

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT

**FOR THE PROPOSED DEVELOPMENT OF RIVER
ESTATE HOUSING DEVELOPMENT
,REHABILITATION OF JADONGO ACCESS ROAD
AND ASSOCIATED AMENITIES ON PLOT L.R.
NUMBER 209/20567 NGARA AREA, NAIROBI
COUNTY,**

PROPONENT

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ACRONYMS

DOSHS	Directorate of Occupation Safety and Health Services
EIAs	Environmental Impact Assessment Study
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental Social Impact Assessment
KM	Kilometers
NEC	National Environment Council
NECC	National Environmental Complaints Committee
NEAP	National Environment Action Plan
NES	National Environment Secretariat
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
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

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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 to the environment enhances and promotes environmental sustainability as anthropogenic factors are balanced with natural environmental needs.

The construction eight blocks of thirty four (34) floors each 1,2 &3 bedroom apartments, commercial shops ,rehabilitation of Jadongo access road and other associated amenities may have significant impacts on the environment which has to be mitigated, if adverse, and optimized, if beneficial.

The proponent's objective is to develop the plot into a contemporary housing development with adequate associated facilities.

The project will entail the development of;

1. 8 Blocks of apartments 34 floors each plus Basement and ground floor
2. 1637 units in total;3Bedroom 537units,2Bedroom 1,088units,1Bedroom 7units
3. 60 units of commercial shops
4. 875 parking spaces on Ground floor and basement
5. Underground water tanks
6. Sewer connection to Nairobi city water &sewerage company services.
7. Rehabilitation of the Jadongo access Road

In keeping with the requirements of the Environmental Management and Coordination Act (EMCA), cap 387 an Environmental Impact Assessment (EIA) study for the proposed River Estate housing project was commissioned. The aim of this Environmental Impact Assessment (EIA) 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 EIA criteria for the Study

The scope of the assessment covered the construction works of the proposed housing development, which include ground preparation, masonry, and installation of service lines as well as the other necessary facilities. 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 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.
- 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, cap387
- Environmental scoping that provided the key environmental issues
- Desk Stop studies and interviews
- Physical inspection of the site and surrounding areas
- EIA 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

- Land transformation in to a contemporary housing project
- Improvement of housing facility in Nairobi
- Rehabilitation of the Jadongo access road
- 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,
- infrastructure strain (water, sewer, road and electricity),
- 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 areas.
- Install sound barrier 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 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. These positive impacts include: creation of employment, optimal use of land, incorporation of collective waste management practices, increase in revenue to the proponent and the County 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 EIA 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 project 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 out 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 industrial development.

1. INTRODUCTION

This Environmental Impact Assessment project report has been prepared as per the provision of Environmental Management and Coordination Act Cap 387 and more specifically to environmental (Impact Assessment and Audit) Regulation 2003, Legal notice No. 101.

The proposed River estate housing development, rehabilitation of the Jadongo access road and associated amenities on plot No.209/20567 in Ngara area, Nairobi County

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 discussion 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 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 mitigation 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 EIA 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. The output of this work was a comprehensive study report for the purposes of applying for an EIA license.

It is stipulated in EMCA, Cap387 that a form of development such as the proposed housing development, rehabilitation of the Jadongo access road and associated amenities 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 study report for the proposed 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 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.

- Advise on the protection of the Nairobi River Riparian reserve in line with the Environmental Management and Coordination (Water quality) regulation 2006 and water Act 2016
- 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, land-ownership documents and site history.

The output from the consultants includes the following:

- An Environmental Impact Assessment 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 Ngara area bordering the Nairobi River which is one of the sensitive environmental resources hence posing the project cumulative effect to the surrounding environment to be adverse. Nevertheless the proposed development and use of the proposed housing development and the associated amenities will be in line with what exists in the surrounding areas, hence an environmental study 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, cap 387
- Environmental scoping that provided the key environmental issues
- Terms of reference (TOR) approved by NEMA(TOR annexed to the report)
- Desk Stop studies and interviews
- Physical inspection of the site and surrounding areas
- EIA 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 the requirements of the principal environmental legislation; specifically the second schedule. Issues considered included the physical location, sensitive issues and nature of the anticipated impacts 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 EIA process, questionnaires were administered to the site neighbours within the area and the information gathered was subsequently analyzed and incorporated into the EIA project report.

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

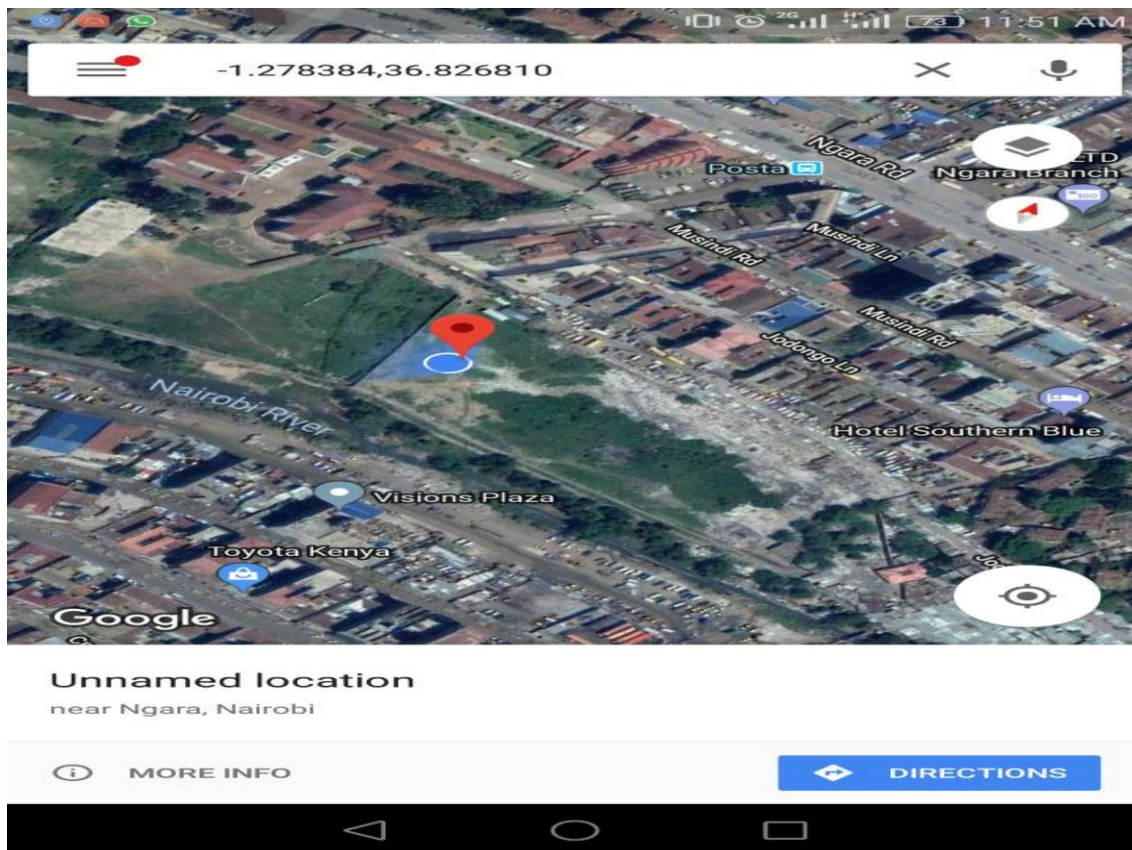
2. PROJECT DESCRIPTION

2.1 Location and Size of the Project

The environmental impact assessment (EIA) was carried out for the **proposed River estate housing** development, rehabilitation of the Jadongo access Road and associated amenities **on plot L. R. No. 209 /20567 Ng'ara area, Nairobi County**. The plot measures **2.302** of a hectare or there abouts.

