ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) PROJECT STUDY REPORT

FOR THE PROPOSED PLUMERIA APARTMENTS AND ASSOCIATED AMENITIES, ON PLOT NO.330/179 ALONG RIARA ROAD, DAGORETTI NORTH, NAIROBI CITY COUNTY

NEMA REF.: NEMA/TOR/5/2/615

PROPONENT

RIARA PLUMERIA DEVELOPMENT LIMITED

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NAIROBI

ENVIRONMENTAL CONSULTANTS	
Lead Expert **Dr. Ezekiel Ndunda**	**Reg No.** 7867
DHELYN ECO-SOLUTIONS	

SEPTEMBER, 2023

The report has been done with reasonable skills, care and diligence in accordance with the Environmental management and Co-ordination Act, 1999 (amended 2015) and the Environmental Impact Assessment and Audit Regulations, 2003.

DOCUMENT AUTHENTICATION

This ESIA study report has been prepared by Lead Expert Dr. Ezekiel Ndunda 7867 in accordance with the Environmental Management and Coordination Act (EMCA) 1999, 2015 amendment and the Environmental Impact Assessment and Audit Regulations 2003 which requires that every development project must have an ESIA report prepared for submission to the National Environmental Management Authority (NEMA). We the undersigned, certify that the particulars in this report are correct and righteous to the best of our knowledge.

EIA/EA LEAD EXPERT:

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Signature…… Date…….5th October, 2023…

PROPONENT:

RIARA PLUMERIA DEVELOPMENT LIMITED

P.O. BOX 598-00217, NAIROBI.

NAME: ……..

POSITION: ……..

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Submitted to:	**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY** **HEAD QUARTERS ALONG POPO RD,**

In accordance with Environmental Management and Coordination Act CAP 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003

ACRONYMS

ESIA's	Environmental and Social Impact Assessment Study
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
Ha	Hectare
KM	Kilometers
NEC	National Environment Council
NEAP	National Environment Action Plan
NES	National Environment Secretariat
PPE	Personal Protective Equipment
TOR	Terms of Reference
WRMA	Water Resources Management Authority
SWM	Solid Waste Management
UFL	Noise level lower the lower operating limit (50 dB) of the Mark
NPEP	National Poverty Eradication Plan
OHS	Occupational Health and Safety
NEAP	National Environmental Action Plan

GLOSSARY OF TERMS

"Air quality" means the concentration prescribed under or pursuant to the Environment Management and Coordination Act 1999 (2015 amendment) of a pollutant in the atmosphere at the point of measurement;

"Analysis" means the testing or examination of any matter, substance or process for the purpose of determining its composition or qualities or its effect (whether physical, chemical or biological) on any segment of the environment**;**

"Biological diversity" means the variability among living organisms from all sources including, terrestrial ecosystems, aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, among species and of ecosystems;

"Ecosystem" means a dynamic complex of plant, animal, micro-organism communities and their non-living environment interacting as a functional unit;

"Effluent" means gaseous waste, water or liquid or other fluid of domestic, agricultural, trade or industrial origin treated or untreated and discharged directly or indirectly into the aquatic environment;

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

Environmental and Social Impact Assessment (Assessment) is a process that determines the potential environmental and social risks and impacts (including labour, health, and safety) of a proposed Project in its area of influence

Environmental Impact Assessment (EIA) is a comprehensive document of a Project's potential environmental and social risks and impacts.

Environmental Management Plan (EMP) summarizes the commitments to address and mitigate risks and impacts identified as part of the Assessment, through avoidance, minimization, and compensation/offset. This may range from a brief description of routine mitigation measures to a series of more comprehensive management plans (e.g. water management plan, waste management plan, resettlement action plan, indigenous peoples plan, emergency preparedness and response plan, decommissioning plan). The level of detail

and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's potential risks and impacts.

Environmental Management System (EMS) is the overarching environmental, social, health and safety management system, which may be applicable at a corporate or Project level. The system is designed to identify, assess and manage risks and impacts in respect to the Project on an on-going basis. The system consists of manuals and related source documents, including policies, management programs and plans, procedures, requirements, performance indicators, responsibilities, training and periodic audits and inspections with respect to environmental or social issues, including Stakeholder Engagement and grievance mechanisms.

"Environmental management" includes the protection, conservation and sustainable use of the various elements or components of the environment;

"Environmental monitoring" means the continuous or periodic determination of actual and potential effects of any activity or phenomenon on the environment whether short-term or long term;

"Natural resources" include resources of the air, land, water, animals and plants including their aesthetic qualities;

"Noise" means any undesirable sound that is intrinsically objectionable or that may cause adverse effects on human health or the environment;

"Pollutant" includes any substance whether liquid, solid or gaseous which (a) may directly or indirectly alter the quality of any element of the receiving environment; (b) is hazardous or potentially hazardous to human health or the environment; and includes objectionable odours, radio-activity, noise, temperature change or physical, chemical or biological change to any segment or element of the environment;

"Pollution" means any direct or indirect alteration of the physical, thermal, chemical, biological, or radio-active properties of any part of the environment, by discharging, emitting, or depositing wastes so as to affect any beneficial use adversely, to cause a condition which is hazardous or potentially hazardous to public health, safety or welfare, or to animals, birds, wildlife, fish or aquatic life, or to plants or to cause contravention of any condition, limitation, or restriction which is subject to a license under the EMCA 1999 (2015 amendment).

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EXECUTIVE SUMMARY

Environmental Impact Assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. Early identification of possible development impacts promotes environmental sustainability as anthropogenic factors are balanced with natural environmental needs.

The proponent has put forth a proposal to construct a residential development on L.R. No.330/179, along Riara Road in Dagoretti North, Nairobi County. The proponent's objective is to develop the plot into a residential apartment development with adequate car parking and associated amenities' that will serve the local community.

The development will include the following:

Four blocks of Three hundred and thirty-two 3-bedroom and 2-bedroom Housing Units

Associated amenities and services

- Development of utilities services including community water supply tanks, drainage systems, sewerage systems and electricity supply
- Development of perimeter wall fences, common gate to constitute a gated community estate.
- Site landscaping especially tree planting

Basement

- Car parks (Basement 1,2 & 3)

Ground floor

- Swimming pool
- Parking spaces
- Gym space
- Electricity rooms
- Garbage accumulation point

- Office
- Security room
- Childrens playing room
- Rooftop terrace

First- sixteenth Floor – 20 units per floor

Seventeenth floor – 12 units

In keeping with the requirements of the Environmental Management and Coordination Act (EMCA), 1999 (amended 2015) an Environmental and Social Impact Assessment (EIA) study for the proposed residential development was commissioned. The aim of this Environmental and Social Impact Assessment (ESIA) is to examine both the positive and negative effects that this proposed undertaking is likely to have on both the physical and socio-economic environment.

Scope Objective and ESIA criteria for the Study

The scope of the assessment covered, construction works of the proposed development, which include ground preparation, masonry, and installation of service lines as well as the other necessary utilities. The output of this work was a comprehensive Environmental Impact Assessment report for the purposes of applying for an EIA license.

The consultant on behalf of the proponent conducted the study by incorporating but not limited to the following terms of reference:

- The proposed location of the proposed residential development and its associated infrastructure.
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the proposed project.
- The technology, procedures and processes to be used, in the implementation of the project.

- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project.
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- To recommend a specific environmentally sound and affordable wastewater management system.
- Analysis of alternatives including project site, design and technologies.
- 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 the foreseeable accidents and hazardous activities in the cause of carrying out the development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties, which were encountered in compiling the information.
- An economic and social analysis of the project.
- Such other matters as the Authority may require.

Methodology Outline

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(amended 2015)
- Environmental scoping that provided the key environmental issues
- Desk Stop studies and interviews
- Physical inspection of the site and surrounding areas

- ESIA Public participation Meetings and Reporting.

Anticipated Environmental Impacts

As with any other physical development, both positive and negative impacts are anticipated to arise from the proposed project, during the construction phase, operation phase as well as the decommissioning phase. In general, the following positive and negative impacts are expected to be associated with the proposed project.

Positive Impacts

- Creation of employment opportunities
- Improved growth of the economy
- Increased business opportunities
- Revenue to national and local governments amongst others
- Improved local security

Negative impacts

- Increased runoff from new impervious areas,
- Soil erosion,
- Solid Waste generation,
- Noise pollution,
- Traffic Congestion
- Air pollution from dust emissions and exhaust emissions,
- Potential Oil Spills,
- Increased water demand,
- Increased energy Consumption,
- Increased demand for building materials extracted from the natural resource base,
- Workers' accidents and hazards during construction,

Mitigation Measures

In order to alleviate the potential negative impacts associated with the proposed project the proponents shall take several measures, among these are;

Dust emissions will be controlled by the following measures:

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

The following noise-suppression techniques will be employed to minimize the impact of temporary construction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Co-ordinate with relevant agencies regarding all substation construction activities in portions of the property bordering residential areas.
- Install sound barriers for pile driving activity.
- Limit pickup trucks and other small equipment to an idling time, when necessary, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.

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

- Vehicle idling time shall be minimized
- Alternatively fueled construction equipment shall be used where feasible
- Equipment shall be properly serviced and maintained.

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 construction, and will include an emergency response programme to ensure quick and safe clean-up of accidental spills. The plan will identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted.

The proponent will also ensure that a waste water treatment plan will be designed and implemented so that the large amounts of waste water can be recycled and reused. Adequate collection and storage of solid waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided. In addition, the proponent shall also provide covers for refuse containers and appropriate personal protective equipment's.

Conclusion

The proposed project will contribute to significant positive impacts in the area during its construction and operation phases. The positive impacts include: creation of employment, quality shelter, increase in national housing stock, optimal use of land, incorporation of collective waste management practices, increase in revenue to the proponent and the government among others.

It is equally evident that, although the project will contribute to various positive impacts, some negative impacts are inevitable and the purpose of conducting this ESIA is to outline measures to mitigate them or where possible eradicate them completely. The negative impacts of this project include increased pressure on infrastructure, noise pollution, and air pollution, generation of solid and liquid wastes among others.

It is our informed recommendation that the proponent be allowed to proceed with the implementation of the proposed provided the outlined mitigation measures in this report are adhered to and the Environmental Management Plan (EMP) is implemented effectively. An initial environmental audit will also be carried within a period of 12 months after commencement of the operations to check compliance status of the project to the set policies, standards and laws. The proponent is advised to contract licensed experts to undertake the

Environmental, Health and Safety Audit Services for the construction phase of the proposed residential development.

CHAPTER 1. INTRODUCTION

It is the Kenya Government's policy commitment to ensure a balanced development approach in its efforts at promoting socio-economic development and the management of natural resources and environmental quality. Emphasis has been stressed on the need for the inclusion of environmental considerations as a required factor in decision making at the planning stage of all major development projects.

The Kenya Government policy on all new project, programmes or activities requires that an environmental impact assessment is carried out at the planning stages of the proposed project to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of the facility. The scope of this full study, therefore include:

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

The overall objective of the study is to ensure that all environmental concerns are integrated in all the development activities of the proposed residential development project in order to enhance sustainable development. Specifically, the objectives are:

- To identify potential environmental impacts, both direct and in direct.
- To assess the significance of the impacts
- To assess the relative importance of the impacts of relative plans designs, and sites
- To propose preventive mitigating and compensative measures for the significant negative impacts of the project on the environment.
- To generate baseline data for monitoring and evaluation of how well the mitigating measures are being implemented during the project cycle.

- To present information on impact of alternative.
- To present the results of the ESIA that can guide informed decision making and
- To prepare EMP for the proposed project and decommissioning plan.

The scope of the assessment covered site preparation works, construction works of the proposed development that included ground preparation, masonry and installation of service lines as well as the necessary required utilities by the potential residents. The output of this work was a comprehensive full study report for the purposes of applying for an ESIA license.

It is stipulated in EMCA 1999 (amended 2015) that a form of development such as the proposed residential housing project is likely to impact the site and the surrounding environment hence, before commencement of any work, an Environmental Impact Assessment should be undertaken in compliance with the principal environmental Act and Environmental Impact Assessment/Audit Regulations 2003.

The study included the necessary specialist studies to determine the environmental impacts relating to the biophysical and socio-economic aspects and to determine the issues or concerns from the relevant authorities and interested and/or affected parties. The appropriate measures to ensure co-existence of the proposed development with other social and economic activities in the area are provided as part of Environmental Management Action Plan.

The main objective of the assignment was to assist the proponent to prepare a full study report for the proposed residential project so to ensure that the proposed development takes into consideration appropriate measures to mitigate against identified adverse impacts to the environment. The study identified existing and potential environmental impacts and the issues of concern that interested and/or affected parties raised about the development. The associated prevention and mitigation measures for the proposed projects negative impacts are outlined in the environmental Management Plan (EMP) proposed.

