ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT

FOR THE PROPOSED GREAT WALL GARDENS 6 RESIDENTIAL DEVELOPMENT LAND REFERENCE NUMBER LR No.12581/7 & 12581/8 ATHI RIVER, MACHAKOS COUNTY

Coordinates: S01° 25' 24.3', E036° 58' 35.3"

PROPONENT

PROF. JOSEPH KAMUYA MAITHA

P.O BOX 42541-00100

NAIROBI

ENVIRONMENTAL CONSULTANTS	
KATRINA MANAGEMENT CONSULTANTS LIMITED	Reg No.1695

JULY 2023

CERTIFICATION

The report has been done with reasonable skills, care and diligence in accordance with the Environmental Management and Coordination Act No. 8 of 2015, and the Integrated Environmental Impact Assessment Regulations, 2018.

We certify that the particulars given in this report are correct to the best of our knowledge.

EIA/EA FIRM OF EXPERTS

KATRINA MANAGEMENT CONSULTANTS LIMITED

REGISTERED EIA/EA FIRM OF EXPERTS (1695)

P.O Box 67688-00200

NAIROBI

E-MAIL; info@katrinamcl.co.ke

SIGNATURE……DATE……..

PROPONENTS

PROF. JOSEPH KAMUYA MAITHA
P.O BOX 42541-00100
NAIROBI

SIGNATURE ……DATE……..

ACRONYMS

DOSHS	Directorate of Occupational Safety and Health Services
EA	Environmental Audit
EIAs	Environmental Impact Assessment Study
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment Study
Ha	Hectare
KM	Kilometers
KPLC	Kenya Power and Lighting Company
L N	Legal Notice
L.R	Land Registration
MAVWASCO	Mavoko Water and Sewerage Company
NEAP	National Environment Action Plan
NEC	National Environment Council
NEMA	National Environment Management Authority
NES	National Environment Secretariat
NPEP	National Poverty Eradication Plan
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Act, 2007
PCM	Public Consultation Meeting
PPE	Personal Protective Equipment
SWM	Solid Waste Management
TOR	Terms of Reference
UFL	Noise level lower the lower operating limit (50 dB) of the Mark
URTI	Upper Respiratory Tract Infection
WRA	Water Resources Authority

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NON TECHNICAL SUMMARY

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

According to the legal notice 150 of 16th June 2016, the L N 8/2003 EMCA 1999 (second Schedule) was amended and Projects categorized as low risk, medium risk and High risk according to their potential impacts to the environment.

Screening of the proposed project was done and according to the classification described in the above legislation as "…Urban development including establishment of new housing estate developments exceeding one hundred housing units", the project is categorized a high risk project. A scoping exercise was therefore done and acknowledged that Project's potential impact on the natural environment and human environment are significant but can be addressed and mitigated as described in this ESIA.

JUSTIFICATION OF THE PROJECT

Housing is enshrined in our Constitution as one of the basic social and economic rights. It is the right to "accessible and adequate housing, and to reasonable standards of sanitation" (Art. 43(b)). The requirement for new urban housing is estimated at 250,000 units a year, against a production of 50,000 units, translating to a deficit of 200,000 units. The cumulative deficit is estimated at two million units. As a result, more than 60 per cent of urban Kenyans live in slums and other low-quality housing without adequate sanitation, undermining their dignity and exposing them to health hazards. This is also a reflection of the bias towards upper income housing. Of the 50,000 units built every year, only 2 per cent (1,000 units) are classified as affordable housing. Moreover, our rapid urbanisation rate at 4.4 per cent, equivalent to 500,000 new city dwellers a year, means that housing supply is a moving target.

However, the jurisprudence on the right to housing, as indeed on other economic and social rights remains thin. The proposed project attempts to address this challenge by providing decent and affordable housing targeting middle income earners and especially first time home owners.