The proposed plot is has no structures within and is secured with a boundary wall nearly 3M high, it is adjacent to Nairobi rive one of the sensitive ecological feature .The other sensitive neighbor is the Ngara girls high school but the rest of the development are residential flats which are in conformity with proposed development.

The proposed location is shown in the pictures below. The co-ordinates of the project sites geographical area are **(-1.2783799S, 36.82678771 E)**.





The proposed site

2.2 Project Description

In preparation on commencement of the proposed housing development and its associated amenities, the proponent begun by securing the plot and contacting the firm of experts to assess the area for NEMA license application, followed by soil/rock sample extraction for lab testing. After the two processes the contractor will begin the excavation and then construction of the structures. The components of the proposed river housing development as shown in the architectural drawings and brief from the client include;

1. 8 blocks of apartments
2. 34 floors plus ground and basement floors
3. 1632 Total number of units
4. 3BR Apartments;537 units
5. 2BR Apartments 1,088 units
6. 1BR Apartment 7 units
7. Shops ;60 units
8. Parking spaces;875 units
9. Underground water tank
10. Sewer connection to Nairobi city Water and Sewerage Company Services
11. Rehabilitation of the Jadongo Access Road

2.3 Project's surrounding

The proposed River estate housing development on plot 209/20567 in Ngara area, Nairobi County neighbors the **Ngara girl's high school** and adjacent to the **Nairobi River**. Other than the two sensitive neighbours, there are a number of residential flats around and Juacali car garages around the plot. The proposed development con forms with the area zoning as per the Nairobi County zoning guide.

2.3 Site Ownership and Size

The proposed River estate housing development, rehabilitation of the Jadongo road and associated amenities on land number L.R No.209/20567 in Ngara area, Nairobi County. The land measures 2.302 or thereabouts has per the attached certificate of title.

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 the excavation works and transportation of construction materials.

This will be undertaken in a phased approach to mitigate soil erosion and the impacts of excessive dust generation and solid wastes. 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 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.

2.4.4 Structural steel works

The building will be reinforced with structural steel for stability. Structural steel works 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 to the main 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 Occupation activities

Once construction is complete, Clients will occupy the houses and start their daily household chores such as cleaning, cooking, home maintenance, shopping and laundry that will lead to generation of solid wastes and waste water.

2.5.2 Solid waste

The proponent will provide facilities for handling solid waste generated within the facility. These will include dust bins/skips for temporarily holding waste within the premises before final disposal at the designated sites. The waste handling company must be registered with NEMA and disposing waste to a licensed designated dumping site using well branded waste plastic bags bearing the company's name.

2.5.3 Liquid waste

The proponent will provide adequate and safe means of handling liquid waste generated within the facility. 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.

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 and Lighting Company power supply line. The KPLC electricity supply lines are already available within the neighborhood of the proposed project site. Use of solar panels also is encouraged for the purpose of power saving and going green as well.

2.5.6 Earthing and Lightning Protection

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.

2.5.7 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 housing 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 development . 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.

3. BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

The environmental impact assessment (EIA) was carried out for the **proposed River estate housing development, rehabilitation of the Jadongo access Road and associated amenities** on **plot L. R. No. 209 /20567 Ngara area, Nairobi County**. The plot measures **2.302** hectare or there abouts as per the attached architectural drawings.

The proposed plot has no structures within and is secured with a boundary wall which is about 3M high and is adjacent to Nairobi River. It neighbours Ngara Girls high school and several residential flats including Ngara plaza.

The proposed location is shown in the pictures below. The co-ordinates of the project sites geographical area are **(-1.2783799 S, 36.82678771 E)**



Naighbour; Ngara Girls high school

3.2 Climate

The County enjoys a warm climate with temperatures ranging between 12°C and 18.7°C. The rainfall aggregate for the county is 1000mm each year. The cool climate makes it a conducive for farming. June and July rank as the coldest months while January-March and September-October are the hottest months.

3.2 Land use

The location of the proposed project is zoned for commercial/ residential use as per the Nairobi City County zoning guide

3.3 Topography

The proposed site is slightly sloppy and is adjacent to the Nairobi River. Its grounds are covered with grass and few weeds, no trees within the site but few trees along the Nairobi River riparian.

3.4 Geology and Soils

The proposed site soils can be categorized under the Nairobi City soils which comprise of several spots of sensitive soils and variable/inclined ground profiles. The surface is covered by the following patches of soils: black cotton clays, red or brown clays, red silty soils, laterites, decomposed tuffs, alluvium or swamp soils. The shallow groundwater is found to flow towards the Nairobi River and joins River Athi that discharges water to the Indian Ocean.

3.4 Infrastructure and Transport

The proposed project is within Ngara area which is about 3km from Nairobi CBD .Road transport is the main mode of access to the proposed site either by Private vehicle,Town service vehicles commonly Known as Matatu or Taxi services.The matatu leading to the project site can be found at Odeon Matatu No.9 or 6 stage .

The area has electricity supply, water supply and sewerage services from the provider NCWSCO .Internet and mobile providers are available and vary in terms of services e.g safaricom,airtel,Telkom Kenya and many more others.

3.5 Biological Diversity

The Ngara area is zoned for commercial/residential highrise buildings which make it busy with human activities giving no room to any kind of neither wild animals nor wildlife corridors.

The Nairobi River is one of the ecological features adjacent to the proposed plot which makes the project environmental sensitive.

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, Cap387) No. 8, 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.

4.3.7 The National Occupational Safety and Health Policy

This Policy significantly sustains continual development and implementation of the National Occupational Safety and Health systems and programs to reduce incidences of work related accidents and diseases. In addition, it seeks to offer equitable compensation to those who suffer physical injuries and contract occupational diseases.

The Policy addresses the current challenges, gaps and future development of safety and health systems and programs in the country. It promotes basic principles of assessing occupational risks or hazards; combating occupational risks or hazards at source; and developing a national preventative safety and health culture that includes information,

consultation, research and training. The policy also promotes continuous improvement of occupational safety and health by integrating Kenyan national laws and regulations with Regional Protocols, ILO Conventions, ISO standards and the best practices in the world. It sets up mechanisms for resource mobilization for occupational safety and health programs and activities and provides guidance to all stakeholders in the development and implementation of national occupational safety and health systems and programs.

In all phases of the project, the issues of occupational safety and health will emerge and the National Occupational Safety and Health Policy will be handy in addressing these issues.

4.5 Institutional Framework

Environmental Impact Assessment (EIA) is a critical examination of the effects of a project on the environment. The goal of an EIA 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 EIA 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 industrial development include the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Kenya Forest Service, Water Resources Management Authority (WRMA), Directorate of Occupational Safety and Health Services (DOSHS) 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 impending 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.

4.5.7 Directorate of Occupational Safety and Health Services (DOSHS)

This is one of departments within the current Ministry of East African Community, Labour and Social Protection, whose primary objective is to ensure safety, health and welfare of all workers in all workplaces. Unsafe and unhealthy work environment causes accidents, diseases, disasters and environmental pollution that occasion huge economic and social burdens to individuals and enterprises thereby stifling economic and social growth.

The Directorate enforces Occupational Safety and Health Act, 2007 (OSHA, 2007) with its subsidiary legislation which aims at prevention of accidents and diseases at work. It also administers the Work Injury Benefits Act, 2007 (WIBA, 2007) which provides for compensation of workers who have been injured or have suffered a disease out of and in the course of employment.