The consultant on behalf of the proponent conducted the study by incorporating but not limited to the following terms of reference:

- Location of the proposed residential housing project
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the project.
- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- To recommend a specific environmentally sound and affordable wastewater management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- 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 the foreseeable 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, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties that were encountered in compiling the information. p. An economic and social analysis of the project.
- Such other matters as the Authority may require.

1.2: Data collection procedures

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

and scientific tests, where necessary in the manner specified in the Environmental (Impact Assessment and Audit) Regulations, 2003.

1.3: Responsibilities and Undertaking

The Consultant undertook to meet all logistical costs relating to the assignment, including those of production of the report and any other relevant material. The proponent through the project architect provided the project site plan showing roads, service lines and buildings layout plans, operation permits and conditions, land-ownership documents and site history.

The output from the consultants includes the following:

- An Environmental and Social Impact Assessment (ESIA) Study Report comprising of an executive summary, study approach, baseline conditions, anticipated impacts and proposed mitigation measures.
- An Environmental Management Plan Outline which also forms part of the report recommendations.

1.4: Methodology outline

The proposed site is located within an area with minimal natural resources hence the projects cumulative effect to the surrounding environment will not be adverse. Moreover, the proposed development and use of the facility will be in line with what exists in the surrounding areas, hence an environmental project reports will adequately address the projects 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(amended 2015)
- Environmental scoping that provided the key environmental issues
- Desk Stop studies and interviews
- Physical inspection of the site and surrounding areas
- ESIA Public participation by the use of questionnaires
- Reporting.

1.5: Environmental screening

The screening process was applied to determine whether a full study was required and what level of assessment was necessary. This was done in reference to requirements of the principal environmental legislation and specifically the second schedule. Issues considered included the physical location, sensitive issues and nature of anticipated impact of the proposed project.

1.6: Environmental scoping

The scoping process narrowed down the study to the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

1.7: Desk top study

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

1.8: Site assessment and public participation

Field visits were meant for physical inspections of the site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts. To ensure adequate public participation in the ESIA process, questionnaires were administered to the site neighbours within a one Kilometre radius and the information gathered was subsequently analyzed and incorporated into the ESIA project report.

Reporting In addition to constant briefing of the client, this full prepared study report will be presented for submission to NEMA as required by law.

CHAPTER 2. PROJECT DESCRIPTION

2.1 Location and Size of the Project

The proposed project is situated along Riara road. The site is located within Dagoretti North Sub County, within Nairobi County on plot LR. NO. 330/179. The proposed site(below) is owned by the proponents. The co-ordinates of the project sites geographical area are -1.2974,36.7606).

Plate 1: Project site

2.2 Project's surrounding

The neighbouring area is occupied mainly by human settlement, commercial premises and social amenities; including restaurants, schools, offices and churches and multi-dwelling residential developments. Such key neighbouring facilities include: -

- The junction mall
- Riara School

- Urban Oasis
- Garage facility
- Residential Units
- Kingara apartments
- Makini school
- General tire garage

Plate 2: General Tires limited neighbouring the project site

Plate 3: Residential apartment compatible to the proposed project

Plate 4: Makini school loated along Riara rd

2.3 Site Ownership and Size

The proposed site falls within Land Reference Numbers 330/179 and will all be utilized to develop the proposed development. The land is registered in the name of the proponent Riara Plumeria Development Limited as a transferee.

2.4 Description of the project's construction activities

2.4.1 Site preparation works

The proposed project site will be prepared for construction. This will involve demolition works of the existing structures in the project site, clearing of vegetation, excavation works, transportation of construction materials and construction works. This will be undertaken in a phased approach to mitigate soil erosion and the impacts of excessive dust generation. Due to the nature of the proposed project, construction will involve the use of earthmoving machinery such as excavators and bulldozers. The engineers will also utilize human labour where necessary so as to create employment to the local residents especially the youth.

2.4.2 Storage of materials

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

2.4.3 Masonry, concrete work and related activities

The construction of the building walls, foundations, floors, pavements, drainage systems, and parking among other components of the project involves a lot of masonry work, laying of plumbing and related activities. General masonry and related activities include, 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 will be supplemented by machinery.

Construction inputs (materials) include:

i. Construction raw materials i.e. sand, cement, stones, crushed rock gravel, murram, ceramic and glazed tiles, clay tiles, glass, steel metals and metal products, plastic and PVC pipes and materials, ceiling materials (soft board panels), steel pipes, timber and timber products, precast and concrete products, iron sheets and iron products, electric cables and conduits, painting materials among others. Other inputs shall include necessary fittings and fixtures such as electrical gadgets (switches, sockets, lamps etc.), water closet sets and other bathroom accessories, water taps, sinks and

kitchen equipment and furniture and general office furniture among others. All these will be obtained from licensed dealers and especially those that have complied with the environmental management guidelines and policies. It is worthwhile noting that most of the construction materials are locally available.

ii. Construction machines including machinery such as excavators, graders, mixers, and bulldozers and other tools and equipment. These will be used for the transportation of materials, clearing of the vegetation and debris, in the construction of the project site. Such machinery will use petroleum products to provide energy.

iii. A construction labour force of both skilled and non-skilled workers. These will require services such as energy, water supply and sanitation facilities.

iv. Large volumes of water for construction purposes. It will be supplied from the local area supply mains.

Construction activities include the following: -

a. The first activities will involve the demolition of the existing buildings and structure(s)
b. Construction of temporary construction office(s) and store
c. Procurement of construction materials from approved dealers.
d. Transportation of construction materials using heavy and light machinery.
e. Storage of the construction materials.
f. Site clearing, excavation and filling, laying of foundation, building works, disposal of the resulting construction wastes.
g. Disposal of the existing debris/ materials. All debris and excavated materials will be dumped on sites approved by the relevant departments of the government.
h. Electrical, civil, and water engineering works. These will be done by registered expertise
i. Landscaping works and earth works.
j. Completion of the development and occupation.

The buildings will be constructed based on applicable building standards of Kenya. These include but not limited to the Building Code and the British Building Standards *BS 8110* and

BS 5950, BS4449, BS446, BS5255, BS497, BS556, BS4466, BS4461 etc. The constructions will as well incorporate environmental guidelines, health and safety measures.

2.4.4 Structural steel works

The building will be reinforced with structural steel for stability. Structural steel woks involve steel cutting, welding and erection.

2.4.5 Electrical work

Electrical work during construction of the premises 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.

2.4.6 Plumbing

Installation of pipe-work will be done to connect sewage from the ablution blocks to a sewer system. Plumbing will also be done for drainage of storm water from the rooftop into the peripheral storm water harvesting tanks. Plumbing activities will include metal and plastic pipe cuttings, the use of adhesives, metal grinding and wall drilling among others.

2.5 Description of the project's operational activities

2.5.1 Residential activities

Once construction is complete, the residential apartment will be ready to be occupied by respective owners.

2.5.2 Solid waste

The proponent will provide facilities for handling solid waste generated within the facility. These will include solid waste accumulation room for temporarily holding waste within the premises before final disposal at the designated sites.

2.5.3 Liquid waste

The proponent will provide adequate and safe means of handling liquid waste generated within the facility by connecting to the existing sewer line that travers along Riara rd. These

will include conducting regular inspections for pipe blockages or damages and fixing them appropriately. Also, the proponent will conduct regular monitoring of the sewage discharged to the county foul sewerage system from the project to ensure that the stipulated sewage/effluent discharge rules are not violated.

The proponent is advised to undertake a pre-connection survey on the loads supported by the alternative trunks prior to selection of the suitable connection line.

2.5.4 Storm Water Drainage

The proposed development will generate enormous surface water. It is therefore recommended that adequate and well drainage channels be provided to accommodate the increased discharge. This will be determined at the site works.

2.5.5 Electricity Supply

The proposed development will be connected to the Kenya Power supply line. The Kenya power electricity supply lines are already available within the neighbourhood of the proposed project site.

2.5.6 Mains Water Supply

A dedicated potable water system will be provided within the building. The system will consist of the following main system components. The existing facility is connected to NCWSC water supply, the proponent intends to similarly apply for approvals and subsequently connect to the NCWSC water supply, additionally, potable water tanks shall be provided to serve domestic and drinking water purposes. The sizes of the tanks are based on a capacity/demand storage period of wholesome/potable water consumption for each block. The proponent in the event of considerations to drill borehole, is thus advised to undertake adequate survey on the ground water tables and seek approvals from the relevant authority prior to implementation of the borehole sinking. The boreholes should there be need for one, shall undergo ESIA process and approval by NEMA, WRA and the Nairobi City County.

2.5.7 Earthing and Lightning Protection

Buildings/ structures within the proposed development which will require lightning protection will generally include a roof air termination network with suitable down

conductors to ground level. Where practical, it may be possible to make use of the building structure to form the down conductor path, with suitable test and inspection facilities at the lowest levels.

2.5.8 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.

2.6 Decommissioning Phase

Decommissioning of operations is here taken to mean that the residential development cease to operate and the premises are closed down or reverted to another use. Under such circumstance, the proponent will be expected to adhere to the relevant legislation applicable to such an undertaking in the laws of Kenya. The decommissioning shall be undertaken through a number of steps and measures to rehabilitate the site to its initial status before the implementation of the residential development project. This will involve analysis of sustainable alternative uses of the site that is compatible to the surrounding project site area. An environmental impact assessment shall be commissioned to advice the proponent on the environmental impacts with respect to the identified new use.

CHAPTER 3. BASLINE INFORMATION OF THE STUDY AREA

3.1 Introduction

The project site is located in Dagoretti North Sub County within Nairobi County. The site is along Riara Road. There is few natural vegetation within the site. A mix of clustered exotic trees spread all over the land the neighbourhood to the project site. The neighbouring area is occupied mainly by human settlement, commercial premises and social amenities; including restaurants, schools, offices and churches and multi-dwelling residential developments.

3.2 Climate

The project area enjoys moderate cool climatic conditions. The altitude makes for some chilly evenings, especially in the June-July season when temperature can drop less than 10ºC. The period between December and March is the sunniest and warmest with temperatures averaging the mid-twenties during the day. The mean annual temperature is 17°C and the mean daily maximum and minimum are 23oC and 12oC, respectively. The climatic condition of the area highly influences the land use patterns, levels of productivity and general development decisions of the area.

Climate data for Nairobi

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	25.5 (77.9)	26.7 (80.1)	26.8 (80.2)	25 (77)	23.6 (74.5)	22.5 (72.5)	22 (72)	22.7 (72.9)	25 (77)	25.7 (78.3)	24 (75)	24.4 (75.9)	24.49 (76.11)
Daily mean °C (°F)	18 (64)	18.8 (65.8)	19.4 (66.9)	19.2 (66.6)	17.8 (64)	16.3 (61.3)	15.6 (60.1)	15.9 (60.6)	17.3 (63.1)	18.5 (65.3)	18.4 (65.1)	18.1 (64.6)	17.77 (63.95)

Average low °C (°F)	10.5 (50.9)	10.9 (51.6)	12.1 (53.8)	13.4 (56.1)	12.1 (53.8)	10 (50)	9.2 (48.6)	9.1 (48.4)	9.7 (49.5)	11.3 (52.3)	12.7 (54.9)	11.7 (53.1)	11.06 (51.92)
Rainfall mm (inches)	58.3 (2.295)	49.8 (1.961)	92.2 (3.63)	242.3 (9.539)	189.5 (7.461)	38.6 (1.52)	17.6 (0.693)	24 (0.94)	31.2 (1.228)	60.8 (2.394)	149.6 (5.89)	107.6 (4.236)	1,061.5 (41.787)
Avg. rainy days (≥ 1 mm)	4	4	8	16	13	5	3	4	4	7	14	9	91
Mean monthly sunshine hours	288.3	268.4	266.6	204	189.1	159	130.2	127.1	180	226.3	198	257.3	2,494.3

Source #1: Hong Kong Observatory *(1961-2020) and* World Meteorological Organization

Figure 1: Nairobi climate data

3.3 Humidity

Because of 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.

3.4 Infrastructure and Transport

The proposed residential development is accessible from Kingara rd and Niavasha rd that links to Ngong rd, and located along Riara Road that links Naivasha rd to Kingara road and extends to Oledume rd that connects Ngong rd to Argwings Kodhek in Dagoretti North. Due to rapid urban growth, provision of basic infrastructure for all has become an important concern for development planners in Nairobi.

The basic infrastructural services that have deteriorated due to rapid increase in population include: Solid Waste Management (SWM) system; Water and Sewerage Systems; Drainage and flood protection; Roads; Mass transportation; Electric installations; and telecommunications. Greater environmental pollution, congestion and problems have been the result of under-provision of such basic services.

Nairobi city is well served with good communication and transport network such as air, road, and railway. The project site is centrally located to serve the prospective residents with easy access to Bus stations and the road access within an easy reach to the City centre.

