situation in Karen especially Langata road.

The proponent proposes to introduce acceleration lanes along hillcrest road to deter disruption of traffic accessing Hillcrest International School.

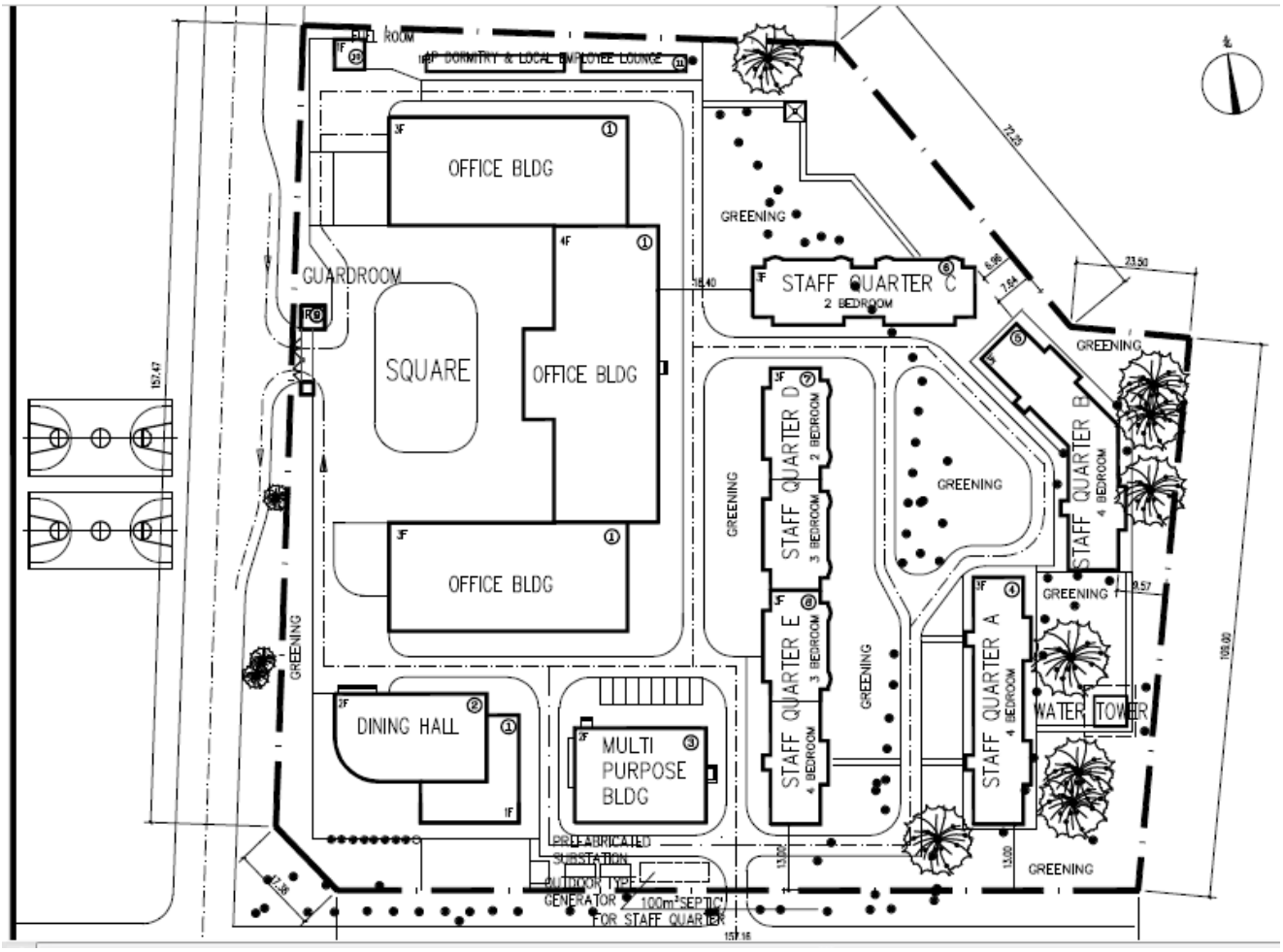


Figure 10: The proposed acceleration lanes at the main entrance along hillcrest road

2.8.4 Solid Waste Management

The proponent takes cognizance of a significant volume of waste that will be generated during the land preparation, construction, and operation of the project i.e. from the staff quarters, offices and other premises.

An integrated solid waste management system will be applied at all phases of the project. First, the proponent will give priority to *Reduction at Source* of the waste materials. Under this option, the proponent will implement a solid waste management awareness programme for the management and all the residents. Secondly, *Recycling, Reuse and compositing* of the waste will be the second alternative in priority. Under these options the proponent plans to a management system of separating waste at the source. The recyclables will be sold to waste buyers in the City.

Finally, *sanitary land-filling* in legally designated sites will be the last option for the proponent to consider. The general approach for solid waste management take into consideration the principles illustrated in the following figure

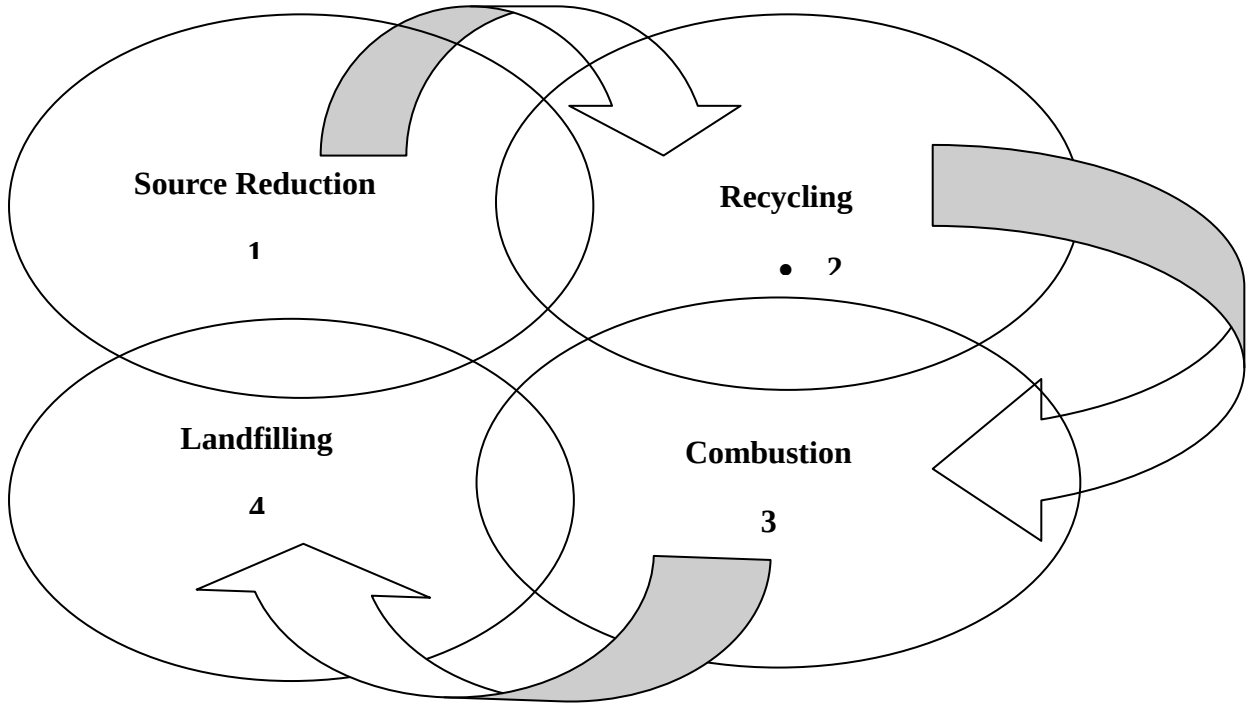


Figure 11: An integrated solid waste management approach

2.8.5 Electricity Supply

The proposed development will be connected to the 11KV electricity overhead line along the Langata Rd which will be used in all phases of the project. The total estimated power demand of this project is around 1000KVA, including office buildings, apartment buildings, utility power demand and lighting, etc. The proposed Prefabricated Substation locates inside the projected area and near the southern side

of the boundary. 1000KVA (estimated), 11/0.415 dry type transformer shall be installed in proposed substation, and the enclosure of substation shall be IP44.

LV distribution shall be installed by armored cable direct buried to every individual utilization buildings. LV cables shall be armored XLPE insulated0.6/1KV copper cables. Cable bury depth shall not be lesser than 700mm as per IEC standard, and shall be protected by C20 concrete encased PVC duct bank where crossing road. The voltage drop between the origin of projected substations and the equipmentshould not be greater than 4 % of the nominal voltage of the installation.

To ensure security of electrical supplies, the developer intends to have his own individual dedicated standby diesel generator. This generatorshall be outdoor type, equipped with silencer to minimize the noise, and the enclosure shall be IP44, with the same colour with the nearby prefabricated substation to ensure the aesthetic aspect. The underground bulk fuel storage tank shall be provided at a suitable adjacent location to the generator to provide 15 days /3 hrs per day at full load.

2.8.6 ICT Infrastructure

ICT system infrastructures will be provided by developer within the projected area, such as PVC duct bank, hand holes, etc. The bury depth of PVC duct bank shall not be lesser than 800mm, and shall be protected by C20 concrete encased where crossing road.

The infrastructure provision will be utilized by local communication company, local Television Company to install their cables, optic fiber, etc in the future where customer required.

The ducting system shall be start from the southern boundary of the projected area where locate communication optic fibre cables and TV cables along the Langata Rd and lead to all necessary individual buildings in the projected area.

2.9 Description of the project's construction activities

2.9.1 Pre-construction Investigations

The implementation of the project's design and construction phase started with preliminary surveys and cost-benefit analysis to establish the need for a bigger and office. Investigations also covered identification of any existing legal and regulatory requirements that may affect the project at any stage of its implementation.

The whole site has been divided into site A and B as described hereinbefore. Construction at site B will commence ahead of site A. The housing facilities at site A will be renovated and be used temporarily by the construction staff. Social amenities e.g. a basketball court will also be constructed at site A to be used by the construction

staff temporarily. However the structures at site A will eventually be demolished to pave way for construction of permanent facilities under the proposed project.

Figure 12: Some of the facilities that will be renovated for use by the construction staff and then will be demolished later

2.9.2 Excavation and foundation works

Excavation will be carried out to prepare the site for construction of foundations, pavements and drainage systems. The excavation will involve the use of heavy earthmoving machinery such as tractors and bulldozers.

2.9.3 Storage of materials

Building materials will be stored on site. Bulky materials such as rough stones, ballast, sand and steel will be carefully piled on site. To avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and

stones. Materials such as cement, paints and glasses among others will be stored in temporary storage structures built for this purpose.

2.9.4 Masonry, concrete work and related activities

The construction of the building walls, foundations, floors, pavements, drainage systems, perimeter fence landscaping among other components of the project involves a lot of masonry work and related activities. General masonry and related activities include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and are supplemented by machinery such as concrete mixers.

2.9.5 Structural steel works

The buildings will be reinforced with structural steel for stability as it will be designed by structural engineers. Structural steel works will involve steel cutting, welding and erection.

2.9.6 Roofing works

Roofing activities will include raising the roofing materials such as tiles and structural timber to the roof and fastening the roofing materials to the roof.

2.9.7 Electrical work

Outdoor LV distribution shall be installed by armoured cable direct buried. LV cables shall be armoured XLPE insulated0.6/1KV copper cables. Cable bury depth shall not be lesser than 700mm, and shall be protected by C20 concrete encased PVC duct bank where crossing road.

Indoor electrical work will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus, sockets etc. In addition, there will be other activities involving the use of electricity such as welding and metal cutting.

2.9.8 Plumbing

Installation of pipe-work will be done to connect sewage from the ablution blocks to a waste water treatment plant. Plumbing will also be done for drainage of storm water from the roof-tops into the storm water harvesting facilities. Plumbing activities will include metal and plastic pipe cuttings, the use of adhesives, metal grinding and wall drilling among others.

2.10 Description of the project's operational activities

2.10.1 The facility users

Offices
The offices to be constructed as described in this report will be used by AFRIGO's senior staff.

Staff Quarters
The staff quarters will be used by AFRIGO's senior management as residential premises.

Conference Hall
The conference hall will be used by AFRIGO for holding meetings and other events and it will also be used for offering training to students.

2.10.2 Solid waste and waste water management

The proponent will provide facilities for handling solid waste generated within the facility. These will include dust bins/skips for temporarily holding waste within the premises before final disposal at the designated sites. Wastes will be handled as explained above in this chapter.

2.10.3 General repairs and maintenance

The proposed development and associated facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repair and maintenance of electrical gadgets, painting and replacement of worn out materials among others.

2.11 Description of the project's decommissioning activities

2.11.1 Demolition works

Upon decommissioning, the project components including buildings, pavements, drainage systems, parking areas and perimeter fence will be demolished. This will produce a lot of solid waste, which will be re-used for this or other construction works or if not re-usable, disposed of appropriately by a licensed waste disposal company. However, this phase is expected after over 100 years plus.

2.11.2 Dismantling of equipment and fixtures

All equipment including electrical installations, furniture, finishing fixtures partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of these equipment in other projects. This will be achieved through resale of equipment to other building

owners or contractors or donation of these equipment to schools, churches and charitable institutions.

2.11.3 Site restoration

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the top soil and re-vegetation using indigenous plant species.

3. BASELINE INFORMATION OF THE PROJECT AREA

3.1 Introduction

Karen is within Langata Constituency in Nairobi County. Nairobi is one of the fast growing cities in Africa. Nairobi County is one of the 47 counties in the Republic of Kenya. It borders Kiambu County to the North and West, Kajiado to the South and Machakos to the East. Among the three neighbouring counties, Kiambu County shares the longest boundary with Nairobi County. The County has a total area of 696.1 Km2 and is located between longitudes 36° 45'East and latitudes 1o 18'South.
Source: Nairobi County Integrated Development Plan 2014

3.1.1 Topography

Nairobi lies at an altitude of about 1680m above sea-level, but this height ranges from 1500m (to the east) to 2300m (to the West). It is located at longitude 36° 45' east and latitude 1° 18' South about 140 km South of the Equator and situated at an elevation of about 5,500 feet above sea level, placing its high affect for the cooler air to keep its temperatures moderate.

The terrain in the eastern side of the County is gently rolling but divided by steep valleys towards the City boundaries. To the north, there is the Karura forest which is characterized by steep sided valleys. The Karen - Langata area is characterized by plains surrounded by Nairobi National Park on the east and Ngong Forest on the south.

Several streams with steep-sided valleys covered with vegetation are a dominant landscape feature of the County. The main rivers in the County are Nairobi River, Ngong River and Kabuthi River. These rivers are highly polluted as open sewers and industrial waste is directed towards them. Nairobi dam, which is along the Ngong River, and Jamhuri dam are the main water reservoirs in the County. The main types of soils are the black cotton and the red soils that form patches in different parts of the County. There are three forests in the County namely Ngong Forest to the south, Karura Forest to the north and the Nairobi Arboretum. The three forests have a total coverage of 23.19 Km2. The site has a slope of 1.3 %.

The proposed site is located within the Karengata region which has a fairly subdued topography with elevations falling to the east. The most prominent topographic feature within Karengata region is the Mbagathi River valley. The Karengata area is characterized by extensive faulting running in a north-south direction and conforming to the rift system.
Source: Nairobi County Integrated Development Plan 2014 and the Karengata Local Physical Development Plan, 2006

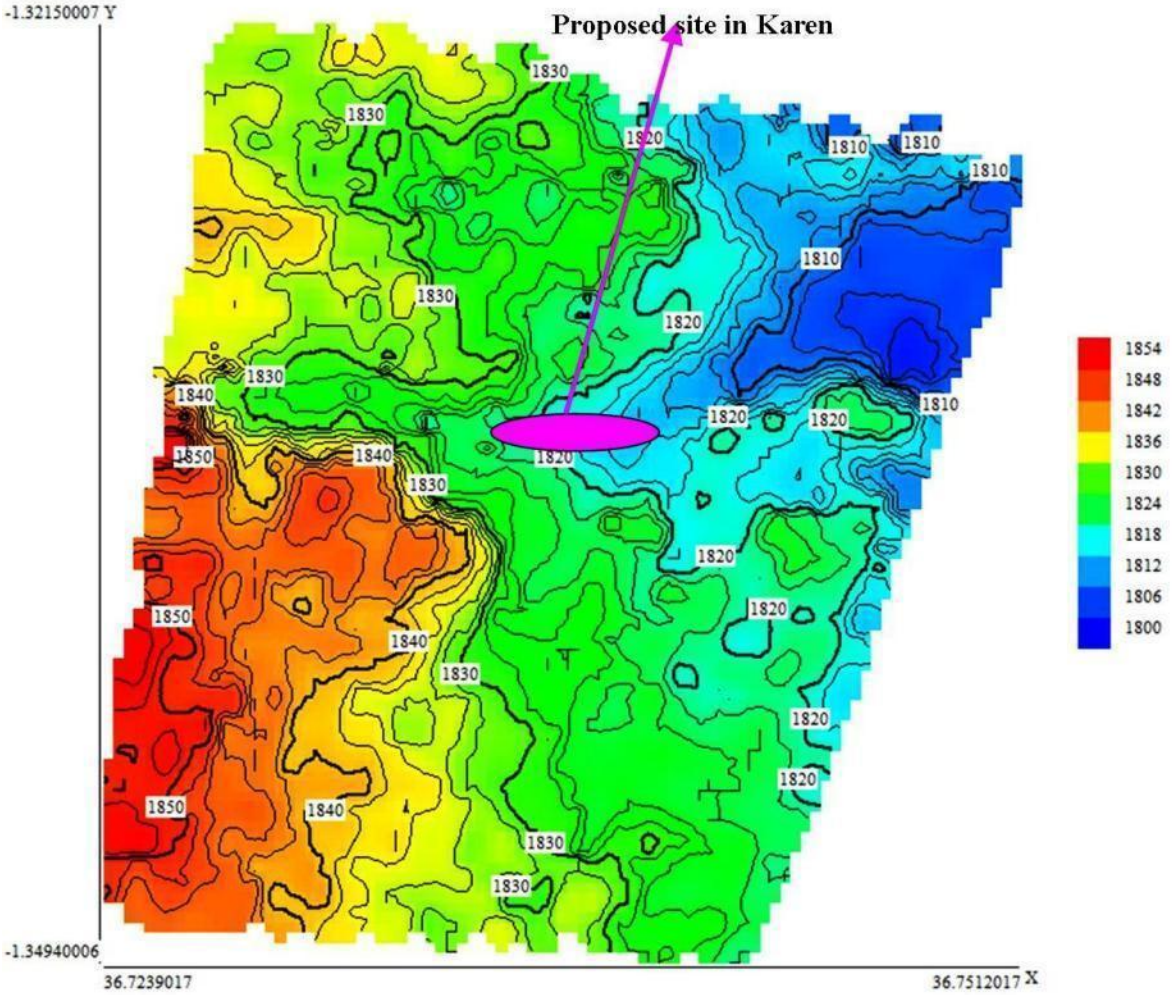


Figure 13: The Contour map of the proposed site (Source: Generated from Google Earth)

3.1.2 Drainage

Nairobi City lies in the Athi River Drainage Basin. The major rivers that cross the City include Nairobi, Ruaraka, Ngong, Athi and Mathare River. All these drain from the West and flow towards the Eastern direction as dictated by the topographical features. As the rivers pass through the City, industrial effluents, municipal waste and siltation heavily pollute them.

