ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT STUDY

FOR THE PROPOSED

MINARA HEIGHTS

(A MEGA HIGH-RISE RESIDENTIAL APARTMENTS BLOCK DEVELOPMENT)

WITHIN HIGHRIDGE AREA, ALONG ELDAMA RAVINE ROAD OF WESTLANDS SUB-COUNTY, NAIROBI COUNTY.

LEAD EXPERT:	PROPONENT:	SUBMITTED TO:
MR. GEOFFREY W. KOLOLI P.O. BOX 380 - 00517 NAIROBI. NEMA REG. NO. 1624	MINARA HOMES LIMITED P.O. BOX 19346 – 00100 GPO, NAIROBI.	NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA) HEADQUARTES P.O. BOX 67839 - 00200, NAIROBI. POPO ROAD, OFF MOMBASA ROAD TEL. 254-020-2183718/2101370 *E-MAIL DGNEMA@NEMA.GO.KE* *WWW.NEMA.GO.KE*

CERTIFICATION:

We, the under signed, hereby approve that all information given here in this report is accurate and true according to the best of our knowledge and understanding.

DECLARATION

I, Geoffrey W. Kololi. , hereby certify that the contents of this Environmental Impact Assessment Study for this proposed High-Rise Apartments Block to be constructed on L.R. No. 1870/1/237, within Highridge Area of Nairobi County, concurs that the information given herein is factual and true and that the contents conform to the guidelines contained in the Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003.

SIGNED AT NAIROBI ON THIS: ***Friday, 24 December 2021***

SIGNATURE. ……

***Designation*: NEMA REG. NO. 1624**

DECLARATION

I, **……,** on behalf of **Minara Homes Limited, the Proponent** of this proposed High-Rise Apartments Block to be constructed on L.R. No. 1870/1/237, within Highridge Area of Nairobi County, concurs that the information given herein is factual and true and confirms that we shall ensure the implementation of the Environmental Management Plan contained in this report. I further assure that I shall adhere to any recommendations or conditions issued by NEMA and other relevant Authorities with regard to the proposed project.

SIGNED AT NAIROBI ON THIS: ***Friday, 24 December 2021***

SIGNATURE. ……

***Designation*: PROPONENT**

ACKNOWLEDGEMENT

The Whole ESIA Lead Expert and Team would like to take this opportunity to thank various persons who provided support, information and assistance in preparation of this project report. The ESIA expert is thankful to ***Minara Homes Limited, Arch. M. Odindo and Staff of Spectrum Architects*** *for their confidence in our competence and the entire team for their integral roles in the project's management inputs and co-ordination in the process of the ESIA Study Report's production.*

The Lead Expert is likewise grateful to the entire occupants of this area, particularly the immediate buildings and neighbours along Eldama Ravine road and its surroundings for their views and inputs during the ESIA Study exercise.

ACRONYMS

^{0}C	Degrees Celsius
CBD	Central Business District
CLPs	Consents, Licenses and Permits
CSR	Corporate Social Responsibility
EA	Environmental Audit
EAC	East African Community
EAM	Environmental Management Company
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
ESIA	Environmental & Social Impact Assessment
EMCA	Environmental Management and Co-ordination Act
EMP	Environmental Management Plan
HCFC	Hydro-chlorofluorocarbon
HWM	Household Waste Management
KBS	Kenya Bureau of Standards
KM	Kilometres
KPLC	Kenya Power and Lighting Company
KVA	Kilo Volts Amperes
NCG	Nairobi County Government
NW&SC	Nairobi Water and Sewerage Company
NEC	National Environmental Council
NEMA	National Environment Management Authority
PPM	Parts Per Million
SHE	Safety, Health and Environment
SWM	Solid Waste Management
TOR	Terms of Reference
UNEP	United Nations Environmental Programme
WRMA	Water Resources Management Authority

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EXECUTIVE SUMMARY

A. Introduction

As a tool for better environmental planning, Environmental Impact Assessment Studies (ESIAs) have been identified as some of the key components in such like new projects' implementation. According to section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 second schedule 9 (1), and Environmental (Impact Assessment and Audit) regulation, 2003, projects of this nature must undergo Environmental Impact Assessment Study. A Report of the same must be submitted to National Environment Management Authority (NEMA) for approval and issuance of relevant certificates. This is necessary as many forms of such developmental activities cause damage to the environment and hence the greatest challenge today is to maintain sustainable development without interfering with the environment.

A registered Environmental Impact Assessment Expert was thus contracted by the proponent, Minara Homes Limited, to carry out an Environmental Impact Assessment Study for proposed Single Mega High-Rise Residential Building on Plot LR. NO. 1870/1/237 situated along Eldama Ravine Road, just three kilometres from the Nairobi City's CBD, within Highridge Area of Nairobi County. This is to comply with the Legal requirement stipulated in the Environmental Management and Coordination Act 1999 and the subsequent Legal supplement of 2003. More so it is a way of promoting benign environmental management for sustainable development.

The proponent is required to present this report in order to comply with the Environment Management Co-ordination Act 1999 and in particular part II of the Environmental (Impact Assessment and Audit) Regulations, 2003. The report has provided a summary statement of the likely environmental effects of the proposed project.

Since the proposed site is located within residential area and surrounded by other similar and related buildings amongst them, Cutchi Gujarati Hindu Union Shiv Temple, The Augustus Villas (a communal low-lying homes), Mwiko Gardens, (neighbourhood restaurant) El Signature Apartments (communal high-rise residential apartments), Anjarwalla & Khanna Law Firm Building, Kannan Villas (communal Upmarket residential maisonettes), Westwood Residential Hotel, Glaka Properties Villas (communal Upmarket residential maisonettes) Maple Bear Nursery & Pre-school and other related buildings and commercial quiet leafy neighbourhood. Being an area with no rich natural resources, apart from afore-mentioned buildings surrounding the site, on go-a-head, the site will be cleared of its vegetative components, demolition of the affected house/structures and parking areas, excavation and other preliminary works will be done to pave ways for creation of firm foundation for the proposed new building, thus causing soil disturbance and other environmental changes, whose total effect to the surroundings could be mildly adverse but mitigable in the long run. Though slightly different, it is notable that the intended development and use of the plot are in line with what exists in the surrounding areas and thus in sync with the area's zonation specifications.

Picture 1: Front view of the long-standing bungalow on the site, all earmarked for demolition, in readiness for the new mega block.

The ESIA Study done is based on laid down scientific qualitative procedures with the most recent methodologies and analysis required in ESIA and, with strict adherence to the relevant legislative framework governing the construction industry. Reference is also made to other ESIA studies dealing with similar projects from other parts of the country and world at large. The general steps followed during the assessment were as follows:

- Environment screening, in which the project was identified as among those requiring environmental impact assessment under schedule 2 of EMCA, 1999
- Environmental scoping that provided the key environmental issues
- Desktop studies and interviews
- Physical inspection of the site and surrounding areas
- ESIA Public participation via the use of questionnaires
- Reporting.

B. Project Description

This project focuses on the construction of the Single Mega High-Rise Residential-Apartments Block for the church's private usage within its compounds. The block will comprise of the following:

C. The Single High-Rise Residential-Apartments Block

- A Single Basement floor and the ground floor solely dedicated for parking of cars, each with an approximately capacity of parking about 106 cars in number, all totalling to about **213 parking slots**.
- The strategically designed apartments comprising of **3, 4 and 5 Bedroomed Apartments** accompanied by **4 Bedroomed Duplexes with Dsq** (**From 2nd to 18th floor**) complete with their accompaniments, **all totalling to about 180 Units**, units as depicted in the copy of Architectural Scheme Drawings herein attached, for your perusal.
- The apartments are designed with Spacious Lounge, Kitchen, Dining Area, Store, Utility Area, Master Bedroom En-suite complete with Master Dresser and other additional bedrooms ranging from two to four in conjunction with other surrounding amenities for a comfortable living.
- 4 Slots for the installation of Fast and Heavy Duty Lifts have been designed for ease of movement with the building.

- ☞ Mosque (Prayer area), Modernly Furnished Gymnasium accompanied by Men and Ladies' swimming pools as well as children's playing area.
- ☞ Surrounding security and beautifications must be finalised with a wall fence and designer landscaping to improve the aesthetics of the building.

The actual design, which can be clearly verified from the architectural drawings attached at the appendix, will include, amongst other things, the following:-

- Construction of the Single High-Rise Residential-Apartments Block,
- Construction of a driveway within the plot, sidewalk and parking lots for the user-to-be,
- Development and connection of utilities lines (Water, Electricity, Sewerage, Drainage etc.)
- Site landscaping to improve its greenery.
- Construction of a guard house, fence construction and installation of dustbin cubicles

D. Cost Estimates

This project is estimated to cost approximately Seven Hundred and Fifty Million Kenya Shillings (Kshs. 750,000,000).

E. Impacts and Mitigation Measures

There are both positive and negative impacts associated with the proposed Mega High-Rise Residential Block's project. These are identified according to phases namely: Construction Phase, Operational Phase and Decommissioning Phase.

In general the following positive impacts are associated with the proposed development:-

- Narrowing the supply and demand gap in the housing sector
- Employment opportunities
- Gains in the local and national economy
- Increase in national housing stock
- Improvement in the housing quantity and quality
- Market provision for construction agents, machinery and materials
- Optimal use of land

The negative Impacts associated with the proposed project are:

- Noise pollution
- Disposal of excavated soil
- Oil spills
- Increased water demand
- Dust emissions
- Solid waste generation
- Generation of exhaust emissions
- Increased runoff from new impervious areas
- Soil erosion
- Hydrology and water quality degradation
- Workers accidents and hazards during construction
- Increased pressure on infrastructure
- Electricity consumption

Several measures shall be put in place to mitigate the impacts that are likely to lead to environmental degradation. Some of these measures include preparation of a hazardous substance control and

emergency response plan that will include preparations for quick and safe clean-up of accidental spills, others are minimization of increased water demand; minimization of worker accidents and hazards during construction phase; reduction of energy consumption; reduction of impacts at extraction sites and efficient use of raw materials; Minimization of solid waste during construction phase; minimization of storm water run-off and soil erosion; and minimization of vegetation disturbance which are all outlined elaborately within the environmental management/monitoring plan.

The study was based on laid down scientific qualitative procedures with the most recent methodologies and analysis required in ESIA and, strictly adheres to the relevant legislative framework governing the construction industry. Reference was also made to ESIA studies dealing with similar projects from other parts of the world.

Where possible, we have provided annexes such as site maps, plans and applications to local authorities to support our findings or show the depth of our investigations. We have also provided several photos of the proposed site.

We found out that, the proponent of the proposed project has proposed to follow the laid down regulations, standards, laws and structural drawings as laid out and proposed by the relevant authorities and professionals respectively. Our conclusion is that the project is important for economic development of the area and has balanced environmental considerations and benefits. We have given adequate measures to mitigate the negative impacts and a management plan proposed which the proponent should adhere to so as to curb irreparable environmental effects.

1. INTRODUCTION

1.1. Background and Rationale for an Environmental Impact Assessment

Increased population, need for better living/working facilities in Nairobi and other Kenyan cities and town necessitate these developments in order to narrow the demand gap. Coupled with upsurge in rural-urban migration in search of better living standards and better job opportunities in major towns of Kenya, increased demand for these facilities are on the rise as well. Highridge Area, on the western side of Nairobi City's CBD, being one of the many rapidly growing estates around the Kenyan Capital, also requires more buildings for these purposes. To meet this demand, most private and even corporate developers have and are still constructing these High-Rise Residential buildings to narrow this gap.

The principle measure of sustainable development is that all activities which are carried out to achieve development must take into account the needs of environmental conservation. The sustainability of the ecosystem requires the balance between human settlement development and the natural ecosystem, which is a symbiotic relationship. This can be achieved through careful planning and the establishment of appropriate management systems. In modern times, the need to plan activities has become an essential component of the development process. Consequently a number of planning mechanisms have been put in place to ensure that minimum damage is caused to the environment. Environmental planning is also integrated with other planning processes such as physical planning, economic planning, and development planning. Environmental & Social Impact Assessment Study (ESIA) is considered part of environmental planning. ESIAs are undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority. In Kenya, the competent authority is the National Environment Management Authority (NEMA).

As part of the ESIA process, it is necessary to devise alternatives to avoid undesirable impacts. Besides the alternative, identification of impacts may also lead to the development of mitigation measures i.e. means of reducing the impacts. As a tool of environmental planning, ESIA is therefore precautionary in nature. ESIA is neither anti- development nor does it stop actions which impact the environment. It only requires that those impacts be considered. Most development activities impact the environment hence a "no impact" interpretation of environmental impact assessment could lead to no development. But a "considerable impact" interpretation of ESIA will lead to better development. If environmental impacts are ignored, the project may not be sustainable in the long-run, in which case the money invested in it will have been wasted.

In this development proposal, the proponent (Minara Homes Limited) intends to initiate construction of a Single Mega High-Rise Residential-Apartments Block on a piece of land with Land Reference Number LR. No. 1870/1/237, measuring approximately 0.429 Ha. (1.06 Acres) in size and situated along Eldama Ravine Road, Highridge Area within Westlands Sub-County of Nairobi County. This block will provide the proponent with the needed facilities to enhance and broaden its services to the ever-expanding residential demands. It has been established that such projects have a potential of causing significant impacts on the environment. It is under this premise that the proponent deemed it necessary to carry out an Environmental & Social Impact Assessment Study (ESIA) for the proposed project.

Picture 2: The long existing bungalow on the site, earmarked for demolition, on the project's commencement.

Environmental Impact Assessment studies were carried out as per the provisions of Environmental (Impact Assessment and Audit) Regulations, 2003 .This report is a product of the entire study and will be used in various decision making platforms including consideration for issuance with an ESIA license by the National Environment Management Authority (NEMA).

1.2. Justification of the Proposed Project.

In recent times, real property sector has achieved a significant growth owing to the fact that many people are currently putting up such buildings to meet rising demand for such facilities in Kenya. Besides, the project will empower the proponent economically in the future, as well as providing close working area for interested businesses in the neighbourhood.

The central government will benefit in the form of Value Added Taxes (VAT) imposed on construction materials and various fees charged by different government institutions More importantly, the design of the project is well thought out and has taken into consideration all the necessary interventions needed to take care for mitigation of negative impacts on the environment and safeguard safety of construction workers.

Picture 3: The site's view, as captured from the lower and slopping side of the plot.

1.3. Project and Environmental Impact Assessment Objectives.

The project objective is to build a single mega residential block comprising of the following:

- A Single Basement floor and the ground floor solely dedicated for parking of cars, each with an approximately capacity of parking about 106 cars in number, all totalling to about **213 parking slots**.
- The strategically designed apartments comprising of **3, 4 and 5 Bedroomed Apartments** accompanied by **4 Bedroomed Duplexes with Dsq** (**From 2nd to 18th floor**) complete with their accompaniments, **all totalling to about 180 Units**, units as depicted in the copy of Architectural Scheme Drawings herein attached, for your perusal.
- The apartments are designed with Spacious Lounge, Kitchen, Dining Area, Store, Utility Area, Master Bedroom En-suite complete with Master Dresser and other additional bedrooms ranging from two to four in conjunction with other surrounding amenities for a comfortable living.
- 4 Slots for the installation of Fast and Heavy Duty Lifts have been designed for ease of movement with the building.
- Mosque (Prayer area), Modernly Furnished Gymnasium accompanied by Men and Ladies' swimming pools as well as children's playing area.
- Surrounding security and beautifications must be finalised with a wall fence and designer landscaping to improve the aesthetics of the building.

On the other hand the ESIA study objectives for the proposed project were:

To identify environmental economic, social and health impacts,

To solicit views/opinion of the public and neighbours on the impacts of the project, and

Develop an Environmental Management Plan for the project.

1.4. Scope of the ESIA Study.

Arising from above objectives (Project and ESIA), the scope of Environmental Impact Assessment includes the following:

- The baseline conditions of the project area,
- Description of the proposed project,
- Relevant legislative, policy and administrative frameworks,

- Views/opinions of the public,
- Identification of significant adverse impacts to the environment,
- Mitigation measures to adverse impacts, and
- An Environmental Management Plan for the proposed project.

1.5. Terms of Reference.

In November 2021, the proponent contracted EIA/EA Expert, to conduct an Environmental Impact Assessment and come up with a report, for the proposed residential housing development.

Terms of reference, which, defined duties of the expert were as follows:

- The proposed location of the project,
- The objectives of the project,
- A concise description of the national environmental legislative and regulatory framework, baseline information and any other relevant information related to the project,
- The technology, procedures and processes to be used, in the implementation of the project,
- The products, by- products and waste 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,
- Alternative technologies and processes available and reasons for preferring the chosen technology and processes
- Analysis of alternatives including project site, design and technologies and the reasons for preferring the proposed site design and technologies,
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, time frame and responsibility to implement the measures,
- Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the course of carrying out activities or major industrial and other development projects,
- The measures to prevent health hazards and to ensure security in the working environment for the employees and for the management 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,
- An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures and
- Such other matters as the authority may require.