The proponent is hereby advised to undertake traffic assessment in order to develop an adequate material delivery plan to avert possibility of traffic jam resulting from the proposed project development.

Plate 5: Section of Kingara rd, near Urban Oasis

Plate 6: Section of Riara rd that serves the project site

3.5 Water supply and Sanitation

The major source of water is the water supplied by The Nairobi Water and Sewerage Company supplemented by water from private boreholes. The proposed project site will utilize water supplied by The Nairobi Water and Sewerage Company. Waste water discharged from the facility shall be channeled to the NCWSC sewer line upon compliance to the regulatory provisions that guide such connections.

3.6 Biological Diversity

- **Flora**

Natural vegetation in the area has been highly compromised by human settlement and other anthropogenic activities. The project area is covered with scattered exotic species of trees, grasses and shrubs. Similarly different food crops are also present in the area including maize and various vegetables. The vegetation within the proposed site does not merit special conservation status since it is of least biological and cultural importance. However, the proponent will implement a landscaping plan upon completion of construction and it is recommended that indigenous tree species be utilized. The proponent is advised to desist from tree cutting and encourage tree conservation unless it's necessary. The proponent

should also develop a re-vegetation plan to compensate for the tree cover that will be lost during the project implementation phase. This can well be achieved through landscaping works on the open areas, engaging in tree planting activities, donation of tree seedlings to neighboring school facilities and conservation organizations.

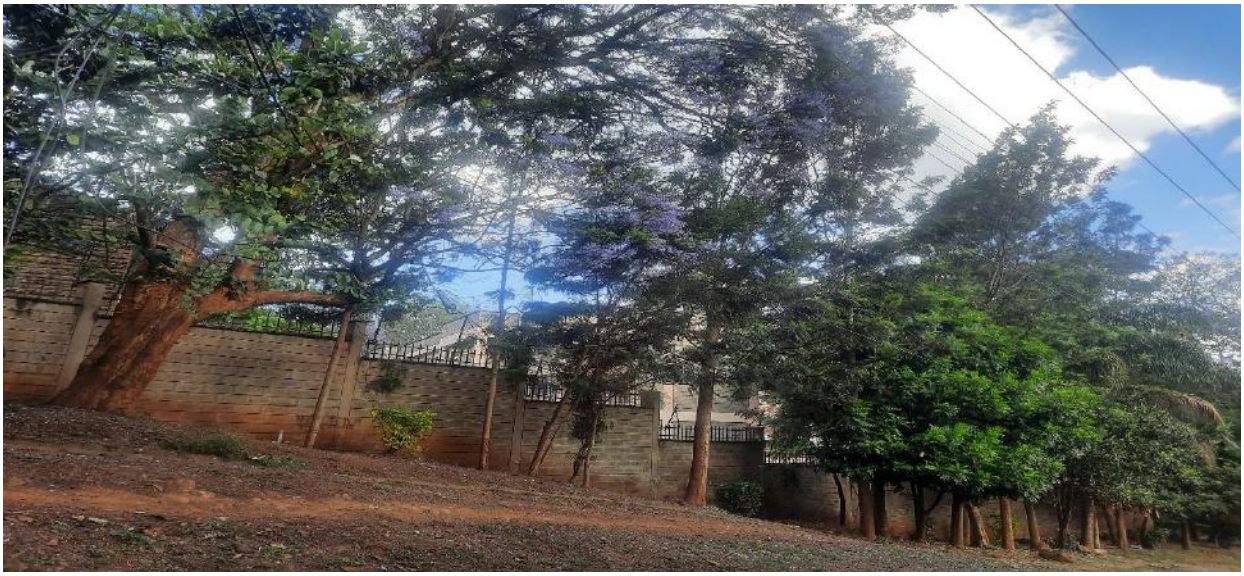

Plate 7: Vegetation distribution around the project site vicinity

- **Fauna**

No macro wild animals were noticed in the surrounding area, but a variety of birds and insects were observed. It is therefore not anticipated that there will be great habitat destruction so long as the green designs adopted are implemented

3.7 Demography

Nairobi City is a cosmopolitan area. It records one of the highest urban population densities in the country. The current population is of Nairobi is 4 million (KNBS 2019 CENSUS). The population is expected to reach 6 million by 2023. Provision of housing facilities is still a challenge to a large segment of population in Nairobi with majority of the residents living in slum areas. The project's surrounding is predominantly a residential area however there are schools, restaurants, a petrol station and small shopping centres within the project vicinity.

3.8 Economic Activities

The major economic activities in Nairobi include businesses, both informal and formal. Some of the investments in the city are industries, farming and office complexes. The city also is a home of a number of international UN organizations for example United Nations Environmental Programme (UNEP) Agency. Due to its population, Nairobi provides numerous opportunities for trade at various scales.

Plate 8: The Junction Mall one of the key economic hub in the project surrounding

CHAPTER 4. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

Environmental and Social Impact Assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. According to section 58 of the principal Environmental Management and Coordination Act (EMCA) No. 8 of 1999, second schedule 9 (I), and Environmental (Impact Assessment and Audit) Regulation, 2003, both new and old projects must undergo Environmental Impact assessment and Audits. The report of the same must be submitted to the National Environment Management Authority (NEMA) for approval and issuance of the relevant certificates.

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 adversely affect the natural resources upon which the economy is dependent. 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.

4.2 Environmental policy

This ESIA has been prepared to fully comply with environmental and social safeguard policies and procedures as outlined in the various regulations by Kenya's National Environment Management Authority.

4.3 Relevant Kenya Policies

4.3.1 National Environment Policy 2013

The National Environment Policy aims to provide a holistic framework to guide the management of the environment and natural resources in Kenya. The major objective of the policy is to provide a framework for an integrated approach to planning and sustainable management of Kenya's environment and its natural resources. The policy further ensures that the environment is integrated in all government policies in order to facilitate and realize sustainable development at all levels. This would help promote green economy, enhance

social inclusion, improve human welfare and create opportunities for employment and maintenance of a healthy ecosystem.

4.3.2 Physical Planning Policy

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

4.3.3 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that ancillary buildings are adequately provided with utilities that make them 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 the residents and visitors who access the facilities.

4.3.4 The Sessional Paper No.4 on Energy

The major objective of the Policy is to ensure adequate, quality, cost effective and affordable supply of energy through indigenous resources while protecting the environment. It encourages wider adoption and use of renewable energy technologies to enhance their role in the country's energy supply matrix. The Energy Policy is aligned to long term development strategy -Vision 2030 and other policies.

4.3.5 The Kenya Vision 2030

The Kenya Vision 2030 is the national long-term development policy that aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment.

4.3.6 The Kenya National Climate Change Response Strategy

The purpose of this strategy is to put in place robust measures needed to address most of the challenges posed by climate variability and change through thorough impact assessments and monitoring of various projects. According to Climate Change Projections, the country is likely to experience hotter drier sunny seasons, warmer wetter rainy seasons, rise in sea levels and an increase in extreme weather events.

In the construction sector, priority inclusion areas should include energy efficient innovations and technologies, and utilization of low-carbon appliances and tools; the utilization of eco-friendly energy resources such as wind, solar, biogas, etc.; as well as possible utilization of biofuels.

4.5 Institutional Framework

Environmental and Social Impact Assessment (ESIA) is a critical examination of the effects of a project on the environment. The goal of an ESIA is to ensure that decisions on proposed projects and activities are environmentally sustainable. It guides policy makers, planners, stakeholders and government agencies to make environmentally and economically sustainable decisions. It is therefore a legal requirement to carry out an ESIA before commencement of the proposed project.

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions relevant to the proposed Residential housing development include the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Kenya Forest Service, Water Resources Management Authority (WRMA) and others. There are also local and international NGOs involved in environmental issues in the country.

4.5.1 National Environment 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 utilisation of environmental resources on a sustainable basis for the improvement of the quality of human life in Kenya.

- Take stock of the natural resources in Kenya and their utilisations in 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.

- Mobilise 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 the following committees

4.5.2 National Environmental Complaints Committee (NECC)

The NECC'S mission is to facilitate access to environmental justice to the public by providing a forum for environmental conflict resolution and contributing to environmental policy. The Committee performs the following functions:

- Investigate complaints or allegations regarding the condition of the environment in Kenya and suspected cases of environmental degradation.

- The NECC also undertakes public interest litigation on behalf of the citizens in environmental matters.

4.5.3 County Environment Committee

The County Environment Committee shall-

(a) Be responsible for the proper management of the environment within the county for which it is appointed;

(b) Develop a county strategic environmental action plan every five years for consideration and adoption by the County Assembly. Every County Environment Committee, in preparing a county environment plan, shall undertake public participation and take into consideration every other county environment action plan already adopted with a view to achieving consistency among such plans. The respective County Executive Committee members of every county shall submit the county environment action plan to the Cabinet Secretary for incorporation into the national environment action plan.

(c) Perform such additional functions as are prescribed by the EMCA (Amendment) Act 2015 or as will from to time, be assigned by the county Governor by notice in the Gazette.

4.5.4 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. The members of the Standards and Enforcement Review Committee are set out in the third schedule of the principal Environmental Management and Co-ordination Act.

The Principal Secretary under the Cabinet Secretary is the Chairperson of the Standards 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 also provides secretarial services to the Committee. The Committee regulates its own procedure. The Standards and Enforcement Review Committee may co-opt any person to attend its meetings and a person so co-opted shall participate at the deliberations 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.

4.5.5 National Environmental Tribunal

The tribunal's principal function is to receive, hear and determine appeals arising from decisions of the National Environment Management Authority (NEMA) on issuance, denial or revocation of environmental impact assessment (EIA) licenses, among other decisions. If disputes with respect to the proposed mini-hydro project arise, the NET will function very much like a court of law.

4.5.6 National Environmental Council (NEC)

Part III section 4 of the principal Act outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for purposes of EMCA; sets national goals and objectives, determines policies and priorities for the protection of the environment, promotes co-operation among public departments, county governments, private sector, non-governmental organizations and such other organizations engaged in environmental protection programmes. It also performs such other functions as assigned under EMCA.

4.6 Legal Framework

The country has several legal provisions on environmental protection, which regulate infrastructural development projects such as the proposed residential development project. A summary of the various legislations relevant to the proposed development are outlined below. The following pieces of legislation and regulations are applicable to the proposed development.

4.6.1 The Environmental Management and Coordination (Amendment) Act, 2015

The Act provides for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment. This Act is guided Policy wise by the national environmental council, while the day-to-day enforcement falls under the Director General of the National

Environmental Management Authority. Thus (NEMA) enforces the Act on behalf of the Cabinet Secretary responsible for Environment. Its functions include:

- The coordination of various environmental management activities;
- Initiation of legislative proposals;
- Research, investigations, and surveys on the field of environment.
- Creation of environmental education and awareness programmes;
- Advise the government on regional and international agreements to which Kenya is party to; Executing the Environmental Impact Assessment (EIA) under the Environmental Impact (Assessment and Auditing) regulations, 2003, among other duties

4.6.6.1 The Environmental (impact assessment and audit) Regulations, 2003

Environmental Impact Assessment under the Act is guided by the Environmental Impact Assessment (Assessment and Auditing) Regulations of the year 2003, which is 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 principal EMCA, 1999 section 58 (1), (4) that require an Environmental Impact Assessment project 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.

4.6.6.2 Environmental Management and Coordination (Water Quality Regulations), 2006

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. NEMA regulates discharge of all effluent into the aquatic environment. The regulations provide for the creation of a buffer zone for irrigation schemes of at least fifty (50) metres in width between the irrigation scheme and the natural water body. Standards for irrigation water are given in schedule nine of the regulations.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental Management and Coordination Act (EMCA) gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

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

These Regulations cited as the Environmental Management and Co-ordination (Waste Management) Regulations, were gazetted in 2006. Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

4.6.6.4 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 period. 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 labelled 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.

4.6.6.5 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 proposed project must comply with the various national provisions that aim at the protection and conservation of the country's biodiversity

4.6.6.6 Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009

The Regulations determine that no person or activity shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
- Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Any person(s) intending to undertake activities in which noise is suspected to be injurious or endangers the comfort, repose, health or safety of others and the environment, must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions. Failure to comply with these regulations attracts a fine of KES 350,000- or 18-months jail term or both.

4.6.6.7 Air Quality Regulations, 2008

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2008". The objective of the regulation 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 mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the principal Environmental Management and Coordination Act. 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 for 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;
- Firefighting rehearsals or drills conducted by the Fire Service Agencies
- Traditional and cultural burning of savannah grasslands;
- Burning for purposes of public health protection;

4.6.7 The Traffic Act, 2012

The Traffic Act of gives provisions and guidelines that govern the Kenya roads transport sector. These guidelines are essential to private, public and commercial service vehicles in ensuring safety and sanity on the roads hence ensuring the environment; the human being a component is safeguarded. In section 41 The Act demands for installation and certification of speed governors for the commercial vehicles ferrying goods adjusted to the loading condition of such vehicles to a limit of 80 KPH, registration and competence of drivers.