There are two perennial water source s in the Karengata area: the Mbagathi and Motoine rivers. The Mbagathi rises in the Dagoretti forests, flows along the southern boundary of the Nairobi National Park and onto Athi River Township where it where it joins the Stonyathi River. The Motoine River rises in the Dagoretti Forest, Kiambu District; and flows along the northern boundary of the plan area through the Ngong Road Forest and into the Nairobi Dam.

There are a number of ephemeral water sources in the area. Prominent among them is the North Mokoyeti River, which arises as the discharge from the Karen

oxidation ponds and flows eastwards north of the Langata Road and into the Nairobi National Park north east of Bomas of Kenya. Mokoyet River is about 500m north of the proposed site.
Source: Source: Nairobi County Integrated Development Plan 2014 and the Karengata Local Physical Development Plan, 2006

3.1.3 Climate

The County has a fairly cool climate resulting from its high altitude. Temperature ranges from a low of 100C to a high of 290C. It has a bi-modal rainfall pattern. The long rains season fall between March and May with a mean rainfall of 899 millimeters (mm) while the short rains season falls between October and December with a mean rainfall of 638 mm. The mean annual rainfall is 786.5 mm.
Source: Nairobi County Integrated Development Plan 2014

3.1.4 Temperatures

The average daily temperature throughout the year varies slightly from month to month with average temperatures of around 17 degrees Celsius during the months of July and August to about 20 degrees Celsius in March. But, the daily range is much higher, with the differences between maximum and minimum temperatures each day around 10 degrees in May and up to 15 degrees in February. Between the months of June to September, southeast winds prevail in the coastal parts of Kenya and last up to several days without a break. The clouds cause day temperatures to remain low and most times the maximum temperature stay below 18 degrees Celsius. The minimum temperatures also remain low during cloudy nights, usually hovering around 8 degrees Celsius and sometimes even reaching 6 degrees Celsius. Clear skies in January and February also bring colder nights. The highest temperature ever reached in Nairobi was 32.8 degrees Celsius and the lowest was 3.9 degrees Celsius.
Source: Nairobi County Integrated Development Plan 2014

3.1.5 Humidity

Nairobi's location just south of the equator in combination with humid air pumped in from the Indian Ocean, the humidity values for each day are generally on the higher end. This is not to say that values are always high, since the easterly winds coming off the Indian Ocean tend to keep the temperatures standard throughout the country; therefore the "warm sticky" feeling is usually not associated with Nairobi as much as one would think. In the summer to autumn months of January to April, relative humidity values have been known to plummet to anywhere from 10% to 20%. The typical day, humidity-wise, starts off with nearly saturated in the morning hours, and steadily decreases throughout the remainder of the day.

Source: Nairobi County Integrated Development Plan 2014

3.1.6 Rainfall

With these routinely high relative humidity figures, it is not surprising that the Nairobi climate is one that produces much rain annually. In fact, from the past 50 years, the expected amount of rain could be anywhere in the range of 500 to 1500 mm, with the average ringing in at 900 mm. The majority of these rainfall figures crash down in Nairobi in one major and one minor monsoon seasons respectively. The major monsoon season occurs within the months of March to May, and is called the "Long Rains" by the locals. The minor monsoon seasons emerges within the October to December Months, and is called the "Short Rains".
Source: Nairobi County Integrated Development Plan 2014

3.2 Infrastructure

Due to such rapid urban growth, provision of basic infrastructure for all has become an important concern of development planners in Nairobi. Basic infrastructural services that have deteriorated due to such rapid increase in population include: Solid Waste Management (SWM) system; water and sewage systems; drainage and flood protection; roads; mass transportation; electric installations; and telecommunications. Greater environmental pollution, congestion and other problems have been the result of under-provision of such basic services.

The city is well served, with good communication and transport network such as air, road, and railway. The city is a hub of road transport connecting other major towns in the country. On air transport, Jomo Kenyatta International airport makes it easy to transport goods from all over the world into the country and vice versa.

The proposed sites can be easily accessed using Langata Road and Hillcrest Road which is on the eastern boundary of site A and western boundary of site B

3.12 Character of surrounding developments

Right from inception, concerted efforts have been put in place that a blend of both business premises and private residential compounds is realized in the proposed project. The proposed development will thus blend with the existing neighbourhood with no violation of the physical planning zoning specifications.

The Western end of site A borders an animal orphanage (Kenya society for the protection and care of animals) and a residential estate. The Southern end of the sites border Langata road and Hillcrest road is on the Eastern boundary of site A and Western boundary of site B. The red cube restaurant is about 250 meters West of site B while Ngong forest and the southern bypass are about 1.5km north of the proposed

site. Other neighbours to the proposed site include Marist International University College, Karen Vineyard church and Grace College. Mokoyet River which has its source in the Nairobi National park is about 500m north of the proposed site.

Plate 2: Neighbouring dwellings to the project site (Hillcrest International School)

Plate 3: Buildings along Langata road

Plate 4: A section of Hillcrest International School on the northern end of the proposed site

Plate 5: The animal orphanage on the South Eastern end of site A

Though the Karengata area is predominantly residential, areas along Langata road have been utilized for commercial and office enterprises. The following are some of commercial/ office premises identifies on Langata road;

i) Water Mark Business park

This is a three level development along Langata road within the Karengata area. The facility used for office space with a provision for a restaurant.

ii) The Karen Hospital

The highest section of the Karen hospital has 5 levels.

Plate 6: The Karen Hospital along Langata road

iii) A flat belonging to Mbandu stores

Though the use for this flat was not identified, its height suggest that it is of either commercial or office use. The development is still under construction. It is a five level flat under construction along Langata road on LR 12144-122 near the Karengata Seventh day Adventist Church.

Plate 7: The five storey building under construction along Langata road within Karengata area

The proposed development will therefore be in harmony with the existing development along Langata road.

Source: Nairobi County Integrated Development Plan 2014, Karengata Local Physical Development Plan (2006) and observation.

3.3 Population

The cosmopolitan capital of Kenya, currently houses over 2.5 million people with a growth rate estimated at 7% which represents 51% of the country's urban population. Nairobi City has one of the highest urban population densities in the country of up to

3,079 persons per square kilometer. Nairobi City has experienced rapid growth both in terms of population and physical expansion. The physical area of Nairobi has been expanding tremendously from 3.84 Km^2 in 1900 to 684 Km^2 in 1963 which is the current official size of the City. According to 2009 National Census Report; the Karen ward has a population of 24,507.
Source: Nairobi County Integrated Development Plan 2014

3.4 Economic Activities

Nairobi city is the canter of commercial, manufacturing and industrial development in East Africa. The major economic activities in Nairobi City include trade. Like most modern cities, Nairobi has crowded markets and trading areas, middle class suburbs, and spacious mansions for the rich and powerful. It also has vast overcrowded tenements and slums, exploitation, and high unemployment. Between these two worlds, the city offers big screen film, theatres, restaurants, bookshops, cafes and bars for tourists from all over the world.

The economic activities of the Karengata area are influenced by the predominant land uses of residential, educational, public purpose (mainly religious) agricultural and offices.

Major employers include schools and other educational institutions, flower farms, cottage industries commercial centres, Petrol filling stations, garages, construction sites, security firms and the residents.

Some of the economic activities near the proposed site include; real estate business, educational (Hillcrest International School, Marsit International College University), transport activities such as bodaboda operators and a few public service vehicles. There is also an animal orphanage adjacent to site A
Source: Nairobi County Integrated Development Plan 2014, Karengata Local Physical Development Plan (2006) and observation.

3.5 Flora and Fauna

The County is predominantly a terrestrial habitat that supports a diverse web of biodiversity ecosystems. It is home to about 100 species of mammals, 527 bird species and a variety of plant species. Although it is endowed with some permanent rivers, the aquatic ecosystems are largely choked by the effects of pollution from different sources. Currently, efforts are underway to ensure a sustainable clean Nairobi River Basin. The Nairobi National Park has remained iconic in an expanding city.

The proposed site is characteristic of an equatorial rain forest teeming with a variety of flora and fauna. There is a variety of mature tree species interspersed with various shrub and grass species. Some of the tree species identified on site include; Nandi

flame (*Spathodea ampanulata*), *Gravelia robusta*, Brazilian pepper (*Schinus terebinthifolius*), Cypress trees (*Taxodium distichum),* various species of Eucalyptus, Jacaranda trees, Bamboo, (*Pordocarpus elongatus)* among others.

There are a lot of vervet monkeys (*Chlorocebus pygerythrus*) especially at the eastern end of site A near the animal orphanage. A number of bird species were also identified at the site; Marabou stork (*Leptoptilos crumenifer*), Pied crow (*Corvus albus*), African sacred bird (*Threskiornis aethiopicus*) among others. Broadly, there are more plant and animal species at site than B.
Source: Nairobi County Integrated Development Plan 2014, Karengata Local Physical Development Plan (2006) and observation.

Plate 8: Mature stands of *Pordocarpus elongatus*

Plate 9: Mature tree stands of Eucalyptus and Jacaranda

Plate 10: Bamboo bush at site A

Plate 11: Brazilian pepper (*Schinus terebinthifolius*) at the site (A)

Plate 12: Mature Nandi flame (*Spathodea ampanulata*) at the site

Plate 13: Vervet monkeys (*Chlorocebus pygerythrus*) at the western end of site A. More trees will be planted on both sides to preserve the habitat of these monkeys

Plate 14: Marabou stork (*Leptoptilos crumenifer*) at site A

Plate 15: Pied crow (*Corvus albus*) at the site (A), the proponent will endeavour to minimize cutting of trees on site to prevent destruction of their habitat.

3.6 Soils and Geology

The project area majorly comprises of lithosols characterized by an upper layer of red soil.
Source: The geology Map of Kenya and the Kenya Soil Map

4. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economy is based. Environmental Impact Assessment is a useful tool for protection of the environment from the negative effects of developmental activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

According to Sections 58 and 138 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999 and Section 3 of the Environmental (Impact Assessment and Audit) Regulations 2003 (Legal No. 101), requires an Environmental Impact Assessment project/study report prepared and submitted to the National Environment Management Authority (NEMA) for review and eventual Licensing before the development commences. This was necessary as many forms of developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development through sustainable use of natural resources without interfering with the environment.

4.2 Relevant Policies

There are a number of policies that are pertinent to this project, chief of which is the constitution of Kenya. A brief description of the policies is given bellow.

4.2.1 The Constitution of Kenya 2010

The Constitution of Kenya, promulgated into law on 27 September 2010 is the supreme law of the Republic of Kenya and binds all persons and all State organs at all levels of government. It provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectoral legislative documents are drawn.

In relation to environment, Article 42 of Chapter 4, the Bill of Rights, confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70.

Chapter 5 of the new constitution provides the main pillars on which the 77 environmental statutes are hinged and covers "Land and Environment" and includes

the aforementioned articles 69 and 70. Part 1 of the Chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. Part 2 of the Chapter directs focuson the environment and natural resources. It provides for a clear outline of the state's obligation with respect to the environment. The Chapter seeks to eliminate processes & activities likely to endanger the environment. Article 69 states that 1) The State shall:

- Ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
- Work to achieve and maintain a tree cover of at least ten percent of the land area of Kenya;
- Protect and enhance intellectual property in, and indigenous knowledge of, biodiversity and the genetic resources of the communities;
- Encourage public participation in the management, protection and conservation of the environment;
- Protect genetic resources and biological diversity;
- Establish systems on environmental impact assessment, environmental audit and monitoring of the environment;
- Eliminate processes and activities that are likely to endanger the environment; and,
- Utilise the environment and natural resources for the benefit of the people of Kenya.

There are further provisions on enforcement of environmental rights as well as establishment of legislation relating to the environment in accordance to the guidelines provided in this Chapter.

In conformity with the Constitution of Kenya 2010, every activity or project undertaken within the Republic of Kenya must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. The proposed development project is a development activity that will utilize sensitive components of the physical and natural resources hence need for a clearly spelt out environmental management plan to curb probable adverse effects to the environment.

The proponent will therefore adhere to the provisions of the Environmental management plan provided in this report to ensure the publics' and employee's right to a clean and safe environment is not infringed.

4.2.2 Kenya Vision 2030

Kenya Vision 2030 is the country's development blueprint covering the period 2008 to 2030. It aims at making Kenya a newly industrializing 'middle income country providing high quality life for all its citizens by the year 2030. The vision has been developed through an all-inclusive stakeholder consultative process, involving Kenyans from all parts of the country. The vision is based on three 'pillars' namely; the Economic Pillar, the Social Pillar and the Political Pillar. The vision 2030 comes after the successful implementation of the Economic Recovery Strategy (ERS) for

Wealth and Employment Creation 2003-2007.

The Kenya Vision 2030 economic pillar aims at providing prosperity of all Kenyans through an economic development programme aimed at achieving an average GDP growth rate of 10% per annum over the next 25 years from the year 2008. The social pillar seeks to build 'a just and cohesive society with social equity in a clean and secure environment'. On the other hand, the political pillar aims at realizing a democratic political system founded on issue–based politics that respects the rule of law, and protects the rights and freedoms of every individual in the Kenyan society.

The proposed project is in line with the economic and social pillars of Kenya vision 2030 and therefore its implementation will contribute to Kenya's realization of the objectives set in the Kenya Vision 2030.

4.2.3 Policy Paper on Environmental and Development (Sessional Paper No. 6 of 1999)

This policy was formulated on the basis of the National Environment Action Plan (NEAP) process of 1994. The policy's major objective is to harmonize environmental and developmental concerns to ensure sustainability. Furthermore, this policy ensures that environmental issues are taken into consideration before the commencement of development policies, programmes, plans and projects. The proposed project is therefore consistent with the Sessional Paper No. 6 of 1999.

4.2.4 Physical Planning Policy

The current policy governs the development and approval all building plans as provided for in the Physical Planning Act (Cap 286). The proposed project will be subjected to the provisions of this policy and legislation. The plans for the proposed development have been submitted to the County government for approval.

4.2.5 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. The proposed development has been designed by professional engineers and architects and as such will have all amenities/utilities that are essential for safeguarding public health for all people using the facilities during the construction, operational and decommissioning phases of the project. The proponent will adhere to the provisions of the relevant Act of parliament; Public Health Act (CAP 242).

4.2.6: Wildlife Policy

The policy takes cognisance of the value of wildlife in Kenya and appreciates the need to sustainably manage wildlife for the benefit of both present and future generations. This Policy proposes a broad range of measures and actions responding to the wildlife conservation challenges and seeks to balance the needs of the people of Kenya with opportunities for sustainable wildlife conservation and management countrywide

4.2.7: Forest Policy, 2007

The policy underscores the need to sustainably manage forest resources within Kenya. The policy acknowledges that forest conservation and management has faced a number of challenges in Kenya; the increasing demand for land and forest resources, inadequate funding that constrains the provision of public services among others. This Policy proposes a broad range of measures and actions responding to the challenges faced by the forest sector. The proponent will adhere to the tenets of this policy at all phases of the project.

4.2.8: Wetlands Policy

The policy acknowledges that wetlands highly productive ecosystems and that they perform many functions that maintain the ecological integrity of the systems and also provide many goods and services. The policy also underscores the functions and benefits provided by wetlands and their significance for the general public as they support agriculture, tourism, industry, and biodiversity conservation, social economic and cultural activities. The policy decries the deterioration of wetland quality and quantity due to mismanagement.

The Policy seeks to ensure that the plans and activities of the government, private developers and wetland stakeholders promote conservation and sustainable/ wise use of wetlands. It provides a framework for actions to improve institutional and organizational arrangements, address legislation and government policies, increase knowledge and awareness of wetlands and their values, review the status of and identify priorities for wetlands in a national context, and address problems at particular wetland sites.

4.3 Institutional Framework

There are 21 institutions, which deal with environmental issues in Kenya. Some of the key institutions include National Environmental Management Authority (NEMA), the Department of Resource Surveys and Remote sensing (DRSRS), the Water Department, The Kenya Forest Service (KFS), the Kenya Wildlife Service (KWS) the Kenya Forestry Research Institute (KEFRI), the National Museums of Kenya (NMK), the Kenya Marine and Fisheries Research Institute (KMFRI), the Kenya Agricultural Research Institute (KARI) among others. There are also local and international NGOs

While implementing the project, both the proponent and the contractor will have to work in liaison with a number of these institutions when dealing with issues within the jurisdiction of the institutions.

4.3.1 National Environmental Council (NEC)

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

4.3.2 National Environmental Management Authority (NEMA)

The objective and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director- General appointed by the president heads NEMA. The Authority shall:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.

- Take stock of the natural resources in Kenya and their utilization and consultation, with the relevant lead agencies, land use guidelines.

- Examine land use patterns to determine their impact on the quality and quantity of the natural resources.
- Carry out surveys, which will assist in the proper management and conservation of the environment.
- Advise the government on legislative and other measures for the management of the environment or the implementation of relevant international conservation treaties and agreements in the field of environment as the case may be.
- Advise the government on regional and international environmental convention treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements where Kenya is a party.
- Undertake and co-ordinate research, investigation and surveys in the field of environment and collect and disseminate information about the findings of such research, investigation or survey.
- Mobilize and monitor the use of financial and human resources for environmental management.
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA.
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur.
- Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impeding environmental emergencies is given.
- Undertake, in co-operation with relevant lead agencies programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard.
- Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.
- Render advice and technical support, where possible to entities engaged in natural resources management and environmental protection so as to enable them to carry out their responsibilities satisfactorily.