Functions

In fulfilment of its responsibility of identifying hazards at workplaces and assessment of risks with a view of preventing accidents, diseases and damage to property, the Directorate undertakes the following functions;

- Systematic inspection and auditing of workplaces to promote best practices and ensure compliance with safety and health standards as set out in OSHA, 2007 and its subsidiary legislations.
- Examination and testing of steam boilers, air and steam receivers, gas cylinders, refrigeration plants, passenger lifts, hoists, cranes, chains and other lifting equipment to ensure their safe use.
- Identification, evaluation and control of biological, chemical, physical, psychosocial, ergonomic and other factors in the work environment which may affect the safety and health of employed persons and the general environment.
- Medical surveillance, including medical examination to monitor and check on the health status of the workers and advise on intervention measures.
- Training and awareness creation on occupational safety and health in order to promote safety and health culture in the country.
- Ensuring compensation to employees for work related injuries and diseases contracted in the course of their employment in accordance with the provisions of WIBA, 2007.
- Investigation of occupational accidents, dangerous occurrences and cases of Occupational diseases with a view to preventing recurrence.

4.6 Legal Framework

4.6.1 Environmental Management and Coordination Act, Cap 387

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

Relevance to the proposed project

Environmental Management and Coordination Act, Cap 387 provides a legal and institutional framework for the management of the environmental related matters. This report has been written pursuant to section 58 (1) of this Act.

4.6.2 Environmental Impact Assessment and audit regulations 2003

These regulations stipulate how an EIA project report should be prepared and specifies all the requirements that must be complied with. It highlights the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the whole EIA project Report making process. It also requires that during the EIA process a proponent shall in consultation with the Authority seek views of persons who may be affected by the project or activity.

Relevance to the proposed project

The proponent and consultants shall seek the views of the project neighbours through the use of questionnaires so as to ensure that their concerns are addressed in this report.

4.6.3 Water Quality Regulations (2006)

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. 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. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings. In addition, of

immediate relevance to the proposed project for the purpose of this Project Report is Part II Sections 4-5 as well as Part V Section 24.

Part II Section IV states that –Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution. Part IV Section 24 states that –No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses. According to these regulations, –Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act.

Relevance

All waste water shall be channeled to the main drain so as not to pollute the ground and surface water draining to the Nairobi River. The proponent shall protect and observe riparian reserve in line with water Act and if a pollution incidence occurs the contractor/proponent shall notify the authority immediately.

4.6.4 EMCA (Waste management) Regulation, 2006

The Waste Management Regulations (2006) are contained in the Kenya Gazette No. 69, Legal Notice No. 121. The Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management

Regulations are to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source. The regulation requires licensing of transporters of wastes and operators of disposal site (sections 7 and 10 respectively). Of immediate relevance to proposed development for the purposes of this project report is Part II Sections 4(1-2), 5 and 6. Section 4 (1) states that –No person shall dispose of any waste on a public highway, street, road, recreational area or any other public place except in a designated waste receptacle. Section 4(2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority.

Section 5 provides method of cleaner production (so as to minimise waste generation) which includes the improvement of production processes through conserving raw materials and energy. Section 11 provides that any operator of a disposal site or plant shall apply the relevant provisions on waste treatment under the local government act and

regulations to ensure that such waste does not present any imminent and substantial danger to the public health, the environment and natural resources. Section 12 provides that every licensed owner or operator shall carry out an annual environmental audit pursuant to the provision of the act In section 14 (1) every trade or industrial undertaking is obliged to install anti- pollution equipment for the treatment of waste emanating from such trade or industrial undertaking.

Relevance

The Developer is expected to take all responsibility to ensure that solid waste is properly disposed by a solid waste collection company that has a valid license from the National Environment Management Authority (NEMA).

4.6.1 EMCA (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These Regulations require 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
- 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. Part II Section 4 state that: except as otherwise provided in these Regulations, no person shall

a) Make or cause to be made excessive vibrations annoys, disturbs, injures or endangers the comfort, response, health or safety of others and the environment; or

b) Cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source.

Part III Section 2 (1) states that any person wishing to a) operate or repair any machinery, motor vehicle, construction equipment, pump, fan, air conditioning apparatus or similar

mechanical device; or b) engage in any commercial or industrial activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels provided in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence.

Section 13 (1) states that except for the purposes in sub-Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations. These purposes include emergencies, those of domestic nature and/or public utility construction.

Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying site, and state that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work is to be carried out including but not limited to requirements regarding a) machinery that may be used, and b) the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

Relevance

The contractor shall be required to implement these measures, ensure that all machineries are in good working condition to reduce noise. Also construction activities shall be restricted between 0800Hrs-1700Hrs to ensure that the neighbours are not disturbed.

4.6.4 Environmental Management and Coordination (Air Quality) Regulations, 2008

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The general prohibitions state that no person shall cause the emission of air pollutants listed under First Schedule (Priority air pollutants) to exceed the ambient air quality levels as required stipulated under the provisions of the Seventh Schedule (Emission limits for controlled and non-controlled facilities) and Second Schedule (Ambient air quality tolerance limits).

Relevance

The contractor shall implement the mitigation measures provided in the EMMP to prevent air pollution especially during construction phase.

4.6.5 The Energy (Solar Water Heating) Regulations, 2012 Installation and use of solar water heating systems

All premises within the jurisdiction of a local authority with hot water requirements of a capacity exceeding one hundred litres per day shall install and use solar heating systems

A person who contravenes the provisions of this regulation commits an offence and shall, on conviction, be liable to a fine not exceeding one million shillings, or to imprisonment for a term not exceeding one year, or to both.

Responsibility for compliance

6. (1) A developer of a housing estate, a promoter of the construction, an owner of the premises or an Architect or an Engineer engaged in the design or construction of premises shall comply with these Regulations.

(2) An owner of premises, Architect and an Engineer engaged in the design, construction, extension or alteration of premises shall incorporate solar water heating systems in all new premises designs and extensions or alterations to existing premises.

(3) An owner or occupier of premises that has a solar water heating system shall use and carry out the necessary operational maintenance and repairs required to keep the installation in good and efficient working condition.

(4) An electric power distributor or supplier shall not provide electricity supply to premises where a solar water heating system has not been installed in accordance with these Regulations.

Relevance

In compliance to these regulations solar energy shall be adopted for water pumping, lighting common areas and cooling systems within the development.

4.6.6 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.

Relevance to the project

The proponent shall protect the Nairobi River Riparian and improve the section that is adjacent to the plot by planting trees and gardening. The proposed project must comply with the various national provisions that aim at the protection and conservation of the country's biodiversity

4.6.7 County Governments Act, 2012

This Act vests responsibility upon the County Governments in planning of development projects within their areas of jurisdiction is it projects of importance to the local County Government or those of national importance.

Section 102 of the Act provides the principles of planning and development facilitation which include integration of national values in county planning, protect the right to self-fulfillment within the county communities and with responsibility to future generations, protection of rights of minorities and marginalized groups and communities, promotion of equity resource allocation, among others.

Section 103 of the Act outlines the prime objective of county planning which aligned to the bill of rights and the constitution of Kenya.

Section 114 and 115 indicate and give guidelines in planning of projects of national significance and instill the aspect of public participation in every aspect of the planning process through that: clear strategic environmental assessments; clear environmental impact assessment reports; expected development outcomes; and development options and their cost implications. Each county assembly is tasked with the role to develop laws and regulations giving effect to the requirement for effective citizen participation in development planning and performance management within the county.

Relevance to the project

The project proponent has initiated the process of County Government engagement in the initial project planning through application of essential development approvals from Nairobi County Government.