The project proponent is developing a Greatwall Gardens 6 Residential Development on plot L.R. No. 12581/7 & 12581/8 Athi River, Machakos County. The development will include:

- There will be 25 Blocks ground plus 15 floors
- Total No. of units is 3,000
- Total No of Shops 108
- Parking spaces 1725
- Associated amenities: Lifts, children's play area, boundary wall, Transformer house, Gate house, Garbage cubicles among other amenities
- Property Acreage 18.972 Acres

The proponents are aware that an Environmental Impact Assessment (EIA) is a statutory requirement under Environmental Management and Coordination Act No. 8 of 2015, and the Integrated Environmental Impact Assessment Regulations, 2018. The experts undertook the study with the objective of identifying both positive and negative impacts of the proposed project; provide counter measures for the negative impacts and optimize the positive ones and come up with an Environmental Management Plan (EMP) as per the terms of reference (TOR).

The EMP will be useful in managing the activities at the site so that potential and actual impacts to the environment are addressed.

The report has also provided guidelines on how to mitigate the negative environmental impacts and is confident that they will be implemented by the proponent.

The EMP will also be an excellent reference tool for compliance audits in future. This is in line with the statutory requirements and the guidelines issued by NEMA.

Scope of the study

The scope of Environmental Impact Assessment includes the following:
1. Identification of potential adverse environmental and social impacts to the environment arising from the proposed project activities.
2. Proposes mitigation measures to environmental and social impacts of proposed project activities.
3. Prepare an Environmental and social Management and monitoring Plan (ESMMP) for the proposed project.
4. Carry out baseline studies for the proposed project area,
5. Relevant legislative, policy and administrative frameworks,

6. Seek the Views/opinions of the public

Objective and EIA criteria for the Study

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

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

- The proposed location of the development and its associated infrastructure.
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the proposed project.
- The technology, procedures and processes to be used, in the implementation of the project.
- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project.
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- To recommend a specific environmentally sound and affordable wastewater management system.
- Analysis of alternatives including project site, design and technologies.
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out the development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties, which were encountered in compiling the information.
- An economic and social analysis of the project.
- Such other matters as the Authority may require.

Methodology Outline

The general steps followed during the assessment were as follows:

- Environment screening, in which the project was identified as among those requiring environmental impact assessment under schedule 2 of EMCA, cap387
- Environmental scoping that provided the key environmental issues
- Desk Stop studies and interviews
- Physical inspection of the site and surrounding areas
- EIA Public participation Meetings and Reporting.

Anticipated Environmental Impacts

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

Positive Impacts

- Increase of housing premises
- Creation of employment opportunities
- Improved growth of the economy
- Increased business opportunities
- Revenue to national and local governments amongst others
- Improved local security
- Area transformation
- Improve of Road infrastructure

Negative Impacts

Negative Impacts	**Mitigation Measures**
i. Solid waste and construction debris	• Provision of waste receptacles and their covers • The waste bins to be labeled based on type of waste to encourage segregation at source • Construction debris to be transported by a licensed waste handler to a licensed disposal ground
ii. Noise pollution	• Installation of portable barriers to shield compressors and other small stationary equipment where necessary.

	• Use quiet equipment (i.e. equipment designed with noise control elements). • Install sound barriers for pile driving activity. • Limit pickup trucks and other small equipment to an idling time when necessary • Observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible
iii. Workers accidents and hazards during renovation	• Ensure safety of staff during construction through provision of PPE • Laborers are trained or skilled as per designation • By restricting access to the construction site to those who are not construction workers.
iv. Air pollution from dust emissions and exhaust emissions	• Dust nets will be used when necessary • All trucks hauling soil, sand and other loose materials will be covered • All trucks will be required to maintain at least two feet of freeboard. • Sprinkling of water, or application of (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction site. • Vehicle idling time shall be minimized • Alternatively fueled construction equipment shall be used where feasible • Equipment shall be properly serviced and maintained. • An air quality baseline has been carried out
v. Increased water demand	• Encouraging reuse of water where possible • Emphasizing on minimal use to reduce wastage • Adopt water harvesting plans
vi. Increased energy consumption	• switching off all equipment and power sources not in use