- Prepare and issue an annual report on the state of the environment in Kenya and in this regard may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency and,

- Perform such other functions as government may assign to the Authority or as are incidental or conducive to the exercise by the authority of any or all of the functions provided under EMCA.

However, NEMA mandate is designated to various committees

The contractor and the client will work in liaison with NEMA in getting various permits, licenses, approvals and generally in complying with the provisions of EMCA 1999 and any other subsidiary legislation under EMCA 1999

4.3.3 Public Complains Committee (PCC)

The Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Council.

- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and

- To perform such other functions and excise such powers as may be assigned to it by the council.

4.3.4 National Environment Action Plan Committee

This Committee is responsible for the development of a 5-year Environment Action plan among other things. The National Environment Action Plan shall:

- Contain analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.

- Contain analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.

- Recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.

- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for the planning and management of the environment and natural resources.
- Identify actual or likely problems as may affect the natural resources and the broader environment context in which they exist.
- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment, and strategies for the amelioration of their negative impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.
- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritize areas of environmental research and outline methods of using such research findings.
- Without prejudice to the foregoing, be reviewed and modified from time to time to incorporate emerging knowledge and realities and;
- Be binding on all persons and all government departments, agencies, States Corporation or other organ of government upon adoption by the national assembly.

4.3.5 Standards and Enforcement Review Committee

This is a technical Committee responsible for environmental standards formulation methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures.

Standards and Enforcement Review Committee consists of the members set out in the third schedule to the Environmental Management and Co-ordination Act. The Permanent Secretary under the Minister is the Chairman of the Standard and Enforcement Review Committee. The Director General appoints a Director of the Authority to be a member of the Standards and Enforcement Review Committee who is the Secretary to the committee and who provides secretarial services to the Committee. The Committee also regulates its own procedure. The Standard and

Enforcement Review Committee may co-opt any person to attend its meetings and a person so co-opted shall participate at the liberations of the committee but shall have no vote. Finally, the Committee shall meet at least once every three months for the transactions of its business.

4.3.6 National Environmental Tribunal (NET)

This tribunal guides the handling of cases related to environmental offences in the Republic of Kenya. If disputes to the proposed project arise, they are supposed to be presented here for hearing and legal direction.

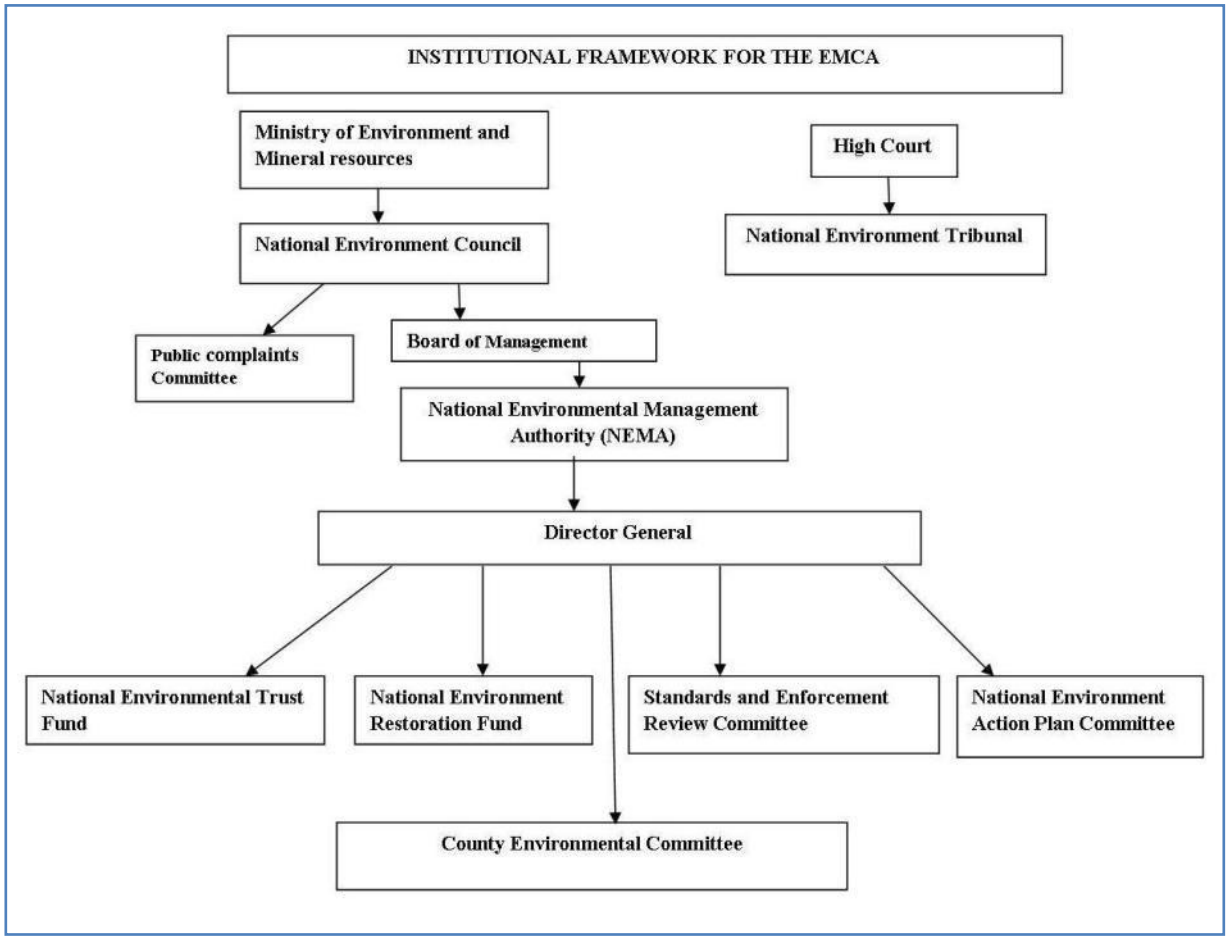


Figure 14: The EMCA 1999, Institutional Framework

4.4 Legal Framework

Kenya has several statutes that govern environmental standards and quality. Most of these statutes are sector specific covering issues such as public health, planning, air quality, agriculture, water quality, and land use. This section seeks to bring to light statutes and legislation pertinent to the development of the proposed development in Karen herein referred to as the proposed project.

4.4.1 The Environmental Management and Coordination Act (EMCA), 1999

The Environmental Management and Coordination Act (EMCA) of 1999 provides for the legal framework for the management of the Kenyan environment. Under the EMCA, all proposed projects that are likely to have significant impact on the environment according to the Second Schedule will undergo an Environmental Impact Assessment (EIA) while projects already in place will undertake annual Environmental Audits (EA). This Act came into force on 14th January 2000. It aims at coordinating environmental protection activities in the country. In its preamble, the Act states that every person in Kenya has a right to a clean and healthy environment. According to section 58 of the Act (EMCA) No. 8 of 1999, second schedule 9 (i), and the environmental (Impact Assessment and Audit) Regulations, 2003, all new enterprises and projects must undergo Environmental Impact Assessment (EIA). The EIA study report is submitted to the National Environment Management Authority (NEMA) in the prescribed form, and accompanied by the prescribed fees.

It is in line with this provision that the proponent appointed EIA experts to undertake an Environmental and Social Impact Assessment and prepare a report in respect of the proposed development. This addresses the requirement as the project activities are likely to have negative environmental impacts. This will ensure the Proponent observes continuous improvement on environmental, health and safety management and takes appropriate measures to mitigate any adverse impacts to the environment and the surrounding communities that the project may have during its implementation and operation.

Part VII, Section 68 of the same Act requires operators of projects or undertakings to carry out environmental audits in order to determine level of compliance with statements made during the EIA. The audit report should be submitted to NEMA.

The proponent shall submit an Environmental Audit report in the first year of operation to confirm the efficacy and adequacy of the Environmental Management Plan

Section 87 sub-Section 1 states that no person shall discharge or dispose of any wastes, ether generated within or outside Kenya, in such a manner as to cause pollution to: environment or ill health to any person, while Section 88 provides for

acquiring of a license for generation, transporting or operating waste disposal facility. According to section 89, any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste shall apply to the NEMA for a license.

Sections 90 through 100 outline more regulations on management of hazardous substances including oils, chemicals and pesticides.

The proponent will have to ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as solid waste management plans, water reticulation maintenance and landscaping are implemented, as per the design drawings and maintained throughout the project cycle

EMCA 1999 has several subsidiary legislations that were enacted to ensure effective implementation of the Act. A few regulations that are pertinent to the proposed project are described below.

4.4.1.1 The Environmental Management and coordinating (water quality) regulation 2006

The Regulations provides for sustainable management of water resources including prevention of water pollution and protection of water sources (lakes, rivers, streams,' springs, wells and other water sources).

It is an offence under Regulation No.4 (2), for any person to throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.

Regulation No. 11 further makes it an offence for any person to discharge or apply any poison, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit the dumping or discharge of such matter into the aquatic environment unless such discharge, poison, toxic, noxious or obstructing matter, radioactive waste or pollutant complies with the standards for effluent discharge into the environment

Regulation No. 14 (1) requires every licensed person generating and discharging effluent into the environment to carry out daily effluent discharge quality and quantity monitoring and to submit quarterly records of such monitoring to the Authority or its designated representatives.

The proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water sources are implemented throughout the project cycle.

4.4.1.2 The Environmental Management and Co-ordination (Waste Management) Regulations, 2006

The regulations provide details on management (handling, storage, transportation, treatment and disposal) of various waste streams including:

- Domestic waste
- Industrial waste,
- Hazardous and toxic waste
- Pesticides and toxic substances
- Biomedical wastes and
- Radioactive waste

Regulation No.4 (1) makes it an offence for any person to dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

Regulation 5 (1) provides categories of cleaner production methods that should be adopted by waste generators in order to minimize the amount of waste generated and they include:

i) Improvement of production process through-
   - Conserving raw materials and energy
   - Eliminating the use of toxic raw materials and waste
   - Reducing toxic emissions and wastes

ii) Monitoring the product cycle from beginning to end by-
   - Identifying and eliminating potential negative impacts of the product
   - Enabling the recovery and re-use of the product where possible
   - Reclamation and recycling

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

The Proponent shall ensure that the main contractor adopts and implements

all possible cleaner production methods during the construction phase of the project.

Regulation 6 requires waste generators to segregate waste by separating hazardous waste from non- hazardous waste for appropriate disposal. Regulation 14 (1) requires every trade or industrial undertaking to install at its premises anti-pollution equipment for the treatment of waste emanating from such trade or industrial undertaking. Regulation 15 prohibits any industry from discharging or disposing of any untreated waste in any state into the environment. Regulation 17 (1) makes it an offence for any person to engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by NEMA. Regulation 18 requires all generators of hazardous waste to ensure that every container or package for storing such waste is fixed with a label containing the following information:

- The identity of the hazardous waste
- The name and address of the generator of waste
- The net contents
- The normal storage stability and methods of storage
- The name and percentage of weight of active ingredients and names and percentages of weights of other ingredients or half-life of radioactive material
- Warning or caution statements which may include any of the following as appropriate-

  -the words "WARNING" or "CAUTION"

  - the word "POISON" (marked indelibly in red on a contrasting background; and

  -the words "DANGER! KEEP AWAY / NO ENTRY FOR UNAUTHORIZED

  PERSONS" and

  -a pictogram of a skull and crossbones

  Regulation 19 (1) requires every person who generates toxic or hazardous waste to treat or cause to be treated such hazardous waste.

During the construction phase of the project, the Proponent shall ensure that the main contractor implements the above mentioned measures as necessary to enhance sound environmental management of waste.

4.4.1.3 The Environmental Impact (Assessment and Auditing) Regulations, 2003

The Environmental Impact Assessment exercise under the Act is guided by the Environmental Impact Assessment (Assessment and Auditing) Regulations of the year 2003, which was given under legal notice no. 101. The regulations stipulate the ways in which environment impact assessment and audits should be conducted. The project falls under the second schedule of EMCA, 1999 section 58 (1), (4) that require an Environmental Impact Assessment report. As stipulated by the legal notice No. 101, 2003, PART V, Section 31 (3((a) (i) and (ii) it is required that an environmental assessment be undertaken to provide baseline information upon which subsequent environmental control audit shall be based.

It is in the wake of these regulations that the proponent commissioned AWEMAC; a firm of experts to carry out an EIA exercise, write a report and submit it to NEMA with an aim of being awarded an EIA license.

4.4.1.4 Environmental Management and Coordination Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements. Under these regulations, NEMA will be publishing a list of controlled substances and the quantities of all controlled substances imported or exported within a particular. The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations.

The regulations stipulate that controlled substances must be clearly labeled with among other words, "Controlled Substance-Not ozone friendly'') to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer."

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters

or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

In case the contractor deals with substances defined as "controlled substances" by the regulations, he will be required to comply with the regulations.

4.4.1.5 Environmental Management and Coordination (Conservation of Biodiversity regulations 2006)

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection.

The country has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning.

The primary purpose of these regulations is to monitor the status and the components of biological diversity in Kenya and take necessary measures to prevent and control their depletion so as to ensure that conservation of biological diversity resources is achieved. Part II, section 4 of the regulations states that

(1) A person shall not engage in any activity that may-

(a) have an adverse impact on any ecosystem;

(b) lead to the introduction of any exotic species;

(c) lead to unsustainable use of natural resources, without an Environmental Impact Assessment License issued by the Authority under the Act.

The contractor will ensure that the construction activities do not negatively impact on the existing ecosystems near the construction area.

4.4.1.6 Environmental Management and Co-ordination (Noise and Excessive Vibrations Regulations 2009

The regulations define noise as any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health or the environment. The regulations prohibit any person from making or causing to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Article 13 2(d) of the regulations allows for construction work at night for public utility construction, construction of public works, projects exclusively relating to roads, bridges, airports, public schools and sidewalks, provided noise generated is not caused within a residential building or across a residential real property boundary where such noise interferes with the comfort, repose, or safety of the members of the public. The second Schedule of the Regulations provides for the maximum permissible level of noise at construction sites.

Table 3: Minimum and maximum permissible noise levels

Facility	Maximum Noise level permitted (leq) in dB (A)	
	Day (6.01am-6.00pm)	Night (6.01 pm-6.00am)
Health facilities, educational institutions, homes for disabled and residential areas	60	35
Other areas	75	65

4.4.1.7 Air Quality Regulations, 2008

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2008". The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The

regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

- Back-burning to control or suppress wildfires;
- Fire fighting rehearsals or drills conducted by the Fire Service Agencies
- Traditional and cultural burning of savannah grasslands;
- Burning for purposes of public health protection;

The Proponent shall observe policy and regulatory requirements and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution.

4.4.2 The Occupational Safety and Health Act, 2007

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes.

The key areas addressed by the Act include:

- General duties including duties of occupiers, self employed persons and employees.
- Enforcement of the act including powers of an occupational safety and health officer.
- Registration of workplaces.
- Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences.
- Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver.
- Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas.
- Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials

- Welfare general provisions including supply of drinking water, washing facilities, and first aid.

Under section 6 of this act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7). He is also required to establish a safety and health committee at the workplace in a situation where the number of employees exceeds twenty (section 9) and to cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a registered safety and health Advisor (Section 11). In addition, any accident, dangerous occurrence, or occupational poisoning which has occurred at the workplace needs to be reported to the occupational safety and health officer of the respective area by an employer or self-employed person (section 21).

According to section 44, potential occupiers or users of any premises as work places are required to apply for registration to the Director for all premises intended for use as workplaces. Such places shall be maintained in a clean state during the operation phase (section 47).

To ensure machinery safety, every hoist or lift - section 63 and/ or all chains, ropes and lifting tackles - section 64 (ld), shall be thoroughly examined at least once in every period of six months by a person approved by the Director of Occupational Health and Safety Services. Similarly, every steam boiler - section 67 (8) and/or steam receiver section 68 (4) and all their fittings and/or attachments shall be thoroughly examined by an approved person at least once in every period of twelve months whereas every air receiver shall be thoroughly cleaned and examined at least once in every period of twenty four months or after any extensive repairs - section 69 (5). According to section 71 (3), every refrigeration plant capable of being entered by an employee also needs to be examined, tested and certified at least once in every period of twelve, months by an approved person.

In relation to fire safety, section 78 (3) requires spillage or leaks of any flammable liquid to be contained or immediately drained off to a suitable container or to a safe place, or otherwise treated to make it safe. Furthermore, a clear and bold notice indicating that smoking is prohibited should be conspicuously displayed in any place in which explosive, highly flammable or highly combustible substances, are

manufactured, used, handled or stored-section 78 (5). In addition, necessary precautions for dealing with fire incidents should be implemented including provision of means for extinguishing fire and means for escape, in case of fire, for the persons employed in any workplace or workroom - section 81. As far as disaster preparedness and emergency response program is concerned, section 82 (1) makes it a mandatory requirement for every occupier of a workplace to design evacuation procedures to be used during any emergency situation and to have them tested at regular intervals.

To promote health and safety of employees who are at risk of being exposed to chemical substances, section 84 (3) and 85 (4) requires every employer to maintain at the workplace material safety data sheets and chemical safety data sheets respectively for all chemicals and other hazardous substances in use and ensure that they are easily available to the employees.

The employers' positive contribution towards the welfare of the employees include provision and maintenance of adequate supply of wholesome drinking water - section 91 and a first aid box or cupboard of the prescribed standard - section 95 at suitable point (s) conveniently accessible to all employees.

Other precautionary measures include: issuance of a permit to work to any employee, likely to be exposed to hazardous work processes or hazardous working environment, including such work processes as the maintenance and repair of boilers, dock work, confined spaces, and the maintenance of machinery and equipment, electrical energy installations, indicating the necessary precautions to be taken - section 96 (1); provision and maintenance for the use of employees, adequate, effective and suitable protective clothing including suitable gloves, footwear, goggle and head coverings in any workplace where employees are likely to be exposed to wet, injurious or offensive substance section 101 (1).

During project implementation and operations, a large labour force will be required. This Act makes provisions for safety, health and welfare of persons upon which provision of their protection will be based. This will protect them against hazards to health and safety arising out of or in connection with their activities at work especially during the construction phase. This Act therefore safeguards workers welfare during the project phases by ensuring capacity building on Health and safety of workers at work place. In summary, this act will

be used a guideline to ensure health and safety of workers is guaranteed. The proponent will ensure that the contractor includes in the contract adequate measures to promote safety and health of workers during all phases of the proposed project.