4.6.8 Land Planning Act cap 303

Section 9 of the subsidiary legislation (the development and use of land Regulations 1961) under which it require that before the local Authority to submit any plans to then minister for approval, steps should be taken as may be necessary to acquire the owners of any land affected by such plans. Particulars of comments and objections made by the landowners

should be submitted, which intends to reduce conflict of interest with other socio economic activities.

Relevance to the proposed project

The proponent has submitted architectural plans to Nairobi County for approval.

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.

4.6.11 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.

4.6.12 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

Relevance to the project

The proponent is the owner of the proposed plot as per the provided certificate of title attached.

4.6.12 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.

Relevance to the project

The proponent should contract an NCA registered contractor and adhere to the regulations as it is stipulated.

4.6.13 Occupational Safety and Health Laws and Regulations

The following pieces of legislation form the basis for occupational safety and health matters in Kenya:

The Occupational Safety and Health Act, No. 15 of 2007

His Excellency the President assented into law this Act on 22nd October 2007 and the date of commencement declared as 26th October 2007. This is the main operational law for health and safety in Kenya today. Its enactment led to the repeal of the Factories and Other Places of Work Act, Chapter 514 of the Laws of Kenya.

Duties of the proponent pertaining to safety and health

It is the duty a proponent to:-

- i) Provide and maintain of safe plants and systems at the factory during the operational phase.
- ii) Ensure absence/elimination of risks at the workplace.
- iii) Provide information to employees to ensure safety and health at the factory.
- iv) Maintain the factory in a safe and healthy state.
- v) Provide and maintain the factory in a safe and healthy state.
- vi) Carry out the workplace risk assessment and send a copy of the risk assessment to the Directorate of Occupational Safety and Health Services (DOSHS).
- vii) Stop any hazardous activities.
- viii) Obtain a certificate of registration of a workplace with the Directorate of Occupational Safety and Health Services.
- ix) Prepare safety & health policy and submit a copy to the Directorate of Occupational Safety and Health Services.
- x) Bring the content of the safety and health policy statement to the attention of employees.
- xi) Prevent environmental pollution
- xii) Send notice of accident occurrence, cases of occupational diseases and dangerous occurrence to DOSHS
- xiii) To have the architectural plans of the factory approved by the Directorate of Occupational Safety and Health Services before construction activities commence. In approving the plans Directorate of Occupational Safety and Health Services will among other requirements ensure that:
 - Prescribed dimensions with regards to distance of floor to ceiling of every workroom is upheld
 - Space defining machine layout for intended use by operators will be within statutory limits

- Emergency exits are provided for and are designed to open in accordance to statutory requirements
 - Sanitary conveniences are provided for with adequacy as to number of intended employees and are designed to have separate approaches
 - First aid facilities like first aid room(s) are provided for,
 - There is provision for accommodation for clothes not worn during working hours
 - There is provision for adequate ventilation
 - There is provision for storage of fire fighting water storage tank with a capacity of at least 10,000 litres
- xiv) Ensure that no employee is discriminated against by virtue of:-
- Lodging a complaint about an unsafe condition at the workplace
 - Being an active member of a health safety committee.
- xv) Establish a health and safety committee whose composition should be in accordance to the Factories (Health and Safety Committees) Rules L.N. 31 of 2004, if he will employ 20 or more employees.
- xvi) Carry out workplace health and safety audit on an annual basis.

General Duties of Employees

Persons employed in the factory during the operational phase will be required:

- i) To ensure personal safety and health at the workplace
- ii) To co-operate with the employer with respect to the safety and health at the workplace
- iii) To use personal protective equipment and appliances adequately
- iv) To comply with any relevant safety and health rules under the Occupational safety and Health Act, 2007
- v) To report to the supervisor, hazardous situations
- vi) Not to interfere with or misuse of provisions that are for their safety and health
- vii) Not to create hazards by bad behavior, practical jokes etc.

Relevance

The contractor as the employer during the construction phase has a duty to provide for the safety, health and welfare of workers and all persons lawfully present at the workplace. The developer (Proponent) has a subsequent duty to provide for the safety, health and welfare of workers and all persons lawfully present at the workplace during the operational phase of the project.

Work Injury Benefits Act, No. 17 of 2007

This law was assented to by His Excellency the President on 22nd October 2007. Various sections in this law were nullified by the high court as they were found to be unconstitutional. This is an act of parliament designed to provide for compensation to employees for work-related injuries and diseases contracted in the course employment and

for connected purposes. This is the law whose enactment led to the demise of the Workmen Compensation Act Cap 236.

Relevance to the proposed project

The contractor as the employer has a duty provide for compensation to employees for work related injuries and diseases contracted in the course of their employment at the construction site.

Rules and Regulations

The following rules have been promulgated by the Minister for Labour as provided for in the statues in the furtherance of the safety & health agenda in various applicable workplaces, processes, occupations and branches of the economy; construction sites inclusive:

i. Safety & Health Committee Rules, 2004 Legal Notice No. 31

These rules apply in all workplaces where The Occupational Safety and Health Act, No. 15 of 2007 applies.

These rules are described in Legal Notice No. 31 of the Kenya Gazette Supplement No. 25 of 14th May 2004. The rules apply to all places work that regularly employs twenty or more employees. Among other items, the rules state that:

- The occupier of every workplace shall establish a health and safety committee;
- The committee shall consist of safety representatives from the management and the workers;
- The factory occupiers shall appoint a competent person from the management staff to be responsible for safety, health and welfare in the factory or workplace; and the person appointed shall be the secretary to the committee.
- Every member of the Health and Safety Committee shall undertake a prescribed basic training course in occupational health and safety within a period of six months from the date of appointment or election, and thereafter further training from time to time;
- The occupier of every workplace shall cause a health and safety audit of the workplace to be carried out at least once in every period of twelve months by a registered health and safety adviser.

The Legal Notice also describes the functions and duties of the health and safety committee, the purpose of meetings and recording minutes, and the roles of the office bearers. It further describes the duties of the occupier and those of the Health and Safety Adviser.

Relevance to the proposed project

This Subsidiary legislation require the contractor to form a safety and health committee to oversee safety and health on site while construction activities on site are ongoing

ii. Fire Risk Reduction Rules, 2007 Legal Notice No. 59

The rules apply to workplaces where the Occupational safety and Health Act, 2007 applies.

An employer/occupier having flammable substances must have fire resistant facility. The occupier to store highly flammable substances in fixed storage tanks, closed vessels, cupboards except for vehicles transporting the same. Flammable materials have to be kept in separate labeled stores. In go-downs, the employer has to maintain a distance of at least 80 cm wall gangway between the walls and stack of goods.

Every employer is required to maintain good ventilation to allow exit of flammable fumes, maintain good housekeeping, maintain good electrical fittings, provide and maintain fire exits, form and train fire fighting teams, conduct fire drills yearly, designate an assembly point, provide and maintain first aid facilities, post fire safety notices, install fire detectors, provide and maintain fire fighting appliances, conduct an annual fire safety audit and formulate a fire safety policy.

Relevance to the proposed project

In the construction phase, the contractor will apply the rules to ensure fire safety at the site offices and site camp while the rules come in handy for use by the developer when the go-downs are up and running.

iii. Hazardous Substances Rules, 2007 Legal Notice No. 60

The rules require that where hazardous substances are handled, washing facilities be provided, protective clothing be kept separate from personal clothing, separate clean and dirty changing rooms be maintained, proper maintenance and testing of engineering controls be done after every 2 years and a report submitted to DOSHS, protection against radioactive, carcinogenic, mutagenic or teratogenic be provided, Material Safety Data Sheets (MSDS) be availed in respect of chemicals handled, correct disposal of hazardous chemical substances be done, containers of hazardous substances be labeled, workers be trained on hazards associated to hazardous substances handled and air monitoring and measurements be done after every 12 months by an air quality monitor.