Moreover, the owner of commercial vehicles or trailer shall ensure clear markings on their vehicles in English language on the right side of the vehicle showing ownership details, tare weight of vehicle and maximum authorized weight.

Section 26 and 27 of the same discourages engines that emit exhaust gases to the atmosphere without passing via a silencer or expansion chamber.

Section 55(1) of the Traffic Act states that no vehicle shall be used on a road unless such vehicle and all parts and equipments thereof, including lights and tyres comply with the requirements of the Act and such parts and equipments shall at all times be maintained in such a condition that the driving of the vehicle is not likely to be a danger to other users of the road or to persons travelling on the vehicle. In ensuring safety of all the persons in transit, section 56 encourages that every public and commercial vehicle be fitted with inspected and first class first aid box and fire extinguisher

4.6.8 Public Health Act (Cap. 242)

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

4.6.9 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. The Land Act of 2012 subsection (1) states that 'any land may be converted from one category to another in accordance with the provisions of this Act or any other written law.' it continues to state in subsection (2) that Without prejudice to the generality of subsection (1)

a) Public land may be converted to private land by alienation

b) Subject to public needs or in the interest of defense, public safety, public order, public morality, public health, or land use planning, public land may be converted to community land

c) private land may be converted to public land by

   i. Compulsory acquisition;

   ii. Reversion of leasehold interest to Government after the expiry of a lease; and

   iii. Transfers; or

   iv. Surrender.

(d) Community land may be converted to either private or public land in accordance with the law relating to community land enacted pursuant to Article 63(5) of the Constitution.

It is important to note that any substantial transaction involving the conversion of public land to private land shall require approval by the National Assembly or county assembly as the case may be.

Part I of the same Act states that title to land may be acquired through:

(a) allocation;

(b) land adjudication process;

(c) compulsory acquisition;

(d) prescription;

(e) settlement programs;

(f) transmissions;

(g) transfers;

(h) long term leases exceeding twenty-one years created out of private

land; or any other manner prescribed in an Act of Parliament.

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.

4.6 10 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:

- Registration of interests in all public land as declared by Article 62 of the Constitution;
- Registration of interests in all private land as declared by Article 64 of the Constitution; and
- 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.

4.6.10 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.

4.6.11 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):-

- to manage public land on behalf of the national and county governments;
- to recommend a national land policy to the national government;
- to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;
- to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;
- to initiate investigations, on its own initiative .or on a complaint, into present or historical land injustices, and recommend appropriate redress;
- to encourage the application of traditional dispute resolution mechanisms in land conflicts;
- to assess tax on land and premiums on immovable property in any area designated by law; and To monitor and have oversight responsibilities over land use planning throughout the country

4.6.12 Water Act, 2002

The Water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, and requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 59 (4) of the Act states that the national water services strategy shall contain details of:

- Existing water services
- The number and location of persons who are not being provided with basic water supply and basic sewerage

- Plans for the extension of water services to underserved areas
- The time frame for the plan; and

Part II, section 18, of the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRMA) to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records ought to be kept by a facility operator and the information thereof furnished to the Authority.

4.6.13 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

4.6.14 Petroleum Act Cap. 116

Section 5 of this Act states that the occupier of any facility which petroleum is kept in contravention of any rule made under this Act shall be guilty of an offence.

Section 6 states that if any person to whom any license is granted under any rule made under this Act contravenes any of the conditions of the license, he shall be guilty of an offence. Petroleum rules, Part III section 13(1) provides guidelines on storage of petroleum.

According to the section, no person shall store petrol unless in accordance with a license issued by a licensing Authority. Petroleum rules, part III section 19 and 29 provides guidelines on storage sheds and associated installations.

4.6.15 National Construction Authority Regulations, 2014

The NCA published the National Construction Authority Regulations 2014, the Code of Conduct and Ethics for the Construction Industry, and the NCA Strategic Plan (2015-2020) to effectively regulate the construction industry in Kenya. Contractors operating or willing to undertake construction operations in Kenya are required by law to register through the National Construction Authority (NCA), which is constituted under Act No. 41 of 2011 Laws of Kenya. The NCA is mandated to clear builders and contractors as a way of eliminating rogue contractors in Kenya and malpractices in the building and construction industry. The Authority has provided the regulatory framework for registration and renewal of contractors. It is tasked with the responsibility of inspecting construction and building projects around the country to ensure high quality of work and close projects posing health risks and collapse hazards.

4.6 16 The Occupational Safety and Health Act (OSHA), 2007

Before any premises are occupied, or used, a certificate of registration must be obtained from the chief inspector. The occupier must keep a general register. The Act covers provisions for health, safety and welfare. This Act applies to all workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to secure the safety, health and welfare of persons at work, and protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the Activities of persons at work. Some of the areas addressed here are machinery safety, chemical safety and health, safety and welfare special provisions are also provided in the ILO conventions on safety and health in construction recommendation, 1988 R175.Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000- or 3-months jail term or both or penalties of KES 1,000,000- or 12-months jail term or both for cases where death occurs and is in consequence of the employer.

4.6 17 The Standards Act Cap. 496

The Act is meant to promote the standardization of the specification of commodities, and to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.

4.6.18 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

4.6 19 Physical Planning Act (Cap 286)

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes enacted by the Parliament of Kenya Under this Act, no person shall carry out development within the area of a county government without a development permission granted by the county government. The county government concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. If on the expiry of the ninety days' notice given to the developer such restoration has not been affected the concerned county government shall restore the site to its original condition and recover the cost incurred thereto from the developer.

4.6.20 Employment Act No 11 of 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. Its purpose is to promote sound labour relations through freedom of association, the encouragement of effective collective

bargaining and promotion of orderly and expeditious dispute the protection and promotion of settlement conducive to social justice and economic development for connected purposes. This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the construction industry.

4.6.21 Penal Code Cap 63

Section 191 of the penal code states that if any person or institution voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use, the person 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 neighborhood or those passing along public way, commits an offence.

Other relevant regulations include: -

- New sustainable solid waste management act of 2022
- The Nairobi County Solid waste management act of 2015
- Kenya's climate change act of 2016

CHAPTER 5 PUBLIC PARTICIPATION

5.1 Introduction

Public consultation and participation 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. Therefore, the chapter describes the process undertaken in the public consultation and public participation followed to identify the key issues and impacts of the proposed the residential development in Nairobi County. The objective of the consultation and public participation was to:

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

In addition, the process enabled,

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

5.2 Methodology used in public consultation

The exercise was conducted by a team of experienced registered environmental experts. The following process in carrying out the entire process involved:

- Key informant interviews and discussions
- Public barazas
- Field surveys, photography and observations
- CPP questionnaires

The use of pre-designed questionnaires captured all the phases of the proposed development The purpose for such interviews and barazas was to identify the positive and negative impacts and subsequently identify proposals for the best practices to be adopted to mitigate the negative impacts. It also facilitated the in identification any other miscellaneous issues, which may bring conflicts in case project implementation proceeds as planned. The information gathered identified specific issues from the stakeholders' response, which provided the basis for undertaking the Environmental Impact Assessment process.

Plate 9: 1st Public participation meeting

Plate 10: 2nd Public consultation meeting

5.3 Views expressed

From the field work surveys it was apparent that the proposed development was received with mixed reactions by the interviewed people as they anticipated numerous impacts both negative and positive alike. The local community people, neighbours, and major stakeholders independently gave their views, opinions, and suggestions.

5.3.1 Positive Views Expressed

5.3.1.1 Employment Opportunities

The respondents interviewed were optimistic that the project will create numerous employment opportunities for both for skilled and unskilled labour alike from the construction phase to the operational phase. Despite the fact that most of the project will need skilled labour force, some of those interviewed expressed hope that they will be able to access employment once the project commences mostly as casual workers.

This will be a source of income for several individuals and households and hence is expected to boost the GDP and improve the living standards of the local people.

5.3.1.2 Economic growth

The use of locally available materials during the construction phase of the proposed residential development such as cement, building blocks concrete and ceramic tiles, timber, sand, ballast electrical cables etc., will enhance the growth of the economy as well as the living conditions of the business enterprises trade on these construction materials. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increased government revenue.

5.3.1.3 Increased Business Opportunities

Those with businesses along and around the area were optimistic that the increased number of visitors and customers in the area will result in an increased customer base to their business enterprises. According to them, the number of customers will increase from the construction workers, the security and maintenance personnel including visitors who will be visiting the residential housing development during its operation phase.

Impact	Discussion
Employment Opportunities for the Locals	The respondents were positive that the project would create numerous employment opportunities for both skilled and unskilled labour alike, during the construction and operational phases. Even though most of the works would need skilled labour force during construction, people expressed hope that they would be able to access employment once project commences mostly as casual workers. The respondents were also optimistic that they would take up relevant training to take up jobs during construction stage.
Poverty Alleviation	The respondents were positive that the proposed development activities would reduce poverty in the area and its environs due to improved income brought about by employment.
Increased Business Opportunities	The respondents and participants were optimistic that business opportunities would arise during construction of the Development

Increase in Land Value	Land rent and standard of living of the populace will increase due to high demand for space for urban development thus increasing the value of land and property within and surrounding.
Attraction of Investors	With the proposed development, investors will be attracted to invest their money in the proposed development through enterprises, business, residence among others
Development of Infrastructure and Social Amenities in the Area	Respondents were optimistic that the proposed development activities would improve infrastructure in the area.
Improved and Accessible Education	The respondents were optimistic that the proposed development activities would improve the value of education in the area and accessibility to research institutes
Better Healthcare	Respondents were positive that the proposed development activities will improve health services in the area and it will reduce fatalities from curable diseases.
Improved Water Supply	The participants were optimistic that the proposed boreholes for water extraction would improve the availability of water in the area.
Improved Electricity Facilities	The participants were optimistic that the proposed connections to Kenya Power and Solar Power would improve the availability of electricity in the area.
Improved Security	The respondents were optimistic that the proposed development activities will lead to improved security situation in the neighbourhood due to the numbers that will reside in the areas
Housing amenities availability	The respondents were positive that the proposed residential apatment would boost availability of improved housing conditions in the area
Transfer of Skills	The members of the public suggested that with the project being a source of employment. Many different skilled workers would be employed from

	within and without the area. This would lead to a transfer of skills and gaining of experience during the implementation phase.
Economic Growth / Increased revenue	The use of locally available materials and labour for the proposed development activities will contribute towards growth of the local and national economies by contributing to the gross domestic product.
Improve Networking and Culture Exchange	The development will attract various people from different counties and countries and this will promote cultural integration of knowledge and exchange of a wide range of ideas.

5.3.2 Negative concerns expressed

5.3.2.1 Dust emissions

The people expressed concern over possibility of generation of large amount of dust and exhaust fumes within the project site and surrounding areas as a result of construction works and transportation of construction materials. The proponent shall ensure that dust levels at the site are minimized through implementation of dust abatement techniques on unpaved, un-vegetated surfaces to minimize windblown erosion. Sprinkling water in areas being constructed and along the tracks used by the transport trucks and diversions within the site will be done. Additional mitigation measures presented within the EMP will be fully implemented to minimize the impacts of dust generation.

5.3.2.2 Noise and Vibration Pollution

The residents expressed their fears over noise pollution that would come from the construction works and the vehicles during the operation phase. They requested the proponent to use minimum noise producing machines and to reduce the duration of idling of vehicles making deliveries. Residents were informed that maximum permissible noise levels as per the EMCA (Noise and Excessive Vibration Pollution Control) Regulations 2008 would be observed during the construction phase. It is also recommended that quieter construction machines such as jack-in piling machines, which generate about 20 dB (A) less noise than bore piling machines be utilized. It is also recommended that the proponent consider using noise control equipment such perimeter noise barriers, which can reduce

noise by 5 dB (A) to 10 dB (A). These measures will be effective in reducing construction noise, when used as part of a good noise management system.

5.3.2.3 Solid Waste Generation

Some of the excavation spoil material will be rendered unusable and thus will have to be disposed of. This also applies to some of the soil/rocks, which may not be reusable after excavation processes are complete. All these materials need to be collected, transported and disposed of appropriately in approved designated areas. It is encouraged that other alternative uses of these materials should be found e.g. filling excavated areas at the site. During construction and the operational phase, designated areas for waste collection will be provided and the solid wastes will be disposed of by a NEMA registered Waste operator.