1.6. METHODOLOGY.

1.6.1. Environmental Screening.

Environmental screening was carried out to determine whether an ESIA study is necessary for this project and at what level of evaluation. This took into consideration the requirements of the Environmental Management and Coordination Act (EMCA), 1999, and specifically the second schedule of the same act. From the screening process, it was understood that this project will cause significant impacts on the environment.

1.6.2. Environmental Scoping.

In scoping, focus was on environmental impacts of great concern. Environmental issues were categorized into

physical, natural/ecological and social, economic and cultural aspects. Impacts were also classified as immediate and long-term impacts.
This will include assessment of the proposed project in respect of but not limited to:

Project Background: This will give the brief history of the proposed project site, the parties involved and justification of the project in terms of demand or lack of the same, the project area, relevant policy and legislation, identification of any associated project, or any planned projects including products within the region which may compete for the same resources; the project including products, by- products, processes both at implementation and operational level, resources required for successful implementation and operation of the project and the different options considered.

The proposed project's objectives; both in the short and long run; and how they are linked to the overall objectives.

Present environmental conditions: Description of the project site, ecological zoning as well as the state of the environment and its surroundings. Attempts will state if it is already suffering from degradation. If the latter is true, the causes of the original degradation will be established and if possible, the state of the environment before the observed degradation,

Identification of Environmental Impacts; the report will distinguish between significant positive and negative impacts, direct and indirect impacts and immediate and long term impacts which are unavoidable and / or irreversible,

Analysis of the alternatives to the proposed project: This will involve description of alternatives and identifying alternatives that would achieve the same objectives. Alternatives will be compared in terms of potential environmental impacts; capital and operating costs; suitability under local conditions; and institutional training and monitoring requirements.

Community/ Stakeholder Consultations: These will be undertaken to determine how the project will affect the local people / various stakeholders.

Cost- Benefit Analysis: To evaluate the economics of the project and establish its viability in terms of the expected environmental concerns and measures.

Evaluation: An indication of how the information gathered will be evaluated to give optimum results;

Development of an Environmental Management Plan (EMP): To mitigate negative impacts, recommending feasible and cost effective measures to prevent or reduce significant negative impacts to acceptable levels,

Development of a Monitoring Plan: This will be used in monitoring the implementation of the mitigation measures and the impacts of the project during construction and operational phases, including an estimate of capital and operational costs, and make necessary recommendations pertaining to the proposed development.

1.6.3. Desktop Study.

This involved documentary review of project documents, architectural drawings, past ESIA relevant policy, legal and institutional frameworks. Documents containing climatic, demographic and hydrological data for Nairobi region were also relied upon.

1.6.4. Site Visits and Public Participation.

Field visits were meant for physical inspections of the project site in order to gather information on the state of environment. Several photos of the project site were taken for inclusion in this report. The study also sought public opinion/views through Consultation and Public Participation (CPP) exercise. Clip board questionnaires were administered to the public and interviews held with neighbours. The questionnaires have been included in this report.

Picture 4: One of the two servants quarters within the site earmarked for demolition on licensing of the project's commencement.

1.6.5. Reporting.

In the entire exercise, the proponent and ESIA experts contacted each other on the progress of the study and signing of various documents. The proponent will have to submit ten copies of this report alongside a Softcopy to the National Environment Management Authority for review, make recommendations along with inputs from the wider public's comments and subsequently issue an improvement order or if satisfied, will issue an ESIA License.

All the materials and workmanship used in the execution of the work shall be of the best quality and description. Any material condemned by the architect shall be removed from the site at the contractors cost. Environmental concerns need to be part of the planning and development process and not an afterthought. It is therefore advisable to avoid land use conflicts with the surrounding area through the implementation of the Environmental Management Plan (EMP).

The proponent has proposed to put up a Single Mega High-Rise Residential-Apartments Block and its accompaniments on the above mentioned piece of land measuring approximately Nought Decimal Four Two Nine Zero (**0.4290**) Hectare (1.06 Acres) plot situated approximately 3 kilometres on the western side of Nairobi City's CBD along Eldama Ravine Road, on Land Reference Number No. LR. No. 1870/1/237. The proposed site is currently occupied by one old apartment and surrounded long-standing indigenous trees, vehicles parking lot (pictured below) which will be demolished to pave ways for other clearance works, prior to the construction commencement followed by excavations and final foundation-laying for the construction of this new proposed residential block.

Picture 5: Other vegetative cover on the site, likely to be cleared.

Picture 6: Some of the numerous old trees and other long-established vegetative cover – likely to be cut, within this green plot.

The plot targeted for development is located about 2.5 kilometres from Nairobi City's Central Business District. It can be only and easily be accessed via Eldama Ravine Road. This luxurious Mega High-Rise Residential Block is planned to incorporate well tendered access drives, parking facilities among other accompanying facilities for excellent working condition within the setup.

1.7. Duties of the Proponent

It will be the duty of the proponent to ensure that all legal requirements as pertaining to the development are met as specified by the law.

- ☞ On the site provided by the proponent, the contractor shall erect a temporary office complete with all the furniture and sanitary facilities to facilitate site management, meetings, inspections and other personnel's day to day activities.
- ☞ The proponent, depending on their agreement with the contractor, may also provide the contractor with a separate storage place, tentatively before they erect their own, for their usage and for use by the other subcontractors.

1.8. Duties of the Contractor

- ☞ Prepare and maintain an approved Time and Progress chart, showing clearly the period allowed for each section of the work
- ☞ The contractor is to comply with all regulations and by-laws of the local Authority including serving of notices and paying of the fees.
- ☞ During the night, public holidays and any other time when no work is being carried out onsite, the contractor shall accommodate only security personnel and never should a labour camp be allowed onsite.
- ☞ The contractor shall make good at his own expense any damage he may cause to public and private roads and pavements in the course of carrying out his work.
- ☞ The architect shall define the area of the site, which may be occupied by the contractor for use as storage, on the site.
- ☞ The contractor shall provide at his own risk, and cost all water required for use in connection with the works including the work including the work of subcontractors, and shall provide temporary storage tanks,
- ☞ The contractor shall make his own arrangement for sanitary conveniences for his workmen. Any arrangements so made shall be in conformity with the public health requirements for such facilities and the contractor shall be solely liable for any infringement of the requirements.
- ☞ The main contractor shall be responsible for all the actions of the subcontractor in first instance.
- ☞ The contractor shall take all possible precaution to prevent nuisance, inconvenience or injury to the neighbouring properties and to the public generally, and shall use proper precaution to ensure that safety of wheeled traffic and pedestrian.
- ☞ All work operations, which may produce under level of noise, dust vibration, or any other discomfort to the workers and/or guest of the client must be undertaken with care, with all necessary safety precautions taken.
- ☞ Workers will not be allowed to assemble or wait around the premises main gate.
- ☞ Workers will be picked from elsewhere and transported through the main entrance to the internal perimeter of the project site.
- ☞ The contractor shall take all effort of muffle/quieten the noises from his tools, equipment and workmen to not more than 70 Decibels
- ☞ The contractor shall upon completion of working, remove and clear away all plant, rubbish and unused materials and shall leave the whole of the site in a clean and tidy state to the satisfaction of the Architect. He shall also remove from the site all rubbish and dirt as it is produced to maintain the tidiness of the premises and its immediate environs.
- ☞ No unnecessary shrubs, trees, bushes or underground installations shall be removed except with the

express approval of the architect.

- ☞ No blasting shall be permitted without the prior approval of the architect and the local authorities.
- ☞ Burrow pits will only be allowed to be opened up on receipt of permission from the Architect
- ☞ The standard of workmanship shall not be inferior to the current operation codes of practice and /or the Kenya Bureau of Standards where existing. No inferior materials shall be incorporated for use in the permanent works or shall any material be used for any works or purpose other than that for which it is provided. Similarly, no material for temporary support may be used for permanent incorporation into the works.

All the materials and workmanship used in the execution of the work shall be of the best quality and description. Any material condemned by the architect shall be immediately be removed from the site at the contractors cost.

2. POLICY, INSTITUTIONAL AND LEGAL FRAMEWORK

2.1 Introduction

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

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

2.2 Environmental Problems in Kenya

There are many environmental problems and challenges in Kenya today. Among the cardinal environmental problems include: loss of biodiversity and habitat, land degradation, land use conflicts, human animal conflicts, water management and environmental pollution. This has been aggravated by lack of awareness and inadequate information amongst the public on the consequences of their interaction with the environment.

2.3 POLICY FRAMEWORK

Kenya has developed many environment-related policies in the past. Some of these have been consented while others are the draft stage. While some are sector specific, others are holistic. Some of the relevant policies and other documents include:

2.3.1 National Housing Policy for Kenya (Sessional Paper No. 3 of July 2004)

The first comprehensive Housing Policy for Kenya was developed in 1966/67 as Sessional Paper No. 5. At that time, Kenya's population was just over 9 million people, growing at a rate of 3 % p.a. for the whole country and 5 to 6 % p.a. in the urban areas. The annual housing requirements then were 7,600 and 38,000 new units in urban and rural areas respectively. The policy directed the government to provide the maximum number of people with adequate shelter and a healthy environment at the lowest possible cost.

Picture 7: Neighbouring High-rise Apartments, Residential maisonettes and other up-coming high-rise buildings towering this vicinity.

The policy advocated for slum clearance and encouraged mobilization of resources for housing development through aided self-help and cooperative efforts. Emphasis was placed on enhanced coordination to increase efficiency in the preparation of programmes and projects. Other areas included in the policy paper included increased research in locally available materials and construction techniques, and housing for civil servants through home ownership schemes in urban areas as well as institutional and pool housing schemes in remote stations.

Despite the creation of Sessional Paper No. 5, the investment in the housing sector since 1966/67 has been minimal and sporadic. The demand for housing still outstrips supply. High rate of urbanization, increasing poverty and escalation of housing costs and prices have made the provision of housing, infrastructure and community facilities one of the daunting challenges in the socio-economic development of the country. Research on low cost building materials and construction techniques has been limited, thus not providing viable guidance to the development of the sector. Moreover, stringent planning regulations and high infrastructural standards have been an impediment in the housing delivery system.

The high level of poverty has rendered access to decent housing an elusive dream to the swelling ranks of people living below the poverty line. The problem in urban areas is mainly that of acute shortage in the number of habitable dwellings, inadequate infrastructure, community facilities and services, overcrowding and extensive slums and squatter settlements.

The estimated current urban housing needs are 150,000 units per year. This level of production can be achieved if the existing resources are fully utilized by the private sector with the enabling hand of the government. It is estimated that the current production of new housing in urban areas is only 20,000-30,000 units annually, giving a shortfall of over 120,000 units per annum. This shortfall has been met through proliferation of squatter and informal settlements and overcrowding.

The overall goal of this Housing Policy is to facilitate the provision of adequate shelter and a healthy living environment at an affordable cost to all the socio-economic groups in Kenya in order to foster sustainable human settlements. This will minimize the number of citizens living in shelters that are below the habitable living conditions. It will also curtail the mushrooming of slums ad informal settlements especially in major towns.

Picture 8: Some of the Leafy homes bordering the site, a residential community to the sloppy north.

According to the housing policy, based on the 1999 National Population and Housing Census, there are about 3 million people in urban areas and about 6 million people in rural areas in urgent need of proper housing. Given the average household size of 4 persons from the census, there are about 750,000 households in urban areas and 1,500,000 households in the rural areas that need to be housed. In this policy, the government has committed itself to facilitate an annual output of 150,000 housing units in urban areas and 300,000 units in the rural areas in the next 5 years in order to meet that demand.

According to section (89) to the National Housing Policy, the private sector will be an anchor to housing development by participating in the construction of housing for all categories of the population either for rental or for sale. In this connection, the private sector will:

a) Participate in the manufacture and supply of building materials in the housing construction sector;
b) Participate in infrastructure development for human settlements;
c) Encourage and enter into joint ventures with the public sector in housing development programmes;
d) Encourage communities improve their living environment through community participation in projects.

In the Housing Policy, in order to ensure sustainable human settlements development, the following measures will be necessary:

a) Environmental Impact Assessment will be applied on sources of building materials such as quarries to check against negative impacts on the environment;
b) Developers will be required to submit an ESIA Study Report together with the development proposals. Where in the opinion of the approving authority, the development activity is likely to have

injurious effect on the environment; such a development will not be approved unless remedial measures are appropriately put in place.

2.3.2 National Land Policy

Kenya has not had a single and clearly defined land policy since independence. This, together with the existence of many land laws, some of which are incompatible, has resulted in a complex land management and administrative system. The land question has manifested itself in many ways such as land fragmentation, breakdown in land administration, disparities in land ownership and poverty. This has resulted in environmental, social, economic and political problems including deterioration in land quality, squatting, landlessness, disinheritance of some groups and individuals, urban squalor, under-utilization and abandonment of agricultural land, tenure insecurity and conflict.

To address these problems, the government embarked on the formulation of a National Land Policy through a wide and consultative process with the aim of producing a policy whose vision is "To guide the country towards efficient, sustainable and equitable use of land for prosperity and posterity".

The land policy has been formulated to address critical issues of land administration, access to land, land use planning, restitution of historical injustices, environmental degradation, conflicts, unplanned proliferation of informal urban settlements, out-dated legal framework, institutional framework and information management. It recognizes the need for security of tenure for all Kenyans (all socio-economic groups, women, pastoral communities, informal settlement residents and other marginalized groups).

The policy designates all land in Kenya as Public, Community or Private. Most significantly, it recognizes and protects customary rights to land. It also recognizes and protects private land rights and provides for derivative rights from all categories of land rights holding.

According to the draft land policy, in order to promote ESIA and audit as tools of land management the Government shall implement the following principles:

a) Ensure that EIAs and audits are carried out on all land developments that have a propensity to degrade the environment and implement appropriate remedial measures;
b) Monitor annually and stringently urban and rural environmental degradation to avert both current and future socio-economic negativities in infrastructural developments;
c) Encourage public participation in the monitoring and protection of the environment;
d) Institute the polluter pays principle, and provide incentives to manufacturing concerns in order to promote cleaner production and prevent pollution of soil, water and air.

The land policy has just been approved by the cabinet and now awaits passing in parliament.

2.3.3 National Environmental Policy

There has never been a national environmental policy in Kenya. However the government is currently in the process of coming up with the national environmental policy and a committee has been established to spearhead this process under the Ministry of Environment and Natural Resources.

2.3.4 The National Environment Management Authority (NEMA)

This is the government authority charged with the general supervision and coordination of all environmental matters in the Kenya. NEMA is the principal instrument of the government in the implementation of all policies relating to the environment. The authority is a creature of the Environmental Management and Coordination Act (EMCA) that came into effect on the 14th of January, year 2000.

Among others, the functions of NEMA are:

a) To coordinate various environmental management activities undertaken by lead agencies;

b) To promote the integration of environmental considerations into development actions with a view to ensuring proper management and rational utilization of environmental resources on a sustainable yield basis for the improvement of quality of life;
c) To advise the government on legislative and other measures for the management of the environment or the implementation of various international conventions, treaties and agreements in the field of environment;
d) To identify development actions for which environmental audit and monitoring must be conducted under the Act;
e) To assess and monitor activities to ensure that the environment is not degraded by such activities, that environmental management objectives are adhered to and adequate early warning on impending environmental emergencies is given;
f) To cooperate with relevant lead agencies on environmental education and enhancement of public awareness on environmental protection;
g) To prepare and issue an annual report on the state of the environment in Kenya

Under EMCA, NEMA may delegate any of its powers on the performance of any of its functions to Provincial and District Environment Committees; NEMA officers (such as the District and Provincial Environment Officers); its employees or agents. NEMA is headed by a Director General (DG) who is appointed by the president.

2.4 INSTITUTIONAL FRAMEWORK

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environment Management Authority (NEMA), the Forestry Department, Kenya Wildlife Services (KWS) and others.

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- To cooperate with relevant lead agencies on environmental education and enhancement of public awareness on environmental protection;

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2.4.2 Provincial and District (County) Environment Committees

According to EMCA, 1999 No. 8, the Minister by notice in the gazette appoints Provincial and District Environment Committees of the Authority in respect of every province and district respectively. The Provincial and District Environment Committees are responsible for the proper management of the environment within the Province and District in respect of which they are appointed. They are also to perform such additional functions as are prescribed by the Act or as may, from time to time be assigned by the Minister by notice in the gazette. The decisions of these committees are legal and it is an offence not to implement them.