Relevance to the proposed project

Substances in form of cement, paints, solvents, fuels and lubricants for construction plants will be used on site by the contractor. The rules will help the contractor to ensure safety and health of workers with regards to the substances. At the operational phase the rules will be very useful as many types of goods including hazardous are likely to be stored in the go-downs.

iv. First Aid Rules, 1977 Legal Notice No. 160

These rules outline first-aid box content with respect to size of a workplace and under whose charge the first-aid box should be placed.

Relevance to the proposed project

During all phases of the project provision of first aid is a requirement and the rules will be useful in this regard in catering for injuries sustained on site and workplace.

v. Eye Protection Rules legal Notice No. 44 of 1978

The rules were developed for purposes of eye safety in workplaces. Processes where eye protection is required include blasting, cleaning, chipping, metal cutting, arc welding, abrasive wheel use (grinding).

Relevance to the proposed project

During the construction phase, work activities requiring eye protection will be a common feature. The rules will provide a good platform for ensuring eye safety of the workers involved in the stated activities

vi. Electric Power(Special) Rules, 1979 Legal Notice No. 340

The rules were developed to provide for electrical safety with regards to electrical power installations, use and handling. These rules apply to generation, transformation, conversion, switching, controlling, regulating, distribution and use of electricity.

vii. Building Operations and Works of Engineering Construction Rules, 1984 Legal Notice No. 40

These rules provide for the safety, health and welfare of workers in construction sites.

Relevance to the proposed project

The contractor will be expected to ensure safety, health and welfare of workers and all persons lawfully present at the construction site

viii. Medical Examination Rules, 2007 Legal Notice No. 24

The rules apply to workplaces of classified hazards. Every employer has to ensure medical examination of workers in the workplaces of classified hazards.

Relevance to the proposed project

During the construction phase there will be noise emission, exposure to dusts and fumes (cement, soil, welding fumes etc) and exposure to musculoskeletal hazards. Exposure to the said hazards will require statutory medical examination on the victims.

ix. Noise Prevention and Control Rules, 2005. Legal Notice No. 25

Kenya's Noise Prevention and Control Rules were passed under Legal Notice No. 25 dated 2005, as a subsidiary legislation of the now repealed Factories and Other Places of Work Act, Cap. 514. The rules state that '*No worker shall be exposed to noise level excess of the continuous equivalent of 90 dB(A) for more than 8 hours within any 24 hours duration*'.

Relevance to the proposed project

During the construction phase there is likely to be noise emission in excess of 90 dB(A) requiring the invoking of these rules to provide for the safety with regards to noise. The rules will guide the contractor in protecting the workers from effects of high noise levels.

4.6.14 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.

Relevance to the project

The proponent to ensure that all the materials to be used have undergone testing and verification to ensure they are of good quality.

4.6.15 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.

Relevance to the Project

As part of the project the proponent will rehabilitate the Jadongo access road. The access road will be used during material delivery and during occupation phase.

4.6.16 Water Act, 2002

This Act of Parliament provides for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for

the regulation and management of water supply and sewerage services; to repeal the Water Act (Cap. 372) and certain provisions of the Local Government Act. Section 25 (1) states that a permit shall be required for any of the following purposes:— (a) Any use of water from a water resource, except as provided by section 26; (b) The drainage of any swamp or other land; (c) The discharge of a pollutant into any water resource; (d) Any purpose, to be carried out in or in relation to a water resource, which is prescribed by rules made under this Act to be a purpose for which a permit is required.

Relevance to the project

The proponent shall apply for water and sewer services from the provider NCWSCO

4.6.17 Physical Planning Act, 1999

Part V—Control of development 30. (1) No person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. (2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand shillings or to an imprisonment not exceeding five years or to both. (3) Any dealing in connection with any development in respect of which an offence is committed under this section shall be null and void and such development shall be discontinued. (4) Notwithstanding the provisions of subsection (2)— (a) The local authority 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; (b) If on the expiry of the ninety days notice given to the developer such restoration has not been effected, the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

31. Any person requiring development permission shall make an application in the form prescribed in the Fourth Schedule, to the clerk of the local authority responsible for the area in which the land concerned is situated.

The application shall be accompanied by such plans and particulars as are necessary to indicate the purposes of the development, and in particular shall show the proposed use and density, and the land which the applicant intends to surrender for— (a) Purposes of principal and secondary means of access to any subdivisions within the area included in the application and to adjoining land; (b) Public purposes consequent upon the proposed development. 36. If in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the

applicant shall be required to submit together with the application an environmental impact assessment report.

Relevance to the proposed project

This Act provides for order in terms of development execution. The proponent shall submit the project designs to the local authority for approval. This development shall also comply with all the provisions of this law including vertical zoning requirements.

4.6.18 The Local Government Act (Cap. 265)

Section 160 helps local authorities ensure effective utilization of the sewerage systems. It states in part that municipal authorities have powers to establish and maintain sanitary services for the removal and destruction of, or otherwise deal with all kinds of refuse and effluent and where such service is established, compel its use by persons to whom the service is available.

Relevance to the proposed project

The appointed contractor and the Proponent will mitigate against such impacts by ensuring strict adherence to the Environmental Management Plan provided in this project report throughout the project cycle.

4.6.19 The Penal Code (Cap. 63)

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

Relevance to the proposed project

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

4.6.20 The Traffic Act, 2012

The Traffic Act, 2012 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

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. In ensuring compliance to this Act the contractor and developer shall ensure that all site drivers and all material suppliers to the site satisfy the provisions as stipulated in Act.

Relevance to the Project

The proponent shall adhere to this regulation where applicable

4.6.21 Persons with Disability Act (PWD), 2003

Kenya has a Person with Disabilities Act (PWD), 2003 which is a comprehensive law covering rights, rehabilitation and equal opportunities for people with disabilities.

- It creates the National Council of Persons with Disabilities as a statutory organ to oversee the welfare of persons with disabilities.
- The Act aims to ensure that Persons with Disabilities' issues and concerns are mainstreamed.
- Requires establishment of DMCs in all public institutions

Section 21 of this Act entitles Persons with disabilities 'to a barrier-free and disability-friendly environment to enable them to have access to buildings, roads and other social amenities, and assistive devices and other equipment to promote their mobility'.

Relevance to the project

The Proponent shall ensure that the main contractor adopts implements and mainstream PWD Provisions throughout the project phases.

4.6.22 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.

4.6.23 Building Code 2000

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local Authority for permit to connect to the sewer line and all the wastewater must be discharged in to sewers. The code also prohibits construction of structures or building on sewer lines.

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, Cap387 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 River Estate housing development, Rehabilitation of Jadongo access road and associated amenities. 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 EIA 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.



Residential flats near the site

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
- Dissemination of questionnaires
- Field surveys, photography and observations

The use of pre-designed questionnaires captured all the phases of the proposed development. The purpose for such interviews 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 identification of 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.

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 neighbors/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 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 industrial 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 development will create room for many other businesses 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 during operation.

5.3.1.4 Proper drainage

Those who reside in the neighboring residential flats expressed their concerns in the poor drainage in the area. Their fear is that there might be contamination to the water they are using and hence the risk of water borne diseases like cholera, typhoid and others. They therefore request the proponent of the proposed development if he can help address the problem of poor drainage around the area.

5.3.2 Negative concerns expressed

5.3.2.1 Displacement of the Juacali Business

Those with the juacali businesses around the proposed development like the car garage, vegetables vendors and others received the news with mixed reactions since they will be the ones affected mostly. To them the coming of the development will cut off their livelihood and so they have to look for new jobs and new business places.