Impact	Comments
Noise Pollution and Vibrations	The residents expressed fear over noise and vibrations likely to occur during the execution of the project. They highlighted construction equipment and other moving machines in the construction sites
Air Pollution	The people expressed concern over the possibility of generation of large amount of dust and fumes within the execution stage of the project. They noted that surrounding areas might encounter air pollution from excavation works and transportation of construction materials and industries.
Water Pollution	The residents feared that execution of the project would lead to increased population in the area, the natural water ways would be polluted through sewage effluent and water waste water from the construction process if not adequately managed.
Increased pressure on infrastructure	Some participants were concerned that due to magnitude of the proposed project, its execution will increase pressure on existing infrastructure such as roads, water supply system, waste handling facilities, electricity etc. This would be due to increased volumes on human and vehicle traffic along the access road.

Interference of Existing Development Infrastructure	The respondents also claimed that the execution of the proposed project would interfere with already existing infrastructure such as the pipeline, water pipes, power lines, roads and thus cause inconveniences.
Displacement of the site residents	The participants were worried that the proposed development activities would lead to displacement of those residing within the project site
The non-skilled are unlikely to get jobs	Respondents were concerned that only the skilled would have jobs leaving out the unskilled who are the majority in the area
Increased Insecurity	There were concerns that due to an influx of many people during project execution phase, insecurity is likely to increase.
Dust Generation	The public expressed concerns over the possibility of generation of large amounts of dust within the project site and surrounding areas because of demolition, excavation works and transportation of building materials
Loss of Vegetation Cover	Members of the public expressed concerns that during the construction phase of the project, there would be clearance of vegetation, which would lead to the negative impacts. The clearance of vegetation would affect the scenic beauty and ecological functioning of these sensitive areas. Also, the clearance of vegetation would have impacts on the soil particularly increased soil loss which subsequently might impact on the water quality and ecosystem productivity.
Increase in the spread of STD, HIV and AIDS	The residents expressed concern that there would be an increase in incidences of sexually transmitted diseases including HIV and AIDS during construction and operational phase as a result of increased interactions
Competition for resources and other utilities	The respondents feared that the proposed project would attract a high population in the area which would result to increased demand of shared resources and other utilities. This is feared to bring about competition of resources against the increasing population

CHAPTER 6: GRIEVANCE REDRESS MECHANISM (GRM)

6.1 Introduction

A key principle of any development is to prevent or minimize grievances rather than going through a redress process. This can be achieved through commitment to full participation and consultation of the stakeholders and establishing extensive communication and coordination between the affected communities, and the envisioned development. However, this does not always preclude grievances from arising.

This ESIA process provides opportunities for the likely to be affected parties to air and articulate their queries, concerns, issues, complaints, dissatisfaction or sense of injustice or unfairness, and seek to have these resolved amicably, and in the shortest time possible. Affected parties should be able to file a grievance for any disagreeable decision, practice or activity, arising from proposed development. Therefore, a Grievance Redress Mechanism (GRM) as a mechanism, or set of procedures and processes, or organizational systems and resources, has been established to be used as a means to hear, address and resolve issues and complaints related to the proposed project implementation. The stakeholder input handled through these systems and procedures may be called grievances, complaints, feedback, or any other functionally relevant terminology or concept.

6.2 Potential Grievances

In practice, some of the possible grievances that can be anticipated or are most likely to occur during implementation of the project may include:

- Disagreement over opportunities offered to the community, for instance on job opportunities, loss of livelihoods, loss/decrease of business or income etc.;
- Interruption of public, community, social or other services and infrastructure e.g., water
- Damage to un-expropriated public / community assets such as roads

6.3 Objective of a Grievances Redress Mechanism

Essentially, GRMs are designed as a conduit for soliciting inquiries, inviting suggestions, and increasing participation in developments. The proposed GRM has been established to:

- Generate public and stakeholder awareness about the proposed project and its objectives;
- Increase stakeholder involvement in the Project implementation;
- Improve proposed project outcomes: through timely resolution of issues and problems; the GRM will contribute to timely achievement of the project's objectives
- Provide feedback to different levels of the project performance i.e., providing management with practical suggestions/feedback;
- Act as an early warning mechanism / effective risk management tool to identify and resolve implementation problems in a timely and cost-effective manner:
- Build community relations / legitimacy among stakeholders; through creating and maintaining trust with affected persons and the stakeholders,
- Allow the development management team to be more accountable, transparent and responsive to stakeholders
- Deter or curb fraud and corruption
- Assess the effectiveness of the proponent's processes but also improve the operational processes and performance.

6.4 Guiding Principles for an effective Grievance Redress Mechanism

There are several guiding principles that drive the design of an effective GRM. GRMs that involve these principles are more likely to provide effective resolution of grievances. Some of the key GRM principles are as follows: -.

- **Start early** in the project cycle: GRM (or at least the lowest Level institution at PAP level should be put in place as early as possible, and later modified as need arises.
- **Simple and Accessible:** Should be known to the intended users and accessible to diverse members of the community, with multiple points of entry and access.
- **Legitimate**: Enabling trust from the stakeholders intended to use it
- **Participatory and Inclusive:** Should be developed in a participatory manner and include representatives from the main actors/categories relevant to the area
- **Contextualization and appropriateness** (e.g., Cultural and Context Sensitive):

Should be localized to ensure it's appropriate to the local context, keeping in line with local cultural or traditional structures for raising and resolving issues.

- **Responsive, Timely, and Efficient:**
  Should be responsive to the needs of all complainants, and resolutions should be reached in the soonest time possible to discourage lengthy suits that are time wasting.
- **Transparency / fairness / impartiality**: Users must be clearly informed on how they can access the mechanism and be given fair and impartial resolutions without fear of reprimand.
- **Formalized:** The mechanism needs to be formally established, predictable and well known, and not ad hoc. It needs rules for addressing grievances, holds regular meetings/deliberations on specific and well-known days to discuss the issues. Clearly laid out and expected timetable for key process milestones is essential.
- **Appropriate Protection**: The mechanism should prevent retribution and should not impede access to other remedies such as legal reprieve.

6.5 The Proposed Grievance Structure

This ESIA proposes a three (3) - tier grievance redress mechanism;

- Community / Stakeholders Level
- Management Level – project Implementation Team
- Board Level – Proponent

Table 1: Grievance redress mechanism summary

Institution	Membership	Functions
Grievance Redress Committee *Community Stakeholders*	Established at the community / Stakeholders' level with membership from the project area	Assist community / stakeholders to file a complaint. To address affected persons grievances as 1st point of contact, within 15 days

Level (CLO)	Consists of a 11-member committee (exclusive of ex-official members) Membership should be drawn from a variety of factors including affected persons (all gender, elders' representatives, Youth, in cognizance of local dynamics. A representation of the local government administration i.e., chief and assistant chief as ex-official default members with no voting rights	Publicize the grievance management procedures. • Receive, review, investigate and keep track of grievances through the grievance logs/registers (with support of Community Liaison Person). Adjudicate and develop redress options for the raised grievances. Monitor fulfilment of agreements achieved through the committee. Provide inputs into the monitoring and evaluation process i.e. monthly reports on grievances.

If no amicable solution or settlement is reached, the aggrieved person is not satisfied or does not hear from the GRC through CLO within the required time limits (15 days), they can escalate the grievance to the next level

Management Level – *The project Implementation Team*	The proponent will consider grievance reports forwarded to it and make a determination. Membership consists of the management team. The CLO may be invited to the meeting to give a highlight and account of grievances.	Escalation Mechanism to determine grievances unresolved by GRC within 15 days Responsible for monitoring the complaints Providing inputs into the monitoring and evaluation

		process i.e., quarterly reports on grievances handled.
Top leadership level	• Through the proponent, the grievances not concluded at the management level can be forwarded to the top leadership for approval and discussion.	• Resolves matters forwarded from the implementation team through an open hearing process and decision making

The aggrieved person can go Court as a last resort. Given the above mechanism it is not foreseen that many disputes will end up in court.

Court of Law

The land and Environment court

- The aggrieved party may seek legal deals specifically with land and redress and at their own cost
- The legal option will act as a last resort and will be sort after all other redress medium have been exhausted unsuccessfully

6.6 Grievance Redress: Process, Procedures and Timelines

Grievance procedures may be invoked at any time, depending on the complaint. The following procedures should be followed:

6.7 Grievance uptake: Receipt and Lodge/Register

The community / stakeholders level grievance redress procedure should start with registration of the grievances with the community Liaison Officer (CLO). The CLO should convene a meeting with GRC, invite the aggrieved party to the meeting and present the grievance to the committee for hearing. It is envisaged that the GRC should acknowledge

receipt of the complaints and grievances within two weeks and strive to resolve the matter within one month. The GRC should ensure that grievances reported to it are dealt with in a fair, consistent and timely manner, in accordance with the GRM principles, agreed timelines and resolution modes. The GRC should seek to eliminate unreasonable or illegitimate claims which may be driven by other factors that are not genuine, development related, and satisfy legitimate claimants.

The Community Liaison Officer (CLO) should be the link between the GRC and management team. If the GRC is unable to satisfy the claimant, then the matter will be escalated to the management team through the CLO. Being a support to the GRC, the CLO in agreement with the GRC should escalate the unresolved complaints to the management team, with documentation about the issue, how it has been dealt with by the GRC as well as the reason for the stalemate. A number of avenues should be made available to the affected parties for communication of grievances, e.g., through e-mail, text messaging, telephone calls, face to face interactions with members of the committees.

6.8 Sorting and Processing: Acknowledge, Assess and Assign

The committee siting will assess the eligibility of the issue for the GRM mechanism while those not related to the mixed-use development are referred to the right process or organization. Such may include complaints constituting criminal activity and violence.

For eligible complaints, these are categorized as: -

a) Comments, suggestions, or queries;
b) Complaints to be handled by GRC;

Complaints to be referred directly to Management team and other parties. Some, e.g. (a) above may only require an immediate clarification or a simple explanation, while for (b) type of complaints, these will be assigned priority for investigation. In each, the action required is written down in the grievance registry.

Collaborative: Not all complaints should be handled through a GRM. For example, grievances that allege corruption, coercion, or significant and systematic violations of rights and/ or policies are typically referred to organizational accountability mechanisms or administrative

or judicial bodies for formal investigation, rather than to GRMs for collaborative problem-solving.

6.9 Verification and Investigation

The GRC will then hold a meeting on the grievance and may work in consultation with the aggrieved person. In this step, they will also gather information on the grievance and decide on the corrective action within 15 days. The proposed action will be lodged in the register.

6.10 Develop and Communicate Response

The GRC will inform the complainant – through a meeting, followed by a summarized written communication of the decision and resolution – of the results of investigations and the actions proposed, seeking to seek agreement on the response. The actions can be:

- Direct action to resolve the complaint;
- Further assessment and engagement with the complainant and/or involving other actors to jointly determine the best way to resolve the complaint.

Two possible scenarios can result from this meeting:

- The aggrieved party accepts the proposed corrective action: A written agreement is developed, detailing the time frame for implementing the corrective action as well as responsible party. This is signed by the GRC chairperson or CLO and the aggrieved party, and the corrective action commences. The acceptance is also lodged in the log, and later the completion date will be lodged after verification that recommended action was undertaken by the GRC, or concerned party.
- The aggrieved party rejects the proposed corrective measures: The default position is that case/matter is referred to management level.

If the GRM does not result in an action acceptable to the aggrieved party, he/she can resort to the judicial recourse.

6.11 Action: Implement Response and Review if Successful

When there is agreement between a complainant and the GRC such as acceptance of a proposed action, thus enabling the process to move forward with the proposed action or stakeholder process, then the response should be implemented.

6.12 Closeout or refer the grievance

Where the response has been successful, the secretary of the committee and CLO should document the satisfactory resolution. It is best to have the complainant countersign to show their satisfaction with the response. The grievance is then indicated as closed.

6.13 Monitoring, Evaluation, and Providing Feedback

At all levels, regular progress monitoring of grievances filed, their status and actions taken and recommendations/resolution will be constantly undertaken. The management team is individually responsible for monitoring and tracking grievances, assessing the extent to which progress is being made to resolve them, and generate quarterly reports. These reports and data/lessons generated should be used to make policy and/or process changes to minimize similar grievances in the future or to adapt the GRM to correct or remove inefficiencies.

6.14 Documentation

At all levels, keeping of documentation should be ensured, including the grievance registers, grievance forms. Every meeting should have written minutes and approved by the relevant parties.