2.4.3 Public Complaints Committee

The Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Council.
- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and
- To perform such other functions and excise such powers as may be assigned to it by the Council.

2.4.4 Nairobi County Council

This is a local authority that is charged with regulating developments within the city. NCC approves developments, inspects building during constructions, issues permits and necessary licences including hoarding, advertisement, waste disposal and business licences.

2.4.4.1 Nairobi County Council

Nairobi Water and Sewerage Company was established in 2003 December as the leading provider of quality water and proper sewerage to the residents of Nairobi and adjoining areas. Nairobi Water Company achieves its objective by proper utilization of available resources in an effective manner.

The services provided by Nairobi City Water Company can be broadly categorized into Water Services, and Sewerage Services. Nairobi Water Company extracts approximately 500,000 cubic meters of water from 4 different sources (Lower Kabete Dam, Sasumua Dam & Kabete Water Works), and supplies nearly 442,020 cubic meters to the city.

Nairobi City Water and Sewerage Company also undertake the following services:

(i) City sewerage service,
(ii) Sale of water – Nairobi Water Company sells water in cases of shortages or breakdown in regular supply.
(iii) Exhaust Services in areas that do not have proper sewerage facilities, usually on a prepaid service charter

Picture 9: An existing sewer man-hole along Ring Road Westlands, about 160 metres away, to which the site's lines will be connected.

2.5 LEGAL AND REGULATORY FRAMEWORK

Environmental Management and Co-ordination Act No. 8 of 1999, provide a legal and institutional framework for the management of the environmental related matters. It is the framework law on environment, which was enacted on the 14th of January 1999 and commenced in January 2002. Topmost in the administration of EMCA is National Environment Council (NEC), which formulates policies, set goals, and promotes environmental protection programmes. The implementing organ is National Environment Management Authority (NEMA). EMCA comprises of the parts covering all aspects of the environment.

Part VIII, section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. Section 73 requires that operators of projects which discharge effluent or other pollutants submit to NEMA accurate information about the quantities and quality of the effluent. Section 74 demands that all effluent generated from point sources are discharged only into the existing sewages system upon issuance of prescribed permit from the Local Authorities.

2.5.1 The Environmental (Impact Assessment and Audit) Regulations, 2003

The Environmental (Impact Assessment and Audit) Regulations, 2003 state in Regulation 3 that "the Regulations shall apply to all policies, plans, programmes, projects and activities specified in Part IV, Part V and the Second Schedule of the Act".

Regulation 4(1) further states that:
"…no proponent shall implement a project:
(a) Likely to have a negative environmental impact; or
(b) For which an environmental impact assessment is required under the Act or these Regulations;

Unless an environmental impact assessment has been concluded and approved in accordance with these Regulations…"

2.5.2 Environmental Management and Coordination Act (EMCA), 1999

The enactment of EMCA, 1999 was a milestone in promoting sustainable environmental management in the country. The Act provides for the harmonization of about 77 sectoral statutes, which address aspects of the environment. Some sectoral statutes have inadequate provisions for prosecution of environmental offenders, while in some penalties are not sufficiently punitive to deter offenders. EMCA, 1999 provides an institutional framework and procedures for management of the environment, including provisions for conflict resolution.

Section 3 of EMCA, 1999 states that "Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment." The Act is intended to ensure that our activities do not compromise the capacity of the resource base to meet the needs of the present generation as well as those of future generations (WCED, 1987)

2.5.3 Waste Management Regulations, 2006

Part II of the regulations regulation 4 (1) states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated receptacle. Regulation 4 (2) further states that a waste generator shall collect, segregate and dispose such waste in the manner provided for under these regulations.

Regulation 5 (1) provides for cleaner production methods. It states that a waste generator shall minimise the waste generated by adopting the following cleaner production methods:

(a) Improvement of production process through:

- ☞ Conserving raw materials and energy;
- ☞ Eliminating the use of toxic raw materials; and
- ☞ Reducing toxic emissions and wastes;

(b) Monitoring the product cycle from beginning to end by:

(i) Identifying and eliminating potential negative impacts of the product;

(ii) Enabling the recovery and re-use of the product where possible; and

(c) Incorporating environmental concerns in the design and disposal of a product.

Regulation 8 of the regulations provides for the responsibility of waste transporters. It states that any person granted a license to transport waste shall ensure that:

1) The collection and transportation of such waste is conducted in such a manner that will not cause scattering of the waste;
2) The vehicles and equipment for the transportation of waste are in such a state that shall cause scattering of, flowing out of waste or emission of noxious smells from such waste;
3) The vehicles for transportation and other means of conveyance of waste follow the scheduled routes approved by the Authority from the point of collection to the disposal site or plant; and
4) He or his agent (s) possess at all times during transportation of the waste, a duly filled tracking document as set out in Form III in the first schedule to these regulations and shall produce the same such tracking document on demand to any law enforcement officer.

2.5.4 EMCA – (Noise and Excessive Vibration Pollution Control) Regulations

According to Regulation 3.(1), except as otherwise provided in these Regulations, no person 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.

According to regulation 3 (2), in determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered: -

(a) Time of the day;

(b) Proximity to residential area;

(c) Whether the noise is recurrent, intermittent or constant;
(d) The level and intensity of the noise;
(e) Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,
(f) Whether the noise can be controlled without much effort or expense to the person making the noise.

Under Regulation 4(1), except as otherwise provided in these Regulations, no person shall-

(a) Make or cause to be made excessive vibrations that annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment;
(b) Cause to be made excessive vibrations that exceed 0.5 centimetres per second beyond any source, property boundary or 30 metres from any moving source**.**

Under Regulation (5), no person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

According to Regulation 8 (1) No person shall use or operate any radio or receiving set, musical instrument, phonograph, television set, any other machine or device for the producing or reproducing of sound or any other sound-amplifying equipment in a loud, annoying or offensive manner such that, noise from the device:-

(a) Interferes with the comfort, repose, health or safety of members of the public;
(b) Creates a risk thereof, within any building or, outside of a building, at a distance of 30 meters or more from the source of such sound; or
(c) Interferes with the conversation of members of the public who are 30 meters or more from the source of such sound.

In accordance with Regulation 9 (1), any person in charge of a party or other social event that occurs on any private or public property shall ensure that the party or event does not produce noise in a loud, annoying or offensive manner such that noise from the party interferes with the comfort, repose, health or safety of members of the public within any building or, outside of a building, or recklessly creates the risk thereof, at a distance of 30 meters or more from the source of such sound.

According to Regulation 10 (1) No person shall:-

(a) Preach, tout, advertise, promote or sell anything; or
(b) Engage in any commercial activity; in any manner so as to emit noise by shouting within a Central Business District of any town, a residential area, a silent zone, or any other area declared as a silent zone by NEMA;

In line with Regulation 11 (1) any person wishing to-

(a) Operate or repair any machinery, motor vehicle, construction equipment or other equipment, pump, fan, air-conditioning apparatus or similar mechanical device; or
(b) Engage in any commercial or industrial activity, that is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant levels prescribed in the First Schedule to these Regulations.

In accordance with Regulation 12 (1) no person shall operate a motor vehicle that

(a) Produces any loud and unusual sound; and
(b) Exceeds 84 dB (A) when accelerating. In addition, sub-Regulation (2) states that no person shall at any time sound the horn or other warning of a vehicle except when necessary to prevent an accident or an incident.

Under Regulation 13 (1) except for the purposes specified in sub-Regulation (2)
hereunder, during night time hours, 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.

According to Regulation 16. (1) where a sound source is planned, installed or intended to be installed or modified by any person in a manner that such source will create or is likely to emit noise, or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, such person shall apply for a license to the Authority. In accordance with Regulation 19 (1).no person shall carry out activities such as fireworks, demolitions, firing ranges and specific heavy industry without a valid permit issued by the Authority.

Under Regulation (26), where there is continuous emission of noise or excessive vibration after the Environmental Inspector has issued an improvement notice, the Environmental Inspector may, with the approval of the Director General, and in consultation with the relevant lead agency, order the closure of an establishment or undertaking emitting such noise or excessive vibrations.

According to Regulation (28), any person who contravenes any of the provisions of these Regulations, for which no penalty is stipulated, commits an offence and
is liable, upon conviction, to a fine of not more than three hundred and fifty thousand shillings or to imprisonment for a term of not more than eighteen months or to both such fine and imprisonment.

THE TABLES BELOW SHOW THE MAXIMUM PERMISSIBLE NOISE LIMITS FOR VARIOUS AREAS.

Table 1: First Schedule (Maximum permissible Intrusive Noise Levels).

Zone		Sound Level Limits dB(A)(Leq,14 h)		Noise Rating Level (NR) (Leq,14 h)	
		Day	Night	Day	Night
A	Silent Zone	40	35	30	25
B	Places of worship	40	35	30	25
C	Residential indoor)	45	35	35	25
	Residential indoor)	50	35	40	25
D	Office Block residential (with some commercial and places of entertainment)	55	35	50	25
E	Commercial	60	35	55	25

Time Frame:
Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h)
Night**:** 8.01 p.m. – 6.00 a.m. (Leq, 10h) Source: www.nema.go.ke

Table 2: Second Schedule (Maximum permissible Noise Levels for construction sites).

Facility		Maximum Noise Level Permitted (Leq) in dB(A)	
		Day	Night
(i)	Health facilities, educational institutions, homes for disabled etc.	60	35
(ii)	Residential	60	35
(iii)	Areas other than those prescribed in (i) and (ii)	75	65

Time Frame:

Day: 6.01 a.m. – 6.00 p.m. (Leq, 14 h)
Night: 6.01 p.m. – 6.00 a.m. (Leq, 14 h)

2.5.5 Water Quality Regulations, 2006

Regulation 8 of these regulations provides for compliance with water quality standards. It states that all operators and suppliers of treated water, containerised water and all water vendors shall comply with the relevant quality standards in force as may be prescribed by the relevant lead agencies.

Regulation 9 of these regulations provides for water quality monitoring. It states that the Authority in consultation with the relevant lead agency, shall maintain water quality monitoring for sources of domestic water at least twice every calendar year and such monitoring records shall be in the prescribed form as set out in the second schedule to these regulations. Table 2 below shows the quality standards for sources of domestic water.

TABLE 3: QUALITY STANDARDS FOR SOURCES OF DOMESTIC WATER

Parameter	Guide Value (Maximum allowable)
pH	6.5 – 8.5
Suspended solids	30 (mg/L)
Nitrate – NO_3	10 (mg/L)
Ammonia – NH_3	0.5 (mg/L)
Nitrate – NO_2	3 (mg/L)
Total dissolved solids	1200 (mg/L)
Ecoli	Nil/100ml
Fluoride	1.5 (mg/L)
Phenols	Nil (mg/L)
Arsenic	0.01 (mg/L)
Cadmium	0.01 (mg/L)
Lead	0.05 (mg/L)
Selenium	0.01 (mg/L)
Copper	0.05 (mg/L)
Zinc	1.5 (mg/L)
Alkyl benzyl sulphonates	0.5 (mg/L)
Permanganate Value (PV)	1.0 (mg/L)

2.5.6 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 Local Authorities 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.

2.5.7 Local Authority Act (Cap 265).

Section 160 helps Local Authorities ensure effective utilization of the sewages systems. Section 170, allows the right to access to private property at all times by Local Authorities, its officers and servants for purposes of inspection, maintenance and alteration or repairs of sewers. The Act under section 176 gives powers to Local Authority to regulate sewage and drainage, fix charges for use of sewers and drains and require connecting premises to meet the related costs. According to section 174, any charges so collected shall be deemed to be charges for sanitary services and will be recoverable from the premise owner connected to the facility.

Section 264 also requires that all charges due for sewage sanitary and refuse removal shall be recovered jointly and severally from the owner and occupier of the premises in respect of which the services were rendered. This in part allows for application of the "polluter-pays-principle".

2.5.8 Water Act, 2002

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

The Water Act Cap 372 vests the rights of all water to the state, and the power for the control of all body of water with the Minister, the powers is exercised through the Minister and the Director of water resources in consultation with the water catchments boards, it aims at among others:

1. Provision of conservation of water and
2. Appointment and use of water resources.

2.5.9 Building Code.

This is a composition of Local Government Adoptive building by-laws that any municipal or county council may adopt. The Building Code is comprised of the Local Government (Adoptive By-Laws) (Building) Order of 1968 and the Local Government (Adoptive By-Laws) (Grade II Building) Order 1968. According to the Building Code, any person who intends to erect a building shall submit a written application to do so in such form as the Council may require, completing all details required therein in so far as they apply to the proposals. The application form shall be signed by the developer or by a person representing himself to be his duly authorized agent in which event it shall state the name of the person on whose behalf it has been submitted. The form shall be attached to any plans or documents submitted in accordance with by-law (5) of these By-laws.

According to section (5) of these By-Laws, a person who intends to erect a building or materially change the use of a building or part of a building shall furnish the council in the manner provided in part (A) of the First Schedule of these by-laws. Section (6) (1) of the Building Code states that when a person submits an application pursuant to these by-laws, a fee shall be paid to the council in accordance pursuant to these by-laws, a fee shall be paid to the council in accordance with the charges and conditions prescribed in te10th Schedule to these By-laws. In section 7 (1), within 30 days of receipt of a duly completed application form, together with such particulars as are required by these By-laws, the council shall notify the applicant in writing whether or not the application has been approved, provided that the council may within the said 30 days extend the period in the case of any particular application for a further 30 days.

The Building code generally gives guidelines and specifications for various buildings and constructions including farm buildings, temporary buildings, temporary latrines, space in front of buildings, boundary walls, access to buildings, drainage of building sites and specifications for foundations among others. In addition, the code gives general classification and bearing capacity of sub-soils, wall foundations, dimensions for bricks and stones, fire resistance for various buildings and requirements for stairways. The code gives guidelines for ventilation, sewer and plumbing installations and load capacity of various building materials. The Building Code has 12 schedules that address various specific building requirements.

2.5.10 Occupational Safety and Health Act, 2007

This is an Act of parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and

Health and for connected purposes. According to Section 3 (1), this legislation shall apply to all workplaces where any person is employed, whether permanently or temporarily.

Under Section 3 (2), the purpose of this Act is to: -

a) Secure the safety, health and welfare of persons at work; and
b) Protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work.

Under Section 6 (1), every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace. Under section 6 (3), every occupier shall carry out appropriate risk assessments in relation to the safety and health of persons employed, and on the basis of these results, adopt preventive and protective measures to ensure that under all conditions of their intended use, all chemicals, machinery, equipment, tools, and process under the control of the occupier are safe and without risk to health and comply with the requirements of the safety and health provisions in this Act. Under 6 (4), every occupier shall send a copy of a report of risk assessment carried out under this section to the area occupational safety and health officer.

According to Section 6 (6), it is the duty of every occupier to register his workplace unless such workplace is exempted from registration under this Act.

Under section 7 (1) except in such cases as may be prescribed, it is the duty of every occupier to: -

a) Prepare and, as often as may be appropriate, revise a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy; and
b) To bring the statement and any revision of it to the notice of all his employees.

Under section 9 (1), every occupier shall establish a safety and health committee at the workplace in accordance with regulations prescribed by the minister if –

(a) There are twenty or more persons employed at the workplace; or
(b) The Director (of Occupational Safety and Health) directs the establishment of such committee at any other workplace.

Section 11 (1) states that the occupier of a workplace shall ensure a thorough safety and health audit of his workplace be carried out at least once in every period of 12 months by a safety and health advisor, who shall issue a report of such an audit containing the prescribed particulars to the occupier on payment of a prescribed fee and shall send a copy of the report to the Director of Occupational Safety and Health Services.

According to Section 13 (1) (c), every employee shall at all times wear or use any protective equipment or clothing provided by the employer for the purpose of preventing risks to his safety and health. Under Section 16 (1), no person shall engage in any improper activity or behaviour at the workplace which might create or constitute a hazard to that person or any other person.

In accordance with Section 21, an employer or self-employed person shall notify the area occupational safety and health officer of any accident, dangerous occurrence or occupational poisoning which has occurred at the workplace. Where an accident in a workplace causes the death of a person therein, the employer or self-employed person shall –

a) Inform the area occupational safety and health officer within 24 hours of the occurrence of the accident; and
b) Send a written notice of the accident in the prescribed form to the area occupational safety and health officer within 7 days of occurrence of the accident.

Under Section 22 (3), an occupier shall send a written notice of any disease specified in the second schedule of the Act occurring in the workplace to the Director.