5.3.2.2 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.

5.3.2.3 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.

5.3.2.4 Solid Waste Generation

Solid waste will be generated during excavation and construction phases of the project which have to be disposed of in an environment friendly manner. 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.

6.0 POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

6.1 Introduction

The environmental baseline information and the project characteristics discussed earlier, form the basis for impact identification and evaluation. The potential 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.

6.2 Construction phase

6.2.1 Positive Impacts

6.2.1.1 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.

6.2.1.2 Gains in the Local and National Economy

The proposed project will improve income/economic status of people within the project neighbourhood. 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.

6.2.1.3 Increased business within the surrounding

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

6.2.1.4 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 commercial space that ensures optimal land use as compared to the current use or any perceived future use of the said plot.

6.2.1.3 Proper drainage

Those who reside in the neighboring residential flats expressed their concerns in the poor drainage in the area. Their fear is that there might be contamination to the water they are using and hence the risk of water borne diseases like cholera, typhoid and others. They therefore request the proponent of the proposed development if he can help address the problem of poor drainage around the area.

6.2.2 Negative Impacts

6.2.2.1 Noise 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 the residents of the neighbouring premises 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; retrofitting 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 minimise the impact of temporary construction noise at the project site:

6.2.2.2 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.

6.2.2.3 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.

6.2.2.4 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.

6.2.2.5 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.

6.2.2.6 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.

6.2.2.7 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

6.2.3 Impacts Related to Occupational Health and Safety

6.2.3.1 Pre-Construction/Planning Phase

i. Approval of Architectural Plans

Pursuant to section 125 of OSHA, 2007, no building shall be erected or converted for use as a workplace and no structural alteration and no extension shall be made to any existing workplace except in accordance with plans showing details of the proposed construction, conversion, alteration or extension, approved by the Director of Occupational Safety and Health Services.

The proponent will ensure arrangements are made for submission of the architectural plans for approval at the offices of the Directorate of Occupational Safety and Health Services before commencement of construction. Upon satisfaction that the plans provide for suitable premises for use of a workplace of the type proposed, an approval for such plans will be issued by the Directorate of Occupational Safety and Health Services.

ii. Notification of Building Operations and Works of Engineering Construction

It is required of the contractor engaged by the proponent to give notice, in a prescribed form, of the building operations and works of engineering construction at least 10 days before commencement of the construction phase of the project to the Directorate of Occupational Safety and Health Services. This is a provision in the Building Operations and Works of Engineering Construction Rules, 1984 Legal Notice No.40.

Upon receipt of the notice, the Director of Occupational Safety and Health Services shall take such steps as may be necessary to satisfy himself that the site is suitable for use as a workplace of the nature stated in the notice, and upon being so satisfied, shall cause the site to be registered and shall issue to the applicant (the contractor in this case), upon payment of a prescribed fee, a certificate of registration which is renewable annually until the construction phase is over.

6.2.3.2 Construction Phase

The proponent will set it out as preconditions for every contractor to adhere to during award of the contract so that aspects of occupational safety and health are factored in financial allocations. During the construction, the contractor is expected to adhere to the requirements in the following table so as to uphold safety, health and welfare of persons employed at the site.

Table 6-1. Requirements to be adhered to during the construction phase of the project

Requirement	Relevant clause in the Law
1. Appoint a Site Safety Supervisor	Legal Notice No.40 of 1984
2. Provide Personal Protective and Equipment (PPE) to site workers i.e. <ul style="list-style-type: none"> a) Helmets/hard hats for head protection b) Goggles/shields for eye protection when necessary c) Ear protection (ear muffs or ear plugs) for those workers exposed to high noise levels d) Dust masks/respirators for protection from inhalation of air contaminants when necessary e) Body protection (overalls, reflector jackets or aprons as appropriate) f) Gloves for hand protection when necessary g) Foot protection (safety boots or safety shoes) h) Safety harnesses, when necessary, for prevention of falls from height 	Legal Notice No.40 of 1984 as read together with Section 101 of OSHA, 2007
3. Acquire and display at a prominent place within site offices an abstract of Building Operations and Works of Engineering Construction Rules.	Section 121 of OSHA, 2007
4. Acquire and maintain a General Register	Section 122 of OSHA, 2007
5. Develop an occupational safety and health policy and ensure all workers are informed of its content.	Legal Notice No.31 of 2004 as read together with Section 7 of OSHA, 2007
6. Undertake the risk assessment exercise, compile a report and submit a copy to the Directorate of Occupational Safety and Health Services.	Section 6 of OSHA, 2007
7. Form a workplace Safety and Health Committee and have it	Legal Notice No.31 of 2004 as

trained on matters relating to Occupational Safety and Health.	read together with Section 9 of OSHA, 2007
8. Provide first aid i.e. a) Appoint and train using a government recognized trainer, first aiders b) Provide and maintain, to the prescribed standard, first aid box(es)/cupboards c) Provide and maintain a stretcher d) Provide and maintain a first aid room	Legal Notice No. 160 of 1977 as read together with Section 95 of OSHA, 2007
9. Ensure safe Housekeeping by:- a) Placing barrier tapes around pits, excavations and areas where construction works are ongoing b) Designating walkways and driveways for site safe movement. c) Neat arrangement of site material like timber, iron rods, cement, boards, used materials etc.	Legal Notice No.40 of 1984 as read together with Section 77 of OSHA, 2007
10. Ensure safety of workers at height by :- a) Providing and maintaining safe work platforms of the standards prescribed b) Providing and maintaining safe scaffolds of the standards prescribed c) Providing and maintaining safe harnesses d) Development of a permit to work document to be used risky work at height e) Providing and maintaining safe ladders	Legal Notice No.40 of 1984
11. Protect workers from adverse weather conditions by providing and maintaining adequate shelter at the site.	Legal Notice No.40 of 1984
12. Ensure medical examination is done to workers exposed to classified hazards e.g. excessive noise levels, hazardous dusts, chemicals, radiation etc.	Legal Notice No.24 of 2005
13. Cause the safety and health audit of the construction works to be conducted on an annual basis	Legal Notice No.31 of 2004 as read together with section 11 of OSHA, 2007
14. Cause the fire safety audit of the construction works to be conducted on an annual basis	Legal Notice No.59 of 2007
15. Provide adequate and suitable sanitary conveniences to all persons employed	Section 52 of OSHA, 2007
16. Provide and maintain fire safety at site and camp by:- a) Providing fire fighting appliances and instruction workers in their use	Legal Notice No.59 of 2007 as read together with sections 78, 81 and 82 of OSHA, 2007

<ul style="list-style-type: none"> b) Conducting fire drills as necessary c) Providing a documented fire emergency procedure d) Ensuring proper storage of highly flammable materials 	
<p>17. Ensure general welfare provisions to site workers by:-</p> <ul style="list-style-type: none"> a) Providing clean wholesome drinking water b) Providing washing facilities c) Providing accommodation for clothing not worn during working hours 	<p>Sections 91, 92 and 93 of OSHA, 2007</p>
<p>18. Ensure plant and machinery safety at the site by:-</p> <ul style="list-style-type: none"> a) Ensuring proper maintenance and repair of plant and machinery b) Guarding, fencing and encasing of dangerous parts, whichever the case may be, of plant and machinery c) Ensuring prescribed statutory examinations are carried out on plants e.g. cranes, air receiver etc. at prescribed intervals 	<p>Section 55 and 72 of OSHA, 2007</p>
<p>19. Notify occurrence of accidents and incidents to the Directorate of Occupational Safety and Health Services and ensure compensation when work injuries occur.</p>	<p>Section 31 of OSHA, 2007 and WIBA, 2007</p>

6.2.3.3 Occupational and 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 are, 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:

- The workers, immediate neighbours 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 developments.