There is a number of subsidiary legislation that was enacted to operationalize the OSHA 2007. The following are subsidiary legislation under OSHA 2007 which is pertinent to the proposed project.

4.4.2.1 The Factories (Woodworking machinery rules)-L.N 431/1959

These rules apply to workplaces where wood working machines are used. Part II (Rule 5 -19) of these rules gives the duties of the occupiers;

i) Maintaining the floor surrounding every woodworking machine in good and level condition free from chips and other loose material and avoiding the floor from becoming slippery
ii) Fencing and guarding of circular saws
iii) Provision of a suitable push-stick at the bench of every circular saw which is fed by hand to enable the work to be carried on without unnecessary risk.
iv) Safe operation of pendulum saws
v) Safe operation of plain band saws
vi) Ensuring the safe use of all machines and equipments provided at wood working workplaces.

The contractor will be occupier of the workplace (site) and will therefore comply with rule 5-19 of the rules. The contractor will have to ensure that the machines being used at the carpentry section comply with these rules and that the environment within the carpentry section is safe.

Part III (Rule 20): Duties of employed persons

Rule 20 states that every person employed on a woodworking machine shall;

i. Use and maintain in proper adjustment the guards provided in accordance with the rules
ii. Use the ―spikes‖ or push-sticks and holders provided in compliance with the rules.

The contractor should therefore train the workers and give them relevant information on the safe use of woodworking machines provided and the carpenters should cooperate with the employer to ensure safe machinery and safe workplace

4.4.2.2 The Factories (Examination of Plant) Order- G.N. 958/1951.

These rules provides for the statutory examination of plants; any equipment, gear, machinery, apparatus or appliance or any part thereof. The main aim of these rules is to ensure that the plants provided at a given workplace are safe. In an industrial setting, plants will comprise of;

1. Pressure vessels

- Steam boilers
- Steam receivers
- Air Receivers

2. Cylinders for compressed, liquefied, and dissolved gases
3. Lifting machines such as

- Cranes and other Lifting Machines
- Hoists and Lifts
- Chains, Ropes and Lifting Tackle

The rules require that;

(i) Every steam boiler and all its fittings and attachments be thoroughly examined by an authorized/approved boiler inspector at least once in every period of fourteen months, and also after any extensive repairs.

(ii) Every steam receiver and all its fittings be thoroughly examined by an authorized/approved person at least once in every period of twenty–six months.

(iii) Every air receiver be thoroughly cleaned and examined at least once in every period of twenty-six months.

(iv) Cylinders (gas and liquid) be examined and tested by an approved person.

a) Before being used for the first time

b) After repairs

c) At least once in every two years for cylinders carrying corrosive gases.

d) At least once in every five years for cylinders carrying other gases.

(v) Every host or lift must be thoroughly examined at least once in every period of six months by an approved person.

(vi) All chains, ropes and lifting tackle must be tested and thoroughly examined before being used for the first time and also in every period of six months, by an approved/authorised person and again after extensive repairs.

(vii) All parts and working gear of every lifting must be thoroughly examined and tested, by an approved person;

a) Before being used in that workplace for the first time,

b) At least once in every period of fourteen months, and

c) After major repairs

The contractor should therefore make a register of plants that will be on site and cause their examination by approved persons as provided for in these rules.

4.4.2.3 The Factories (First-Aid) Order- L.N 160/1979

This order provides for the number of first aid facilities and equipments to be provided at a workplace, their respective contents and first aid management at a given workplace.

Regarding first aid management, the order states that;

In every factory where there are more than ten but less than fifty employees there shall be at least two persons trained in first aid and at least one such person shall always be available in the work place at all times during all working hours.

In every factory where there are more than fifty but less than one hundred employees there shall be at least three persons trained in first aid and at least one such person shall always be available in the work place at all times during all working hours.

In every factory where there are more than one hundred employees but less than five hundred employees there shall be at least three persons trained in first aid, plus one additional person for each extra hundred employees (or part thereof) beyond the first one hundred employees, and two such trained persons shall always be available in the work place at all times during all working hours.

In every factory where more than five hundred persons are employed there shall be a first-aid room which shall always be open and manned by a trained nurse during working hours.

The order also requires that the First Aiders are trained by approved institutions and given annual refresher courses.

The contractor should therefore provide first aid equipments and facilities on site commensurate with the population of the workforce and train a number of first aiders commensurate to the number of the workforce and spatial distribution of the site.

4.4.2.4 The Factories and other Places of Work (Safety and Health Committees) Rules 2004

These rules provide guidelines on the formation of safety and health committee and their roles at workplaces. Rule number 2 states;

A Safety and Health Committee shall consist of safety representatives from the management and the workers in the following proportions—

a) In the case of factories or other workplaces with between twenty and one hundred regular employees, not less than three safety representatives each from the management and the workers;

b) In the case of factories or other workplaces with between one hundred and one thousand regular employees, not less than five safe representatives each from the management and the workers and;

c) In the case of factories or other workplaces with one thousand or more regular employees, not less than seven safety representatives each from the management and the workers.

The rules define the roles of the committee members and the frequency of meetings. As per the rules, meetings should be held at least once after every four months and the minutes of the meeting be submitted to DOSHS. Under these rules, the occupier should arrange for the statutory training of the committee members by an approved organization.

When the works commence, the contractor should formulate a safety and Health Committee with reference to the population of the workforce and follow the procedures provided for in these rules when electing safety representatives. Arrangements should also be made for annual training of the safety committee members by an approved firm. The members to the committee should be given appointment letters and their names submitted to DOSHS.

4.4.2.5 The Factories and Other Places of Work (Medical Examination) Rules, 2005.

These Rules are made under the Occupational Safety and Health Act, 2007, through Legal Notice No. 24 of 1st April 2005. Rule number four requires the employer to ensure that all persons employed in any of the occupations outlined in the Eighth Schedule to the Act undergo both pre-employment and periodic medical examinations by the designated health practitioner as outlined in the First Schedule of the Act.

The contractor will be expected to identify workers exposed to various hazards and conduct pre-employment, periodic and post-employment medical examinations. Workers exposed to noise should undergo audiometric tests; those exposed to high noise should undergo ear hearing testing e.t.c.

4.4.2.6 Factories and Other -Places of Work (Noise Prevention and Control) Rules, 2005.

The aim of these rules is to ensure a workplace free of noise hazards or a workplace where the noise hazard has been reduced to manageable levels.

Rule 6 (1) (i), states; It shall be the duty of the occupier to carry out measurements of noise at least once in every period of twelve months in order to determine the prevailing noise conditions.

The Rules give directions on the maximum exposure level of different noise measurements in a workplace;

No worker shall be exposed to a noise level in excess of—

a) The continuous equivalent of ninety dB (A) in eight hours within any twenty four hours duration;
b) One hundred and forty dB (A) peak sound level at any given time.

Where noise is intermittent, noise exposure shall not exceed the sum of the partial noise exposure equivalent continuous sound level of ninety dB (A) in eight hour duration within any twenty four hours duration.

It shall be the duty of the occupier to ensure that noise that gets transmitted outside the workplace shall not exceed fifty five dB (A) during the day and forty five dB (A) during the night; and

Where noise in a workplace exceeds the continuous equivalent of eighty five dB (A) the occupier must develop and implement an effective noise control and hearing conservation programme.

The contractor is expected to cause a noise survey to be carried out at the site when the works commences and take appropriate action as provided for in these rules according to the results. The noise survey should be carried out annually and the management measures be updated appropriately. Hearing test records should be kept by the contractor in a manner acceptable to the Director and appropriate training should be given to the workers.

4.4.2.7 The Factories and Other Places of Work (Fire Risk Reduction) Rules 2007.

These rules outline measures that should be undertaken by occupiers to control the risks of fire outbreaks in work places. The measures include provision of portable fire fighting equipments and training and maintenance of the fire fighting appliances provided on sites.

The rules give directions on safe storage, transport and general handling of flammable material on site.

The rules provide for training of a fire fighting team and putting in place appropriate emergency preparedness plans for fire.

Under these rules the contractor will be required to carry out the following inter alia;

- **Carry out a fire safety audit of the site (to be done by an approved fire safety auditor) annually**
- **Provide and periodically service appropriate fire fighting appliances**
- **Put in place emergency preparedness arrangements**
- **Conduct fire drills annually to test the effectiveness of the emergency procedures put in place.**
- **Train fire marshals and give them refresher training annually**

4.4.3 The Public Health. Act (Cap. 242)

Section 115 of the Act states that no person/institution shall cause nuisance or, conditions likely to be injurious or dangerous to human health. Section 116 require local Authorities (currently County governments) to take lawful, necessary and reasonably practicable measures to maintain areas under their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable for injurious or dangerous to human health.

Such nuisance or conditions are defined under Section 118 waste pipes, sewers, drains refuse pits in such a state, situated or constructed as in the opinion of the medical leer of health to be offensive or injurious to health. Any noxious matter or waste water, discharged from any premises into a public street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also termed as a nuisance. Other nuisances are accumulation of materials or refuse which in opinion of the medical officer of health is likely to harbour rats or other vermin.

The proponent will be required to abide by these provisions throughout the project cycle.

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act.

The proponent will be required to contract a licensed solid waste collector to collect all solid waste from the site to an approved dumping site. Sewage from the site will be discharged into a treatment plant which is the appropriate method for this area awaiting construction of the sewer line.

4.4.4 The Physical Planning Act, 2012

The County governments are empowered under Section 29 of the Act to reserve and maintain all land planned for open spaces, parks, urban forests and green belts. The same Section, therefore, allows for prohibition or controls the use and development of land and buildings in the interest of proper and orderly development of an area.

Section 30 states that any person who carries out development without permission will be required to restore the land to its original condition. It also states that NO other licensing authority shall grant license for commercial or industrial use or occupation of any building without a development permission granted by the respective local authority.

Finally, Section 36 states that if in connection with a development application, local

authority is of the opinion that the proposed development activity will have injurious impact on the environment; the applicant shall be required to submit together with the application an environmental impact assessment (EIA) report. EMCA, 1999 echoes the same by requiring that such an EIA is approved by the National Environmental management Authority (NEMA) and should be followed by annual environmental audits.

The proponent has complied with this provision by appointing EIA/Audit experts prepare and submit this Environmental Impact Assessment study report to National Environmental management Authority (NEMA). Formal approval of architectural and engineering drawings will be required prior to commencement of the project.

4.4.5 The Mining Act, 2012

There has been a clear lack of a formal mining policy in Kenya. Mineral exploitation and mining has been carried under the auspices of the Mining Act, Cap 306 (now the Mining and Minerals Act) administered by the Department of Mines and Geology in the Ministry of Mining. The Department has the responsibility of undertaking geological surveys, geo-scientific research, coordination and regulation of the activities of the mining sector. All un-extracted minerals under or upon any land, as per the Act, are vested in the Government, subject to any rights, which under the Act, have been granted to any other person. The reviewed Mining and minerals Act law provides for lesser discretionary powers to the licensing authorities and hence provide for greater security of tenure. Similarly, there is now a planned mining policy, which will cover environmental protection, local processing, technology transfer and royalties and taxes.

Kenyan laws now require that the resulting open pits be rehabilitated appropriately, so that the natural environment is protected.

The Mining and Minerals Act is the main legislative tool that governs the prospecting and extraction of all minerals including quarrying activities in the country. The Act vests all un-extracted minerals under or upon the land in the hand the government. Under the Act, it is an offence for any person to mine without authority. The Act lists areas or land where no person should mine unless with respective authority (Section 7).The proposed site is not near such areas. The Act provides for compensation by the miner for disturbance, nuisance or damage to lawful occupiers of the lands.

The proponent will ensure the stakeholders in the mineral sector are consulted before quarries are opened. EIAs will be carried for all quarries and borrow pits.

4.4.6 County Government Act 2012

The main purpose of the enactment of this Act was to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Functions which were carried out by local governments were effectively transferred to the county governments.

The Act gives county the responsibility of planning and co-coordinating all developments within their areas of jurisdiction. Part XI (sections 102-115) of the Act provides for planning principles and responsibilities of the county governments. The land use and building plans provided for in the Act are binding on all public entities and private citizens operating within the particular county.

The proposed project is within the County of Nairobi and thus there will be need of working in liaison with the county government of Nairobi. The plans for the proposed project must be approved by the county government of Nairobi and the County government may also issue directives and authorizations on various aspects e.g. waste management and fire emergency preparedness among others.

Therefore, the proponent should work in liaison with Nairobi County and in particular the department of Environment and Natural Resources.

4.4.8 Penal Code Act (Cap.63)

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water for public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

The Proponent will be required to ensure strict adherence to the Environmental Management Plan throughout the project cycle in order to mitigate against any possible negative impacts

4.4.9 The Land Registration Act, 2012

The Land Registration Act is place to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act applies to

Subject to section 4, this Act shall apply to:

(a) Registration of interests in all public land as declared by Article 62 of the Constitution;

(b) Registration of interests in all private land as declared by Article 64 of the Constitution; and

(c) Registration and recording of community interests in land.

Section 24 states that: (a) the registration of a person as the proprietor of land shall vest in that person the absolute ownership of that land together with all rights and privileges belonging or appurtenant thereto; and (b) the registration of a person as the proprietor of a lease shall vest in that person the leasehold interest described in the lease, together with all implied and expressed rights and privileges belonging or appurtenant thereto and subject to all implied or expressed agreements, liabilities or incidents of the lease.

4.4.10 The Environment and Land Court Act, 2011

This Act is in place to give effect to Article 162(2) (*b*) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes.

4.4.11 The National Land Commission Act, 2012 (No. 5 of 2012)

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1):-

(*a*) to manage public land on behalf of the national and county governments;

(*b*) to recommend a national land policy to the national government;

(*c*) to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;

(*d*) to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;

(*e*) to initiate investigations, on its own initiative .or on a complaint, into present or historical land injustices, and recommend appropriate redress;

(*f*) to encourage the application of traditional dispute resolution mechanisms in land conflicts;

(*g*) to assess tax on land and premiums on immovable property in any area designated by law; and

(*h*) to monitor and have oversight responsibilities over land use planning throughout the country.

4.4.12 The Land Act, 2012

This is an Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. Part viii of this Act provides procedures for compulsory acquisition of interests in land. Section 111 (1) states that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination. The proponent has acquires land for the proposed project in accordance with this Act.

4.4.13 The Explosives Act (Cap 115)

The Act regulates the purchase, assemblage, manufacture and use of explosive materials. Explosives are used routinely in many quarries for blasting and lessening of rocks. The Act also stipulates conditions for use, precautionary measures and storage requirements. The Act requires one to seek authority to acquire, transport and use blasting materials. The Act makes it an offence liable for penalties to any person causing an explosion where life or property is endangered.

If the proponent establishes a quarry or quarries for the purpose of getting building materials, he will have to comply with the provisions of this Act and work in liaison with the Mines and Geology Department.

4.4.14 Water Act, 2002

The Act deals with control and conservation of water resources. It prohibits activities that may cause pollution to sources of water likely to be used for human consumption or domestic use or in the manufacture of food for human consumption. There is no river or surface water near the proposed project site therefore; the surface water is not at a risk of pollution. Adequate measures are also adapted to control erosions and runoff that may affect the quality of water.

4.4.15 The Traffic Act, Cap 403

This regulates emissions from motor-vehicle engines whether stationary or mobile, with regard to air pollution management. The Act is applicable thus to trucks, generators, compressors, stone cutting machines and other fuel-oil engine machinery used at the proposed excavation and borrow pit sites.

4.4.15 The Wildlife Conservation and Management Act, 2013

This Act may be cited as the Wildlife Conservation and Management Act, 2013. This Act shall apply to all wildlife resources on public, community and private land, and Kenya territorial waters. The primary purpose of this Act is to provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes ENACTED by the Parliament of Kenya, as follows—

Part VI of the act section 1 clarifies the provisions of this Act with respect to conservation, protection and management of the environment shall be in conformity with the provisions of the Environmental Management and Coordination Act.

Section 27 part(1) No user rights or other license or permit granted under this Act shall exempt a person from complying with any other written law concerning the conservation and protection of the environment.

4.4.16 The Energy Act of 2006

The Energy Act 2006 was enacted on 2nd January 2007. The Act establishes an Energy Regulatory Commission mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, Public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to energy sector in Kenya. Section 30 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the Environmental and Coordination Act of 1999 (No. 8 of 1999), moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

4.5 Relevant International Conventions and Treaties

Kenya is signatory to several international conventions and treaties that would need to be adhered to in implementing this project and are geared towards environmental protection and conservation. Some of these include;

- ILO Conventions ratified by Government of Kenya
- Safety and Health in Construction Recommendation, 1988

- Recruiting of Indigenous Workers Convention, 1936 (No.50)
- Convention on Wetlands or the Ramsar Convention
- The Convention on International Trade in Endangered Species (CITES)
- Convention on the Conservation of Migratory Species
- United Nations Framework Convention on Climate Change
- United Nations Convention to Combat Desertification
- Important Bird Areas
- The World Heritage Convention, among other
- United Nations Convention on Biological Diversity (UNCBD)

4.5.1 The Convention on Biological Diversity (1992)

The convention promotes the protection of ecosystems and natural habitats, respects the traditional lifestyles of indigenous communities, and promotes the sustainable use of resources. The project activities especially during construction will impact negatively to the flora and fauna of the respective construction areas. As such both the proponent and the contractor must ensure that the activities of the proposed project do not affect the immediate ecosystems negatively and that the livelihoods of the local people are not negatively affected but rather enhanced.

4.5.2 Stockholm convention on Persistent Organic Pollutants (POPs)

PoPs have a long time effect on the food chain and can persist in the environment for a very long time. Due to global warming, most of these pollutants end up in the Nordic countries and hence the convention was signed in Stockholm, Sweden. All states are to abide by requirements in the treaty as it is designed to protect human health and the environment from PoPs- which are chemical substances that are persistent and toxic, that bio-accumulate in fatty tissue (achieving higher concentrations as they move up a particular food chain) and that are prone to long range environmental transport. This convention is most pertinent during the construction phase of the project. The contractor and the proponent must ensure that the materials and processes employed do not lead to the emission of Persistent Organic Pollutants.