Under Section 47 (1), every workplace shall be kept in a clean state, and free from effluvia arising from any drain, sanitary convenience or nuisance. In accordance with section 52 (1), sufficient and suitable sanitary conveniences for the persons employed in the workplace shall be provided, maintained and kept clean, and effective provision shall be made for lighting the conveniences; and where persons of both sexes are or are intended to be employed (except in the case of workplaces where the only persons employed are members of the same family dwelling there), such conveniences shall afford proper separate accommodation for persons of each gender.

Under section 78 (1), all stocks of highly inflammable substances shall be kept either in a fire resisting store or in a safe place outside any occupied building, provided that no such store shall be so situated as to endanger the means of escape from the workplace or from any other part thereof in the event of fire occurring in the store.

Under Section 81 (1), in every workplace or workroom, there shall be –

a) Provided and maintained, and conspicuously displayed and free from any obstruction so as to be readily accessible, means for extinguishing fire, which shall be adequate and suitable having regard to the circumstances of each case; and
b) Present, persons trained in the correct use of such means of extinguishing fire during all working hours.

Under 81 (2), every workplace shall be provided with adequate means of escape, in case of fire, for persons employed therein, having regard to the circumstances of each case. Under 82 (1), every occupier of a workplace shall design evacuation procedures to be used during any emergency and have the procedures tested at regular intervals.

Under Section 84 (3), every employer shall ensure the availability at the workplace of material safety data sheets for all chemicals and other hazardous substances in use at the premises of the employer, containing detailed essential information regarding the identity, supplier's classification of hazards, safety precautions and emergency procedures

2.5.10.1 Wayleaves Act Cap 292

According to the Wayleaves Act cap 292 Section 2, Private land does not include any land sold or leased under any Act dealing with Government lands. Section 3 of the Act states that the Government may carry any sewer, drain or pipeline into, through, over or under any lands whatsoever, but may not in so doing interfere with any existing building. Section 8 further states that any person who, without the consent of the Permanent Secretary to the Ministry responsible for works (which consent shall not be unreasonably withheld), causes any building to be newly erected over any sewer, drain or pipeline the property of the Government shall be guilty of an offence and liable to a fine of one hundred and fifty shillings, and a further fine of sixty shillings for every day during which the offence is continued after written notice in that behalf from the Permanent Secretary; and the Permanent Secretary may cause any building erected in contravention of this section to be altered, demolished or otherwise dealt with as he may think fit, and may recover any expense incurred by the Government in so doing from the offender.

2.5.10.2 Registration of Titles Act Cap 281

Section 34 of this Act states that when land is intended to be transferred or any right of way or other easement is intended to be created or transferred, the registered proprietor or, if the proprietor is of unsound

mind, the guardian or other person appointed by the court to act on his/her behalf in the matter, shall execute, in original only, a transfer in form F in the First Schedule, which transfer shall, for description of the land intended be dealt with, refer to the grant or certificate of title of the land, or shall give such description as may be sufficient to identify it, and shall contain an accurate statement of the land and easement, or the easement, intended to be transferred or created, and a memorandum of all leases, charges and other encumbrances to which the land may be subject, and of all rights-of-way, easements and privileges intended to be conveyed.

3.1.1 National Construction Authority Act, 2011

The act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contactors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they satisfy they are in Kenya for that specific time.

The foreign contractors must also produce a certificate of compliance. Furthermore they must lodge an affidavit with the NCA that once the project they have been licensed is over, they shall wind up their business. This prevents them from engaging in any other construction in the country.

The Proponent will ensure strict adherence to this Act for their smooth operations throughout the proposed project's phase's right from inception through to operation.

3.1.2 County Government Act, 2012

Section 30 (1) of the Act stipulates that 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. Section 29 of this Act provides for development control. It empowers the local authority to prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area. The council is further empowered by the Act to reserve and maintain all the land planned for open spaces, parks, urban forests and greenbelts in accordance with the approved physical development plan. The Act further states that, No licensing Authority shall grant, under any written law a license for commercial or industrial or occupation of any building or in respect to any premises or land, for which no development permission has been granted by the respective local authority.

The main purpose of the enactment of this Act was to give effect to Chapter Eleven of the Constitution; to provide for county governments' powers, functions and responsibilities to deliver services and for connected purposes. Functions which were carried out by local governments were effectively transferred to the county governments. The Act gives county the responsibility of planning and co-coordinating all developments within their areas of jurisdiction. Part XI (sections 102-115) of the Act provides for planning principles and responsibilities of the county governments. The land use and building plans provided for in the Act are binding on all public entities and private citizens operating within the particular county. The proposed project is within the Nairobi County Government (NCG) and thus there will be need of working in liaison with the County Government. The plans for the proposed project must be approved by the County Government and the County government may also issue directives and authorizations on various aspects e.g. waste management and fire emergency preparedness among others.

This is a local authority that is charged with regulating developments within the city. Nairobi County Government (NCG) approves developments, inspects building during constructions, issues permits and necessary licences including hoarding, advertisement, waste disposal and business licences.

3.1.3 Nuclear Regulatory Act. 29 of 2019

This ACT of Parliament provides for a comprehensive framework for the regulation of safe, secure and peaceful utilization of atomic energy and nuclear technology; the production and use of radiation sources and the management of radioactive waste; the repeal of the Radiation Protection Act and for connected purposes. (*This Act commenced on 10th January, 2020 after being assented on 23rd December, 2019).*

Part IV of the Act clearly elaborates on how such endeavours can be done by prescribing the best measures in terms of Regulatory Controls, Notifications, Authorizations, Inspections and Enforcement procedures as explained below:

Sec. 21 ***Notifications:***

who intends to engage in any activity (***meaning any undertaking that is geared towards the production, use, import and export of radiation sources for industrial, research and medical purposes; the transportation of radioactive material; the siting, construction, commissioning, operation, and decommissioning of facilities; radioactive waste management activities and site remediation)*** shall submit a notification to the Authority (***Kenya Nuclear Regulatory Authority***) of his intention to carry out such activity.

ority shall prescribe by regulations a notification regime prescribing the form, manner and s within which the notification shall be made.

Sec. 22 ***Authorization:***

(1) A person shall not carry out an activity unless the activity has been:
   (a) Specifically authorized by the Authority; or
   (b) Exempted, wholly or partially from regulatory control, by the Authority.

(2) An application for authorization under this section shall be in the prescribed form and manner and shall include any information and documents as required by the Authority, including:
   (a) A detailed description of the activity, nuclear or radioactive material, its intended use and the facility in which it shall be used;
   (b) A description of the radiation protection measures and for physical protection of the nuclear or radioactive material or facility;
   (c) A plan for the management of radioactive waste resulting from the use of nuclear or radioactive material; and
   (d) Proof of payment of prescribed fees.

(3) The Authority may issue an authorization:
   (a) Only for activities that can be conducted in a manner that adequately ensures the protection of people, property and the environment; and
   (b) Upon such other terms and conditions as may be prescribed.

(4) A person who contravenes this section commits an offence and is liable upon conviction to a fine not exceeding five million shillings or imprisonment for a term not exceeding five years or to both.

Sec. 23 ***Categories for Authorization:***

(1) The Authority may establish categories of authorization for any activity for a specified period and subject to the terms and conditions specified in the authorization.

(2) The Authority may require an authorized person to submit such reports as the Authority may from time to time request.

Sec. 24 ***Suspension, Revocation or Modification of an Authorization:***

(1) An authorization issued under this Act may be suspended, modified, or revoked by the Authority in the event of:
   (a) A contravention of this Act;
   (b) Violation of the terms and conditions of the authorization; or
   (c) Any circumstance where the Authority determines that continued activity under the authorization would pose a risk to people, property or the environment.

(2) A responsibility arising out of an authorization under this Act shall not be transferred unless with the written approval of the Authority.

(3) An authorization shall cease to be valid when any time limit prescribed under the provisions of this Act lapses or the terms and conditions of the authorization expire.

Sec. 25 ***Primary Responsibility for Safety:***

A person authorized to conduct an activity shall have the primary responsibility for the safe and secure conduct of the activity and for ensuring compliance with this Act and all applicable regulations.

Sec. 26 ***Right of Review of a Decision:***

(1) A person aggrieved by a decision of the Authority under this Part shall have the right to apply to the Authority for a review of the decision.

(2) An application for review under subsection (1) shall be filed with the Authority within thirty days of communication of the decision and shall state the factual, legal and procedural ground on which it is based.

(3) The Authority shall within sixty days of receipt of an application for review, make a finding and communicate the same to the authorized person.

(4) An application for review under this section shall not have the effect of suspending the decision by the Authority.

(5) Nothing under this section stops an applicant from seeking alternative means of redress in a court of law.

Sec. 27 ***Inspection Objectives and Programmes:***

(1) The objectives of inspection and enforcement is to monitor compliance with the requirements of this Act, and the terms and conditions of the authorization issued by the Authority, such that:

(a) Facilities and activities meet the necessary regulatory requirements;

(b) Relevant documents and instructions to authorized persons are valid and are being complied with by the authorized persons, employees or agents;

(c) Persons engaged in authorized activities possess the competence necessary for their functions;

(d) deficiencies and deviations from authorization requirements are remedied without undue delay; and

(e) Lessons learnt from authorized activities are communicated to other authorized persons, the Authority and any other relevant persons.

(2) The Authority shall establish a planned and systematic inspection programme consisting of routine and reactive inspections that are announced and unannounced to monitor compliance with this Act and all applicable regulations.

In case of any dealing with such like substances, the Proponent shall observe policy and regulatory requirements, should this requirement be involved, and implement the mitigation measures proposed in this document in an effort to comply with the provisions of these Regulations on abatement of air pollution.

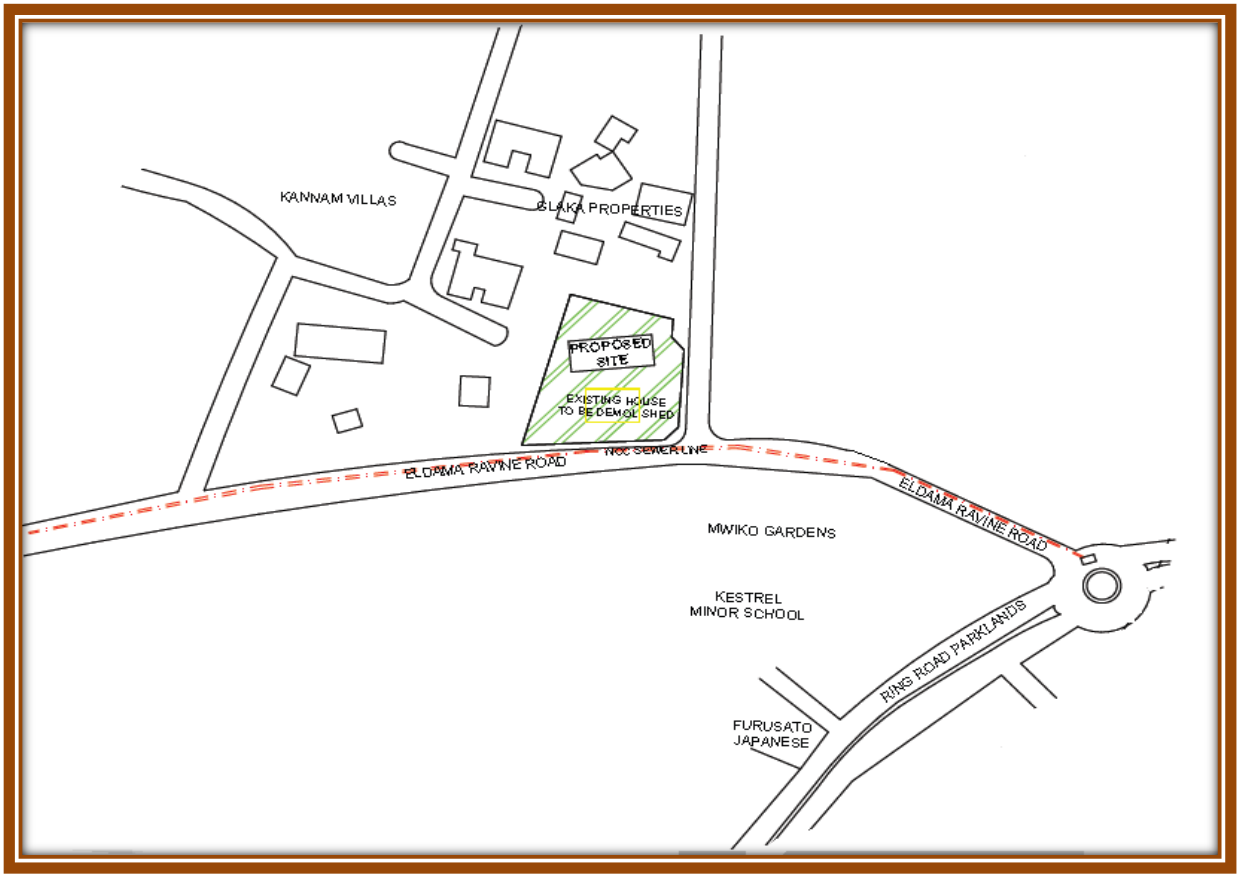
3. DESCRIPTION OF THE PROJECT

3.1 Introduction

This Section describes the proposed Mega High-Rise Residential Block's and its peripherals' design. It highlights various aspects related to the proposed project. The aspects include the following; Client's brief, location, access and design and response to the environment.

3.2 Project Location

The proposed project is located about three kilometres from Nairobi Central Business within Highridge Area along Eldama Ravine Road bordering some outstanding and established institutions, high-rise and low-lying commercial buildings, organization's offices, commercial buildings, Hindu Temple, Schools amongst other establishments within this quiet leafy and sparsely populated neighbourhood. Some of these include; Cutchi Gujarati Hindu Union Shiv Temple, The Augustus Villas, Mwiko Gardens Restaurant, El Signature Apartments, Anjarwalla & Khanna Law Firm Building, Kannan Villas, Westwood Hotel, Glaka Properties Villas, Maple Bear Nursery & Pre-school and other related buildings and commercial quiet leafy neighbourhood.



Picture 10: Sketch of the site, its neighbouring access roads and residential settlements bordering it.

Most of the nearby major roads like Ring Road Parklands, General Mathenge, Peponi are in good shape due to the recent expansion or recarpeting initiatives by the County Government while feeder roads like Eldama Ravine, need urgent facelifts to improve their conditions and save them from further deterioration due the area's increased population and frequent use. The site falls within a rapidly growing residential area with several residential and commercial premises and associated developments - all combining to make the area more

habitable and enjoyable. These are flanked by numerous infrastructural amenities including reliable road network, electricity, and other infrastructural amenities.

Picture 11: Eldama Ravine road, the site's only access route, in its current condition.

3.3 Current Status of the Proposed Project Site.

During the site visit and area's environmental survey, the ESIA expert found that no construction works has commenced on the project site apart from the still-intact existing old residential low-lying houses, within the plot, all earmarked for demolished once a NEMA Approval/Licence is granted. The following activities are expected to be carried out at the site:

- Demolition and removal of the existing building and it's components from the plot to pave ways for the construction of the proposed new one.
- Selective removal/cutting of some vegetation (trees) to pave way for foundation excavations,
- Hoarding of the site by using iron sheets or any other means deemed fit and appropriate,
- Erection of the project's signboard at the gate to the plot.
- Site clearances, excavations and removal of the undesired materials to designated storage or dumping sites by the contractors
- Construction of a temporary toilet for the expected workers,
- Construction/provision of a temporary sanitary/ toilet facilities for the expected workers,
- Laying of the firm foundation and other earth works for the proposed Mega High-Rise Residential Block,
- Delivery of construction materials e.g. sand, water, ballast and blocks, cement, reinforcement steels etc. at the site,
- Construction of the proposed mega structure and its accompaniments ,

On the plot currently exists an old residential building (still occupied by the tenant), all of which is to be demolished to pave ways for the building of these proposed new ones.

3.3.1 Construction Activities

The proposed project activities to be undertaken during the development of the proposed domestic dwelling include:

- ☞ Site hoarding; to be done using iron sheets and block walling
- ☞ Removal/cutting of some trees to pave way for the construction
- ☞ Demolition of existing buildings and structures
- ☞ Excavation of ground/earth for foundations and pits as necessary
- ☞ Construction of a toilet for construction workers
- ☞ Erection of foundation walls
- ☞ Construction of superstructures and substructures as per the Architectural designs and to the engineer's detail
- ☞ Construction of a sewage disposal system to link to the already existing NW&SC's mains
- ☞ Fittings and finishes including wiring and plumbing
- ☞ Connections to utilities including KPLC mains and NW&SC water mains
- ☞ Paving and Landscaping as per project design
- ☞ Furnishing the dwelling in readiness for occupation

3.3.2 Excavation works

Upon decommissioning, the existing site components including buildings, old pavements, drainage systems and perimeter fence will be demolished and fresh excavations, for foundation laying, works done to give room for creation of new ones corresponding to the new structure's demand.