6.3 Operational phase

6.3.1 Positive Impacts

6.3.1.1 Employment creation

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

6.3.1.2 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.

6.3.1.3 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. This 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

6.3.2 Negative Impacts

6.3.2.1 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.

6.3.2.2 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.

6.3.2.3 Solid Waste Generation

The project is expected to generate solid waste during its operation phase. Once the tenants/owners occupy the houses .The bulk of the solid waste generated during the operation of the project will consist mainly of household waste. 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.

6.3.2.4 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.

6.3.2.5 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.

6.3.3 Impacts Related to Occupational Health and Safety

6.3.3.1 Fire hazards, Accidents and Incidents

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 and incidents at the workplace shall be mitigated by enforcing safety procedures and preparing contingency plan for accident response in addition safety education and training that shall be emphasized.

To ensure safety and health workers employed and to eliminate or minimize incidents during the operational phase of the project, a number of requirements to be adhered to by the proponent are outlined in table 6-2 hereunder.

Table 6-2. Requirements to be adhered to during the operational phase of the project

Requirement	Relevant clause in the Law
1. Ensure acquisition and annual renewal of registration certificate of the workplace by lodging an application and remitting prescribed fees to the Directorate of Occupational Safety and Health Services	Legal Notice No.14 of 2011 as read together with Section 44 of OSHA, 2007
2. Provide Personal Protective and Equipment (PPE) to factory workers i.e. a) Helmets/hard hats for head protection b) Goggles/shields for eye protection where necessary c) Ear protection (ear muffs or ear plugs) for those workers exposed to high noise levels d) Dust masks/respirators for protection from inhalation of air contaminants where necessary and as applicable d) Body protection (overalls, reflector jackets, aprons dust coats as appropriate) e) Gloves for hand protection where necessary f) Foot protection (safety boots or safety shoes) g) Safety harnesses, when necessary, for prevention of falls from height	Section 101 of OSHA, 2007
3. Acquire and display at a prominent place within workplace an abstract of OSHA, 2007	Section 121 of OSHA, 2007
4. Acquire and maintain a General Register	Section 122 of OSHA, 2007
5. Develop an occupational safety and health policy and ensure	Legal Notice No.31 of 2004 as

all workers are informed of its content.	read together with Section 7 of OSHA, 2007
6. Undertake the risk assessment exercise, compile a report and submit a copy to the Directorate of Occupational Safety and Health Services.	Section 6 of OSHA, 2007
7. Form a workplace Safety and Health Committee and have it trained on matters relating to Occupational Safety and Health.	Legal Notice No.31 of 2004 as read together with Section 9 of OSHA, 2007
8. Provide first aid i.e. a) Appoint and train using a government recognized trainer, first aiders b) Provide and maintain, to the prescribed standard, first aid box(es)/cupboards	Legal Notice No. 160 of 1977 as read together with Section 95 of OSHA, 2007
9. Ensure safe Housekeeping by:- a) Ensuring good machine layout and arrangement b) Designating and marking walkways, gangways and driveways for workplace safe movement. c) Proper arrangement of stocks and products	Section 77 of OSHA, 2007
10. Ensure safety of workers engaged in high risk activities by development of a permit to work document to be used in such activities	Section 77 of OSHA, 2007
11. Ensure good health of workers employed by:- a) Causing prescribed periodical medical examinations to be done on workers exposed to classified hazards e.g. excessive noise levels, hazardous dusts, chemicals, radiation etc. b) Causing pre-employment medical examinations to be done on workers to be employed in areas with classified hazards c) Causing post-employment medical examinations to be done on workers formerly employed in areas with classified hazards d) Causing prescribed medical surveillance to be done on workers employed in areas with classified hazards	Legal Notice No.24 of 2005 as read together with section 103 of OSHA, 2007
12. Cause the safety and health audit of the workplace to be conducted on an annual basis	Legal Notice No.31 of 2004 as read together with Section 11 of OSHA, 2007
13. Cause the fire safety audit of the workplace to be conducted on an annual basis	Legal Notice No.59 of 2007
14. Provide adequate and suitable sanitary conveniences to all persons employed	Section 52 of OSHA, 2007

<p>15. Provide and maintain fire safety at workplace by:-</p> <ul style="list-style-type: none"> a) Providing fire fighting appliances and instruction workers in their use b) Conducting fire drills as necessary c) Providing a documented fire emergency procedure d) Ensuring proper storage of highly flammable materials 	<p>Legal Notice No.59 of 2007 as read together with sections 78, 81 and 82 of OSHA, 2007</p>
<p>16. Ensure general welfare provisions to factory workers by:-</p> <ul style="list-style-type: none"> a) Providing clean wholesome drinking water b) Providing washing facilities c) Providing accommodation for clothing not worn during working hours 	<p>Sections 91, 92 and 93 of OSHA, 2007</p>
<p>17. Ensure plant and machinery safety at the workplace by:-</p> <ul style="list-style-type: none"> a) Ensuring proper maintenance and repair of plant and machinery b) Guarding, fencing and encasing of dangerous parts, whichever the case may be, of plant and machinery c) Ensuring prescribed statutory examinations are carried out on plants at prescribed intervals 	<p>Section 55 and 72 of OSHA, 2007</p>
<p>18. Ensure control of air pollution, noise and vibration. The proponent will put measures in place to prevent the pollutant from accumulating in any workroom, and in particular, where the nature of the process makes it practicable, exhaust appliances shall be provided and maintained, as near as possible to the point of origin of the dust or fume or other impurity, so as to prevent it entering the air of any workroom and the dust, fumes or impurity shall not be allowed to enter into the atmosphere without undergoing appropriate treatment to prevent air pollution or other ill-effect to life and property.</p>	<p>Section 89 of OSHA, 2007</p>
<p>19. Notify occurrence of accidents and incidents to the Directorate of Occupational Safety and Health Services and ensure compensation when work injuries occur.</p>	<p>Section 31 of OSHA, 2007 and WIBA, 2007</p>

6.4 Decommissioning phase

6.4.1 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.

7. ANALYSIS OF PROJECT ALTERNATIVES

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

7.1 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 to the proposed project.

7.2 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 proposed housing project.
- Increased poverty and crime in Kenya.
- 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.

7.3 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 River estate housing 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.

7.4 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.

7.5 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/Bowers Water Supply

Several commercial water supply companies operate in the area. These are usually licensed by Water Resources Management Authority (WARMA) to supply water to clients when normal NCWSC 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 - 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 tanks to balance the fluctuating water supply and for emergencies.