6.15 Sensitization and Capacity Building

To create demand for the GRM mechanism, thus avoidance of escalation of issues to court, proponent should undertake:

i. Sensitization of the affected parties on the grievance resolution mechanism and its procedures

The effective working and use of the GRC depend on the awareness of its existence. Therefore, affected parties need to understand and support the purpose of the project GRM. The communications strategy should also reach out to disadvantaged and marginalized groups, which often cannot access GRMs. Communication methods and materials should include meetings, development website, bulletin boards in strategic sites (for instance at the CLO office) brochures summarizing the GRM process, and where possible be translated into

the local Swahili languages as resources permit. Particular messages which need to be reinforced continually may include:

- The GRM is cost-free: there are no financial charges for affected parties to access or have the committees hear a dispute;
- The GRM is open to all;
- There exist mechanisms to escalate an issue if one committee is not able to address it satisfactorily;
- There is no retribution for complainants such as they are not punished;
- The types of grievances that can be submitted;
- The procedures to lodge a complaint and timeframes;
- Confidentiality can be assured where needed; and
- The development welcomes suggestions, recommendations, and grievances as they help improve the project's policies and systems.

ii. Capacity building of the GRC

The GRC should undergo training, e.g., on best practices in resettlement, grievance redress, monitoring, and evaluation to enable them be more effective in their work. The Committee members will also need to be oriented to the grievance management system. The capacities of the Committee members will also need to be built around issues of conflict identification, conflict information analysis, and conflict resolution. This exercise should include detailed terms of reference for the committees.

6.16 Client Commitment to Grievance Redress: Process, Procedures, and Timelines

The success of procedures and activities in the previous sections much depend on the Management commitment towards ensuring the effectiveness and efficiency of the system, thus requiring:

- Regular monitoring,
- Commitment to learning and adapting systems; and
- Provision of sufficient budgets and tools (e.g. grievance registers, forms, files, facilitation fees) to cover their operation and implementation of functions.

- Continuous capacity building of the committees.

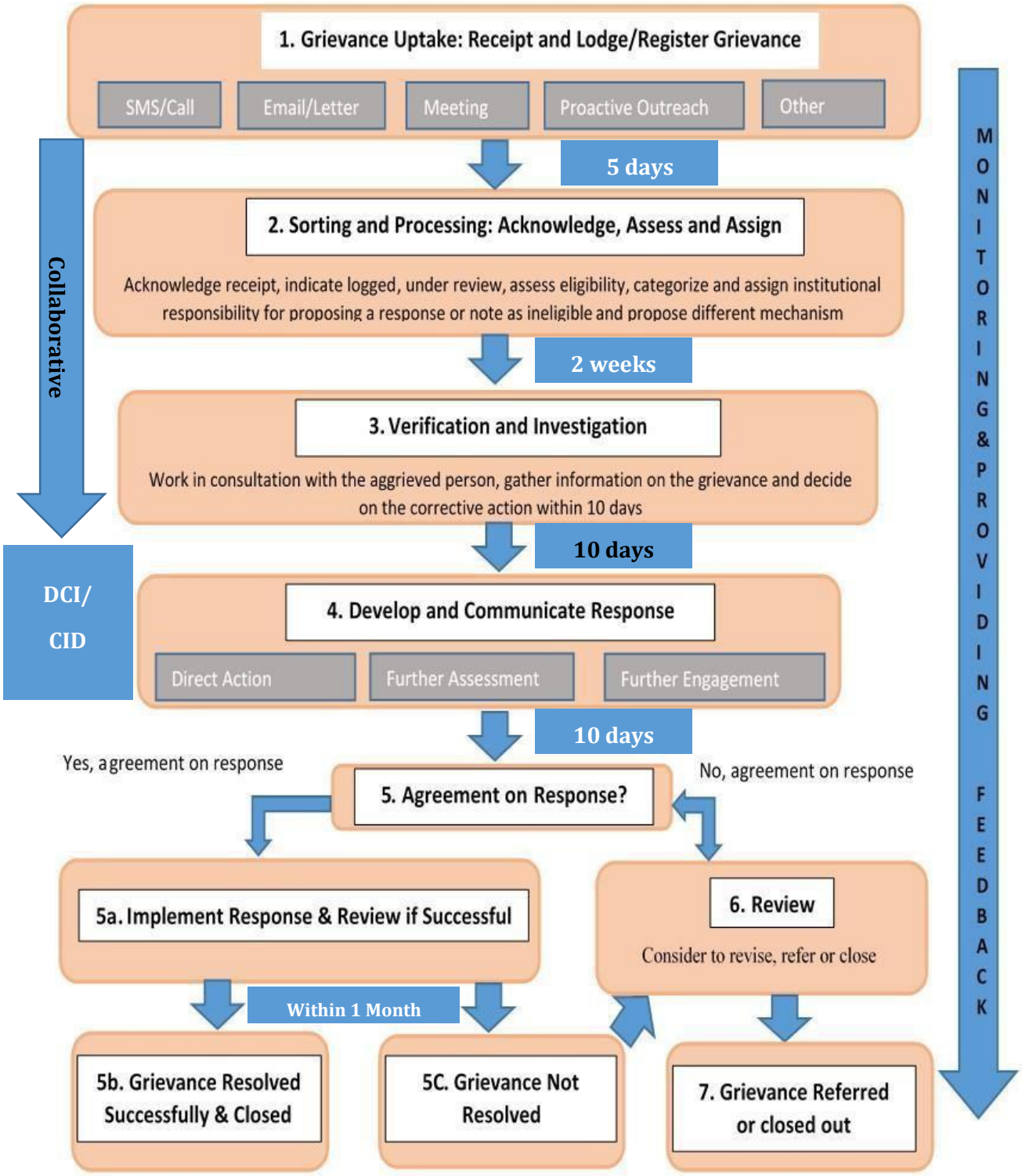

Figure 2: Grievance Redress structure

CHAPTER 7 POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

7.1 Introduction

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

7.1.1 Identification and Analysis of Anticipated Impacts

Impacts can be positive or negative; direct or indirect. The magnitude of each impact is described in terms of being significant, minor or negligible, temporary or permanent, long-term or short-term, specific (localized) or widespread, reversible or irreversible. These are indicated in the assessment.

Table 2: Impact characterization criteria

Key	Type of Impact	Key	Type of impact
++	Major positive impact	+	Positive impact
--	Major negative impact	-	Minor negative impact
0	Negligible/No impact	Nc	No Change
Sp	Specific/Localized	W	Widespread
R	Reversible	Ir	Irreversible
Sh	Short Term	L	Long term
T	Temporary	P	Permanent

Anticipated environmental and social economic impacts are shown in the table below

Table 3: Impact characterization

Impacts	Pre-Construction	Construction	Operation	Remarks
Loss of vegetation/fauna	-, p, ir	-, p	-,p	Clearing of vegetation will be necessary for the construction However, clearing activities could encourage soil erosion. Unnecessary clearing of vegetation should be avoided
Soil erosion		-, Lt, sp	-	Earthworks (during construction, and creation of gravel pits) will have an impact on soil erosion, which may continue even after construction. Incorporating appropriate soil conservation measures and proper drainage facilities during construction would mitigate impacts during operation. During operation, maintenance of structures would also prevent soil erosion.
Solid waste generation	-, t, r,sht	-, t, r,sht	-, t, r	During the construction phase, solid waste will be generated: cleared vegetation, spoils and domestic refuse. During operations the waste will vary with the residents – papers, agricultural wastes, plastics etc. Apart from visual impacts, debris can affect water quality
Changes in hydrology/ drainage		-, r, t	+	The proposed project will likely alter the hydrology because of the structural developments. Hence, runoff will be channelled through culverts. This will be a temporary problem occurring during the construction works.

				Sufficient and right positioning of culverts will be made to ensure that there is no future blockage by siltation and plant overgrowth that will impede water flow. As a result drainage will be improved
Noise pollution		--, t, r	--, r	During construction noise pollution is expected, but this will be temporary in nature. During operation, noise pollution will be anticipated near project site.
Pressure on water resources	--, t	- -		The hydrological regime will be affected during the construction work and water quality will be altered
Air pollution		--, t, r	--, W, r	During construction, there will be air, dust from construction activities and emissions, but this will be temporary in nature. During operation, air pollution will affect settlements/households. Mitigation is possible through consideration on the part of the proponent, or legal enforcement.
Material sites and workman's campsites issues	+,t - p, r, sp	+,t P,-, r, sp		Material site owners will benefit from the sale of construction materials. This is considered to be a temporary positive impact Negative impacts may result from pits that are not reinstated/ landscaped or fenced. Impacts may include hazards to children and livestock, and water accumulating in the borrow pits providing a breeding ground for mosquitoes
Changes in land use: loss of agricultural land and produce		--,Sp, Ir ,	L -,Sp	During construction and operation there will be changes in land use, the project implementation will lead to changes in land use in the area and set precedence for other developments in the project area. Reduction of

				open spaces in the surrounding as well as conversion of single dwelling units into multi-dwelling apartments.
Public health issues	-, t, r, w	-, p, r,w		During construction and operation, increased dust, noise and air pollution levels could impact on public health. Immigrant workers on project site are associated with the spread of sexually transmitted diseases. Awareness campaigns in the area would help to mitigate this problem
Health and safety	---, Sh, Sp	--, Sp	--, Sp	Health and safety outcomes such accidents, injuries, fire, death during the course of construction, preconstruction and operation activities are anticipated. These are negative impacts and their effects maybe specific or widespread i.e. affecting several PAP's.

7.2 Construction phase

7.2.1 Positive Impacts

7.2.1.1 Employment Opportunities

During the construction phase, job opportunities to both skilled and casual workers will be available. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the project site from the project start period to its completion date. Apart from casual labour, semi-skilled and unskilled labour and formal employees are equally expected to obtain gainful employment opportunities during the project construction phase.

7.2.1.2 Gains in the Local and National Economy

The proposed project will improve income/economic status of people within the project neighborhood. There will be gains in the local and national economy. Through consumption of locally available building materials including: concrete tiles, timber and cement. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government. The cost of the materials will be payable directly to the producers.

7.2.1.3 Increased business within the surrounding

The construction crew will buy various commodities from the neighbouring business premises. This would boost to some extend the businesses of the concerned people and hence of their families.

7.2.1.4 Optimal land use

The public interviewed were optimistic that the implementation of the proposed project will lead to opening up the area by adding more residential space that ensures optimal land use as compared to the current use or any perceived future use of the said plot.

7.2.2 Negative Impacts

7.2.2.1Noise Pollution

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction

materials and workers to site. To be affected mostly are neighbouring residents and the site workers since noise beyond the legally stipulated limit in the principal environmental act level is itself a nuisance.

Construction activities often take place outside fields where they can be affected by weather, wind tunnels, topography, atmosphere and landscaping. Construction noise makers, e.g., heavy earth moving equipment, can move from location to location and is likely to vary considerably in its intensity throughout a work day. As a rule, engineering and administrative controls should always be the preferred method of reducing noise levels on worksites. Only, when these controls are proven unfeasible, earplugs as a permanent solution should be considered.

- **Engineering controls** modify the equipment or the work area to make it quieter. Examples of engineering controls are: substituting existing equipment with quieter equipment; retro-fitting existing equipment with damping materials, mufflers, or enclosures; erecting barriers; and maintenance.
- **Administrative Controls** are management decisions on work activities, work rotation and work load to reduce workers' exposure to high noise levels. Typical management decisions that reduce worker exposures to noise are: moving workers away from the noise source; restricting access to areas; rotating workers performing noisy tasks; and shutting down noisy equipment when not they not operational.
- **Personal Protective Equipment** Earplugs are the typical PPE given to workers to reduce their exposure to noise. Earplugs are the control of last resort and should only be provided when other means of noise controls are infeasible. As a general rule, workers should be using earplugs whenever they are exposed to noise levels of 85 dB (A) or when they have to shout in order to communicate.

Noise impacts would be considered significant if the project would result in the following:

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

- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels (more than five DBA) in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase.

The following noise-suppression techniques will be employed to minimize the impact of temporary construction noise at the project site:

7.2.2.2 Quieter Equipment

A cost-effective way to reduce noise at a construction worksite is to lease or hire quiet machinery equipment. In addition, the equipment in use should be the most suitable for the job. The proponent should avoid the use of equipment that is over-powered or those under powered. Whenever feasible the quietest alternative equipment should be used. In general, electronic powered machinery equipments are quieter than diesel powered equipment and hydraulically powered equipment are equally quieter than pneumatic power.

7.2.2.3 Modifying Existing Old Equipment

The most common way to reduce the noise levels of the most common construction equipment is through worksite modifications. Some common worksite modifications include fixing existing equipment with dumping materials and mufflers.

7.2.2.4 Barrier Protection

An effective way of reducing noise is to locate noisy equipment behind purpose-built barriers. The barriers can be constructed on the work site from common construction building material (plywood, block, stacks or spoils) or the barriers can be constructed from commercial panels which are lined with sound absorbing material to achieve the maximum shielding effect possible. The noise source should not be visible and barrier should be located as close as possible to either the noise source or the receiver.

7.2.2.5 Work Activity Scheduling

Work activity scheduling are administrative means to control noise exposure. Planning how noise sources are sited and organized on a work site can reduce noise hazards. Whenever possible, stationary noise sources like generators and compressors should be positioned as far as possible from noise sensitive receivers (workers, schools, residential buildings). When possible, stacks, spoils, and other construction material can be placed or stored around noise sources to reduce the hazard to receivers.