4.5.3 Vienna Convention for the Protection of Ozone Layer

Inter-governmental negotiations for an international agreement to phase out ozone depleting substances concluded in March 1985 with the adoption of this convention to encourage inter-governmental co-operation on research, systematic observation of the ozone layer, monitoring of CFC production and the exchange of information. Therefore both the proponent and the contractor are obliged to minimize or phase out the generation of CFCs into the atmosphere during both phases of project implementation.

5. PUBLIC PARTICIPATION

5.1 Introduction

This chapter describes the process of the public consultation that was followed to identify the key issues and impacts of the proposed development in Karen area, Nairobi County for AFRIGO Development Co. Limited. Views from the general public, and neighbours, who in one way or the other would be affected by the proposed project, were sought through oral interviews and administering of questionnaires as stipulated in the Environment Management and Coordination Act, 1999. A number of site visits has been made to the site to interview the residents.

One of the key information sources used during the Environmental Impact Assessment exercise was public participation exercise. The exercise was conducted by a team of experienced registered environmental experts via administration of pre-designed questionnaires and by interviewing neighbors surrounding the proposed project site.

The purpose for such interviews was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other issues which may bring conflicts in case project implementation proceeds as planned.

5.2 Objectives of the consultation and public participation

The objective of the consultation and public participation was to:

1) Disseminate and inform the stakeholders about the project with special reference to its key components and location.
2) Gather comments, suggestions and concerns of the interested and affected parties.
3) Incorporate the information collected in the ESIA study.

In addition, the process enabled,

1) The establishment of a communication channel between the general public and the team of consultants, the project proponents and the Government.
2) The concerns of the stakeholders to be known to the decision-making bodies at an early phase of project development.

5.3 Methodology used in the CPP

The Consultation and Public Participation (CPP) Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development.

In general, the following Steps were followed in carrying out the entire CPP process:-

I. Identification of institutions and individuals interested in the process-database of the interested and affected parties

II. Administration of questionnaires to the different target groups and local community members along the proposed project Site

Administration of Public participation questionnaires

During the first weeks of the month of October 2015, a site visit was made to the site and a number of questionnaires were administered to the public and the residents. The copies of the questionnaires were submitted with the project report to NEMA.

In the months of October-December a total of sixty one (61) questionnaires were administered at the proposed site and its environs.

The questionnaires were administered to an area of a radius of about 1km from the site. The target group for this area was the residents in close proximity to the proposed project. The names and contacts of the participants are listed in table 7 and copies of the questionnaires are attached.

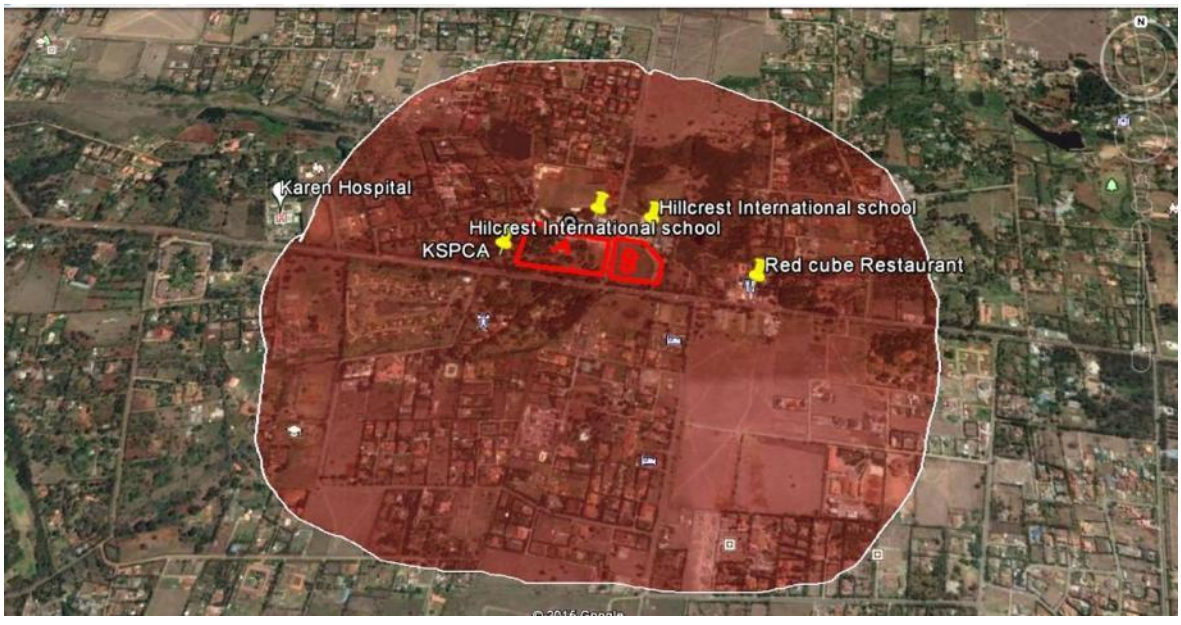


Figure 15: Area covered for public participation for the residents

In the month of December 2015, questionnaires were also administered from Galleria to Karen shopping centre to all business enterprises along Langata road. The names and contacts of the participants are listed in table 6 and copies of the questionnaires are attached.

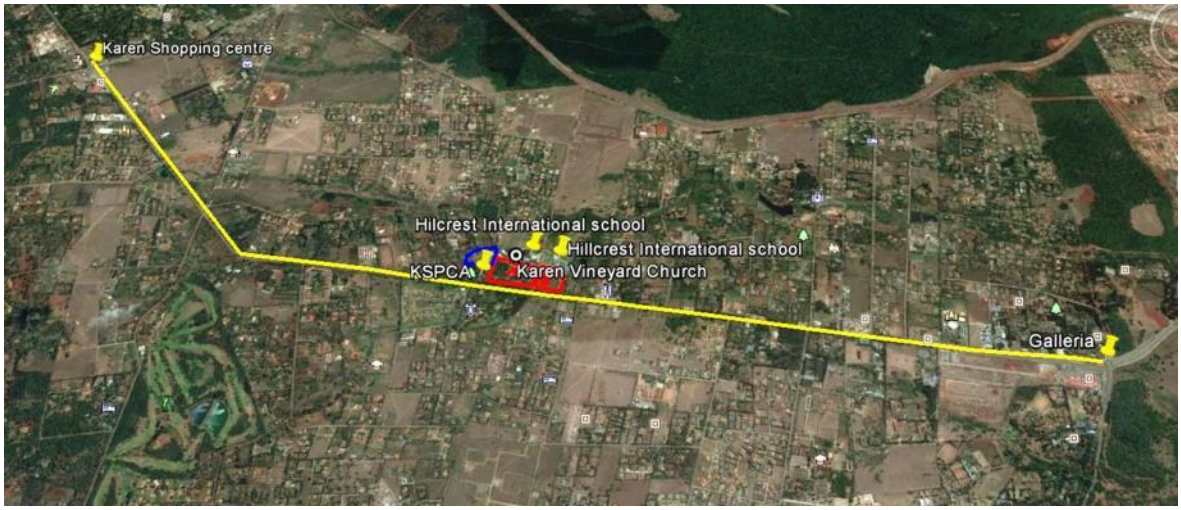


Figure 16: The transect where Public Participation Questionnaires were administered to business enterprises

Table 4: List of public participants interviewed in the month December 2015

S/N	NAME	POSTION/DESIGNATION	CONTACT
1.	Cathleen Biget	Resident	0732600089
2.	Joan Mwale	Eddie General stores	0714564055
3.	Reuben Ndung'u	Birds paradise Souvenir Shop	0722767339
4.	Millicent Kirgu	Farmal General Merchants	0722425509
5.	Ruth Njeri	Club M	0721434093
6.	John Mutabari	Caretaker- Sunrays Apartments	0734816200
7.	Joseph Kalwiji	Brother- Conventual Fransciscans	0706520845
8.	George K. Mwangi	Resident	0725593378
9.	Vincent Sichande	Brother- Conventual Fransciscans	0731914361
10.	Gerald Gathaia	Resident	N/A
11.	Abel Ongeri	Staff- Salvation Army Kenya East Territory	0721583600

S/N	NAME	POSTION/DESIGNATION	CONTACT
12.	Jackson Ndemwa	Domestic worker	0713873946
13.	N. G. Sandys-Lumsdaine	Retired-Resident	0723903386
14.	Jonathan Swayi	Director	0715683229
15.	Evans M. Muchira	Soldier-Resident	0726218373
16.	Ken Ndede	Businessman	0722510365
17.	Nancy Ringera	Supervisor- Goodlife Pharmacy	0728079401
18.	David Kirigua	Resident Fair acres	0710347004
19.	Jeff Cherio	Pastor- Africa Gospel Church	0723601418
20.	Joan Asiko	Supervisor- St. Justins Fashions	0725887639
21.	Andrew	Mangaer- Kenol Petrol station	0725151915
22.	Davies Kiarie	Data Clerk- Dream Centre	0728449870
23.	Tania Ndende	Student	0722510365/0704506029
24.	Gitonga John	Africa Gospel Church	0727869819
25.	Mercy Muiruri	Resident- African Gospel Church	0720744224
26.	Davestar Hardware	Shop Attendant- Daves Hardware	0716512207
27.	Mustafa Jaffer	Manager- Jaffer Trading Ltd	0721973390/0771973390
28.	Mary Wahu	Resident	
29.	Francis Njenga	Tevlyn Interior Decor	0735345077
30.	WanjikuNg'ethe	Resident	0722998339
31.	Simon	Businessman	0720944130
32.	Frank Gaakenya	Resident	0726022063
33.	Dennis	Resident	0738858450
34.	Anne Nyambura	Resident	N/A
35.	Reuben	Resident	N/A
36.	Duncan Ongwae	Sales Executuive	0726665451

S/N	NAME	POSTION/DESIGNATION	CONTACT
37.	Jamila Ashton	Shopkeeper	0701852791
38.	Boniface Wamuriuki	Shopkeeper- Megalink Hardware	0725166582
39.	Esther Mugure	Sales- Regional Container Dealer	0715625640
40.	Naomi Ngige	Sales- Papatuka Hardware	N/A
41.	Pius MwangiKuria	Mechanic- Locust General services	0729550130
42.	Davis Osuro	Director- Piston heads EA.	0721131525
43.	Susan Candy	Sales & Marketing	0726677798
44.	Florence Maganda	Director- Orienza LTD	0722735535
45.	Sichei	Member- Mokojet Self Help Group	0729502931
46.	Moses	Manager- San City Cafe	0715316275
47.	John	Salesman	0719213512
48.	ReginahWangui	Business lady	0725082737
49.	Catherine	Sales- Car Garage	0722464293
50.	Gagam	Manager- Pewin Motors LTD	0720946889
51.	Moses Mosweti	Manager- Glory Ministries in Kenya	0726408813
52.	EliudWarutere	Manager- Total Karen	0729336507
53.	Mr. Chege	Manager- Kenol Langata	0710187819
54.	M. Shraib	Manager- Car Clinic	0702836928
55.	Yusuf Wajih	Director- Innova Enterprises	0727114488
56.	Joseph Wambua	Accountant- JanwillEnteprises	0715515247
57.	Francis Njoroge	Grocer at Karen Slip Road	N/A
58.	Kevin Abuto	Staff- Karen vegetables & grocery	N/A
59.	Robert Njoroge	Staff- Uplustre	0724691124
60.	Aggrey Maranda	Resident	0712718818
61.	G. Konzolo	Secretary- Don Bosco Utume	0722200567

Meetings

A number of Consultative meetings have been held with various stake holders.

Public Participation meeting held on 1st December 2015 at site A

The meeting had 14 attendants comprising of residents, consultants and a team from the contractor. Find the attached attendance sheet and the minutes of the meeting.

Table 5: List of Attendance for the Public Participation meeting held on 1st December 2015

No.	Name	Position/Designation	Contact
1	PROF. JACOB KIBWAGE	Lead Expert: **Team Leader**	0722479061
2	GARY SUI		0717744213
3	TOM LEE	AFRIGO	0770295975
4	D.C. SAKAJA	Sunya Development Group: Architect	0722743666
5	TOBIAS OKUTHE	Sunya Development Group: Architect	0735363692
6	ENG. N.D. WAKASAUJA	Sunya Development Group: Services Engineer	0722258778
7	MAUREENE NJERI KARIUKI-	Construction Manager: EHOMESCOPE Properties Limited	0721116934
8	ROBERT MAHALI	Resident; Sandalwood	0720748170
9	STEPHEN KARANJA	Resident, GT Bank	0718729167
10	KEVIN OGILEYI	Resident, GT Bank	0722984376
11	FELIX RONDU	Gallant Technologies Ltd	0727595807
12	LYDIA BOKE	Associate Expert; AWEMAC	0725743946
13	JOHN AYWA	Associate Expert; AWEMAC	0723557482
14	BERYL ONG'UTI	Field Assistant: AWEMAC	0718111636

Meeting with the Hillcrest School Board on 10th December 2015

The meeting was held at the Preparatory School's boardroom. The potential negative impacts given by the board include;

- Noise Pollution
- The impact of the contractor's and Client's boreholes on the school's water supply/ borehole capacity
- Dust pollution
- Security concerns

Table 6: List of Attendants for the Meeting that was held at Hillcrest School on 10th December 2015

No.	Name	Designation	Contact
1	Andrew Hollaus	Chairman	0724256173
2	Bob Kikuyu	Governor	0723606284
3	Ayisi Makehat	Director	0724256173
4	Antony Wahome	Director	0724256173
5	Afred Kitusi	Finance Director	0727905605
6	Anne Kimuthio	Company Secretary	0724256173
7	Wei Dongfang	AFRIGO-Architect	0775660090
8	John Aywa	AWEMAC-Associate Expert	0723557482
9	Prof. Jacob Kibwage	AWEMAC-ESIA Team Leader	0722479061

The proposed mitigation measures, the details of the potential impacts and suggestions from the board are described in detail in the attached minutes. Attached also is the list of attendance of the meeting.

Public Participation Meeting held on 16th December 2015 at Site A

The meeting comprised of the consultant's team, the proponent, the residents and representatives from the association (KLDA). The meeting was attended by a total of 36 participants.

The issues raised in the meeting are given in detail in the attached minutes.

No.	Name	Designation	Contact
1	John Aywa	Associate Expert, AWEMAC	0723557482
2	Eng. Ngang'a D Wa karanja	Sunya Development Group	0722258778
3	Cornelius Olede	Committee Member KAPRA	0724589317
4	Fredrick Auma		
5	Agnes Muindi	Galaxy Heritage LTD	0781083983
6	Malachi Momanyi	Resident	0722742182
7	G.N. Thithi	Resident-Neighbourhood	0722780302
8	Mathenge Munene	Resident	0704012360
9	Alfred Adema	Resident	0722519405
10	Lillian Karathe	Resident	0728888831
11	Joseph Kaluji	Fransiscan Formation House, Marist lane	0706520845
12	Mark Kihara	Resident	0702715370
13	Duncan Munya	KLDA	
14	Onesmus Musyoki	Architect Construction Company	0724973136
15	Samuel N. Karanja	Resident Neighbour	0722521989
16	David Ng'ang'a Mbuthia	Community-Resident	0722728403
17	Regina Achieng	Jubilee-Manager	0712751637
18	Susan Kariuki	Assistant Chief -Karen	0724363365
19	Pius M. Mutay	Hilcrest gardens-Neighbour	0722352472
20	Gitau Joseph	Resident	0710123826

21	Githuko	Resident	
22	S.M Kanguru	Resident	0715031334
23	Lucy Ndegwa	Resident	0791576966
24	Nancy Njeri	Resident	0706294688
25	Edwin Fadhili	Resident	0722726251
26	Blis Wario	Resident	0722993154
27	A. Mathenge	Resident	0738509567
28	John Wambua	Resident	0716860485
29	Mutua M.	Resident	0732510533
30	Kenny Wang	Contractor	0708042176
31	Wei Dongfang	Contractor	0775660090
32	Wu jingdong	Contractor	0705268330
33	Liu Chaohui	Contractor	0775660091
34	LuBao		0717744213
35	Prof. J. Kibwage	AWEMAC- ESIA Consultant (Team leader)	0722476061
36	Lydiah Boke	Associate Expert, AWEMAC	0725743946

Plate 16: Participants during the public participation meeting that was held on 16th of December at Site A

5.4 Issues Raised during public consultations

5.4.1 Positive Issues

Employment opportunities

The proposed development will consist of construction of Staff quarters, offices and conference hall that will require skilled and non skilled staff during the construction and operational stages. The respondents were keen to state on the jobs that will be created from the project.

Business Opportunities

The respondents stated that the business opportunities will increase in two diverse ways:

- The construction phase: The contractors will need various materials, machines and equipment that need to be supplied from various businesses. The local businesses will be greatly improved due to the high demand of materials that will be needed.

- Operational phase: The influx of people likely to occur because of the Staff Quarters and office complexes will mean that there will be a need for subsidiary services like health facilities and shops. Also the prices of land will increase due to the forces of demand and supply making the local land owners to capitalize on the investment hub that will be created from the proposed development.

Increase in security

The respondents complemented the proposed project in terms of increase in security around the area during operational and construction stages. There will be security guards who will safeguard the materials, machines and equipment during the construction phase and also protect the residents during the operation phase. The Staff Quarters and office complexes will be highly equipped with CCTV (Close Circuit Television) to offer 24-hour security to the residents.

Increased aesthetic value of the area

The residents were positive about the increase in art and beauty of structural buildings within the area. The proposed project has designs from experienced engineers and architects who have ensured that the project design is attractive to the residents. The overall landscape of the area will have beautiful scenery from the mix of vegetation and the building structures.

5.4.2 Negative Issues

Increase in traffic and congestion of the road

The proposed project is located along Hillcrest Road and Langata road that is a two-lane freeway. This means that influx of people in the area will likely cause traffic jams and congestion. The Staff Quarters and office complex will host many occupants who are likely to have vehicles that are parked in the proposed underground parking making congestion of roads a likely occurrence.

Stress on sewage system

The residents were concerned about the measures that will be taken to manage the waste and waste management system. The Staff Quarters and office complexes will mean that human waste and commercial waste will increase due to domestic and commercial activities. The proponent will ensure that there is an integrated waste management system. This entails structured waste collection points (dustbins),

regular waste collection, connection of the sewage system to the Nairobi sewage network and regular environmental audit. The proponent is keen on ensuring a sustainable environment especially to the tenants and the local people.