8 ENVIRONMENTAL MANAGEMENT PLAN

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

8.2 Construction Phase EMP

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

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (Kshs)
Encroachment and disturbance of the Nairobi River	<ul style="list-style-type: none"> • Maintain a riparian buffer zone along the River as per WRMA recommendations • No development activity shall be undertaken within the full width of the river or within the riparian reserve as per Water Quality Regulations 2006 • Routine check-ups and monitoring of the WWTP to avoid leakage and blockage 	Proponent, contractor & WRMA	Through the Construction period	
River flooding	<ul style="list-style-type: none"> • Plant environmentally friendly trees on the riparian 	Proponent &	Construction	

	<p>reserve to increase interception and storage while reducing surface run off</p> <ul style="list-style-type: none"> • Liaise with WRMA weigh the option of constructing a levee which can confine the flow • Liaise with WRMA to decommission the weir that is obstructing the smooth running of the river water on the site frontage as it does not serve any purpose. 	WRMA		
Increased Exploitation of Raw materials	<ul style="list-style-type: none"> • Source building materials from suppliers who use environmentally friendly processes in their operations • Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered • Ensure that damage or loss of materials at the construction site are kept minimal through proper storage • Use at least 5%-10% recycled refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills. 	Proponent & Contractor	Throughout the construction period	680,000
Solid waste generation	<ul style="list-style-type: none"> • Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials. • Ensure that construction materials left over at the end of construction period will be re-used in other projects rather than being disposed of. 	Proponent & Contractor	Throughout the construction period	250,000

	<ul style="list-style-type: none"> • Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements • Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste • Reuse packaging materials such as cartons, cement bags, left over steel metals and plastic containers to reduce waste at the site 			
Ecosystem disturbance	<ul style="list-style-type: none"> • Ensure proper demarcation and delineation of the project area to be affected by construction works. • Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage. • Designate access routes and parking within the site. 	Proponent & Contractor	Throughout the construction period	130,000
Run off and soil erosion	<ul style="list-style-type: none"> • Create storm water management practices, such as piping systems or retention ponds or tanks, which can be carried over after the building is complete. • Apply soil erosion control measures such as leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil • Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site. • Ensure that any compacted areas are ripped to reduce 	Proponent & Contractor	Throughout the construction period	250,000

	run-off			
Air pollution	<ul style="list-style-type: none"> • Ensure strict enforcement of on-site speed limit regulations • Sprinkle water on graded access routes each. • Ensure that all the construction materials transportation vehicle are properly covered especially during transportation of materials to site day to reduce dust generation by construction vehicles • Ensure proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done per vehicle or the number of vehicles on the road during the day 	Proponent & Contractor	Throughout the construction	250,000
Traffic congestion and accidents	<ul style="list-style-type: none"> • Proponent to engage KeNHA in developing the Jadongo access road • A traffic marshal to be stationed along the entry point within the project boundary to control vehicles during transportation of materials. • Planned deliveries to make sure they do not coincide with heavy traffic • Provision of separate traffic routes for pedestrians and vehicles during operation phase • Security checks to be conducted inside the compound NOT at the entrance • Provision of designated entry and exit points 	Proponent and the Contractor	Throughout project construction	200,000

Noise Pollution	<ul style="list-style-type: none"> • Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used • Ensure that construction machinery are kept in good condition to reduce noise generation • Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels. 	Proponent & Contractor	Throughout the construction period	250,000
Exploitation and pollution of water resource	<ul style="list-style-type: none"> • Ensure no waste water from the construction site is disposed especially in raw form that might affect the ecosystem • Promote recycling and reuse of water as much as possible • Promptly detect and repair of water pipe and tank leaks 	Proponent & Contractor	Throughout the construction period	50,000
Effluent emissions	<ul style="list-style-type: none"> • Provide adequate means for handling all the liquid waste generated by construction workers • Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated 	Proponent & Contractor	Throughout the construction period	
Structural integrity of residential blocks	<ul style="list-style-type: none"> • Undertake geotechnical survey • Security consideration. 	Proponent & Contractor	Throughout the construction period	-
Violation of rules and regulations/ Mishaps	<ul style="list-style-type: none"> • Ensure that all building plans are approved by the County Government and the County Occupational Health and Safety Office • Registration of the premises under the Factories 	Proponent & Contractor	Throughout the construction period	56,000

	<p>and Other Places of Work Act Cap 514, Laws of Kenya is mandatory</p> <ul style="list-style-type: none"> • A general register should be kept within the facility as stipulated in Sec 62 (1) of the Factories and Other Places of Work Act. • The abstract of the Factories and Other Places of Work Act must be displayed at prominent places within the site. • Develop, document and display prominently an appropriate Safety and Health policy for construction works 			
Occupational health and safety	<ul style="list-style-type: none"> • Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency. Such procedures must be tested at regular intervals • Adequate provisions in place to immediately stop any operations where there is an imminent and serious danger to health and safety and to evacuate workers. • Adequate first aid arrangements. Well stocked first aid box which is easily available and accessible should be provided within the premises • Ensure that workers at the construction site and other dusty sites are adequately protected from inhalation of substantial quantities of dust through provision of suitable protective gear (e.g. nose masks) • Provide workers in areas with elevated noise and 	Proponent & Contractor	Throughout the construction period	Cost is site specific

	<p>vibration levels, with suitable ear protection equipment such as ear muffs</p> <ul style="list-style-type: none"> • Ensure that construction workers are provided with an adequate supply of wholesome drinking water which should be maintained at suitable and accessible points. 			
Sanitary Conveniences	<ul style="list-style-type: none"> • Ensure that conveniently accessible, clean, orderly, adequate and suitable washing facilities, sanitary conveniences are provided and maintained in within the site • Provide and maintain, for the use of all workers whose work is done standing, suitable facilities for sitting sufficient to enable them to take advantage of any opportunity for resting which may occur in the course of their employment • All work places must be kept in a clean state, and free from effluvia arising from any drain, sanitary convenience or nuisance • Provision for repairing and maintaining of hand tools must be in place 	Proponent & Contractor	Throughout the construction period	280,000
Loss of biodiversity	<ul style="list-style-type: none"> • Maintain a riparian buffer zone as per WRMA recommendation • Clearance of vegetation should be done in necessary areas only • Carry out environmental compensation where harm cannot be avoided by planting of indigenous plants 	The proponent & Contractor	Throughout Construction	-
	<ul style="list-style-type: none"> • 			

8.3 Operational phase EMP

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 project is 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	100,000
	Ensure that solid waste generated at the facility, is regularly collected by licensed operators and disposed of appropriately at authorized/designated dumping sites using the legal disposal bags/containers	Proponent & Contractor	Continuous	200,000
Sewage release Into environment	Provide adequate and safe means of handling sewage generated at the industrial park	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	Cost is site specific
Energy Consumption	Install energy saving fluorescent tubes at all lighting points within the industrial premises instead of bulbs which consume higher electric energy	Proponent	One-off	20,000
	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 water pipe and tank leaks	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 Occupational Safety and Health Act, 2007	Proponent	Continuous	Site specific
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	Site specific
Loss of biodiversity	<ul style="list-style-type: none"> • Maintain a riparian buffer zone as per WRMA recommendation • Clearance of vegetation should be done in necessary areas only • Carry out environmental compensation where harm cannot be avoided by planting of indigenous plants • 	The proponent & Contractor	Throughout Construction	-

8.4 Decommissioning Phase

In addition to the mitigation measures provided in the above two 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)
Solid Waste	<ul style="list-style-type: none"> • 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 • 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 • 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	150,000
Rehabilitation of project site	<ul style="list-style-type: none"> • Implement an appropriate re-vegetation programme to restore the site to its original • Consider use of indigenous plant species in re-vegetation status 	Proponent	One-off	-

9.0 CONCLUSION AND RECOMMENDATIONS

The proposed River Estate housing development indicates numerous positive and negative impacts in which the proponent 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.

REFERENCES

1. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009
2. Environmental Management and Coordination Act , Cap387
3. Kenya gazette supplement Acts Building Code 2000,
4. Kenya gazette supplement Acts Physical Planning Act, 1999
5. Kenya gazette supplement Acts Public Health Act (Cap. 242)
6. Environmental Impact Assessment and Audit Regulations 2003
7. Environmental Management and Coordination (Water Quality) Regulations, 2006
8. Environmental Management and Coordination (Waste management) Regulations, 2006
9. Noise Prevention and Control Rules 2005, Legal Notice no. 24
10. The Occupational Safety and Health Act, 2007

Annexes

Annex 1: NEMA License

Annex 2: Ownership Documents

Annex 3: Questionnaire

Annex 4: Plans