Transferring workers from a high exposure task to a lower exposure task could make the employee's daily noise exposure acceptable. Administrative controls include activity planning, for example, scheduling operations so as to reduce the number of work site workers are exposed to. In addition, noisy equipment should not be run for periods longer than necessary and should be switched off when not in use.

7.2.2.6 Disposal of Excavated rejected/ unusable materials

Excavation works on the project site will be extensive due to the relative scale of the project and significant amount of spoil material that will be generated. Most of the excavated soil will be utilized on site to adjust levels and as back filling where necessary and the rest shall be disposed in authorized disposal sites. Procurement procedures that encourage the purchase of substandard materials that may be rendered unusable should be avoided. Any rejected material onsite will be sold to recyclers of the same where possible or donated to individuals or institutions who may utilize them. If none of these options are viable then, the rejected material will be collected for disposal by a NEMA registered waste handler to ensure proper disposal.

7.2.2.7 Solid Waste Generation

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

recommended that demolition and construction waste be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, where possible, the proponent shall ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of. In addition, upon completion of the project, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marble and glass will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community groups, institutions and individual residents or homeowners.

The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal.

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

- Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste
- Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials

7.2.3 Impacts Related to Occupational Health and Safety

.2.3.1 Dust

Large quantities of dust and cement particles in the air may poses as a respiratory hazard. It may also cause visual obstruction hence presenting accident risks. Dust may also affect the eyes. All workers onsite will be provided with appropriate PPE to ensure their safety. Dust abatement techniques that will be implemented on site

7.2.3.2 Public Health and Safety

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

Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated areas shall be provided. In addition, the proponent is committed to adherence to the occupational health and safety rules and regulations stipulated in Occupational Health and Safety Act, 2007.

Other measures that will be implemented will include:

- A fully equipped first aid kit should be provided at the site.
- The contractor must have workmen's compensation cover as required by law (The Workmen's Compensation Act), as well as relevant ordinances, regulation and union's agreements.
- The workers, immediate neighbour and other stakeholders should be sensitized on the dangers and risk associated with the construction works for enhanced self-responsibility on personal safety.
- Appropriate sanitation conveniences should be provided at the site as required in the OSHA, 2007 and echoed in the Public Health Act.
- The proponent should ensure that the completed buildings are fitted with safety facilities including fire detectors, firefighting equipment, fire exits, adequate access and buffer between the residential premises.

7.3 Operational phase

7.3 1 Positive Impacts

7.3.1.1 Employment creation

Employment opportunities are one of the long-term major impacts of the proposed residential development that will be realized after the construction phase and during the operation and maintenance of the facility.

7.3.1.2 Increase in national housing stock

Currently the country's housing demand by far outstrips the housing supply. This has led to the mushrooming of slums in most urban dwellings culminating in low standards of living and health risk concerns. One of the positive aspects of project is that it will increase number of residential houses available to Nairobi residents

7.3.1.3 Optimal use of land

By building the homes the design has incorporated an optimal use of the available land. Land is a scarce resource in Kenya and through construction of the proposed homes shall ensure optimal use of land.

7.3.1.4 Incorporation of collective waste management

The project is designed such that there will be provision of a designated spot for the dumping of garbage which is well protected from rain and animals. These wastes will thus be collected from the site in bulk and as one unit such that the careless disposal and hence proliferation of wastes within the surrounding areas will be curbed

7.3.2 Negative Impacts

7.3.2.1 Increased pressure on infrastructure

The proposed project will lead to increased pressure on existing infrastructure such as roads, sewer lines etc. due to the increased number of people who will be using these facilities which will directly translate into increased in volume of the relevant parameter.

7.3.2.2 Vector breeding grounds

The proponent will put in place efficient storm water and waste management systems that will prevent the accumulation of rain water and uncontrolled waste, as well as an efficient collection system and off-site disposal. However, if the project does not have well designed storm water drains, the rain water may end up stagnating and hence creating conducive breeding areas for mosquitoes and other water-based vectors which may lead to human diseases like malaria. Poor solid waste management practices may also lead breeding grounds for pests such as rats and other scavenging animals.

7.3.2.3 Solid Waste Generation

The project is expected to generate solid waste during its operation phase. The bulk of the solid waste generated during the operation of the project will consist mainly of organic wastes, packaging wastes amongst others. Such wastes can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on animal health. Some of these waste materials especially the plastic/polythene are not biodegradable hence may cause long-term injurious effects to the environment if appropriate care is not taken. Even the biodegradable ones such as organic wastes may be injurious to the environment because as they decompose, they produce methane gas, a powerful greenhouse gas known to contribute to global warming. The proponent will be responsible for efficient management of solid waste generated by the project during its operation. In this regard, the proponent will encourage waste separation at the source and will provide waste handling facilities such as waste bins and skips for temporarily holding waste generated at the site. In addition, the proponent will ensure that such disposed of regularly and appropriately.

An integrated solid waste management system is recommended. The proponent will adhere to the Environmental Management and Coordination (Waste Management), Regulations 2006.

7.3.2.4 Increased water utilization

The proponent will consider the installation of water-conserving automatic taps or push type taps. Moreover, any water leaks resulting from damaged pipes and/or faulty taps, will

be promptly fixed by qualified staff. In addition, the proposed development residents will be sensitized on efficient water utilization.

7.3.2.5 Water Pollution

If the sites for dumping solid wastes are not well managed, they may cause contamination of ground water sources and also form breeding areas for various disease vectors. The proponent will put in place an efficient waste management scheme that will prevent the accumulation of uncontrolled waste, as well as an efficient collection system and off-site disposal.

7.3.3 Impacts Related to Occupational Health and Safety

7.3.3.1 Fire hazards and Accidents

Fire hazard is a reality during the operation phase since use of electricity and related appliances will be used within the project site. The proponent has committed to take all the measures against a fire outbreak as outlined in the EMP.

Workers accidents especially in higher heights construction and other confined spaces shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.

7.4 Decommissioning phase

7.4.1 Rehabilitation

Upon decommissioning the project, rehabilitation of the project site will be carried out to restore the site to its original status. This will include replacement of topsoil and re-vegetation, which will lead to improved visual quality of the area. The proponent is recommended to seek the expertise of an environmental expert during the decommissioning phase of the project.

CHAPTER 8. ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site and technology scale.

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 the proponent has to scout for an alternative parcel of land. This is a delay that our economy can ill afford.

In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option.

8.2 No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- No employment opportunities will be created for thousands of Kenyans who will work in the housing project area.
- Increased poverty and crime in Kenya.
- The developer will not invest in increased housing stock in the city
- The economic status of the Kenyans and the local people would remain unchanged.

From the analysis above, it becomes apparent that the No Project alternative is no alternative to the local people, Kenyans, and the Government of Kenya.

8.3 The proposed development alternative

Under the proposed development alternative, the developers of the proposed project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed residential development, provided all environmental measures are complied with during the construction period and occupation phases. This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

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.

Durable well reinforced concrete roofs will be used. This will ensure that the rainwater harvested will be utilized on site. Heavy use of timber during construction is discouraged because of destruction of forests. The exotic species would be preferred to indigenous species in the construction where need will arise.

8.5 Water Supply

Water is becoming a scarce resource day by day in most parts of the country. Therefore, the proponent looked into methods of sustaining water supply.

- **Alternative one - Rain Water Harvesting**

Rain water flowing into drainage systems during wet seasons will be harvested and used for various purposes. In addition, a lot of water can also be harvested from roofs. This water can be used for watering flower gardens and grass lawns, flushing toilets and general cleaning by the residents.

- **Alternative two – Tanker/Bowsers Water Supply**

Several commercial water supply companies operate in Nairobi. These are usually licensed by Water Resources Management Authority (WARMA) to supply water to clients when normal NWSC water supply system is cut-off. The proponent can use these services as a supply option. However, this option is not sustainable since it's expensive and there is no guaranteed supply of clean water.

Alternative three - Drilling of a Borehole

The proponent will undertake hydro-geological studies of the proposed project site and obtain permits from the Water Resource Management Authority (WRMA). An ESIA will be conducted for purposes obtaining a NEMA licence to sink a borehole within the Development. Water supply from the borehole will cover the water supply deficits experienced from other water supply sources.

Alternative four - Combined Water Supply This is the option preferred by the proponent. A dedicated main water infrastructure system provided for the development. The water will be conveyed to a central storage comprising of elevated and ground storage tanks to balance the fluctuating water supply and for emergencies. Nairobi Water and Sewerage Company water supply may be supplemented by a borehole.

CHAPTER 9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 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 well-being of the local residents.

The Environmental and Social Management Plan (ESMP) for the proposed project provides a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, the ESMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done. The ESMP is a vital output of an Environmental Impact Assessment study as it provides a checklist for project monitoring and evaluation.

9.2 Construction Phase ESMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase the housing project are outlined below.

9.1 Significance of ESMP

The ESMP for the proposed project provide all the details of project activities, impacts, mitigation measures, time schedules, costs, responsibilities and commitments proposed to minimize Environmental Audits during implementation.

9.2 Objectives of ESMP

1. To bring the project into compliance with applicable National, social and legal requirements social policies and procedures.
2. To outline mitigating/ enhancing, monitoring consultative and institutional measures required to prevent, minimize, mitigate or compensate from adverse environmental and social impacts or enhance the project beneficial impacts.

9.3 Responsibilities

In order to ensure sound development and effective implementation of ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organization that will be involved in the project.

9.4 Environmental Monitoring and audits

In this project, environmental monitoring and audits will be conducting to ensure that identified potential negative impacts are mitigated during the project's life cycle.

9.5 Monitoring and Training

In order to ensure sustainable and a healthy environment of the project area and its environs, NEMA and public health should undertake to monitor the quality of the environment as a routine practice. Monitoring will involve measurements, observations, evaluations, assessments and reporting on the following variables during the operation cycle of the project.

- Occupational health and safety
- Air Quality
- Noise levels

Personnel should be provided with necessary training to enable for effective participation in environmental monitoring program and on reliability of data.

The measures proposed in the ESMP presented in the table below are aimed at ensuring that the total environment is not adversely affected by the implementation of the proposed project. In preparing this ESMP, issues of Health, Safety and Environment have been taken into account. In addition, the need for compliance with the laid down regulation was also considered. It is hoped that proponent will fully implement the EMP

IMPLEMENTATION PHASE (IMPLEMENTATION/CONSTRUCTION PHASE)					
Soil, oil & grease, Noise & vibrations, Air pollutions, Topography and Public participations.					
ENVIRONMENTAL ASPECT	ANTICIPATED IMPACTS	MITIGATION METHODS	PROJECT PHASE	RESPONSIBILITY	ESTIMATED COST
Soil erosion	➢ Disturbance of micro-organisms in the soil ➢ loosening of the soil making is vulnerable to agents of erosion (mainly water & wind) ➢ Soil pollution as a result of burying unwanted or non-biodegradable substances.	➢ All construction should be done using the recommended building materials and equipment. ➢ Use of heavy machinery which causes massive destabilization of soil and killing of organisms should be avoided. ➢ Natural organism niches should be conserved. And also, construction activities to be confined within the site area.	Implementation Phase	Contractor	150,000
Oil and Grease	➢ Soil pollution killing micro –organisms. ➢ Pollution of water collection pans through surface flow. ➢ Drying of vegetation leaving the soil bare.	➢ Regular maintenance of construction machines and vehicles to note leaking. ➢ All repairs and servicing of machines and vehicles should be done at the recommended sites. ➢ Proper disposal of used oils and grease	Implementation phase.	Contractor	80,000
Solid waste generation	➢ Lodging of unwanted materials on the ground like wrapping papers, pieces of pipes/metal bars, pieces of wood etc.	➢ Installation of waste bins/pits on site to avoid scattering on the ground. ➢ Dumping of unwanted materials on the recommended places. ➢ Re-using any recyclable materials	Implementation phase	Contactor.	100,000

Noise and vibrations.	➢ Hearing problems. ➢ May cause noise related illnesses like headache.	➢ Use machines of low noise levels. ➢ Turning off construction machines and vehicles while not in use. ➢ Use of protective gadgets for the ears e.g. ear muffs.	Site implementation phase.	Contractor	250,000
Air pollution	➢ Dust particles in the air causing in-hailing problems. ➢ Polluting of water bodies/storage facilities.	➢ Sprinkling of water during the dry seasons. ➢ Construction workers should use protective clothing. E.g. dust masks and goggles	Site implementation phase.	Contractor	100,000
Topography	➢ Alterations of the landscape form ➢ Increased soil erosion	➢ Proper landscaping should be done after the end of all the construction works. ➢ Planting of trees and grass in areas where they had been cleared.	Implementation phase.	Contractor	Project cost
Public Participation	Resistance from the community on implementation of the project in fear of its impacts. E.g. depletion of other similar boreholes.	➢ Proper sensitization of the community at the initial stages of the project with aim of educating them on advantage of the project. ➢ Involving the community on its implementation especially as casuals.	Pre-construction /Construction phase.	Contractor	200,000