		• instilling in workers/laborers the need to use resources efficiently • Installation of solar panels
vii.	Traffic Congestion	• Have the trucks deliver materials at designated times and use alternative routes • Upgrading quarry road so make it usable by residents
viii.	Potential conflict.	• Compliance with environmental conditions and standards. • Effective Grievance Redress Mechanism to be mutually agreed upon by the industrial and residential facilities.
ix.	Potential impacts resulting to climate change	• The use of solar energy to augment KPLC supply particularly for security purposes at night; • Incorporate other social amenities within the development to reduce the need for use of fossil fuel in movements from one place to another; • Designs that maximize the use of natural lighting during the day; and • Incorporate more green spaces within the development and along the boundary wall.

Conclusion

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

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

It is our informed recommendation that the proponent be allowed to proceed with the implementation of the proposed project provided the outlined mitigation measures in this report are adhered to and the Environmental Management Plan (EMP) is implemented

effectively. An initial environmental audit will also be carried out within a period of 12 months after commencement of the operations to check compliance status of the project to the set policies, standards and laws. The proponent is advised to contract licensed experts to undertake the Environmental, Health and Safety Audit Services for the construction phase of the proposed GWG 6 residential development.

1. INTRODUCTION

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

The proposed facility will be located in Athi River, Machakos County on plot L.R 12581/7 & 12581/8.

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

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

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

- To identify potential environmental impacts, both direct and in direct.
- To assess the significance of the impacts
- To assess the relative importance of the impacts of relative plans designs, and sites
- To propose preventive mitigation and compensative measures for the significant negative impacts of the project on the environment.
- To generate baseline data for monitoring and evaluation of how well the mitigating measures are being implemented during the project cycle.
- To present information on impact of alternative.
- present the results of the EIA that can guide informed decision making and
- To prepare EMP for the proposed project and decommissioning plan.

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

It is stipulated in EMCA, Cap387 that a form of development such as the proposed GWG 5 housing development and associated facilities is likely to impact the site and the surrounding environment hence, before commencement of any work; an Environmental Impact Assessment should be undertaken in compliance with the principal environmental Act and Environmental Impact Assessment/Audit Regulations 2003.

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

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

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

- Location of the proposed project
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the project.
- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.

- Analysis of alternatives including project site, design and technologies.
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties that were encountered in compiling the information.
- An economic and social analysis of the project.
- Such other matters as the Authority may require.

1.2: Data collection procedures

The data collection was carried out through questionnaires/standard interview schedules, stakeholders meetings, use of checklists, observations and photography, site visits and desk top environmental studies scientific as per the Integrated Environmental Impact Assessment Regulations, 2018.

1.3: Responsibilities and Undertaking

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

The output from the consultants includes the following:

- An Environmental Impact Assessment Study Report comprising of a non technical summary, study approach, baseline conditions, anticipated impacts and proposed mitigation measures.
- An Environmental Management Plan Outline which also forms part of the report recommendations.

1.4: Methodology outline

The proposed site is located within an area with no rich natural resources hence the project's cumulative effects to the surrounding environment will not be such adverse even if the developer considers expansion of infrastructure such as the sewerage system, drainages, and water supply and roads. Moreover the proposed development and use of the Facility will be in line with what exists in the surrounding areas; hence an environmental study report

will adequately address the project's impacts. The general steps followed during the assessment were as follows:

- Environment screening, in which the project was identified as among those requiring environmental impact assessment under schedule 2 of EMCA, cap 387;
- Environmental scoping that provided the key environmental issues;
- Desk Stop studies and interviews;
- Physical inspection of the site and surrounding areas;
- EIA Public participation by the use of questionnaires, meetings; and
- Reporting.

1.5: Environmental screening

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

1.6: Environmental scoping

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

1.7: Desk top study

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

1.8: Site assessment and public participation

Field visits were meant for physical inspections of the site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts.