3.4 Area Land-use Zonations.

This area consists of a blend of mostly high-rise apartments and commercial blocks, communal maisonettes and commercial establishments of varied capacities ranging from simple shops to established churches amongst other commercial structures and institutions. Currently there are several similar developments around the project environment. The proposed development will thus fit in with the existing type of housing in the neighbourhood.

Picture 12: Other high-rise residential buildings in the neighbourhood.

3.5 Design of the project

In general, the design of the project will tend to essentially optimise the use of best available technology to prevent or minimize potentially significant environmental impacts associated with the project and to incorporate efficient operational controls together with trained staff, to ensure high level business and environmental performances.

This project entails construction a Single Mega High-Rise Residential-Apartments Block comprising of:

- A Single Basement floor and the ground floor solely dedicated for parking of cars, each with an approximately capacity of parking about 106 cars in number, all totalling to about **213 parking slots**.
- The strategically designed apartments comprising of **3, 4 and 5 Bedroomed Apartments** accompanied by **4 Bedroomed Duplexes with Dsq** (**From 2nd to 18th floor**) complete with their accompaniments, **all totalling to about 180 Units**, units as depicted in the copy of Architectural Scheme Drawings herein attached, for your perusal.
- The apartments are designed with Spacious Lounge, Kitchen, Dining Area, Store, Utility Area, Master Bedroom En-suite complete with Master Dresser and other additional bedrooms ranging from two to four in conjunction with other surrounding amenities for a comfortable living.
- 4 Slots for the installation of Fast and Heavy Duty Lifts have been designed for ease of movement with the building.
- Mosque (Prayer area), Modernly Furnished Gymnasium accompanied by both Men and Ladies' swimming pools as well as children's playing area.
- Surrounding security and beautifications must be finalised with a wall fence and designer landscaping to improve the aesthetics of the building.

The other components will include, storm water drainage system, sewage drainage system, and electricity and water supply systems.

Actual designs and dimensions can be verified from the Architectural Drawings attached in the appendix for cross reference.

3.5.1 Solid waste and waste water

Solid waste management may consists of individual garbage containers situated within every unit's staircases for easy downward transportation of garbage into the garbage stores or main and larger ones situated at the compound's entrance. All garbage stores must be protected from rain and scavenging animals both within the housing compound and the guardhouse. The waste will then be collected by a private waste management company to be composted, palletised or re-cycled depending on the waste management strategy to be adopted. Since the upper areas of this neighbourhood are connected to NW&SC's sewer line, waste water from this plot will be connected to this line which is 160 metres away. The apartments are raised, starting from the 2nd floor, to ease the flow of the sewer wastes to the gravity-driven sewer line. Once the direct and wider connection has been linked, all will be channelled into the existing NCG's main stationed on the north-eastern side of the plot or as drainage dictates.

3.5.2 Drainage system

The building will be provided with storm water facilities from the roof top through peripheral NCG drainage systems into storm water drainage systems. Drainage pipes will be of the pvc type and will be laid under the buildings and the driveway and will be encased in concrete.

The pipes will be inclined to a degree that does not allow stagnation of water and thus linked to storm water drainage system.

All storm water drainage will be channelled into open storm water drain systems with a 300mm diameter encase in 150 concrete surround. All I.C'S and manholes in the driveway will have heavy duty covers.

Increased runoff from paved grounds and expansive roofs causing extreme flooding and overflows of drainage systems shall be mitigated. Surface runoff and roof water may be harvested and stored in underground reservoir for reuse. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.

3.5.3 Electrical system

The High-Rise Residential Block will be connected to the electricity main line of the Kenya Power and Lighting Company, which will be used in all phases of the project. The various components of the electrical system shall comprise single and twin socket outlet, one and two way switch outlets wall mounted security bulkhead fitting, lockable meter boards with glass view panel, gate lights and security alarm panel outlet. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to. To reduce much dependence on Hydro-electricity and excessive strain on water bodies, other sources like renewable solar, wind and other sources need to be exploited for better future sustainability and natural regeneration.

3.5.4 Water reticulation system

Water from the nearby boreholes and available water vendors will be used during construction and operation phases. More so there will be water storage tanks to increase water capacity at the project site to the required amount. There shall be water storage tanks provision for each house unit which will be mounted at the roof level of the unit block.

Picture 13: Clogged and unattended storm-drainage channel, along Eldama Ravine road, to which the project's will be directed.

3.5.5 Need for water harvesting and Storage

Due to ever increasing demand for water which is occasioned by gradually increasing population in Nairobi City, and limited supply from the available sources, there is dire necessity to harvest and store rain water, to ensure that water storage tanks are put in place, as a backup system, in case of water shortages since rain water can be harnessed during rainy seasons for usage during dry seasons of the year. This will avert scarcity and promote conservation and accountability among residents and the neighbours. Additionally the proponent may drill a borehole, given the necessary approvals on satisfying the required conditions, to avert any future water scarcity within these additional residential homes.

3.5.6 Storm water run-off

All storm water drainage will be channelled into open storm water drain systems with a 300mm diameter encase in 150 concrete surround. All I.C'S and manholes in the driveway will have heavy duty covers.

3.5.7 Landscaping

The project site's exterior may be landscaped after construction in conjunction with support of the neighbours, using plant species available locally. This may include establishment of flower gardens and lush grass lawns to improve the visual quality of the site and its vicinity.

DESCRIPTION OF THE PROJECT'S CONSTRUCTION ACTIVITIES

3.5.8 Pre-construction investigations

The implementation of the project's design and construction phase will start with thorough investigation of the site biological and physical resources in order to minimize any unforeseen adverse impacts during the project cycle.

3.5.9 Construction Activities

The proposed project activities to be undertaken during the development of the proposed domestic

dwelling include:

- Site hoarding; to be done using iron sheets and block walling
- Demolition of existing buildings and structures
- Removal/cutting of some trees to pave way for the construction
- Excavation of ground/earth for foundations and pits as necessary
- Construction of a toilet for construction workers
- Construction of superstructures and substructures as per the Architectural designs and to the engineer's detail
- Construction of a sewage disposal system and drainage systems
- Fittings and finishes including wiring and plumbing
- Connections to utilities including KPLC mains and water mains
- Paving and Landscaping as per project design

3.5.10 Sourcing and transportation of building materials

Building materials will be transported to the project site from their extraction, manufacture, or storage sites using transport trucks. The building materials to be used in construction of the project will be sourced from Nairobi and neighbouring areas such as Athi River and neighbouring sources. Greater emphasis will be laid on procurement of building materials from within the local area, which will make both economic and environmental sense as it will reduce negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

3.5.11 Storage of materials

Building materials will be stored on site. Bulky materials such as rough stones, ballast, sand and steel will be carefully piled on site. To avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in bits. Materials such as cement, paints and glasses among others will be stored in temporary storage structures, which will be constructed within the project site for this purpose.

3.5.12 Demolition works

The housing structures (comprising of old bungalow and other two servants quarters) that are currently occupying the site will be demolished, by the time the site will be given a-go ahead to commence the construction after its licensing, to pave way for the construction of this proposed new Mega High-Rise Residential Block. The demolition works usually result in a lot of solid waste, which may be reused for other construction works or if not reusable, disposed of appropriately by a licensed waste disposal company.

3.1.1 Excavation and foundation works

After demolition of the existing houses currently occupying the plot, preliminary excavation works will be carried out to prepare the site for construction of foundations laying and subsequent construction of the mega block, all through to its completion complete with pavements and drainage systems. This will involve the use of heavy earthmoving machinery such as tractors and bulldozers.

3.1.2 Masonry, concrete work and related activities

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

mixers.

3.1.3 Structural steel works

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

3.1.4 Roofing

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

3.1.5 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.

3.1.6 Plumbing

Installation of pipe-work for water supply and distribution will be carried out within this Mega High-Rise Residential Block and associated facilities. In addition, pipe-work will be done to connect the Block into the already existing and functional NCG's sewer line while water from the rooftops be channelled into the peripheral storm water drainage system. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.

3.1.7 Landscaping

To improve the aesthetic value or visual quality of the site once construction ceases, the proponent may carry out landscaping. This may include establishment of flower gardens and grass lawns and will involve replenishment of the topsoil. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

3.2 DESCRIPTION OF THE PROJECT'S OPERATIONAL ACTIVITIES

3.2.1 Activities at Operation Stage

This Mega High-Rise Residential Block development comprising of modernly-designed residential apartments accompanied by numerous and spacious vehicle-parking slots, fast and heavy-duty lifts, will completely revolutionize the area residents and developers expectations and demands. The expected activities at the operation stages will majorly include domestic and other related activities accompanied by paper and electronics usages that normally run hand-in-hand with domestic activities including cooking, cleaning etc. These will likely produce some domestic and sanitary wastes to be taken care of.

3.2.2 Solid waste and waste water management

The proponent will provide facilities for handling solid waste generated within the facility. These will include dustbin cubicles for temporarily holding waste within the premises before final collection and disposal by appropriate contracted firm. Since the upper areas of this neighbourhood are connected to NW&SC's sewer line, waste water from this plot will be connected to this line which is 160 metres away. The apartments are raised, starting from the 2nd floor, to ease the flow of the sewer wastes to the gravity-driven sewer line. Once the direct and wider connection has been linked, all will be channelled into the existing NCG's main stationed on the north-eastern side of the plot or as drainage dictates. Sewage generated from the Block will then be discharged or channelled into the already existing and functional NCG's sewer line stationed on the north eastern side of the plot or as drainage dictates. Storm water from the project area will be channelled

into the existing nearby gravity driven storm water drainages. Caution must be observed with the drainage system to avoid and reduce causing mayhem to those living on the sloppy sides of the terrain in terms of drainage overloads and diversions.

3.2.3 Cleaning

The proponent, through the building's care taker, in conjunction with the individual tenants, will be responsible for regular maintenance and cleaning of the pavements and compound. Individual occupiers/tenants or together with assistance of the building's caretaker will be responsible for washing and cleaning their own rooms. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

3.2.4 General repairs and maintenance

The block and its 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, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, painting, maintenance of flower gardens and grass lawns, and replacement of worn out materials among others.

3.3DESCRIPTION OF THE PROJECT'S DECOMMISSIONING ACTIVITIES (JUST IN CASE)

3.3.1 Excavation works

Upon decommissioning, the existing site components including buildings, old pavements, drainage systems and perimeter fence will be demolished and fresh excavations, for foundation laying, works done to give room for creation of new ones corresponding to the new structure's demand.

3.3.2 Dismantling of equipment and fixtures

All equipment including electrical installations, furniture partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Donation of these materials can be made to schools, churches and charitable institutions or be resold to second-hand merchants around the area.

3.3.3 Site restoration

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

4. BASELINE INFORMATION OF THE STUDY AREA

4.1 Location and Site Coordinates

Located at Highridge Area of Westlands Sub-County, on the western side of Nairobi's City CBD, this plot is about 3 kilometres away, along Eldama Ravine Road, and falls at an exact ***Altitude of 1715m (High-Ridge, Westlands)*** above sea level, ***Latitude of 1°15.25662'*** South of Equator and ***Longitude 36°48.39594'*** East of Greenwich Meridian..

4.2 Background Information on the Project Area

Nairobi County lies at an altitude of 1680m above sea level, but this height ranges from 1500m (to the east) to 2300m (to the West). It is located at longitude 36° 50' east and latitude 1° 18' South about 140 km South of the Equator and situated at an elevation of about 5,500 feet above sea level, placing its high affect for the cooler air to keep its temperatures moderate.

Nairobi County has experienced rapid growth both in terms of population and physical expansion. The physical area of Nairobi has been expanding tremendously from 3.84 Km^2 in 1900 to 684 Km^2 in 1963 which is the current official size of the City.

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

4.3 Climate

4.3.1 Average daily temperatures

The average daily temperature throughout the year (**See Table 4, below**) varies slightly from month to month with average temperatures of around 17 degrees Celsius during the months of July and August to about 20 degrees Celsius in March. But, the daily range is much higher, with the differences between maximum and minimum temperatures each day around 10 degrees in May and up to 15 degrees in February. Between the months of June to September, southeast winds prevail in the coastal parts of Kenya and last up to several days without a break. The clouds cause day temperatures to remain low and most times the maximum temperature stay below 18 degrees Celsius. The minimum temperatures also remain low during cloudy nights, usually hovering around 8 degrees Celsius and sometimes even reaching 6 degrees Celsius. Clear skies in January and February also bring colder nights. The highest temperature ever reached in Nairobi was 32.8 degrees Celsius and the lowest was 3.9 degrees Celsius.

	Mean Maximum	Mean Minimum	Mean Range
Months	^{0}C	^{0}C	^{0}C
January	26.8	13.1	13.7
February	28.0	13.4	14.6
March	27.4	14.4	13.0
April	24.6	14.3	10.3
May	24.1	14.2	9.9
June	23.1	12.6	10.5
July	22.3	11.5	10.8
August	22.7	11.8	10.9
September	25.3	12.2	13.1

October	26.2	13.7	12.5
November	23.6	14.4	9.2
December	25.1	13.8	11.6
Year	24.9	13.3	11.6

Table 4: Average Daily Temperature in Nairobi County.

4.3.2 Average Humidity Values

Because of Nairobi's location just south of the equator in combination with humid air pumped in from the Indian Ocean, the humidity values for each day are generally on the higher end (**See Table 2**).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
9.00 AM	79	74	82	86	85	85	83	85	82	80	36	83
3.00 PM	45	37	43	53	55	59	53	53	50	47	57	54

Table 5: Mean Relative Humidity Values (%).

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

4.3.3 Average Rain Amounts

With these routinely high relative humidity figures, it is not surprising that the Nairobi climate is one that produces much rain annually. In fact, from the past 50 years, the expected amount of rain could be anywhere in the range of 500 to 1500 mm, with the average ringing in at 900 mm. The majority of these rainfall figures crash down in Nairobi in one major and one minor monsoon seasons respectively. The major monsoon season occurs within the months of March to May, and is called the "Long Rains" by the locals. The minor monsoon seasons emerges within the October to December Months, and is called the "Short Rains" by the Nairobi citizens. That is what the meteorologists as a whole know about the monsoon seasons. What they do not know is exactly when these seasons will start.

There is usually not an indication of when these rainy seasons will start, since it is difficult to determine when one starts and when the other finishes. Consequently, a person may think there is only one rainy season when looking at the annual rainfall amounts (**See Table 3**).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
48	48	115	195	137	42	15	21	24	52	114	77

Table 6: The average rainfall (mm) for each month of the year, based on the records for 50 years.

4.3.4 Average Winds

Winds along the surface are predominantly easterly throughout the entire year. They are shifted to northeast between October and April, and they are shifted southeast between May and September. Right before the "Long Rains" season, the strongest winds occur, reaching speeds of 20 to 25 miles per hour. During the rest of the year, winds are usually at speeds of 10 to 15 miles per hour. During the night, the winds are calm.

4.3.5 Average Sunshine

Early mornings in Nairobi are often cloudy, but the sun peeks through by mid-morning. Throughout the year, there is an average of seven hours of sunshine per day. Thirty percent more sunlight reaches the ground during the afternoon than in the morning. Of course, there is more sunshine during the summer months, when the sun is more overhead in the Southern Hemisphere. Infrequently during the rainy season the sun never show through the clouds. Even in August, the cloudiest month, there is an average of four hours of sunshine.

4.3.6 Infrastructure

Due to such rapid urban growth, provision of basic infrastructure for all has become an important concern of development planners in Nairobi. Basic infrastructural services that have deteriorated due to such rapid increase in population include: Solid Waste Management (SWM) system; water and sewage systems; drainage and flood protection; roads; mass transportation; electric installations; and telecommunications. Greater environmental pollution, congestion and other problems have been the result of under-provision of such basic services. But with the recent government administrations, major infrastructural initiatives and breakthroughs have been made. Among these are the construction of several bypasses, expansion on major highways, overhauls and construction of new and better railway lines, construction and expansion of new and old coastal and inland ports, on-going construction of overpasses to ease congestion, accommodate more vehicles and speed up movement of people and goods, nationally and regionally

The city is well served, with good communication and transport network such as air, road, and railway. It is centrally located to serve the Eastern African countries. Bus and train stations are within an easy walk of the City Centre. The main railway line runs from Mombasa to Malaba though Nairobi County. This network facilitates transportation of agricultural products from western Kenya to the coast. The city is a hub of road transport connecting other major towns in the country. On air transport JKIA (Jomo Kenyatta International Airport) makes it easy to transport goods from all over the world into the country and vice versa.