Noise and Vibrations

The neighbours adjacent to the project site raised the issue of noise that is likely to occur when the project is commenced. The construction phase will involve machines that are likely to emit noise that may be a disturbance to the neighbours. The construction work will involve earth moving equipment (excavators, trenchers, loaders) construction vehicles (tippers, dumpers, trailers) and material handling equipment (cranes, conveyors, hoists). However, the proponent will implement standard procedures to curb the noise effects like proper service of the machines, minimizing the recurrent transportation of the materials, personal protective equipment (PPEs) for the construction workers and regular updates to the adjacent neighbours on any changes that will directly affect them.

Air pollution

The area residents and neighbors raised concern that air pollution is likely to occur during the construction phase, the construction activities that are likely to cause air pollution include; land clearing, that is the trees that are in the site and all the vegetation cover, operation of diesel engines, demolition of the buildings for example the old dormitories used by Hillcrest students, burning of vegetation cover and use of concrete, cement, wood, stone, silica which contain high levels of dust. They suggested that dust covers to be used during the transportation of materials like cement and sand, control dust through fine water sprays to dampen down the site, screen the whole site to stop dust spreading, or alternatively, place fine mesh screening close to the dust source. The proponent should also ensure that there's no burning of materials on site the proponent will take all the appropriate measures to curb all forms of air pollution as much as possible.

Accidents during construction site

The construction workers at the site raised the concern of the likeliness of accidents during the construction period. The common causes of these accidents could arise from;

- Crane accidents
- Equipment failures
- Injuries from a falling building or construction materials
- Accidents caused by defective products or equipment

- Electrocution
- Chemical exposure
- Welding burns
- Negligence of a contractor or subcontractor
- Accidents caused by unsafe working conditions
- Poor training or incompetence on the job site
- Insufficient safety procedures or precautions
- Falls from buildings, scaffolding or ladder

They suggested that the workers should go through an Occupational Health and Safety training programme to familiarize themselves with the risks, causes of accidents and the ways to minimize fatal injuries.

Loss of vegetation cover

Even though some of the trees and vegetation cover may be cleared to pave way for the proposed development on the site, this will create a negative impact to the environment. Most of the respondents propose that a major landscaping be done in the area hence leading to the beautification of the environment.

Traffic Congestion along Hillcrest Road

Members of the public were concerned of the traffic congestion which might happen during all phases of the project. They pointed out that Hillcrest Road which has been proposed to be used as the main access to the main entrance is already congested especially when the schools are open, since most parents drop their children at Hillcrest International School. While others proposed for a variation of the current design to ease off potential traffic disruption along Hillcrest road others were completely opposed to the main entrance along Hillcrest road and preferred it being cited along Langata road. In addition some pointed out that since Langata Road is going to be expanded to a two carriage Road, the proponent should consider locating the main entrance along Langata.

Concerns were also raised on the actual number of vehicles that will be flowing into the project site. They pointed out that since the proposed project will accommodate 100 people, the approximate number of 36 vehicles per day will be was inaccurate.

Change of use

A number of participants pointed out that the area for the proposed project is a planned for residential and not commercial/ office use. They therefore pointed out that appropriate procedure need to be complied with and the proponent should consult the Local (Karengata) Physical Development Planner. In that regard, the participants also reminded the proponent to apply for change of use or extension of use and furnish the association; Karen and Langata District Association (KLDA) with the procedures to be undertaken.

Congestion

The participants present raised concerns on congestion that might arise after the completion of the project. They observed that the scale of the development was not commensurate with acreage provided for in the Karengata Local Physical Development Plan

Noise pollution

Some members were concerned of the noise that might emanate from the project site especially during the operational phase and from the dining and recreational zone.

On-going activities at the site

Members were concerned with the activities at the site. They were pointed out that the project might have taken off without the necessary approvals.

Information on the proponent

The participants requested more information on the proponent. This was pointed out to be vital as the proponent will part of the community and would be in line with the "nyumba kumi initiative". The residents also sought to know if the development would include rental components.

Base Transceiver Station)BTS sites/Cell towers

The members present expressed fears that the proposed development might be used to install BTS sites which they considered to be hazardous to human health. They reminded the proponent and the consultant to assure them that no such installation will be carried out on the proposed development.

Project Brief

Members present requested for a project brief to get a clear understanding of the project and have a documented evidence of the project description.

Future plan for site A
The participants wanted to know the proponent's future plan for site A.

Response to the Issues that were raised during public consultation

Traffic Congestion along Hillcrest Road

The community members were assured that their concerns on traffic congestion will be considered by the design team. The design team will consider having acceleration lanes either on Langata road or Hillcrest road to mitigate the potential impact of having traffic disruption for vehicles accessing Hillcrest International School. He advised the proponent and the design team to work in consultation with Kenya Urban Roads Authority (KURA)

The team leader observed that the perceived discrepancy between the number of vehicles to be allowed on site (36) and the planned number of staff to be on site (100) was due to the fact that the vehicles that will be used will be company vehicles which can accommodate a number of staff.

Change of user/ Extension of use
The lead consultant reiterated that the title deeds given to the proponent indicated the parcels of land under question as commercial/office.

Congestion
Since the land in question is classified as commercial/office, the proposed development would be in line with Local Physical Plan. A number of developments of similar nature along Langata road were cited;

Water Mark Business Park

This is a three level development along Langata road within the Karengata area. The facility used for office space with a provision for a restaurant.

The Karen Hospital
The highest section of the Karen hospital has 5 levels.

A flat belonging to Mbandu stores
Though the use for this flat was not identified, its height suggest that it is of either commercial or office use. The development is still under construction. It is a five level flat under construction along Langata road on LR 12144-122 near the Karengata Seventh day Adventist Church.

Noise Pollution from the Dining and recreation area

The lead consultant assured the members that the proponent will not install any system or carry out any activity at the recreational area or within the whole site that

would be a noise nuisance to the public and the residents. The lead consultant reiterated that the proponent has taken note of the school which is a sensitive receptor in close proximity to the proposed site.

Activities at the site

The team leader observed that the proponent had planned to take some red soil from the existing site to undertake landscaping at another site. He personally gave the orders for the activities to be halted as this would create an impression that works had commenced without getting appropriate approvals. The members were assured that no works/ activity will be carried out on site until pertinent approvals/permits are obtained.

Information on the proponent

The lead consultant pointed out that the project is purely meant for the AFRIGO'S senior staff and that there was no provision for renting or leasing. He also clarified that the dining and recreation areas was only meant for AFRIGO's staff. He pointed out that this is simply an area for them to take meals and rest.

Base Transceiver Station)BTS sites/Cell towers

The members were assured that the proponent will not enter into contract with any telecommunication company to install a BTS site on the proposed development

Project Brief

The members present were assured that a project brief will be shared with them through their personal email addresses and the Association (KLDA).

Future plans for Site A

The lead consultant informed members present that as of now, the only plan the proponent has for site A is to put up two basketball courts and also renovate the houses on site for temporarily accommodation of the construction staff and that there was no other permanent development planned. However, they assured that should the proponent decide to develop it, the due process including public consultation will be followed.

6. POTENTIAL ENVIRONMENTAL IMPACTS

6.1 Introduction

This section identifies the potential social and environmental impacts of the proposed project in terms of the nature, magnitude, extent and location, timing and duration of the anticipated impacts. These impacts may relate to the project design stage, construction stage or the project operation and decommissioning stage. Based on impact prediction methods, site visits and observations and the results of public consultations, both beneficial and adverse environmental impacts have been identified. Suitable mitigation measures to the negative impacts are discussed in chapter 7. These are then coasted and responsibilities for their implementation assigned as appropriate within the Environmental and Social Management Plan (ESMP). Both potential negative and positive impacts have been considered during the Siting and Construction phase, Operational Phase and Decommissioning phase.

6.2 Siting and Construction Phase

During the sitting and construction period, there is a likelihood of having the following impacts.

6.2.1 Positive Impacts

6.2.1.1 Employment opportunities

There will be job opportunities especially to casual workers. Employment opportunities are a benefit both in economic and social sense. In the economic sense it means abundant unskilled labour will be used in economic production. In the social sense these young and energetic otherwise poor people will be engaged in productive employment other than remaining idle. Remaining idle may attract them into social ills like drug abuse and other criminal activities like robberies. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site for a period that the project will start to the end. Apart from casual labour, semi-skilled and unskilled labour and formal employees are also expected to obtain gainful employment during the construction period.

The proposed project, during construction phase will directly employ as a minimum the following groups:

- Supervising engineering team;

- Contractor's staff (managerial, skilled and unskilled labour force);
- Suppliers of plant, machinery, materials and essential services;
- Construction monitoring personnel from the various Government agencies.

6.2.1.2 Provision of Market for Supply of Building Materials

The project will require supply of large quantities of project materials some, of which will be sourced locally in the surrounding areas. The prefabricated materials will be supplied from

Israel. This shall provide ready market for construction material suppliers such as quarrying companies, hardware shops and individuals with such materials.

6.2.1.3 Increased Business Opportunities

The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small-scale traders such as food vendors around the project site. The project shall also attract more investments in the area such as recyclable material collection, catering and cleaning business as well as security service companies from the local community.

6.2.1.4 Increased revenue to suppliers of construction materials and utilities

This will be an opportunity for the suppliers of construction materials and other utility suppliers to create market and sell their goods. In turn this will boost their profit margin which is an advantage to their businesses. Companies such as Kenya Power Company (formerly known as KPLC), Nairobi Water and Sewerage Company, Internet service providing companies will gain revenue from supply of services for construction activities. Other small businesses will also be boosted by the construction activities such as small eating cafes that will provide meals to the local construction staff.

6.2.2.5 Economic growth

Through the use of locally available materials during the construction phase e.g. cement, steel metals and others; the project will contribute towards growth of the country's economy by contributing to the gross domestic product. The consumption of these materials, oil, fuel and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

6.2.1.6 Provision of Training opportunities and Facilities

The proponent plans to use the conference hall as a training place for students in various fields; engineering architecture among others. There will be also provision to offer internships to students.

6.2.2 Potential Negative Impacts

The key negative impacts identified during the construction phase of the project include:

6.2.2.1 Soil Erosion

Stripping of the vegetation will expose the top soil to agents of erosion and the movement of vehicles and machinery in the area may aggravate the problem. Soil erosion is an important problem both at its source and downstream of the development site. Lost soil will be deposited somewhere, and the location of the deposition could alter downstream hydrology and increase flooding. It may also pose a water quality issue directly as a result of siltation and indirectly from contaminants carried with or attached to soil particles and it may also negatively affect the soil fertility of the affected land. The eroded soil particles may also clog the drainage system and increase maintenance costs.

6.2.2.2 Waste generation (solid and liquid wastes)

Sources of this waste will be rejected materials, surplus materials, surplus spoil, excavated materials, domestic waste from the campsite, and general waste from the offices.

Poor waste management may lead to health effects, unaesthetic appearance of the place and even increase project cost.

Generated waste should be appropriately managed through: identification of the waste types; segregation into the various categories; and the establishment of suitable mechanisms for collection, storage, transfer, and final disposal.

6.2.2.3 Water demand for construction activities

Both the workers and the construction operations will create additional demand for water in addition to the existing demand. Water will be mostly used for domestic use by the workforce, concrete mixing, curing of concrete works inter alia.

6.2.2.4 Impacts on Vegetation (Vegetation Clearing)

During the survey period, there were no floral species of conservation concern reported at the proposed site. Nonetheless, the understory and canopy formations that describe the vegetation structure are the vital attraction and refuge for the diverse faunal species. This makes the area have local ecological importance for resident and visiting species.

The construction of the proposed development should observe minimal and selective removal of the existing vegetation covers particularly along the upstream the river ridges and thick brush formations. Selective habitat clearing reduces the risk for loss of key habitat species and nesting sites for local bird species. It also allows for regeneration. In the long run, this will

ensure minimal disturbance on wildlife in their natural movement, territorial occupation and other ecological process.

Construction earthworks for access roads (to project site) and foundation laying (for building facilities) will release dust particles into the ambient air. When a lot of dust settles on the leaves, it is bound to have negative effects on flora as it covers leaf stomata thus reducing their photosynthetic activity. In addition, dust coated leaves are less attractive and preferred by respective fauna consumers.

Limited vegetation removal and clearing will compliment the efforts on screen planting and landscaping through re-vegetation, which will lead to improved visual quality of the area.

6.2.2.5 Air Quality

Emissions in forms of dust, particulate matter, fugitive emission and, exhaustion from project machines and equipment are anticipated during the project construction phases.

These emissions emanating from trucks and construction equipment are known to have adverse impact on the environment, plant and human health including effect on the upper to lower respiratory infections and silicosis condition.

- Activities likely to generate dust include speeding of vehicles on earth surface not palliated with water, excavation of earth materials in dry sections;
- Activities likely to generate particulate matter include loose material transportation, vehicle and machines exhaust emissions, operations at the batching plant, stone crushing machines, fire among others.
- Some of the particulate matter to be generated include sand, soot, cement, gravel and murram, among others; and
- Exhaust emissions likely to be generated include smoke, hydrocarbons and nitrogenous gases among others pollutants from vehicles, machinery and equipments exhausts.

6.2.2.6 Risk of Leaks and Spills

The project equipments and vehicles will use fossil fuels and thus will require protection from leaks and spillage. Fossil fuel presents both environmental and fire risks. Release of hydrocarbons to the environment has several impacts including sub-soil and groundwater contamination; air pollution, fire and effects on human health due to dermal contact, inhalation or ingestion. However, the risks of major oil spillages occurring in the project area are minimal.

6.2.2.7 Occupational Health and Safety Issues

Potential impacts during construction include: exposure to physical hazards from the use of equipments; trips and fall hazards; rock falls/slides at high elevations and exposure to dust and noise. The uncontrolled proximity to high vehicular traffic during transportation of construction materials and equipment may be a hazard to vehicular and non- vehicular movement in and out of the access road to the site while working along the Langata road /Hillcrest road may lead to injuries or fatalities due to traffic accidents.

Other injuries or fatalities may result from workers operating equipment without adequate training or with lack of PPE or extended exposure to outdoor weather resulting in heat related lethargy.

6.2.2.8 Excessive Noise and Vibration

Levels of noise and vibrations typical of construction works will be generated at the project site during the construction phase. This noise impact is expected to be negative in the long and short-term. The major sources of noises and vibration will be construction equipments, vehicles and workers.

Elevated noise and vibration levels within the site are adverse to the health and safety of the project workers, the residents, passers-by and, other persons and animal within the vicinity of the project site. The major receptors exposed to the noise are expected to be at a minimum and will include mainly the construction workers.

6.2.2.9 HIV/AIDS

The project will attract new people to the project area and increase the amount of disposable cash of the construction workers. This may lead to several repercussions leading to the spread of HIV/AIDS and/or other sexually transmitted diseases (STDs). Influx of new people to the project area especially construction workers can affect the number of new cases of HIV, because they often interfere with an otherwise stable situation but the contrary can also happen where the newcomers find themselves at higher risk.

6.2.2.10 Increased Energy consumption

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. The project will also use electricity supplied by Kenya Power (KP) Ltd. Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. In this regard, there will be need to use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability.

6.2.2.11 Surface and ground water hydrology and water quality degradation

Changes in surface hydrology alter the flow of water through the landscape. Construction of impervious surfaces such as parking lots, roads and buildings increase the volume and rate of runoff, resulting in habitat destruction, increased pollutant loads, and flooding. Built or paved areas and changes in the shape of the land also influence groundwater hydrology (i.e. recharge rates, flow, conditions).

Project related excavation could lead to surface and ground water quality degradation. Contaminated soil or ground water in the path of the project could be disturbed by excavation resulting in a potential transfer of the contamination to surface waters. The excavated area, if linear could act as a conduit to extend groundwater contamination to new areas. Spills of hazardous materials in excavated areas could introduce contaminants to ground water. Material borrowing activities as well as the spillover effects of such projects, which include increased demand for drinking water and increased water use, can impact water quality by contributing sediment, nutrients, and other pollutants to limit water supplies, increasing the temperature of the water, and increasing the rate and volume of runoff.

6.2.2.12 Food kiosks and mushrooming of informal settlement

There is a likelihood of food kiosks starting to appear more so close to the project site due to meal demands from the workers. Most of the foods sold at such places are cheap. The food

Kiosk owners will be looking for shortcut means to get easy money.

The proposed project may involve mushrooming of informal settlements in the surrounding area owing to workers preference to stay near their places of work. The long- term negative impact again will be the mushrooming of informal settlements in the neighbourhood. It is common to see people camping outside the entrance of workplaces in different places in Kenya waiting to be contracted for a day's work. Such people would be attracted to settle in the neighbourhood for that purpose. Such settlements often compromise security in the neighbourhood. However, workers accommodation has been included in the development plan so that this issue is dealt with as far as is directly possible within the development.

6.2.2.13 Increased storm water Volume

There is a likelihood of interference with the percolation and flow of storm water from the excavations, stockpiling of both spoil and construction material and the construction of access routes. The situation is made worse due to the site gradient with respect to the neighbouring plots as pointed out in 6.2.2.1 in this report.

6.3 Operational phase

Some of the impacts both positive and negative that may be as a result of the proposed project during the operation stage will include;

6.3.1 Positive Impacts

It is anticipated that the operations phase of this project will result in the following positive impacts:

Employment creation

Some of the potential positive impacts during the operational phase include;

- Employment opportunities for office maintenance staff
- Optimal use of land
- Increased business opportunities for goods and service providers
- Learning opportunities for students

6.3.2 Negative Impacts

The potential impacts likely to occur during the operations and maintenance phase of the project include:

6.3.2.1 Solid waste generation

The quantities of solid waste to be generated by the users of the offices and other facilities provided within the complex are expected to be significant. Such waste will include foodstuffs, empty plastic containers, cartons, waste papers, plastic bags, etc. Improper management of solid waste will result to aesthetic degradation and breeding of disease vectors.

The occupants will be responsible for proper management of solid waste generated from their units during operation phase. In this regard, they are required to contract a private waste handler who is licensed by NEMA.

6.3.2.2 Occupational Health and Safety Issues

Occupation health and safety hazards during the operation and maintenance phases shall result from various sources and have adverse effects if not controlled within recommended limits. Some of the risk sources are proximity to the Langata and Hillcrest road, use of electricity and fuel storage among others.

6.3.2.3. Increase in water abstraction from underground sources for various uses

The proponent proposes to source water from a proposed borehole to be dug within the project site in Karen to supplement the supply from Nairobi Water and Sewerage Company. The additional water sourcing from the proposed borehole would be likely to contribute to increased abstraction of ground water.