To ensure adequate public participation in the EIA process, questionnaires were administered to the site neighbours within the area, Public Consultation Meetings (PCMs) were also held and the information gathered was subsequently analyzed and incorporated into the EIA study report also the discussion and interviews.

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

2. PROJECT DESCRIPTION

2.1 Location and Size of the Project

The Proponents, have proposed to embark on Greatwall Gardens 6 Residential housing development located in Athi River (**1⁰ 25' 24.3'S 36⁰ 58' 35.3 E"**)–the project to be undertaken on a portion of Land L.R **12581/7 & 12581/8** within Athi River Mavoko, Machakos County.

Map **1**: Map showing the location of the project site

2.2 Project Description

The project shall be an upscale project that will fully showcase the urban vitality and modern atmosphere of Athi River while making full use of the geographic advantage, the public interest and the profound local culture. The components of the project as shown in the architectural drawings include:

- There will be 25 Blocks ground plus 15 floors
- Total No. of units is 3,000
- Total No of Shops 108
- Parking spaces 1725

- Associated amenities: Lifts, children's play area, boundary wall, Transformer house, Gate house, Garbage cubicles among other amenities.
- Property Acreage 18.972 Acres

2.3 Project's surrounding

The neighboring area is a mixed use area occupied mainly by residential homes, Sunset boulevard, Great Wall Gardens Phases 1,2,3,4 & 5, commercial premises, London Distillers Ltd, Tuff Form, Coloho mall, crystal river mall, & Syno hydro company

2.3 Site Ownership and Size

The proposed project is owned by Prof. Joseph Kamuya Maitha. The Proposed land measures 18.972 Acres (Ownership documents attached)

2.4 Description of the project's construction activities

2.4.1 Site preparation works

The proposed project site will be prepared for construction. This will involve mobilization of workers, excavation works and transportation of construction materials and construction of the proposed development.

This will be undertaken in a phased approach to mitigate soil erosion and the impacts of excessive dust generation. Due to the nature of the proposed project, construction will involve the use of earthmoving machinery such as excavators and bulldozers.

The engineers will also utilize human labour where necessary so as to create employment to the local residents especially the youth.

2.4.2 Storage of materials

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

2.4.3 Masonry, concrete work and related activities

The construction of the buildings walls, foundations, floors, pavements, and residential houses among other components of the project involves a lot of masonry work, laying of plumbing and related activities. General masonry and related activities include, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labour intensive and will be supplemented by machinery.

2.4.4 Structural steel works

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

2.4.5 Electrical work

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

2.4.6 Plumbing

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

2.5 Description of the project's operational activities

2.5.1 Occupation activities

Once construction is complete, the apartments will be sold to home owners while the associated amenities will be there to serve the residents.

2.5.2 Solid waste

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

The waste handling company must be registered with NEMA and disposing waste to a licensed designated dumping site using well branded waste plastic bags bearing the company's name.

2.5.3 Liquid waste

The proponent will provide adequate and safe means of handling liquid waste generated within the facility. These will include conducting regular inspections for pipe blockages or damages and fixing them appropriately.

Also, the management will conduct regular monitoring of the sewage discharged to the county sewerage system from the project to ensure that the stipulated sewage/effluent discharge rules are not violated. The current sewerage plant in the area is able to accommodate the existing capacity and the new development. The proponent will connect the waste water to an existing line that connects to Main sewer pumping station at Erdemann Park C industrial Park and flows down through gravity to Kinanie waste water treatment

plant. This has been done in collaboration and consultation with Mavoko Water and Sewerage Company (MAVWASCO).

The proponent has put in place measures to ensure that the existing line can accommodate the sewerage from the upcoming development.