4.3.7 Population

The cosmopolitan capital of Kenya, currently houses about 8.34 million people with a growth rate estimated at 7% which represents 51% of the country's urban population. Nairobi City has one of the highest urban population densities in the country of up to 4,800 or more persons per square kilometre, bringing with it the associated needs for housing facilities. Such needs can be catered for by establishment of adequate facilities such as these houses that will provide living room for the ever-increasing population.

4.3.8 Economic Activities

Nairobi County is the centre of commercial, manufacturing and industrial development in East Africa. The major economic activities in Nairobi County include trade. Like most modern cities, Nairobi has crowded markets and trading areas, middle class suburbs, and spacious mansions for the rich and economically powerful. It also has vast overcrowded tenements and slums, exploitation, and high unemployment.

5. PUBLIC PARTICIPATION

5.1 Objectives of the Public Consultations

The overall goal of the consultation process is to disseminate project information and to incorporate the views of the Project Affected Persons (PAPs) in the design of the mitigation measures and a management plan.

The specific aims of the consultation process are to:

- Improve project design and thereby minimize conflicts and delays in implementation;
- Facilitate the development of appropriate and acceptable entitlement options;
- Increase long term project sustainability and ownership;
- Reduce problems of institutional coordination;
- Make the resettlement process transparent; and
- Increase the effectiveness and sustainability of income restoration strategies, and improve coping mechanisms.

An important element in the process of impact assessment is consulting with stakeholders to gather the information needed to complete the assessment. The main objectives of community consultations were to:

- Provide clear and accurate information about the project to the beneficiary community
- Obtain the main concerns and perceptions of the population and their representatives regarding the project;
- Obtain opinions and suggestions directly from the affected communities on their preferred mitigation measures; and
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.

5.2 Mode of Consultation

Interviews were carried out in the neighbourhood by the use of one on one conversations and even printed questionnaires (attached), to find out all the views from the neighbours' towards this mega housing project. Neighbouring the site are several private businesses and residences. The main purpose for such interviews was to identify the positive and negative impacts and subsequently promote and mitigate them respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned.

Table 7: List of A few Neighbouring Participants Interviewed during the Exercise.

S/No.	NAME	DESIGNATION/COMPANY/DEPARTMENT
1.	Sushil Kumar	Medic, Tel: 0711 374499
2.	Yasmin Abdirahman	Tel: 0711 986384
3.	L. Bin Hussein	Tel: 0715 666744
4.	Indire Julius Anunda	Caretaker, Glaka Villas, Tel: 0711 294504
5.	Maximilien Photiou	Manager, Tel: 0710 430585
6.	Wangeci Gitata	Consultant, Box 2406 00200 Nairobi
7.	Simon Thuo	IT Specialist, Tel: 0734 507246
8.	Dominic Bebeni Morangia	Security Specialist, Tel: 0748 323266
9.	Raj Shah	Kindergarten Proprietor, Tel: 0718 029700
10.		
11.		

12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		

5.3 POSITIVE ISSUES RAISED

5.3.1 Optimal Use of Land

As population increases and need for more residential and office spaces increases, maximization of the plots available must be exploited to meet such demand gaps. Such initiatives are much welcome as they strive to narrow this gap. Care though must be taken in the proper planning and implementation of these projects to ensure that they concur with the available resources as well infrastructural expansions and improvements to go with them.

5.3.2 Infrastructural Improvement

It was acknowledged by the local community that this Single Mega High-Rise Residential-Apartments Block may improve infrastructure around the project site if the stakeholders unites together in improving the access roads by conducting regular maintenance of roads, storm water drainages and power lines amongst other facilities for their own betterment even before the intervention of the county or central governments.

5.3.3 Improved Residential Housings

It was noted that the proposed Mega High-Rise Residential Block will add beauty and glamour to the existing barrage of other high-rise apartments dotting this neighbourhood, in the outskirts of the Westlands as well as increase the housing stock within this city and its environs area which is very easily reachable by the City's inhabitants. This will further improve the area's economic potentiality and thus, leaving standards.

5.3.4 Employment Creation

People coming from different places to seek for apartments to either buy or rent for residential, office and other economic purposes will enjoy its proximity to the CBD, good infrastructural networks, security and a host of other benefits already $_{created}$ by the existing inhabitants and their surroundings.

The implementation of this proposed project is expected to provide modern and spacious apartments to the possible buyers or renters, direct and indirect employment to a number of people whose majority will be from the immediate neighbourhood. However, the exact number cannot be predetermined at this stage. These range from unskilled casual workers, semi-skilled and formal employees.

Specifically, the services of the following groups of people will be required during the construction phase:

- Architects; Structural Engineers; Mechanical and Electrical Engineers;
- Surveyors; Environmentalists, Supervising Engineers;
- Heavy duty truck Drivers; Building Contractors;
- Site managers and Foremen; Security agents; and Transporters;
- Construction workers (Masons, Welders, Carpenters, Painters, Electricians, Plumbers, Casual labours among others);
- Other neighbours with different needs will tap from this influx of professionals/people pool, as well.

Given the Project size and the duration that the construction will take, employment may be short lived. However, for the few who will be employed, their standards of living will improve within the duration of employment.
The site workers will provide a market for the local food vendors and kiosks for the duration of the Project construction.

The negative impacts due to increased population in the neighbourhood that will result from establishment of the Project include increased population without commensurate services and facilities; increased pressure on infrastructure; air pollution; disease out breaks and easy spread of existing ones, water pollution and generation wastes among others which however can be mitigated.

5.4 NEGATIVE ISSUES RAISED

5.4.1 Noise and Air Pollution

Air pollution was noted as a possible cause of concern. Potential impacts on the air quality during the construction stage will be due to the fugitive dust and the exhaust gases generated in and around the construction site by use of heavy vehicles and machinery/equipment at the construction site. These emissions can have significant respiratory and cardio-pulmonary effects on the local population and thus adequate mitigation measures should be implemented. Although the level of discomfort caused by noise is subjective and relies mainly on the distance between the noise source and recipients, the real impact of noise on the area's residents will depend of the nature of equipment used and the timing of their use. Even then, it is possible to avoid excessive noise through implementation of appropriate noise abatement measures during construction.

5.4.2 Water Demand & Sewer System

Issues of increased water demand were raised in the public participation exercise. The neighbours expressed concern about the increasing inadequacy of water and overburdened sewerage line within the area which is likely to worsen with the eventual population upsurge and recommended that either the NCG water supply be upgraded, more boreholes be sunk and sewer lines be expanded to remedy the situation already in the course of project's implementation and completion without which will only amount to a more acute scarcity of water within the area. Thus suggesting that the systems be upgraded to supply more people in this area as demand peaks as well as be upgraded to stomach the ever increasing domestic demands.

5.4.3 Impacts of Increased human and traffic flow in the neighbourhood

As a result of the proposed project taking place, human and vehicles traffic will exponentially increase. This will be as a result of people coming from different places to look for houses to live in, jobs or participate in the numerous activities likely to be unveiled at the site.

5.5 *OTHER IMPACTS:*

5.5.1 Aesthetic impacts

There will be some aerial intrusion from this high-rise building especially by the neighbours occupying other low-lying town houses, maisonettes or apartments similar to one currently on the site. The affected neighbours may come up with better solutions to maintain their privacy as they deem appropriate. However, it should be noted that due to increased population, increased demand for such expansive residential building eventually would be inevitable.

5.5.2 Suggestions by Community Members

During the public participation exercise several suggestions were put forward by the local community members. These suggestions included:-

(a) That the local city's inhabitants especially the available labour force

from Nairobi's surroundings will be considered as first priority for employment by the contractor before others,

(b) That those with the capacity be allowed to supply some of the raw materials,

(c) The proponent should do whatever he can to improve infrastructure within and around the project environs,

(d) Proper waste management and disposal procedures and standards be employed,

(e) Working committees be formed so as to raise their concerns to the other stakeholders and their issues to be addressed by the current as well as present owners of the land.

(f) Noise and dust pollutions be reduced so as not to disturb neighbouring institutions and homes.

6 POTENTIAL ENVIRONMENTAL IMPACTS

Introduction

This chapter outlines the potential negative and positive impacts that will be associated with the housing project. The impacts will be related to activities to be carried out during construction of the project. The operational phase impacts of the project will be associated with the activities carried out by the residents/tenants, which will mainly be domestic. In addition, closure and decommissioning phase impacts of the project are also highlighted.

The impacts of this Mega High-Rise residential block project during each of its life cycle stages (construction, operation and decommissioning) can be categorized into: impacts on the biophysical environment; health and safety and socio-economic impacts.

6.1 Clearance of the site

Demolition of the existing building and other infrastructural-layings within the project site generally result in generation of large quantities of solid waste. These consist of demolition debris, concrete, metal, walls, wood logs from the existing trees, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia, which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

6.2 Soil disturbance

Clearance of land including demolition, cutting of well-established trees and excavation works will lead to pre-exposition of soil to erosion agents at the project site and release of sediments into the drainage systems. Uncontrolled soil erosion can have adverse effects on the local water bodies.

6.3 Dust generation

During demolition, excavation and construction, the project will generate substantial quantities of dust at the construction site and its surrounding. The sources of dust emissions will include excavation and levelling works, and to a small extent, transport vehicles delivering building materials. Emission of large quantities of dust may lead to significant impacts on construction workers and the local residents, which will be accentuated during dry weather conditions.

6.4 Solid waste generation

Large quantities of solid waste will be generated as a result of demolition of the existing buildings and other structures that currently stands on the proposed site and excavation of the site. In addition, additional solid waste will be generated at the site during construction of the building and related infrastructure. Such waste will consist of metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others.

Such solid waste materials can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on human and animal health. This may be accentuated by the fact that some of the waste materials contain hazardous substances such as paints, cement, adhesives and cleaning solvents, while some of the waste materials including metal cuttings and plastic containers are not biodegradable and can have long-term and cumulative effects on the environment.

6.5 Solid waste

Demolition of the project buildings and related infrastructure will result in large quantities of solid waste. The waste will consist of demolition debris including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners.

Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia, which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

6.6 Noise and vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas.

6.7 NEGATIVE ENVIRONMENTAL IMPACTS DURING CONSTRUCTION PHASE

6.7.1 Site Clearance and Reduced greenery

The earmarked site is currently grown and surrounded with long-established indigenous trees and live fence. Construction activities will inevitably lead to loss of vegetation. However it was noted that there are no rare plant species or mature trees in the location. Excavation of the site's top soil will result in large quantities of solid waste. The waste will consist of majorly the top soil layer with a bit of stones. Some of the old vegetative cover around the site should be maintained to ensure the area's greenery and good aeration of not only the site occupants but its neighbourhood as well is improved. Cutting them down will create a scenario which demands quick restoration for the area to continue enjoying good vegetative cover. These have to be replenished by planting new trees ones, once the construction is complete.

6.7.2 Soil disturbance and water logging

Soil erosion is likely to occur during construction at the construction site once exposed by excavation works especially during rainy and windy seasons due to the slope gradient of a portion of the proposed project plot. Considering the land clearing, excavation and other construction processes, soil will be exposed to erosion agents leading to soil/land degradation hence impacting negatively on the environment. Water logging of the proposed site may also occur in the event of heavy rainfall hence the need to provide cut off trenches/storm water drains channelling the water into nearby storm water drains.

6.7.3 Disposal of excavation soil and other materials

During clearing of land in preparation for construction some materials will be rendered unusable and thus will have to be disposed of. This also applies to some of the soil which may not be reusable after excavation processes are complete. All these materials needs to be collected, transported and disposed off appropriately in approved designated areas. It is encouraged that other alternative uses of these materials should be found such as landscaping.

Large quantities of solid waste will be generated as a result of demolition of the existing buildings and other structures that currently stands on the proposed site and excavation of the site. In addition, additional solid waste will be generated at the site during construction of the building and related infrastructure. Such waste will consist of metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others.

Such solid waste materials can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on human and animal health. This may be accentuated by the fact that some of the waste materials contain hazardous substances such as paints, cement, adhesives and cleaning solvents, while some of the waste materials including metal cuttings and plastic containers are not biodegradable and can have long-term and cumulative effects on the environment.

6.7.4 Dust emissions and exhaust emissions

Particulate matter pollution is likely to occur during the site clearance, excavation of the top soil, digging of foundations and loading and transportation of the construction waste.

There is a possibility of PM10 suspended and settle-able particles affecting the site workers and even neighbours health. Exhaust emissions are likely to be generated during the construction period by the various construction machinery and equipment. Motor vehicles used to mobilize the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through gaseous exhaust emissions.

6.7.5 Noise pollution

The construction works on site will most likely have noise operation due to the moving machines (mixers, tippers, communicating workers), incoming vehicles to deliver construction materials, workers to site and other normal construction activities. This may prove to be a potential source of disturbance to the surrounding neighbours and a health hazard to the workers themselves. Such noise emissions should be minimized as much as possible from the source point while workers should be provided with appropriate personal protective wear.

6.7.6 Waste management

Large amounts of solid waste will be generated during excavation and construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. Solid wastes if not well managed have a potential of causing disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes.

The construction workers will also generate feacal waste during their day-to-day operations. The generated waste needs proper handling to prevent disease, such as cholera, typhoid and diarrhoea outbreak on the site. Unless this is addressed, it can prove to be an environmental/health hazard.

6.7.7 Extraction and use of building materials and energy used

Building materials such as hard core, ballast, cement, rough stone and sand required for construction of the housing project will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as rivers and land.

Since substantial quantities of these materials will be required for construction of the buildings, the availability and sustainability of such resources at the extraction sites will be negatively affected, as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health impacts.

6.7.8 Exhaust emissions

The trucks used to transport various building materials from their sources to the project site will contribute to increases in emissions of CO_2, NO_x and fine particles along the way as a result of diesel combustion. Such emissions can lead to several environmental impacts including global warming and health impacts.

Because large quantities of building materials are required, some of which are sourced outside Nairobi, such emissions can be enormous and may affect a wide geographical area. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent gunning of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas.

6.7.9 Increased water demand

Both the workers and the construction works will create an increased demand for water in addition to the existing demand. Water will be mostly used in the creation of aggregates for construction works and for wetting surfaces for softening or hardening after creating the formworks.

6.7.10 Workers accidents and hazards during construction

During construction of the project, it is expected that construction workers are likely to have accidental injuries and hazards as a result of accidental occurrences, handling hazardous waste, lack or neglect of the use of protective wear etc. All necessary health and safety guidelines should be adhered to so as to avoid such circumstances.

Workers are also likely to be exposed to diseases, such as the resent Covid-19 either from close proximity to unknown carriers around or contact with potentially harmful building materials. It is therefore recommended that before the construction commences, there is need for the materials to be well inspected and harmonized to the occupational health and safety standards.

6.7.11 Emerging Workers Precautions during Covid-19 Pandemic

With the outbreak of the Corona Virus Discovered in 2019 world-wide, precautionary measures – popularly known a s Covid-19 Protocols, must be put in place at all times to protect all the involved individuals in this whole social exercise for its smooth continuity to completion, as any laxity could jeopardize its progress right from the beginning

6.8 POSITIVE ENVIRONMENTAL IMPACTS DURING CONSTRUCTION PHASE

6.8.1 Employment opportunities

One of the main positive impacts during projects construction phase will be the availability of employment opportunities especially to casual workers and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled labour will be used in construction hence economic production.

6.8.2 Boosting of the informal sector

There are usually several informal businesses which come up during the construction periods of such projects. These include activities such as food vending who benefit directly from the construction staff members who buy food and other commodities from them. This will promote the informal sector in securing some temporary revenue and hence livelihood.

6.8.3 Provision of market for supply of building materials

The project will require supply of large quantities of building materials most of which will be sourced locally and within the surrounding areas. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

Picture 14: Reliable Power line within the area, already within the site and likely to be rerouted to allow for the construction's progress.

6.9 NEGATIVE ENVIRONMENTAL IMPACTS DURING OPERATION PHASE

6.9.1 Electricity consumption

In completion, the project shall consume substantial amounts of electricity due to the number of the units being proposed and the activities that will take place once the project is complete. Since electric energy in Kenya is generated mainly through natural resources, namely water and geothermal resources, increased use of electricity have adverse impacts on these natural resources base and their sustainability.

6.9.2 Solid waste generation

A lot of domestic waste such as organic wastes from the kitchen, empty plastic containers, waste paper etc. will be generated during the operational phase of the project. Once the project is complete and operational, it's expected to generate a large amount of solid waste on a daily basis whose composition will vary from organic to inorganic substances. Individual collection bins, from registered garbage collectors can be stationed per apartment or communally to manage these while septic wastes will all be channelled to the peripheral line along the site's access routes to the already existing Nairobi Water & Sewerage Company's service lines in this area.

6.9.3 Increased water demand

Once the apartments are occupied, tenants will create an increased demand for water in addition to the existing demand. Water will be mostly used for domestic tasks such as washing, cleaning, cooking, drinking and other domestic chores.