6.3.2.4 Liquid Waste Pollution

Liquid wastes from domestic waste water can result in pollution of water sources around the site, especially storm water drainage streams which passes across the proposed development plot during the wet/ rainy season. Waste water will be generated from the offices, shops and the Staff quarters.

6.3.2.5 Air pollution from vehicles

Emissions from the vehicles on Langata rod around the project site may increase as a result of an increase in the number of vehicles accessing the completed facilities of the proposed development. The proposed basement parking may have elevated levels of vehicular emissions if design and operational controls are not put in place. Another potential source of emissions is the proposed standby generator.

6.3.2.6 Increased traffic flow

There is potential increase in road traffic on Langata road and Hillcrest road since additional vehicles for visitors and occupiers to the proposed development will be using these roads. This may aggravate the problem of traffic jams already being experienced on these roads.

6.3.2.7 Increased storm water flow

The increased surface area of impermeable surfaces e.g. roads, pavements and roofs will increase the volume of runoff.

The other potential negative impacts that may arise from the operational activities of the proposed development include;

- Water pollution
- Insecurity/social crime
- Increased electricity consumption

6.3.2.8 Traffic Congestion along Hillcrest Road

Members of the public were concerned of the traffic congestion which might happen during all phases of the project. They pointed out that Hillcrest Road which has been proposed to be used as the main access to the main entrance is already congested especially when the schools are open, since most parents drop their children at Hillcrest International School. While others proposed for a variation of the current design to ease off potential traffic disruption along Hillcrest road others were completely opposed to the main entrance along Hillcrest road and preferred it being cited along Langata road. In addition some pointed out that since

Langata Road is going to be expanded to a two carriage Road, the proponent should consider locating the main entrance along Langata.

Concerns were also raised on the actual number of vehicles that will be flowing into the project site. They pointed out that since the proposed project will accommodate 100 people, the approximate number of 36 vehicles per day will be was inaccurate.

6.3.2.9 Congestion

The participants present raised concerns on congestion that might arise after the completion of the project. They observed that the scale of the development was not commensurate with acreage provided for in the Karengata Local Physical Development Plan

6.3.2.10 Noise pollution from the recreation and dining area

Some members were concerned of the noise that might emanate from the project site especially during the operational phase and from the dining and recreational zone.

6.3.2.11 Base Transceiver Station) BTS sites/Cell towers

The members present expressed fears that the proposed development might be used to install BTS sites which they considered to be hazardous to human health. They reminded the proponent and the consultant to assure them that no such installation will be carried out on the proposed development.

6.4 Decommissioning Phase

Some of the anticipated impacts during the decommissioning phase of the proposed project include;

6.4.1 Positive Impacts

In the event that the property developed will be decommissioned, the primary activity is expected to be demolition and rehabilitation of the site. The following key activities should be considered:

- Noise pollution;
- Air/dust pollution;
- Liquid waste;
- Landscape design;
- Solid waste material;
- Social impacts;
- Occupational health & safety hazards

The potential positive impacts during the decommissioning phase include;

- Rehabilitation and restoration of the site to its original status
- Employment opportunities

6.4.2 Negative Impacts

The following are the potential negative impacts;

6.4.2.1 Noise Pollution

Activities likely to produce noise during decommissioning include cutting and demolition of structures, machine operations.

Mitigation measures include:

- Schedule noisy activities during the day time period;
- Use silencers on machines where possible;
- Ensure machinery is well maintained to reduce noise emitted.

6.4.2.2 Air/dust Pollution

This is expected to result from demolishing of structures at the site and the transport of demolition debris to the disposal site.

6.4.2.3 Solid Waste Material

It is expected that large amounts of solid waste material arising during demolition will include stone, wood, glass, metal, paper, plastic, equipment, vegetation, etc. The proper disposal of these materials is critical.

6.4.2.4 Occupational Health and Safety Hazards

Occupational Health and Safety hazards such as falling objects, open pits, sharp objects lying around, and dust may all be a health risk to construction workers. Risk of accidents and incidents will be heightened during the decommissioning activities as the workers will be in direct contact with heavy machinery and equipment.

Health, safety and security are important aspects through all the stages of the proposed project. Excavation activities associated with the project works may lead to health and safety hazards attributed to:

- **Unidentified or misidentified utilities:** Workers may be exposed to hazards such as electric shock, suffocation, or explosions if they unexpectedly come in contact with utility lines such as underground HV cables.

- **Hazardous atmospheres:** Workers may be exposed to hazards such as suffocation, chemical exposure, or explosions, if they enter excavations with hazardous atmospheres;
- **Structural instability:** Structures may become unstable if excavation occurs below the base of a building or equipment pad foundations, or below retaining wall footings. This may be fatal to the workers;
- **Water accumulation:** Water accumulation in excavations can cause sloughing of excavation sidewalls, resulting in unsafe conditions for those entering the excavation, particularly if the use of electrical equipment is required;
- **Falls:** Workers or passers-by may accidentally fall into open, unprotected excavations, or vehicles may accidentally be driven into uncovered or inadequately barricaded pits.

7. MITIGATION MEASURES AND MONITORING PROGRAMMES

7.1 Introduction

The proponent of the proposed project acknowledges the fact that the proposed project activities will have some impacts on the biophysical environment, health and safety of its employees and members of the public, and socio economic wellbeing of the local residents. Thus, the main focus will be on reducing the negative impacts and maximizing the positive impacts associated with the project activities through a programme of continuous improvement.

An environmental management/monitoring plan will be developed to assist the proponent in mitigating and managing environmental impacts associated with the life cycle of the project

7.2 Proposed mitigation measures

The Proposed Mitigation measures for potential negative impacts are described below.

7.2.1 Construction and Operational Phase

7.2.1.1 Soil Erosion

Site clearing or disturbance of the natural vegetation will be planned and approved as part of project management process.

Areas cleared, excavated, or/and exposed during construction will be re-vegetated using native vegetation species, preferably of species growing in the immediate pristine environment to allow harmony with the surrounding and minimize duration for watering and care. The restoration period will require monitoring of the re-vegetated sites to assess impacts of heavy foraging, patch growth as well as gulley formation. Presence of well rooted vegetation will act as soil stabilization for the areas.

7.2.1.2 Waste generation (Solid and Liquid)

Mitigation measures for solid waste management:

- A site waste management plan should be prepared by the contractor prior to commencement of construction activities. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring.

- Preparation and implementation of the plan must be made the

responsibility of the building contractor with the system being monitored independently.

- Special attention should be given to minimizing and reducing the quantities of solid waste produced during site preparation and construction.

- Any vegetation and combustible waste should not be burned on the site.

- Reusable inorganic waste (e.g. excavated sand/soils) should be stockpiled away from drainage features and used for in filling where necessary and/or possible.

- Unusable construction waste, such as damaged pipes, formwork and other construction material, must be disposed of at an approved dumpsite.

- Provide solid waste receptacles and storage containers, particularly for the disposal of plastic bags, boxes, so as not to block drainage system and to prevent littering of the site.

- Make arrangements for the daily collection of litter from the site and appoint a licensed solid waste transporter to collect and transport it for dumping at approved site.

Mitigation Measures for Liquid Waste management:

- Provide workers with appropriate sanitary facility which can be in the form of exhaustible mobile toilets or toilets connected to septic tanks.
- Alternatively effluent from mobile toilets should be disposed by a registered NEMA wastewater handler. The waste handler should posses all the relevant waste transportation document including waste tracking documents showing the disposal site; the number of the users of the mobile toilet and distance of disposal should be considered during procurement by proponent or contractor to enable reduce secondary project impact such as exhaust emission, spillage and excessive fuel use ;
- Wastewater from concrete batching and aggregate screening should be discharged into nearby sedimentation pools and clean water re-used;
- A specific area for washing of cement trucks and equipments should be identified and should not be near in water bodies; and
- All equipment must be fuelled at properly designed fuelling stations.

7.2.1.3 Increased water demand

- The contractor should ensure that they maintain water consumption records in order to monitor their use;

- The proponent should apply to Nairobi Water and Sewerage company for the connection to use the water for construction activities;
- The contractor together with the proponent should put in place water storage facilities to store water in case of water shortages or rationing.

7.2.1.4 Impact on vegetation (Vegetation clearing)

- Map out ecologically sensitive areas at the site and make them known to the engineers and contractor
- Ensure there is selective clearing of the vegetation this allows future re-growth and regeneration. This will ensure minimal disruption of wild fauna's natural movement, territoriality, and other ecological processes;
- It is desirable to re-vegetate disturbed areas along roads, and pavements and other construction sites.
- Efforts to minimize dust effects such as water spraying roads should be deployed, while lasting solutions such as tarmac should be sought.
- The Contractor's Environmental, Health and Safety staff should monitor regeneration of natural vegetation as well as the appearance/spread of invasive or opportunistic species within the disturbed areas. Monitoring should include spotting and uprooting of unwanted germinating plants.

7.2.1.5 Air quality

The following mitigation measures are recommended to control effects of project on air quality and human health:

- Provide personnel with Personal Protective Equipment & Clothing (PPE&C) such as dust masks, boots among others. Mechanism should be put in place to ensure PPE&C are specific for the activities at hand and are always worn within the project sites;
- The stockpiles of earth generated during construction works, unpaved access roads and areas used for handling fine construction materials should be palliated with water regularly in order to suppressed evolution of particles;
- All machinery and equipment should be maintained in good working condition in order to minimize emissions to acceptable standards;
- Train construction and delivery trucks drivers on pre-cautionary measures that enable curb emissions for example advise on techniques to reduce dust evolution especially when driving in areas of dense human settlement or nearing the project site to avoid creating dusty conditions; techniques to conserve fuel and reduce emission by switching off the engines when vehicles are idling;
- Construction trucks delivering materials to site should be covered in order to minimize spread of fugitive emissions to the surrounding areas;
- No burning of materials should be permitted at the project site;

- Use clean energy to fuel project vehicles, equipments and machines in order to reduce air pollutants; and
- Limit traffic movement within the earmarked project areas.

7.2.1.6 Risk of Leaks and Spills

The following mitigation measures are recommended to control effects of project on risk of leaks and spills:

- Conduct regular maintenance of site equipment and machinery to ensure leakages are controlled or detected early;
- Project vehicles and equipment should be serviced according to manufacturer's requirements to limit release of exhaust emissions;
- Investigate the possibility of fitting catalytic converters in machines with engines so as to convert harmful substance in the exhaust fumes to less harmful substances;
- Safety procedures for fuel storage and re-fuelling should be well understood and implemented by site staff; and oil residuals including waste oil, lubricants, used filters, should be carefully collected and stored for safe disposal, in order to prevent spillover effects of contaminant hydrocarbons into storm water or groundwater resources;
- Protect project area from fire by posting warning signs in area where hydrocarbon fuels are used;
- Observe the requirements of the emission control regulations.

7.2.1.7 Occupational Health and Safety Issues

The following mitigation measures are recommended to control effects of health and safety:

- Ensure all equipments are inspected before use for appropriate safe guards and that the machine operators are trained on machine safety;
- Caution will have to be kept at high and strict consideration during any excavation works and work at height
- Ensure the working hours are controlled and that employees are not allowed to extend the working hours beyond an acceptable limit for purposes of gaining extra pay;
- Ensure appropriate road safety signages are strategically placed and drivers adhere to the requirements of such signage;
- Erect speed breaks where human and vehicular traffic has high interaction opportunities;
- Provide adequate manual labour to meet the requirements of the tasks.
- Comply with the provisions of the OSHA 2007 and its subsidiary legislation.

7.2.1.8 Excessive noise and Vibrations

The following mitigation measures are recommended to control effects of noise and vibrations during construction phase:

- Conduct periodic noise measuring and monitoring to determine levels and extent of harmful noise;
- Clearly label the high noise areas.
- Provide PPE (hearing protection) to persons operating within or visit identified high noise areas;
- In order to meet noise level requirements, the works equipments should be equipped with standard noise attenuation features. Machines that exceed acceptable noise limits should be equipped with silencers or lagging materials or specially designed acoustic enclosures;
- Inform local residents when construction activities are likely to generate excessive noise in order to minimize disruption to local residents;
- Sensitize truck drivers to switch off engines while offloading materials; to avoid gunning vehicle engines or hooting especially when passing through sensitive areas such as churches, schools, residential areas and hospitals.

7.2.1.9 HIV/AIDS

Measures recommended for implementation to enable reduce the spread of the virus include the following;

- Review the construction activities to integrate with the HIV/AIDS campaigns;
- Develop appropriate training and awareness materials for Information, Education and Communication (IEC) on HIV/AIDS;
- Identify other players (local CBOs, NGOs, and government organizations) on HIV/AIDS for enhanced collaboration;
- Develop an intervention strategy compatible with the construction programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with other stakeholders
- Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs

7.2.1.10 Increased Energy Consumption

Proposed mitigation measures include;

- Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts
- Monitor energy use during the operations of the facilities within the proposed development and set targets for reduction of energy use.
- Conduct annual energy audits

7.2.1.11 Hydrology and water quality degradation

Several measures shall be put in place to mitigate the impacts that are likely to lead to hydrology and water quality degradation. The proponent will prepare a hazardous

substance control and emergency response plan that will include preparations for quick and safe clean up of accidental spills. It will prescribe hazardous-materials handling procedures to reduce the potential for a spill during project operation, and will include an emergency response programme to ensure quick and safe cleanup of accidental spills. The plan will identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted.

Soil sampling and trial holes digging will be conducted before excavation for foundations begins and soil information will be provided to excavation crews to inform them about soil conditions and potential hazards. If excavation of hazardous materials is required, they will be handled in accordance with applicable regulations. If suspected contaminated groundwater is encountered in the depths of the proposed development, samples will be collected and submitted for laboratory analysis for petroleum hydrocarbons, metals, volatile organic compounds and semi-volatile organic compounds. If necessary, ground water will be collected during excavations, contained and disposed off in accordance with all applicable regulations. Appropriate personal protective equipment will be used and waste management will be done in accordance with applicable regulations. Oil absorbent material, tarps and storage drums will be used to contain and control any minor releases of engine and other equipment oil.

7.2.1.12 Food kiosks and mushrooming of informal settlements

In order to alleviate the impact of mushrooming of kiosks, on-site kiosk services with adequate sanitation during operations are recommended. The workers will have designated areas for eating and resting.

7.2.1.13 Increased underground water abstraction

Mitigation measures include:

Compliance with the Water Resources Management Rules, 2007 on approval, authorization and permits for ground water abstraction, including:

- No person shall construct or begin to construct a well or abstract any water from a well if such well is situated within half a mile of another well, without first having obtained the written authority of WRMA;Payment of prescribed permit fees;
- Record of all water abstracted, diverted, stored or discharged, giving the date, time, quality and quantity & methods of such abstraction, diversion, storage or discharge;
- A permit may, at the request of the permit holder, be varied by the Authority if the
- Authority is satisfied that the variation is not contrary to public interest or the rights of others;

- Where the variation results in a change of the category of water use, the permit holder shall be required to re-apply for another permit;
- Borehole status monitoring data – abstraction rate, water levels, water quality, etc.;
- Where two or more operators have a common interest in the employment of water, a statement of the terms and objects of the association, and the rules under which the association proposes to exercise the permit;
- The management should ensure that ways of recycling waste water are explored for use in the washrooms which will in turn reduce the water consumption rates;
- The management should explore alternatives for harvesting rainwater which can be stored and used later, which will then reduce pressure on the borehole water;
- The management should ensure that they maintain water consumption records in order to monitor their use.

7.2.2 Decommissioning Phase

7.2.2.1 Noise Pollution

Mitigation measures include:

- Schedule noisy activities during the day time period;
- Use silencers on machines where possible;
- Ensure machinery is well maintained to reduce noise emitted.

7.2.2.2 Air/dust Pollution

Mitigation measures include:

- Practice dust management techniques, including watering down dust;
- Set up dust barriers/ screens at strategic locations;
- Provide and enforce the appropriate use of Personal Protective Equipment (PPE) against dust.

7.2.2.3 Solid waste

Mitigation measures include:

- Disposal of solid waste in compliance with EMCA 2006 waste management regulations;
- Segregation of waste to encourage reuse and recycling;
- Ensuring that the contracted waste collector is registered with NEMA & County Government of Nairobi to collect and dispose wastes.

7.2.2.4 Liquid waste

These are likely to arise from cleaning activities and sanitary facilities.

Mitigation measures include:

- Prudent use of water to reduce liquid waste volumes;
- Adhere to EMCA 2006 water quality regulations;
- Adhere to WRMA 2007 guidelines for effluent discharge into surface water resources
- Ensure that sewage system is functional during demolition, to prevent pollution of nearby underground and surface water sources;

7.2.2.5 Occupational Health and Safety Hazards

Mitigation measures include:

- The Contractor should ensure registration of all workplaces by the Director, Directorate of Occupational Health and Safety (DOHSS) forming the basis of work statistics;
- The Contractor should ensure provision of appropriate Personal Protective Equipment (PPE) for staff such as:
  - Earmuffs for ear protection;
  - Helmets for head protection;
  - Dust masks for dust protection for all project works;
  - Goggles with good visibility for eye protection;
  - Overalls and dust coats to protect the skin;
  - High-visibility retro-reflective fluorescent yellow-green, fluorescent orange/ fluorescent red jackets with 360o visibility;
  - Safety Shoes for protection of the feet;
  - Gloves of different types according to specific works in relation to:
    - Puncture resistance;
    - Sharps resistance;
    - Cut resistance;
    - Flexibility;
    - Abrasion resistance;
    - Grip
- The Project Manager should ensure that the contractor complies with all standard and legally required health and safety regulations as set out by the Occupational Safety and Health Act (Part XI: Section 96) as pertains to construction activities;
- The Contractor should provide a standard First Aid Kit on site. Recommendations for Employees exceeding fifty (50) [as per the first Aid Rules section 2 (c)] and Fourth Schedule of the Factories (Building Operations and Works of Engineering Construction) Rules 1984 part III

8. ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site, materials and technology scale, solid waste and wastewater management options and shall involve studying design alternatives and analyzing them based the environmental costs and benefits this shall involve studying the technology, design, capital investments, operation and maintenance requirements among others.

8.1 Relocation Option

Relocation option to a different site is an option available for the project implementation. At present the landowner/developer does not have an alternative site. This means that he has to look for the alternative land.

8.2 No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the landowner and the community as a whole. The land will continue to remain idle and underutilized.

8.3 The proposed development alternative

Under the proposed development alternative, the developer of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proposed project, provided all environmental measures are complied with during the construction period and occupation phases. This is the most recommended option because the lease is for commercial/ offices.