COMPANY: ERDEMANN PROPERTY LIMITED							
PROJECT: GREAT WALL GARDENS PUMPED SEWER SYSTEM			**DATE**	**10th July 2023**			
CLIENT: MAVOKO WATER AND SEWERAGE COMPANY							
LOCATION: LUKENYA PARK C MAVOKO							
	GWG 1	GWG 2	GWG 3	GWG 4	GWG 5	GWG 6	TOTAL
Total no. of units per estate	2,173	592	664	601	1,128	3,000	**8,158**
Waste generated /day	8158units x 4dwellers x0.08m3						2,610.56M3
STP Capacity	70m x 16m x 7m						7,840M3
Pump work rate in m3/hr	210m3/h x 2pumps						420m3/h
Time taken to fill the STP	7840m3 / 2610.56m3/day						3.0days
Time taken to empty the STP	7840m3 / 420m3/h						18.7hrs
Time taken to pump the generated waste /day	1650.56m3 / 420m3/h						6.22hrs
No of pumps installed for the system	3 NO.						
no. of working pumps at a time	2 NO.						
no. of stand by pumps	1 NO.						
Type of system installation	Dry						

2.5.4 Storm Water Drainage

The proposed development will generate enormous surface water. It is therefore recommended that adequate and well drainage channels be provided to harvest the rainwater for use around the development eg cleaning and landscaping. This will be determined at the site works.

2.5.5 Electricity Supply

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

SOLAR PV HARVEST REPORT

The project has an approximate roof area of **22,144 SQM**. Though initial capital expenditure is reasonably high, Solar energy is green and has minimal operation cost. Further solar energy is reliable, renewable, silent and clean. Solar Installation have life span in excess of 25 years. Considering the developments load conditions during the day, the size of the solar plant will be in the order of 2000KW. However, if funds are not a challenge, some storage can also be considered.

1) Method of Harvesting Solar PV

a) **Roof Mount**: The development has flat Roofs in every block, where Solar PV Modules can conveniently mounted with several inches above the floor for cooling purposes. The roofs are also shadow free thus maximum power absorption.

b) **Solar support structures**: Support structures can also be erected above the parking bays to carry the solar panels. This shall be carefully done to ensure the panels are not blocked by the building shadows.

2) Type of Solar System:

Grid-tie solar PV Systems shall be designed to operate interconnected with the electric utility. The system will be required to have grid tie inverter with power conditioning unit (PCU) and Uni-directional interface that will limit power exportation to grid.

2.5.6 Earthing and Lightning Protection

Structures within the proposed development which will require lightning protection will generally include a roof air termination network with suitable down conductors to ground level. Where practical, it may be possible to make use of the building structure to form the down conductor path, with suitable test and inspection facilities at the lowest levels.

2.5.7 General repairs and maintenance

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

2.6 Decommissioning Phase

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

3. BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

The proposed site is located in Athi River, Mavoko Sub County; Machakos County on plot L.R 12581/7 & 12581/8. The site is situated in a mixed development zone of residential, commercial and industrial. The proposed area can be accessed through Mombasa road and area is estimated to be 27.8 KM from Nairobi city Centre.

3.2 Climate

Mavoko has a tropical climate, with rainy months from March to May and October to December, with approximately 118 days of rain in the year and an annual precipitation of 40 inches.

There are two rainy seasons, but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast.

3.2.1 Air Quality

Air pollution in Athi River is on the rise due to industrial growth, high vehicular traffic density and urbanization. It is a major problem because it has adverse effects on human health, materials and environment. Air pollution contributes to formation of acid rain, affects soil by reducing its fertility, destruction of aquatic ecosystems and death of certain plants. The proponent commissioned an assessment of the baseline air quality parameters for purposes of monitoring the impacts of his activities to the quality of air.

Air Quality Results

Baseline Air Quality monitoring was carried out in accordance with EMCA Air Quality Regulations 2014.

1. Baseline Air Quality Assessment

The average levels of pollutants in the area were within permissible limits. The likely sources of air pollution in the area were the nearby Go-downs and Roads. In addition, the ongoing construction activities and excavated earth in the area is also likely to increase the level of particulate matter. However, the low concentration of the pollutants indicates no health risk to the staff intended to work in the vicinity and the future occupants. The levels are expected to be lower that the reported during the occupancy period because the ongoing excavation activity will be completed. It should be noted that these results represent the findings as at that particular time of assessment, hence, the values are likely to deviate based on prevailing environmental conditions and activities.