6.10 POSITIVE ENVIRONMENTAL IMPACTS DURING OPERATION PHASE

6.10.1 Employment opportunities

Employment opportunities are one of the long term impacts of the project that will be realized after

construction and during the operation and maintenance of the houses. These will involve other sources of employment such as direct service provision to the domestic sector.

6.10.2 Improvement in the housing quality

These apartments' occupation would also signify an improvement in life's quality for the low, middle and high income earners by the availability of jobs, service provisions and various amenities in line with usages.

6.10.3 Incorporation of collective waste management

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

6.10.4 Increase in revenue to national and local governments

The commissioning of the proposed project will result in positive gains for numerous authorities- Kenya Revenue Authority (KRA), KPLC and Nairobi County Council through payment of relevant taxes, rates and fees to the respective institutions.

6.10.5 Optimal use of land

Change in land use from milled occupation of land to maximum utilization on which a modern development will be constructed will optimize land use in the area; this point must be viewed against the fast expanding Nairobi suburbs.

6.10.6 Provision of modern housing

The well designed modern housing units to be built at the proposed project site will add to the existing housing stock in the country and marginally alleviate the dearth of houses currently experienced in the neighbouring areas, this is in line with the vision of the existing government which implies generally of the need to engage private developers in the provision of housing to the citizenry within a set time frame.

6.10.7 Improved land value

Land Property around the project site once construction is complete is expected to increase. This is a great boon to the current land owners since it will increase the future land property prices.

6.10.8 Increased security

Security around the project site will be increased due to the introduction of streetlights and day and night security guards around the estate.

6.11 POSITIVE ENVIRONMENTAL IMPACTS DURING DECOMMISSIONING PHASE (JUST IN CASE)

6.11.1 Rehabilitation

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation which will lead to improved visual quality of the area.

6.11.2 Employment opportunities

For demolition to take place properly and in good time, several people will be involved. As a result several employment opportunities will be created for the demolition staff during the demolition phase of the proposed project.

6.12 NEGATIVE ENVIRONMENTAL IMPACTS DURING DECOMMISSIONING PHASE (JUST IN CASE)

6.12.1 Noise and vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the proposed project.

6.12.2 Solid waste generation

Demolition of the buildings and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia which may be released as a result of leaching of demolition waste, are known to lead to degradation of groundwater quality.

6.12.3 Dust

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighbouring residents.

7 IMPACTS' MITIGATION AND MONITORING

7.1 *Introduction*

This section highlights the necessary mitigation measures for the expected negative impacts of the proposed project. The potential impacts and the possible mitigation measures have herein been analysed under three categories as done in Chapter Six. These are Construction phase, Operation phase and Decommissioning Phase. References are made as to where decommissioning mitigation measures can be sought.

7.2 CONSTRUCTION RELATED IMPACTS

7.2.1 Minimization of vegetation disturbance

Clearance of part of the vegetation at the project site to pave way for construction is also likely to occur. However, the proponent will ensure proper demarcation of the project area to be affected by the construction works. This will be aimed at ensuring that any disturbance to flora is restricted to the actual project area and avoid spill over effects on the neighbouring areas. In the same vein, there will be strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works. In addition, the proponent has committed himself to re-vegetation of some of the disturbed areas through implementation of a well-designed landscaping programme.

7.2.2 Controlling soil erosion, water logging and siltation of could-be surrounding water bodies

The Proponent will put in place some measures aimed at minimizing soil erosion and water logging of the proposed project site during construction. These measures will include:-

- Terracing, levelling and ripping off compacted areas of the project site to reduce
- run-off velocity and increase infiltration of storm water into the soil
- Digging trenches and cut off drains to channel runoff into storm water drains
- Proper planning of site excavation works such that a section is completed and rehabilitated before another section begins
- Landscaping and construction of retention walls to control soil erosion
- Surface runoff and roof water shall be harvested and stored in underground reservoir for reuse
- A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.

7.2.3 Minimization of waste generation

It is recommended that land clearance, excavation 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, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed of. In addition, damaged or wasted construction materials 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 home owners.

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. It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once- used or recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste.

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

include:-

- ☞ Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.
- ☞ 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.
- ☞ Use of construction materials containing recycled content when possible and in accordance with accepted standards.

7.2.4 Minimization of air quality degradation

Controlling dust during construction is useful in minimizing nuisance conditions and consequently health (respiratory and eye) complications. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (Nitrogen oxides, Carbon dioxide, Sulphur oxides, and diesel related Particulate Matter PM_{10}) that would occur in the exhaust from heavy equipment are also included.

The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines.

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.
- ☞ Pave, 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.
- ☞ Fast growing trees should be planted around the project area to act as a wind breaker to reduce the particulate matter that lead to respiratory diseases.

7.2.5 Minimization of noise pollution

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:-

- ☞ Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- ☞ Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- ☞ A substantial permanent increase in ambient noise levels (more than five dBA) in the project vicinity above levels existing without the project.
- ☞ A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimize the

impact of temporary construction noise at the project site.

- ☞ 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 the residential areas.
- ☞ Install sound barriers for pile driving activity.
- ☞ Limit pickup trucks and other small equipment to an idling time of five minutes, observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.

7.2.6 Minimization of exhaust emission

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

- ❖ Vehicle idling time shall be minimized
- ❖ Alternatively, fuelled construction equipment shall be used where feasible
- ❖ Equipment shall be properly tuned and maintained

7.2.7 Efficient sourcing and use of raw materials

The Proponent will source building materials such as sand, ballast and hard core from registered quarry and sand mining firms, whose projects have undergone satisfactory environmental impact assessment/audit and received NEMA approval. Since such firms are expected to apply acceptable environmental performance standards, the negative impacts of their activities at the extraction sites are considerably well mitigated.

To reduce the negative impacts on availability and sustainability of the materials, the Proponent will only order for what will be required through accurate budgeting and estimation of actual construction requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the Proponent will ensure that wastage, damage or loss (through run-off, wind, etc.) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

In addition to the above measures, the Proponent shall consider reuse of building materials and use of recycled building materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites.

7.2.8 Minimization of water use

The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water usage.

7.2.9 Curbing worker accidents and hazards when handling hazardous wastes

Necessary health and safety rules shall be enforced by the site foreman to ensure that all staff members adhere to these standards and are thus safe. Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided. In addition covers for refuse containers and appropriate personal protective equipment to be used by workers shall also be provided by the proponent.

Workers accidents especially in deep trenching operations and from gas accumulation in sewers and other confined spaces shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.

7.3 OPERATION RELATED IMPACTS

7.3.1 Ensure efficient energy consumption

The proponent shall plan and install an energy-efficient lighting system in all houses and parking areas. This will contribute immensely to energy conservation during the operational phase of the project. In addition, tenants will be sensitised to ensure energy efficiency in their operations.

7.3.2 Ensuring efficient solid waste management

The proponent will be responsible or appoint a caretaker who will be responsible for the efficient management of solid waste generated by the project during its operation. In this regard, the proponent will provide waste handling facilities such as waste bins and skips for temporarily holding waste generated within various sections of the compound. In addition, the proponent will ensure that they are disposed of regularly and appropriately. It is recommended that the proponent puts in place measures to ensure that all tenants manage their waste efficiently through recycling, reuse and proper disposal procedures.

7.3.3 Ensure efficient water use

The proponent will install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff. In addition, the occupants of the houses will be sensitized to use water efficiently.

7.4 DECOMMISSIONING RELATED IMPACTS

During the decommissioning phase of the project an Environmental Impact Assessment will be carried out whereby necessary mitigation measures of all potential impacts will be proposed.

8 ANALYSIS OF PROJECT ALTERNATIVES

This section analyses the project alternatives in terms of site, technology scale and waste management options.

8.1 Alternative Site (Relocation Option)

Relocation option to a different site is an option available for the Project implementation. However, at present the landowner/developer does not have an alternative site. This means that he has to look for the land. Looking for the land to accommodate the scale and size of the Project and completing official transaction on it may take many years although there is no guarantee that the land would be available. The developer will spend another one year on design and approvals since design and planning has to be according to site conditions. Project design and planning before the stage of implementation will cost the developer a large sum of money. Whatever has been done and paid to date will be counted as a loss to the developer.

Assuming the Project will be given a positive response by the relevant authorities including NEMA, this Project would have been delayed for about two (2) years or longer period before implementation. This is a delay that our economy can ill afford. This would also lead to a situation like No Project Alternative option. The other consequence of this is that it would be a discouragement for private/local investors especially in the housing sector that has been shunned by many public and private investors already aggravating our critical housing shortages. In consideration of the above concerns and assessment of the current proposed site, relocation of the Project is not a viable option.

8.2 Alternative Design

Planning, designing and implementation of the project to fit and suit the site in question require time, sourcing of various professionals involved and monetary sacrifices to facilitate their progress. The team ranging from, site planners, surveyors, architects, environmentalist, project managers and many more dedicates their time and resources with a common goal at the end of the period to ensure that the mutually agreed target is attained within the specified time frame. Changing the design may mean greater loss in time, money and resources which could have been diverted to develop other sectors in the general endeavour for economic and environmental sustainability.

8.3 Analysis of the Construction Materials and Technology

The High-Rise Residential Block 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.

Beautiful and durable clay tiles will be used because they are good in heat insulation as compared to the iron sheet roofs. This will ensure that the rainwater harvested will be used in gardening. Heavy use of timber during construction is discouraged because of destruction of forests. The exotic species would be preferred to indigenous species in the construction where need will arise.

8.4 Solid Waste Management Alternatives

A lot of solid wastes will be generated from the proposed Project. An integrated solid waste management system is recommendable.

First, the proponent will give priority to Reduction at Source of the materials. This option will demand a solid waste management awareness programme incorporating both the management and the residents.

Secondly, Recycling, Reuse and composting of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. The waste will be sold to waste buyers within the surrounding area or be collected by a private waste management company.

The third priority in the hierarchy of options is combustion of the waste that is not recyclable.

Finally, sanitary land filling will be the last option for the proponent.

8.5 No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the landowner and the community as a whole. The landowner will continue to pay land rates/rent on the plot while the property is underutilized. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain under-utilized.
- Reduced visitation due to lack of accommodation in the Community that the project is proposed.
- Reduced interaction both at local, national and international levels.
- No employment opportunities will be created for numerous numbers of Kenyans who will work in the housing project area.
- Increased urban poverty and crime in Kenya.
- All the potential benefits would be lost

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

8.6 *Carrying On With the Proposed Development Alternative*

Under the proposed Project alternative, the Proponents of the proposed Project would be issued with an ESIA License. In issuing the license, NEMA would approve the Proponent's proposed 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. This is the most suitable option.

8.7 *Domestic Waste Water Management Alternatives*

Three suitable technologies are discussed below:

8.7.1 *Alternative One: Connection to the sewer system*

Connection to an existing main sewer line will solve the waste water management issue at a very minimal cost and in an environmental efficient manner. Though most of the inhabitants of this area especially those occupying the sloppy northern side use septic tanks, the area is generally well served by the NW&SC's sewer lines. Since the upper areas of this neighbourhood are connected to NW&SC's sewer line, waste water from this plot will be connected to this line which is 160 metres away. The apartments are raised, starting from the 2nd floor, to ease the flow of the sewer wastes to the gravity-driven sewer line. Once the direct and wider connection has been linked, all will be channelled into the existing NCG's main stationed on the north-eastern side of the plot or as drainage dictates. Currently this option is the most practical and cheapest one since the area is well connected and served by a functioning NCG sewer line to which even the long existing apartments were connected. By the increased elevation of the apartments, to increase and easy their gravitational flow, these will be connected to the peripheral sewer line along the newly expanded Ring Road Parklands.

8.7.2 *Alternative Two: Use of septic tanks*

This involves the construction of small underground concrete-made tanks to store the sludge with soak pits. Regular empting is required for this type of waste water discharge regime. This option is not suitable for such a large project considering that each house may require one hence numerous septic tank systems.

8.7.3 *Alternative Three: Construction of a treatment plant*

This involves the construction of a treatment plant. A network of Plant Effluent Drains, Aeration Pits, Tanks etc., It is expensive to construct but is however a centralized system that can easily be maintained and monitored while waste water can be recycled and reused for other purposes. The proponent may incorporated this into the project design as a futuristic alternative should the existing system become overstretched, malfunctional or inefficient, thus providing a viable and suitable option, in case of any eventuality, for this development. All sewerage wastes are channelled into the installed treatment plant to be stationed on the lower side of the plot or as drainage dictates.

8.8 *Solid Waste Management Alternatives*

A lot of solid wastes will be generated from the proposed Project. An integrated solid waste management system is recommendable.

First, the proponent will give priority to Reduction at source of the materials. This option will demand a solid waste management awareness programme in the management and the residents.

Secondly, Recycling, Reuse and composting of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. The waste will be sold to waste buyers within the surrounding area or be collected by a private waste management company.

The third priority in the hierarchy of options is combustion of the waste that is not recyclable.

Finally, sanitary land filling will be the last option for the proponent.

Picture 15: Existing NWSC's connections within the site, likely to be rerouted to allow for the impending construction works.

8.9 *Water Supply Alternatives*

Water is gradually becoming a scarce resource by the day in Kenya hence several methods of supplying it reliably to the estate must be sought. Several options are available including:-

8.9.1 Borehole water use consumption

The project's management shall ensure that they appropriately utilize any water source within their locality or any borehole dug at the project site to supplement water supplied by NW&SC, to the estate. Currently the area is well supplied by NW&SC though there is need to increase this volume to concur with the area's population upsurge. New borehole may be drilled on consultations, area mapping to reveal the existing boreholes, water tables capacity and availability and subsequently licencing from the relevant authorities.

8.9.2 Rain water harvesting

Rain water that will be flowing into drainage systems during rainy seasons shall be harnessed and stored in ground or underground tanks. The proponent will put measures to ensure that its harvested and stored then can be used in cooking, can be filtered for drinking, be used in watering flower gardens, flashing toilets and general cleaning and domestic usages

9 ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

9.1 Introduction

The proposed Mega High-Rise Residential Block and its associated developments proponent realize that its 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. Thus, its main aim focuses on reducing the negative impacts and maximizing the positive impacts associated with its activities through a programme of continuous improvement.

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

Tables 5 and 6, form the core of this EMP for the construction, operational and decommissioning phases of the housing project. In general, the Tables outline the potential safety, health and environmental risks associated with the project and detail all the necessary mitigation measures, their financial costs, as well as the persons responsible for their implementation and monitoring. The EMP will be used as checklist in future environmental audits.

9.2 Construction and 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 construction and operational phases the housing project are outlined in Table 8 below.

Table 8: ENVIRONMENTAL MANAGEMENT & MONITORING MATRIX FOR THE CONSTRUCTION PHASE.