8.4 Analysis of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Kenya Bureau of Standards requirements.

8.5 Domestic waste water management alternatives

The following locally available technologies are discussed below:-

8.5.1 Alternative One - Use of stabilization ponds/lagoons

This refers to the use of a series of ponds/lagoons which allow several biological processes to take place, before the water is released to the outside environment. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used/heavy metals sink and

decomposition processes take place. They are usually a nuisance to the public because of smell from the lagoons/ponds. This option is not preferable in the area because the required space is not available and the area is a cosmopolitan area.

8.5.2 Alternative Two - Use of Constructed/Artificial wetland

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

8.5.3 Alternative Four - Use of septic tanks

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is expensive to construct and regular empting in large discharge points especially with the large projects like the proposed use development in Karen Area, Nairobi County. Given the kind of liquid waste emanating from the proposed project this option is not preferred since it will be uneconomical.

8.5.4 Alternative Five - Waste water treatment plant

This involves the construction of a plant and use of chemicals to treat the effluents to locally/internationally accepted environmental standards before it is discharged into the river nearby. It is usually expensive to construct and maintain, but it is the most reliable, efficient and cost-effective in the long term.

8.5.5 Alternative six - Connection to the sewer line system

Connection to the sewer line option is a viable option since Karen area is served by existing sewer line.

8.5.6 Alternative seven: Use of Bio-digester

Bio digester is an on-site sanitation unit that utilizes anaerobic technology for the disposal of toilet (black) wastewater as well as of kitchen and bathroom (grey) water, in a closed system. This is an incredibly ethical sanitation technology which treats wastewater in an environmentally friendly manner, facilitating its use for irrigation or its return to water bodies without polluting them. The process also generates organic fertilizer and biogas (a form of fuel) by allowing naturally occurring bacteria to break down solid waste. From the analysis and economic as well as environmental; considerations use of bio digester system is a viable option for the proponent to adopt in order to supplement connection to the sewer system.

8.6 Solid waste management alternatives

A lot of solid wastes will be generated from the proposed development. An integrated solid waste management system is recommendable. First, the proponent will give priority to Reduction at Source of the waste materials. This option will demand a solid waste management awareness programme in the management and the workers. Notices for proper waste management/handling may be posted at strategic places for the sake of visitors. Secondly, Recycling, Reuse and compositing of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place especially in the kitchen section. The recyclables will be sold to waste buyers within Nairobi City. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. Finally, sanitary land filling will be the last option for the proponent to consider.

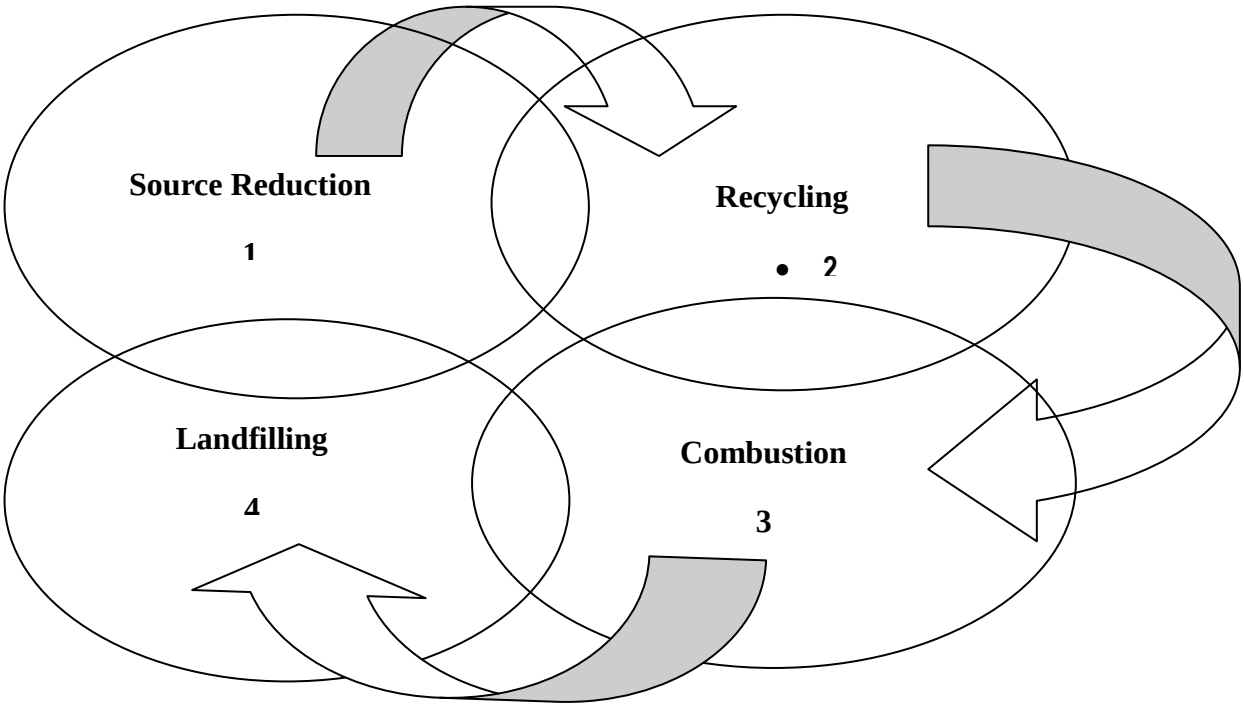


Figure 17: Integrated solid Waste Management

9. ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

9.2 Introduction

The proponent of the proposed project acknowledges the fact that the proposed project activities will have some impacts on the biophysical environment, health and safety of its employees and members of the public and socio-economic wellbeing of the local residents. Thus, the main focus will be on reducing the negative impacts and maximizing the positive impacts associated with the project activities through a programme of continuous improvement.

An Environmental Management/Monitoring Plan has been developed to assist the proponent in mitigating and managing environmental impacts associated with the life cycle of the project. The EMP has been developed to provide a basis for an Environmental Management System (EMS; ISO 14001 principles) for the project. It is noteworthy that key factors and processes may change through the life of the project and considerable provisions have been made for dynamism and flexibility of the EMP. As such, the EMP will be subject to a regular regime of periodic review.

Table 6 below forms the preliminary of this EMP for the construction, phase of the proposed project.

Table 7: Environmental Management Plan for the proposed Project

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
1. Curb project associated conflicts and Lost Time Injuries (LTI) e.g. Disputes with neighbourhood				
Project Implementation Disputes	Land transfer agreements should be formalized before the project start as per the laws of the land	Proponent/Government of Kenya	Project Planning Phase	
	Sufficient planning for adequate resources required i.e. financial, personnel and equipment	Proponent &Contractor	Project Planning Phase	-
2. Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High Demand of construction raw materials	Source building materials from local suppliers who use environmentally friendly processes in their operations	Project Manager & Contractor	Throughout construction period	0
	Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered	Project Manager & Contractor	Throughout construction period	30,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	Project Manager & Contractor	Throughout construction period	15,000
	Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Project Manager & Contractor	Throughout construction period	0
3. Minimize vegetation and landscaped gardens disturbance at and or around construction site				
Vegetation/biodiversity disturbance	Ensure proper demarcation and delineation of the project area to be affected by construction works.	Contractor, Civil engineer & Project Manager	1 month	200,000
	Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage	Civil Engineer, Architect and Project Manager	1 month	20,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Designate access routes and parking within the site	Civil Engineer, Architect and Project Manager	1 month	10,000
	Introduction of vegetation (trees, shrubs and grass) on open spaces and their maintenance	Architect & Landscape specialist	Monthly to Annually	15,000
	Design and implement an appropriate landscaping programme to help in re-vegetation of part of the project area after construction	Architect & Landscape specialist	2 months	15,000
4. Reduce storm-water, runoff and soil erosion				
Increased storm water, runoff and soil erosion	A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed	The Civil Engineer, Mechanical Engineer and Project Manager	1 month	10,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Apply soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.	The Civil Engineer, Mechanical Engineer and Project Manager	1 months	
	Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site	The Civil Engineer, Mechanical Engineer and Project Manager	Throughout construction period	
	Ensure that any compacted areas are ripped to reduce run-off.	The Civil Engineer, Mechanical Engineer and Project Manager	2 months	
	Open drains all interconnected will be provided on site	Civil Engineer	Throughout construction period	7,000 per unit
5. Minimize solid waste generation and ensure efficient solid waste management during construction				

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Increased solid waste generation	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling	Project Manager & Contractor	Throughout construction period	5,000
	Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed rather than cutting them to size, or having large quantities of residual materials	Project Manager & Contractor	One-off	0
	Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed off.	Project Manager & Contractor	One-off	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Ensure that damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects	Project Manager & Contractor	One-off	0
	Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or homeowners.	Project Manager & Contractor	One-off	0
	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time	Project Manager & Contractor	Throughout construction period	–
	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Project Manager & Contractor	One-off	6,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials	Project Manager & Contractor	Throughout construction period	0
	Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste	Project Manager & Contractor	Throughout construction period	0
	Use construction materials containing recycled content when possible and in accordance with accepted standards.	Project Manager & Contractor	Throughout construction period	0
	Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	0
	Dispose waste more responsibly by dumping at designated dumping sites or landfills only.	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	2,000/ month

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Waste collection bins to be provided at designated points on site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	8,000
	Private waste disposal company to be contracted to transport and dispose the solid waste from site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	
	Running an educational campaigns amongst employees, e.g. through use of posters, to encourage reuse or recycling of the solid waste	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	
6. Reduce dust emissions				
Dust emission	Ensure strict enforcement of on-site speed limit regulations	Project Manager & Contractor	Throughout construction period	7,800

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Avoid excavation works in extremely dry weathers	Project Manager & Contractor	Throughout construction period	
	Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles	Project Manager & Contractor	Throughout construction period	
	Personal Protective equipment to be worn	Project Manager	Throughout construction period	
7. Minimization of exhaust emissions and Traffic congestion				
Exhaust emission	Vehicle idling time shall be minimized	Project Manager & Contractor	Throughout construction period	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	Project Manager & Contractor	Throughout construction period	0
	Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points	Project Manager & Contractor	Throughout construction period	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Traffic Congestion	Transport of materials during the traffic off peak hours to avoid possible traffic congestion, Purchasing of material according to the demand, Ensuring minimal residence period for trucks mobilizing material on site, Proper planning during construction period	Project Manager & Contractor	Throughout construction period	0
8. Minimization of noise and vibration				
Noise and vibration	Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Project Manager & Contractor	Throughout construction period	5,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Sensitize construction drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and hospitals	Project Manager & Contractor	Throughout construction period	5,000
	Ensure that construction machinery are kept in good condition to reduce noise generation	Project Manager & Contractor	Throughout construction period	7,000
	Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures to minimize ambient noise levels	Project Manager & Contractor	Throughout construction period	15,000
	The noisy construction works will entirely be planned to be during daytime when most of the neighbours will be at work	Project Manager & all site foremen	Throughout construction period	0

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Comply with the provisions of Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 regarding noise limits at the workplace	Project Manager & all site foremen	Throughout construction period	0
9. Minimization of energy consumption				
Increased energy consumption	Ensure electrical equipment, appliances and lights are switched off when not being used	Project Manager & Contractor	Throughout construction period	0
	Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy	Project Manager & Contractor	Throughout construction period	3,800

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts	Project Manager & Contractor	Throughout construction period	10,000
	Monitor energy use during construction and set targets for reduction of energy use.	Project Manager & Contractor	Throughout construction period	2,400
10. Minimize water consumption and ensure more efficient and safe water use				
High water demand	Install water conserving taps that turn-off automatically when water is not being used	Project Manager & Contractor	One-off	10-40 % higher
	Promote recycling and reuse of water as much as possible	Project Manager & Contractor	Throughout construction period	5,500

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Install a discharge meter at water outlets to determine and monitor total water usage	Project Manager & Contractor	One-off	3,000
	Promptly detect and repair of water pipe and tank leaks	Project Manager & Contractor	Throughout construction period	3,500 per month
	Sensitize staff to conserve water by avoiding unnecessary water use	Project Manager & Contractor	Throughout construction period	2,500
	Ensure taps are not running when not in use	Project Manager & Contractor	Throughout construction period	2,500
11. Minimize release of liquid effluent				
Generation of wastewater	Provide means for handling sewage generated by construction workers	Mechanical Engineer & Project Manager	One-off	5,000 per Month

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Conduct regular checks for pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	Mechanical Engineer & Project Manager	Throughout construction period	4,000/month
	Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated	Mechanical Engineer & Project Manager	Throughout construction period	4,000/month
12. Minimize occupational health and safety risks				
Approval of building plans	Ensure that all building plans are approved by the Local Authority and the local Occupational Health and Safety Office	Developer	One-off	5,000
Registration of the premises	Registration of the premises under the Occupational Safety and Health Act, 2007 Laws of Kenya is mandatory	Developer	One-off	5,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
General register	A general register should be kept within the facility as stipulated in Sec 122&123 of the Occupational Safety and Health Act, 2007.	Project Manager & Contractor	One-off	1,500
Posting of abstract of OSHA 2007 Act,	There shall be displayed at prominent places within the site the prescribed abstract of the OSHA and the relevant notices as stipulated in section 121 of the OSHA, 2007.	Project Manager & Contractor	One-off	2,500
Incidents, accidents and dangerous occurrences.	Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Project Manager, Developer & Contractor	Continuous	2000/month

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.	The Contractor, Project Manager& Site Safety Officer	Continuous	14,400
Insurance	Ensure that the premises are insured as per statutory requirements (third party and workman's compensation)	Developer	Annually	_
Safety, health and environment (SHE) policy	Develop, document and display prominently an appropriate SHE policy for construction works	Project Manager, Developer & Contractor	One-off	2,500
Health and safety committee	Provisions must be put in place for the formation of a Health and Safety Committee, in which the employer and the workers are represented. Statutory training to be offered.	Project Manager	Annually	100,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Sanitary conveniences	Suitable, efficient, clean, well-lit and adequate sanitary conveniences should be provided for construction workers	Project Manager	One-off	50,000
Medical examination	Arrangements must be in place for the medical examination of all construction employees before, during and after termination of employment	Project Manager, Developer & Contractor	Continuous	2000 per examination
Machinery/equipment safety	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Project Manager, Developer & Contractor	One-off	–
	Ensure that equipment and work tasks are adapted to fit workers and their ability including protection against mental strain	Project Manager, Developer & Contractor	Continuous	–

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Project Manager	One-off	_
	Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Project Manager	Continuous	100,000 per training
	Equipment such as fire extinguishers must be examined by a government authorized person. The equipment may only be used if a certificate of examination has been issued	Project Manager	Continuous	
	Reports of such examinations must be presented in prescribed forms, signed by the examiner and attached to the general register	Project Manager	Continuous	20,000 per examination

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Storage of materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Project Manager	Continuous	8,000
	Ensure that items are not stored/stacked against weak walls and partitions	Project Manager	Continuous	_
Safe means of access and safe place of employment	All floors, steps, stairs and passages of the premises must be of sound construction and properly maintained	Project Manager & Contractor	Continuous	_
	Securely fence or cover all openings in floors	Project Manager & Contractor	One-off	_
	Provide all staircases within the premises with suitable handrails on both sides	Project Manager & Contractor	One-off	
	Ensure that construction workers are not locked up such that they would not escape in case of an emergency	Project Manager & Contractor	Continuous	_

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	All ladders used in construction works must be of good construction and sound material of adequate strength and be properly maintained	Project Manager & Contractor	One-off	–
Emergency preparedness and evacuation procedures	Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency	Project Manager & Contractor	One-off	5,000
	Such procedures must be tested at regular intervals	Project Manager & Contractor	Every 3 months	5,000
	Ensure that adequate provisions are in place to immediately stop any operations where there in an imminent and serious danger to health and safety and to evacuate workers	Project Manager & Contractor	One-off	8,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
	Ensure that the most current emergency telephone numbers posters are prominently and strategically displayed within the construction site	Project Manager & Contractor	One-off	3,000
	Provide measures to deal with emergencies and accidents including adequate first aid arrangements	Project Manager & Contractor	Continuous	
First Aid	Well stocked first aid box which is easily available and accessible should be provided within the premises	Project Manager & Contractor	Annually	50,000
	Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Project Manager & Contractor	Annually	50,000
13. Ensure the general safety and security of the site and surrounding areas				

Increased Pressure on Infrastructure	Coordinate with other planning goals and objectives for the region	Architect, Project Manager, Contactor and the Developer	Continuous	5,000
	Upgrade existing infrastructure and services, if and where feasible.	Architect, Project Manager, Contactor and the Developer	Continuous	
Insecurity	Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site.	Security Officer, Project Manager & Police	Continuous	150,000 monthly
	Body-search the workers on entry, to avoid getting weapons on site, and leaving site to ensure nothing is stolen.	Security Officer	Continuous	
	Ensure only authorized personnel get to the site	Security Officer	Continuous	
	Security alarms will be installed	Security Officer	Continuous	
14. Environmental monitoring of the project				

Environmental concern during the construction phase	Due to the magnitude of the project the proponent will liaise with the environmental consultants throughout the construction phase and ensure that the conditions of approval are adhered to.	Proponent, Contractor and AWEMAC	Throughout construction phase	-

CONCLUSION AND RECOMMENDATIONS

The EIA study has established that the proposed development AFRIGO is a worthy investment by the proponent and broadly, it will contribute significantly to the improvement of living standards among the investors and by extension spur economic development. This will be achieved through the prior discussed positive impacts namely; growth of the economy, boosting of the informal sector during the construction phase, provision of market for supply of building materials, employment generation, increase in government revenue and optimal use of land.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the potential negative environmental, safety, health and social impacts associated with the life cycle of the proposed project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects. It is expected that the potential positive impacts arising from the proposed development shall be maximized as much as possible. These measures will go a long way in ensuring the best possible environmental compliance and performance standards.

It is our recommendation that the project be allowed to proceed provided the mitigation measures outlined in the report are adhered to, the Environmental Management Plan (EMP) is implemented and the developer adhere to the conditions of approval of the project that will be given by NEMA.

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Nairobi County Integrated Development Plan 2014

Karengata Local Physical Development Plan

APPENDICES

1. Certificate of Firm of Experts Registration from NEMA
2. Copy of Lease Agreement Documents
3. Proponent certificate of Registration
4. Bill of Quantities
5. A sample of questionnaires used during the field study
6. A copy of minutes and lists of attendance for public participation meetings