2. Air Dispersion Modelling Report

The average concentrations of the emissions simulated were below the ambient tolerance limits stipulated under Air Quality Regulations, 2014. The emission source concentration was assumed to be equal to the emission limits. Based on this assumption, the residential area under construction is expected to comply with the standard limits stipulated under the Air Quality Regulation. However, due to the continuous release of dust and emissions from the nearby plant, it is recommended that the houses be installed with air filters in order to improve the indoor air quality.

The findings of the laboratory analysis are attached in the annexes of this report.

3.3 Land use

The location of the proposed project is zoned for mixed use Light industries and residential use as per the Mavoko County zoning guide

The area is generally sloping towards Mombasa road; it is a semi-arid area with presence of scarce shrubs kind of vegetation

Due to the rapid growth of constructions and human settlement in the area, the wild life have been pushed to other undeveloped areas of Machakos County thus no wildlife/wildlife corridor or presence of wild animals in the vicinity of the project site.

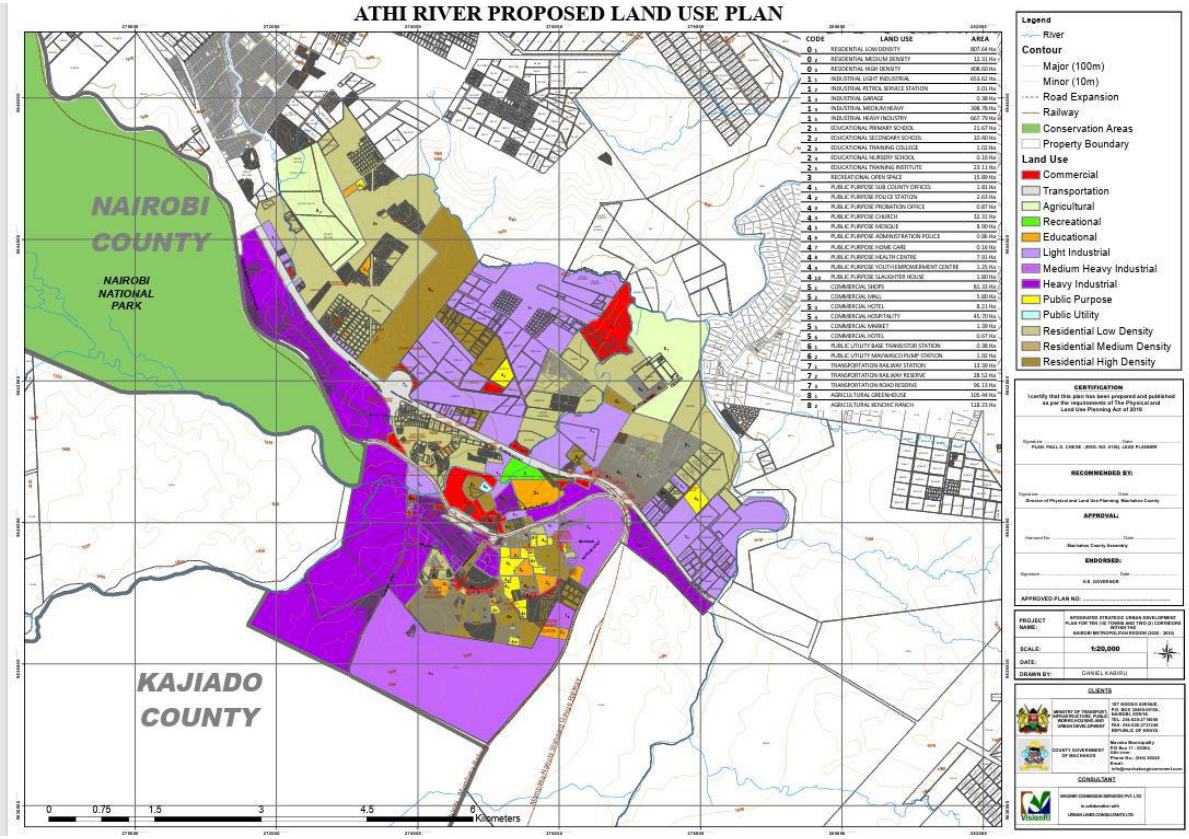

Plate 1: Mavoko land use plan

3.4 Topography and Drainage

Upper Machakos and Nairobi's main drainage follows the regional slope of the volcanic rocks towards the east, while subsidiary internal drainage into the Rift region is confined to the western part. Major plains which comprising mainly the Athi plains and the northern section of the Kapiti plain, extend westwards, rising from 4900 feet (1493 m) at the Athi River to 6000 feet (1829 m) in the faulted region near Ngong. The Kirichwa Valley Tuffs lying to the east of the highway function like a sponge and the contact between them and the underlying impermeable phonolite thus forms a perfect aquifer so much so that a number of channels containing water occur beneath Athi River region.

3.5 Geology and Soils

The location soil type is dark gray clay soil.

3.6 Infrastructure and Transport

The proposed development is located in one of the upcoming locations for residential development in Kenya: 27.88km from Nairobi's central business district using the upgraded Mombasa Road. This provides good transport accessibility which is key to success in Mavoko's rapidly expanding environment. Additional road network to the proposed development is among the works that will be implemented for the said project. The matatus leading to the project site can be found at Afya center or Athi River town. The proponent has provided a stage for matatus within the area

The basic infrastructural services that might deteriorate due to rapid increase in population include Water, the sewerage system and the road network.

Plate **1**: An adjacent access road that the proponent will modernize

3.7 Water supply and Sanitation