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSH.)
1. Minimize Vegetation Disturbance				
Structural Demolition and Soil Disturbance (Disturbance of the neighbours; occupational safety and health impacts)	▪ Demolition of the existing structures within the site, transportation and dumping of the generated wastes have to be done as per the laid down rules and regulations of the Building Code. ▪ Site excavation works to be planned such that a section is completed and rehabilitated while another section begins. ▪ Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil. ▪ Excavation material will be loaded into trucks and be transported to designated disposal sites. ▪ Design and implement an appropriate landscaping programme to help in re-vegetation of part of the project area after construction. Reuse of the top soil in landscaping.	Proponent Site Manager	Construction Phase	As per Budget
Vegetation Disturbance	**1.** Ensure proper demarcation and delineation of the project area to be affected by construction works.	Contractor, Civil engineer & Project Manager	1 month	40,000
	2. Designate access routes and parking within the site.		1 month	10,000
	3. Preserve of some individual trees within the site.	Architect, Project Manager & Landscape specialist	One-off	0
	4. Introduction of vegetation (trees, shrubs and grass) on open spaces and their maintenance.		Continuously	500 per unit
	5. Design and implement an appropriate landscaping programme to help in re-vegetation of part of the project area after construction.	Architect & Landscape specialist	2 months	100,000
2. Minimize Extraction Site Impacts and Ensure Efficient Use of Raw Materials in Construction				
High Demand of Raw Materials	**1.** Source building materials from local suppliers who use environmentally friendly processes in their operations.	Project Manager & Contractor	Throughout construction period	0
	2. Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered.	Project Manager & Contractor	Throughout construction period	0
	3. Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	Project Manager & Contractor	Throughout construction period	0
	4. Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Project Manager & Contractor	Throughout construction period	0
3. Reduce Storm-Water, Runoff and Soil Erosion				

Increased Storm Water, Run-Off And Soil Erosion	1. Surface runoff and roof water shall be harvested and stored in underground reservoir tanks for reuse.	The Construction Team	2 months	10,000 per unit
	2. A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed.	The Construction Team	1 month	
	3. Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.	The Construction Team	1 months	
	4. Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site.	The Construction Team	Throughout construction period	
	5. Ensure that any compacted areas are ripped to reduce run-off.	The Construction Team	2 months	
	6. Site excavation works to be planned such that a section is completed and rehabilitated before another section begins.	Project Manager & contractor	Throughout construction period	5,000 per unit
	7. Open drains all interconnected will be provided on site and linked to peripheral storm water drains.	Civil Engineer	Throughout construction period	5,000 per unit
	8. Roof catchments will be used to collect the storm water for some other uses.	Civil Engineer	Throughout construction period	
	9. Construction of water storage tanks to collect storm water for other uses.	Civil Engineer	Throughout construction period	
4. Minimize Solid Waste Generation and Ensure Efficient Solid Waste Management During Construction				
Increased Solid Waste Generation	**1.** Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling.	Project Manager & Contractor	Throughout construction period	500,000
	2. Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed, rather than cutting them to size, or having large quantities of residual materials.	Project Manager & Contractor	One-off	0
	3. Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of.	Project Manager & Contractor	One-off	0
	4. Ensure that damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects	Project Manager & Contractor	One-off	0
	5. Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or home owners.	Project Manager & Contractor	One-off	0
	6. Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time	Project Manager & Contractor	Throughout construction period	0
	7.Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Project Manager & Contractor	One-off	50,000

	8. Use building materials that have minimal or no packaging to avoid the generation of excessive packaging waste	Project Manager & Contractor	Throughout construction period	0
	9. A Mobile toilet or two must be stationed on the site during the construction period to be used by the workers before establishing a final and lasting connection to the nearby sewer-line	Proponent and the Site Contractors, Site Manager	Throughout construction period	Price depends on the service provider
5. Reduce Dust Emissions				
Dust Emission	**1.** Ensure strict enforcement of on-site speed limit regulations	Project Manager & Contractor	N/A	
	2. Avoid excavation works in extremely dry weathers	Project Manager & Contractor	Throughout construction	5,000 per month
	3. Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles	Project Manager & Contractor	Throughout construction period	
	4. Personal Protective equipment to be worn at all during working periods	Project Manager	Throughout construction	20,000
6. Minimization Of Exhaust Emissions				
Exhaust Emission	**1.** Vehicle idling time shall be minimized	Project Manager & Contractor	Throughout construction period	0
	2. Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	Project Manager & Contractor	Throughout construction period	0
	3. Sensitize truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off or keep vehicle engines at these points	Project Manager & Contractor	Throughout construction period	0
7. Minimization of Noise and Vibration				
Noise and Vibration	1. Sensitize construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used	Project Manager & Contractor	Throughout construction period	0
	2. Sensitize construction drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and schools	Project Manager & Contractor	Throughout construction period	0
	3. Ensure that construction machinery are kept in good condition to reduce noise generation	Project Manager & Contractor	Throughout construction period	10,000
	4. Ensure that all generators and heavy duty equipment are insulated or placed in enclosures to minimize ambient noise levels.	Project Manager & Contractor	Throughout construction period	100,000
	5. The noisy construction works will entirely be planned to be during day time when most of the neighbours will be at work.	Project Manager & Contractor	Throughout construction period	50,000
8. Minimization of Energy Consumption				
Increased Energy	**1.**Ensure electrical machinery, equipment, appliances and lights are switched off when not being used	Project Manager & Contractor	Throughout construction	0

Consumption	2. Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy 3. The works must be limited from 8am to 6pm for maximum usage of the free sun's light and only be done at night on special permission and on necessity.	Project Manager & Contractor	Throughout construction period	10,000
9. Minimize Water Consumption And Ensure More Efficient And Safe Water Use				
High Water Demand	**1.** Promptly detect and repair of water pipe and tank leaks	Proponent	Continuous	2000 per month
	2. Encourage and sensitize staff on water conservation techniques	Proponent	Continuous	550 per month
	3. Ensure taps are not running when not in use	Proponent	Continuous	500/month
	4. Install water conserving taps that turn-off automatically when water is not being used	Proponent	One-off	200 % higher than ordinary taps
	5. Install a discharge meter at water outlets to determine and monitor total water usage	Proponent	One-off	100,000
10. Minimize Release of Liquid Effluent				
Generation of Wastewater	Provide means for handling sewage generated by construction workers e.g. use mobile toilets	Mechanical Engineer & Project Manager	One-off	30,000 per unit
11. Minimize Occupational Health and Safety Risks				
Approval of Building Plans	Ensure that all building plans are approved by the Local Authority and the Local Occupational Health and Safety Office	Developer	One-off	100,000
Site Organization	Develop a clear site organization plan and construction schedule	The Contractor, Project Manager	Continuous	5,000
	Deliver and store materials at appropriate locations	The Contractor, Project Manager	Continuous	10,000
	Hire the right number of workers with clear work schedule and appropriate dress gear	The Contractor, Project Manager	Continuous	1,000,000
Security	Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.	Proponent	Continuous	50,000
Personal Protective Gear (PPG)	Suitable overalls, safety footwear, dust masks, gas masks, respirators, gloves, ear protection equipment etc. should be made available and construction personnel must be trained to use the equipment	Proponent & Contractor	Once off	200,000
Health And Safety Impacts and Covid-19 Protocols	Implement all necessary measures to ensure health and safety of workers and the general public during operation of the housing project as stipulated in OSHA Act 2007 With the outbreak of Corona Virus worldwide, serious Covid-19 protocols must be put in place and be implemented rigorously during the socially-involving construction stage to protect the workers and ensure smooth continuity of the project to completion.	Proponent	Continuous	-
First Aid	Well stocked first aid box which is easily available and accessible should be provided within the premises	Proponent & Contractor	One-off	5,000

	Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Proponent & Contractor	One-off	40,000
Fire Protection	Fire fighting equipment such as fire extinguishers should be provided at strategic locations such as stores and construction areas.	Proponent & Contractor	One-off	40,000
	Regular inspection and servicing of the equipment must be undertaken by a reputable service provider and records of such inspections maintained	Proponent & Contractor	Every 3 months	20,000
	Signs such as **"NO SMOKING"** must be prominently displayed within the premises, especially in parts where inflammable materials are stored	Proponent & Contractor	One-off	2,000
Machinery/ Equipment Safety	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Project Manager, Developer & Contractor	One-off	0
	All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Project Manager	One-off	0
	Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Project Manager	Continuous	5,000 per training
	Reports of machinery inspection/examinations must be presented in prescribed forms, signed by the examiner and attached to the general register	Project Manager	Continuous	2,000 per examination
Storage of Materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Project Manager	Continuous	15,000
	Ensure that items are not stored/stacked against weak walls and partitions	Project Manager	Continuous	0
Safe Means o f Access and Safe Place of Employment	All floors, steps, stairs and passages at the construction site must be of sound construction and properly maintained	Project Manager & Contractor	Continuous	0
	Securely fence or cover all openings in ground, floors	Project Manager & Contractor	One-off	0
	All ladders used in construction works must be of good construction and sound material of adequate strength and be properly maintained	Project Manager & Contractor	One-off	0
	Ensure that construction workers are not locked up such that they would not escape in case o an emergency	Project Manager & Contractor	Continuous	0

TABLE 9: ENVIRONMENTAL MANAGEMENT & MONITORING MATRIX FOR THE OPERATION PHASE.

EXPECTED NEGATIVE	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSH.)
1. Minimization of Solid Waste Generation and Ensuring More Efficient Solid Waste Management				
Solid Waste Generation	1. Provide solid waste handling facilities such as waste bins and skips	Proponent	One-off	20,000
	2. Ensure that solid waste generated at the premise is regularly disposed of appropriately at authorized dumping sites	Proponent	Continuous	500 per house per month
	3. Ensure that occupants of the houses manage their waste efficiently through recycling, reuse and proper disposal procedures.	Proponent	Continuous	–
	4. Donate redundant but serviceable equipment to charities and institutions	Proponent	Continuous	0
2. Minimize Risks of Sewage Release into Environment				
Sewage Disposal	1. Provide adequate and safe means of handling sewage generated at the premise i.e. a cheaper connection to the existing sewer line located approximated 160 metres from the site along Ring Road Parklands or installation of a substitute waste water treatment plant or a Bio-digester to handle all these wastes.	Proponent	One-off	2,540,000
	2. Conduct regular inspections for sewage pipe blockages or damages and exhaust appropriately when necessary	Proponent	Continuous	500 per inspection 7000 per exhaust
3. Minimize Energy Consumption				
Energy Resource Utilization	1. Switch off electrical equipment, appliances and lights when not being used	Tenants	Continuous	–
	2. Install energy saving fluorescent tubes at all lighting points e.g. security lights and within the houses instead of bulbs which consume higher electric energy	Proponent/ Tenants	One-off	200% higher than ordinary lighting
	3. Monitor energy use during the operation of the project and set targets for efficient energy use	Tenants	Continuous	5000/month
	4. Sensitize tenants to use energy efficiently	Proponent	Continuous	500/month
4. Minimize Water Consumption and Ensure More Efficient and Safe Water Use				
Water Consumption	1. Promptly detect and repair water pipe and tank leaks	Proponent/ Tenant	Continuous	2,000/month
	2. Encourage residents to conserve water	Proponent/Tenant	Continuous	-
	3. Ensure taps are not running when not in use	Tenant	Continuous	500/month
5. Ensure the General Safety and Security of the Premises and Surrounding Areas				
1. Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises.		Proponent	Continuous	100,000/month

6. Minimization of Health and Safety Impacts			
1. Implement all necessary measures to ensure health and safety of the general public during operation of the project as stipulated in Occupational Safety and Health Act , 2007	Proponent	Continuous	–
7. Environmental Monitoring of the Project			
Due to the magnitude of the project, the Project's Team of Experts will undertake continuous environmental monitoring of the project for all the Phases in liaison to the National Environment Management Authority and the proponent. This will ensure that environmental concerns are integrated into the project at every stage of implementation. An initial environmental audit will also be carried within a period of 12 months after commencement	Proponent, Construction Team, Firm of Experts and NEMA	Continuous	-

9.3 DECOMMISSIONING PHASE

Although there are no plans to decommission the planned project any time in the foreseeable future, decommissioning phase is still an important phase in the project life cycle. In the event that the proposed residence is to be decommissioned at the end of the project life cycle or sooner, the following will be the potential positive and negative impacts

9.3.1 *Negative Impacts*

These would include: -

- Loss of employment to domestic servants
- Reduction in availability of housing
- Generation of solid waste from demolition rubble and decommissioned facilities
- Occupational health and safety impacts
- Disturbance to neighbours from noise, noise, dust and vibrations

9.3.2 *Positive Impacts*

These would include: -

- Availability of land for other uses
- No generation of waste and wastewater
- Opportunity to replant trees
- Enhanced aesthetics

In addition to the mitigation measures provided in Table 9 above, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the housing 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 housing project are outlined in Table 6 below.

Table 10: ENVIRONMENTAL MANAGEMENT & MONITORING MATRIX FOR THE DECOMMISSIONING PHASE-JUST, IN CASE.

EXPECTED NEGATIVE IMPACT	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSH.)
1. Demolition Waste Management				
Sewage Disposal	**1.** Use of an integrated solid waste management system i.e. through a hierarchy of options: (a) Source reduction, Recycling, Composting and Reuse, Combustion, Sanitary land filling. (b) Donate redundant but serviceable equipment to charities and institutions	Contractor & Project Manager	One-off	-
	2. All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible.	Contractor & Project Manager	One-off	-
	3. All foundations must be removed and recycled, reused or disposed of at a licensed disposal site	Contractor & Project Manager	One-off	-
	4. Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site	Contractor & Project Manager	One-off	-
	5. Donate reusable demolition waste to charitable organizations, individuals and institutions	Contractor & Project Manager	One-off	-
Site Rehabilitation	1. Implement an appropriate revegetation programme to restore the site to its original status 2. Consider use of indigenous plant species in revegetation 3. Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent residential area and the development.	Proponent/ Contractor	Decommissioning Phase	As per Budget

9.3.3 *STATEMENT OF IMPACTS*

From the identification and analysis of the potential impacts of this proposed Single Mega High-Rise Residential-Apartments Block Development by Minara Homes Limited, the ESIA team finds that there really are no potentially significant adverse environmental or socio-economic impacts. The key negative impacts include possible disturbance of the immediate neighbourhood at the initial stages by demolition of the old existing apartments block, site clearance, and at construction stages. However, these impacts can be mitigated if the recommendations suggested in the Environmental Management Plan are keenly undertaken.

10 AUXILLIARY INFORMATION

10.1 Budget

The summary of the Bills of Quantities that form the budget of the project is as follows:

TABLE 11: SUMMARY OF THE PROJECT'S BILLS OF QUANTITIES.

ITEM	COST (KSH)
General Conditions and Preliminaries	18,056,944
Building Works	591,541,667
External Works	15,277,778
Special Installations	27,222,222
Storm Water Drainage	15,829,167
Foul Drainage	20,494,444
Water Reticulation	14,217,889
External Electrical Installations	17,930,556
Other Externalities	11,373,778
Contingencies	18,055,556
TOTAL PROJECT COST	750,000,000

10.2 Monitoring Guidelines

Continuous observations and assessment is essential so that if foreseen safety dangers are noticed, alternatives must be sort for. Risk assessment of fire outbreaks, and others should not be ignored in the construction plan. Waste management in the block should be strictly followed. Mitigation measures of storm water management are also essential. Safety standards should constantly be maintained, in brief, monitoring guidelines could be based on the following parameters:

- Physical water qualities including colour and other variables like Biological Oxygen Demand and Chemical Oxygen Demand (COD). This is to be done with guidance from the NW & SC as the lead agency responsible for water issues.
- Floral and faunal life including the species of either that is in the surrounding
- Health and safety measures using such standards as OHSAS 18001: 2007 and OSHA 2007 guidelines
- Waste management
- Examine the changing land use patterns including those for residential ecological and economic purposes
- Accidents and risk assessment arising from the use of water, roads, electricity and or any other amenity

10.3 Reporting

Constant reporting by the site contractor to the architect is necessary to ensure the project is executed as per the architectural drawings. The safety officer should always remain on site to report any safety concerns for urgent mitigation. He should also at all times enforce safety requirements as per the relevant legislation. The contractor must consult the architect to maintain a clear understanding of all the aspects of the project

11 CONCLUSION AND RECOMMENDATION

11.1 Recommendations

- Consult all relevant service providers and authorities (i.e. Nairobi County Council, KPLC, Water and Sewerage Company, NEMA, amongst others) so as to harmonize the projects infrastructural and socio-economic developments with existing facilities.
- Adhere to all relevant construction, occupational, health and safety regulations and any other relevant law.
- Ensure Water and Energy Management Systems are put in place as outlined within the report and incorporate rain water harvesting facilities.
- Solid waste management during construction and operational phases of the project must adhere to the Environmental Management and Coordination (Waste Management) Regulations, 2006.
- Ensure strict adherence to provisions of Environmental Management and Coordination
- (Noise and Excessive Vibrations Pollution) Regulations, 2009.
- Ensure waste water is disposed off, as per standards set in the Environmental
- Management and Coordination (Water Quality) Regulations, 2006.
- Ensure strict adherence to Occupational Health and Safety Act, 2007
- Ensure an elaborate landscaping program is put in place as the construction phase is being concluded so as to replenish vegetation around the project site by planting trees, flowers and lawns where applicable.

11.2 Conclusion

The proposed Mega High-Rise Residential Block's development project shall have several positive impacts emanating from both the construction and operational phases. These positive impacts including creation of employment; provision of quality shelter, increase in National Housing Stock and increase in Revenue among others as has been outlined within the report.

The proposed project will also provide some negative impacts which in turn need to be minimized and mitigated during the construction and the operational phases. Several of these negative impacts are rated low and short-term thus have minimal impacts. The negative environmental impacts that will result from establishment of the project include increased population without commensurate services and facilities; increased pressure on infrastructure; air pollution; water pollution and generation wastes among others.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the life cycle of the project as outlined within the report. 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. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards.

12 APPENDICES & REFERENCES

12.1 APPENDICES:

- ***Copy of the Plot's Title Deed,***
- ***Copy of the Approved Architectural Designs/Scheme Drawings,***
- ***Copy of the Plot's Change of Use,***
- ***Questionnaires from the Neighbouring Residents Interviewed.***

12.2 REFERENCES

Environmental Assessment Sourcebook, Vol. 2: Sectoral Guidelines. World Bank Technical Paper 140, 1991.

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The Wayleaves Act (Cap 292) Government Printer, Nairobi

Nairobi County Development Plan 2018 - 2022

(In Nomine Domini Nostri Jesu Christi)