OPERATIONAL PHASE.					
Water quality and usage, Electrical safety and oil/fuel spillage.					
ENVIRONME	**ANTICIPATED IMPACTS**	**MITIGATION METHODS**	**PROJECT PHASE**	**RESPONSIBILITY**	**ESTIMATED COST**
Occupational safety and Health (OHS)	✚ Inhaling contaminated air ✚ Illness from consuming unhygienic food/ water	✚ Provide safety gears to the workers e.g. overalls, helmets, gloves ✚ Treating water before domestic use. ✚ Water should be used sparingly to avoid wastage e.g. use of press on taps. ✚ Install sanitary facilities	Operational phase.	Proponent.	300,000
Electrical safety	✚ Electrocution of site workers during the installation phase. ✚ Electrocution of the surrounding community during the operational phase ✚ Outbreak of fire.	✚ Use of qualified electricians in the installation of all electrical gadgets. ✚ All electrical cables should be earthed in the correct manholes. ✚ Use of protective clothing for the workers on site. ✚ ''Danger warning'' warning signs should be placed at strategic place on site. ✚ Install fire extinguishers.	Operational phase	Contractor	Project cost
Oil/fuel spillage	✚ Outbreak of fires ✚ Skidding of vehicles causing accidents ✚ Bad smell	✚ Fire hydrants and sand buckets should be placed strategically In case of fire. ✚ Any spillage should be wiped and dried immediately. ✚ Servicing of vehicles should be done on a designated yard.	Operational phase.	Contractor	50,000
FIRE SAFETY	✚ Loses from burning of facility ✚ Loss of life	✚ Keep well services and working fire hydrants. ✚ Have a chart of hotlines within the facility, this would include fire services, Ambulance, police et ✚ Keep the facility dry of any fuel or oil spillage.	Operational phase.	Proponent.	140,000

		➢ Designate a FIRE ASSEMBLY POINT within the compound in case of fire.			
Sewer /waste water disposal	➢ Bad odour from the waste water ➢ Growing of grass causing breeding of mosquitoes and other disease organisms.	➢ Proper installation of drainage/sewer lines by qualified technicians ➢ Frequent monitoring of the sewer system.	Operational phase.	Proponent.	Project cost
Solid waste disposal	➢ Bad visual image from garbage heaps ➢ Foul smell ➢ Breeding sites for rodents ➢ Blockage of drainage/communication lines.	➢ Install garbage collection facilities. ➢ Employ garbage collectors/monitors. ➢ Put labels on where to dispose of waste. ➢ Proper transportation of waste to prevent spreading along the way.	Operational phase.	Proponent.	Project cost
DECOMMISSIONING PHASE.					
Occupational safety, Public Health, Noise & Vibrations, Dust pollutions, Landform.					
ENVIRONMENTAL ASPECT	**ANTICIPATED IMPACTS**	**MITIGATION METHODS**	**PROJECT PHASE**	**RESPONSIBILITY**	**ESTIMATED COST**
Occupation safety	➢ Bruises and cuts caused during the demolition works. ➢ Falling from heights ➢ Inhaling of poisonous gases ➢ Fire outbreaks	➢ Providing workers with protective clothing and facilities like helmets, safety harness, boots and gloves. ➢ The dismantling exercise should be carried out separately to avoid	Decommissioning phase.	Contractor.	Project cost

		accidents to people who might be on the ground. - Train the site workers on basic first aid methods. - Provide first aid kit on site in case of small cuts/bruises. - Provide a public "NOTICE" on the ongoing works.			
Public health	- Ailments from contaminated food. - Careless disposal of human waste.	- Provide a sanitary unit on site. - Food for the site workers to be prepared in hygienic conditions.	Decommissioning phase.	Contractor	Project cost
Noise and vibrations	- Noise and vibrations from the machines may cause illnesses like mild headaches, to the people who frequent the site.	- Use of machine of low noise and vibration levels. - Switching off machines while not in use. - Switching off vehicles on site while not in use	Decommissioning phase.	Contractor	Project cost
Dust pollutions.	- Pollution of air with dust particles from the demolition works especially the concrete surfaces which may cause respiratory diseases. - Pollution of water collection equipment which may turn cause diseases if consumed.	- Providing workers with protective gadgets like dust masks and ear muffs. - Sprinkling water on concrete surfaces in case of excessive dust. - Ensure all water vessels are tightly covered.	Decommissioning phase.	Contractor	Project cost
Landform	- Change of the landform after demolitions	- Reverting the land to its original form by filling the excavations and planting trees or grass in the affected areas.	Decommissioning phase.	Contractor.	Project cost

	↓ Accidents which may be caused by falls into the excavated pits.				
Solid waste	↓ Generation of waste debris	↓ Donate any re-usable remains to any willing individual/organization. E.g. iron sheets ↓ Dispose-off any un reusable waste into the approved dumpsites ↓ Sell metallic waste to licensed scrap metal dealers	Decommissioning phase.	Contractor.	Project cost

9.3 Operational phase ESMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of the homes are outlined in the table below:

Expected Negative Impacts	**Recommended Mitigation Measures**	**Responsible Party**	**Time Frame**	**Cost (Kshs)**
Solid waste generation	Provide solid waste handling facilities such as waste bins across the estate and ensure that they are often emptied to enhance maximum cleanliness.	Proponent & Contractor	One-off	50,000
	Ensure that solid waste generated at the homes, is regularly collected by licensed operators and disposed of appropriately at authorized dumping sites	Proponent & Contractor	Continuous	200,000
Sewage release into environment	Provide adequate and safe means of handling sewage generated at the apartments.	Proponent	Continuous	50,000
	Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated	Proponent	Continuous	0
Energy Consumption	Install energy saving fluorescent tubes at all lighting points within the apartments instead of bulbs which consume higher electric energy	Proponent	One-off	20,000
	Sensitize apartments' occupants to use energy efficiently	Proponent	Continuous	0
	Monitor energy use during the operation of the project and set targets for efficient energy use	Proponent	Continuous	0

Water exploitation	Promptly detect and repair of water pipe and tank leak	Proponent	Continuous	5000
	Install water conserving taps that turn-off automatically when water is not being used	Proponent	Continuous	Site specific
Health and safety risks	Implement all necessary measures to ensure health and safety of workers and the occupants of housing units during operation of the apartments as stipulated in Factories and Other Places of Work Act Cap 514	Proponent	Continuous	50000
safety and security of the premises and surrounding areas	Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises during night hours	Proponent	Continuous	-

9.4 Decommissioning Phase

In addition to the mitigation measures provided in two above tables in this chapter, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the proposed project have ceased. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project, are outlined in the table below:

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Demolition waste	All recovered building materials, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible	• Proponent & Contractor	• One-off	•
	Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should taken to a licensed waste disposal site	• Proponent & Contractor	• One-off	100,000
	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.	• Proponent & Contractor	• One-off	50,000

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Rehabilitation of project site	Implement an appropriate re-vegetation programme to restore the site to its original status	Proponent	One-off	100,000
	Consider use of indigenous plant species in re-vegetation	Proponent	One-off	50,000

9.5 Environmental and Social Monitoring Plan

The Environmental and Social Monitoring Plan is vital for any Environmental and Social Impact Assessment for development plans. The monitoring plan will help in assessing the effectiveness of proposed mitigation measures, in assessing changes in environmental conditions and to provide warning of significant deterioration in environmental quality for further preventive action.

The principle elements of a monitoring plan are:

- A clear statement of aims and objectives
- A description of sampling sites
- A description of variables that will be measured
- A plan for quality control and quality assurance
- An estimate of the resources required to implement the design
- Delineation of responsibility to implement the monitoring plan
- Proposed frequency and timing of sampling

Specific attention has been made to ensure that the monitoring plan conforms to the following criteria, it is auditable in that it:

- Associates mitigation and monitoring tasks to specific impacts,
- Conforms to all best practice principles by acknowledging the existence of both long term and immediate impacts and the resulting mitigation measures necessary to deal with such
- Delineates key lines of accountability,
- Ensures flexibility to enable incorporation of additional monitoring and mitigation techniques as deemed necessary throughout the life of the development,
- Gives guiding costs of implementation,
- Identifies specific quantifiable monitoring regimes,
- Where practically possible identifies key indicator, which can be utilized for environmental performance monitoring.

Monitoring Requirements

To ensure that the whole ESIA is effective, environmental monitoring is mandatory. Because of the complexity of cumulative effects at a strategic level, there will be uncertainty about

impact predictions. Monitoring is therefore important to assess the accuracy of the predictions and to monitor the effectiveness of mitigation measures.

The monitoring frequency and indicators have been recommended for each management action. Regular monitoring using the recommended indicators will indicate the level of progress regarding ensuring environmental sustainability in the proposed project.

The parameters of the proposed project that were identified for monitoring include: water quality, air quality, solid waste generation, Occupational Health and Safety risks, soil erosion, storm water drainage, and livelihoods.

Environmental Component	Points to be monitored	Parameters to be monitored	Lab Materials and Equipment/Other Requirements	Frequency of monitoring	Responsibility
Water Quality and Quantity	▪ Ground water resources Borehole NCC, NCWSC ▪ Runoff from buildings ▪ Water treatment plant	▪ pH, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS), heavy metals, oils and grease ▪ Construction activities ▪ Abstraction rates and drawdown for boreholes ▪ Waterborne diseases prevalence	▪ Sampling bottles ▪ Cooler box ▪ Access to a NEMA accredited laboratory	Quarterly or at least two times a year to cover seasonal variations	▪ Proponent ▪ WRA ▪ NCWSC
Air Quality	▪ Construction activities	TSP, NO_x, SO_2, CO, Dust particles, particulate matter	Air sampling equipment	▪ Continuous Throughout Construction and operational phases	▪ Proponent ▪ NEMA
Solid and Liquid Waste Generation	▪ Operational and construction phase ▪ Water treatment plant.	▪ Domestic refuse, metallic scraps, sludge, waste composition, treatment methods ▪ Waterborne diseases prevalence ▪ pH, TSS and TDS, heavy metals, oils and grease	▪ Sampling bottles, cooler box, Access to a NEMA accredited laboratory ▪ Waste sampling bins, plastic	Continuous	▪ Proponent ▪ NEMA ▪ Government lead Agencies

			bags, boxes, weighing machine		
Biodiversity Loss	Vegetation to be cleared	▪ Individual species count (capture recapture) ▪ Biomass Index ▪ Rainfall volume, ▪ Topography	Periodical ecological surveys ▪ field survey maps ▪ Rain-gauge	Continuous	KFS, KWS ▪ NEMA ▪ KMFRI
Environmental Component	**Points to be monitored**	**Parameters to be monitored**	**Lab Materials and Equipment/Other Requirements**	**Frequency of monitoring**	**Responsibility**
Soils (Fertility, Erosion, Compaction)	▪ Project construction sites ▪ Excavated areas, sloppy areas ▪ Water sources	▪ Soil salinity, ▪ Humus content ▪ Turbidity in storm water and other water sources ▪ Floods	▪ Laboratory analysis, ▪ Field equipment for soil sampling/ analysis	Continuous	▪ Proponent ▪ Developers /Contractor
Occupational Health and Safety risks	▪ Project construction sites	▪ Total number and types of accident and incident reports and records, ▪ Accident locations ▪ Safety training for workers	▪ Incidents log-book ▪ Accident recording book ▪ Camera, ▪ GIS/GPS device ▪ Medical centres / dispensaries within the area ▪ Field inspections and information	Continuous	▪ Proponent ▪ Developer /Contractor ▪ NEMA ▪ DOSHS

			from lead agencies		
Socio-Economic	Planning and Implementation phase of the project	▪ Number of jobs created ▪ Incomes, ▪ Quality of life (type of homes), ▪ Access to potable water,	▪ Quantitative and ▪ Qualitative analysis	Annually	▪ Proponent

CHAPTER 10. CONCLUSION AND RECOMMENDATIONS

The proposed residential development portends numerous positive impacts such as creation of employment, quality shelter, improved infrastructure, increase in national housing stock and increase in revenue among others as outlined in the report. The negative environmental impacts that will result from establishment of the project include: increased pressure on infrastructure; air pollution; water pollution and generation waste among others which however can be mitigated.

The proponent of the proposed project is committed to implementing the outlined measures in this report to mitigate against the negative environmental, safety, health and social impacts associated with the Development cycle of the proposed housing 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 also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. The outlined measures will effectively ensure the best possible environmental compliance and performance standards.

It is our recommendation that the proponent be allowed to implement the project provided the mitigation measures outlined in the report are adhered to, and the developer adheres to the conditions of approval of the project.

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