The proposed area falls under the category of ground water as the main source of water. The area has existing boreholes and piped water from Mavoko Water and Sewerage Company and the Export Processing Zones Authority.

The proponent is also urged to harvest rain water as it is an environmentally good practice of utilizing and saving water as they plan to drill a borehole.

3.9 Biological Diversity

3.9.1 Flora

Natural vegetation at the site is mostly shrubs and dry grass due to the dry weather conditions. The vegetation within the proposed site does not merit special conservation status since it is of least biological and cultural importance. However, the proponent will implement a landscaping plan upon completion of construction and it is recommended that indigenous tree species be utilized.

3.9.2 Fauna

There are no wildlife/wildlife corridors in the vicinity of the project site.

3.10 Demography

According to the 2019 Kenya Population and Housing census the total population of the Athi River (Mavoko) Sub County is 322,499 with 164,322males and 158,172 females. The Sub County is still growing due to its proximity to the Kenyan capital city of Nairobi. The project's surrounding is predominantly a mixed development area however there is a church and a quarry within the locality.

4. RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

Environmental and Social Impact Assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. According to Environmental Management and Coordination Act No. 8 of 2015. The report must be submitted to the National Environment Management Authority (NEMA) for approval and issuance of the relevant certificates.

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

4.2 Environmental policy

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

4.3 Relevant Kenya Policies

4.3.1 National Environment Policy 2013

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

4.3.2 Physical Planning Policy

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

4.3.3 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that ancillary buildings are adequately provided with utilities that make them fit for human habitation. The proposed development has been designed by professional engineers and architects and as such will have all amenities/utilities that are essential for safeguarding public health for all the residents and visitors who access the facilities.

4.3.4 The Sessional Paper No.4 on Energy

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

4.3.5 The Kenya Vision 2030

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

4.3.6 The Kenya National Climate Change Response Strategy

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

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

4.3.7 The National Occupational Safety and Health Policy

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

The Policy addresses the current challenges, gaps and future development of safety and health systems and programs in the country.

It promotes basic principles of assessing occupational risks or hazards; combating occupational risks or hazards at source; and developing a national preventative safety and health culture that includes information, consultation, research and training.

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

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

4.4 Institutional Framework

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

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions relevant to the proposed residential developmentinclude the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Kenya Forest Service, Water Resources Authority (WRA), Directorate of Occupational Safety and Health Services (DOSHS) and others. There are also local and international NGOs involved in environmental issues in the country.

4.4.1 National Environment Management Authority (NEMA)

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

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper

management and rational utilization of environmental resources on a sustainable basis for the improvement of the quality of human life in Kenya.

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

- Prepare and issue an annual report on the state of the environment in Kenya and in this regard may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency and,
- Perform such other functions as government may assign to the Authority or as are incidental or conducive to the exercise by the authority of any or all of the functions provided under EMCA.

However, NEMA mandate is designated to the following committees

4.4.2 National Environmental Complaints Committee (NECC)

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

- Investigate complaints or allegations regarding the condition of the environment in Kenya and suspected cases of environmental degradation.
- The NECC also undertakes public interest litigation on behalf of the citizens in environmental matters.

4.4.3 County Environment Committee

The County Environment Committee shall-

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

(b) Develop a county strategic environmental action plan every five years for consideration and adoption by the County Assembly.

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

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

4.4.4 National Environmental Tribunal

The tribunal's principal function is to receive, hear and determine appeals arising from decisions of the National Environment Management Authority (NEMA) on issuance, denial or revocation of environmental impact assessment (EIA) licenses, among other decisions.

If disputes with respect to the proposed project arise, the NET will function very much like a court of law.

4.4.5 National Environmental Council (NEC)

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

4.4.6 Directorate of Occupational Safety and Health Services (DOSHS)

This is one of departments within the current Ministry of East African Community, Labour and Social Protection, whose primary objective is to ensure safety, health and welfare of all workers in all workplaces.

Unsafe and unhealthy work environment causes accidents, diseases, disasters and environmental pollution that occasion huge economic and social burdens to individuals and enterprises thereby stifling economic and social growth.

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

Functions

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

- Systematic inspection and auditing of workplaces to promote best practices and ensure compliance with safety and health standards as set out in OSHA, 2007 and its subsidiary legislations.
- Examination and testing of passenger lifts, hoists, cranes, chains and other lifting equipment to ensure their safe use.
- Identification, evaluation and control of biological, chemical, physical, psychosocial, ergonomic and other factors in the work environment which may affect the safety and health of employed persons and the general environment.

- Medical surveillance, including medical examination to monitor and check on the health status of the workers and advise on intervention measures.
- Training and awareness creation on occupational safety and health in order to promote safety and health culture in the country.
- Ensuring compensation to employees for work related injuries and diseases contracted in the course of their employment in accordance with the provisions of WIBA, 2007.
- Investigation of occupational accidents, dangerous occurrences and cases of Occupational diseases with a view to preventing recurrence.

4.5 Legal Framework

4.5.1 Environmental Management and Coordination Act, Cap 387

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

Relevance to the proposed project

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

4.5.2 Integrated Environmental Impact Assessment Regulations, 2018

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

Relevance to the proposed project

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

4.5.3 Water Quality Regulations (2006)

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. Water Quality Regulations apply to water used for domestic, residential, agricultural, and recreational purposes; water used for fisheries and wildlife

purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings. In addition, of immediate relevance to the proposed project for the purpose of this Project Report is Part II Sections 4-5 as well as Part V Section24.

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

Relevance

All waste water shall be channeled to the main drain so as not to pollute the ground and surface water and if a pollution incidence occurs the contractor/proponent shall notify the authority immediately.

4.5.4 EMCA (Waste management) Regulation, 2006

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

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

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

ensure that such waste does not present any imminent and substantial danger to the public health, the environment and natural resources.

Section 12 provides that every licensed owner or operator shall carry out an annual environmental audit pursuant to the provision of the act In section 14 (1) every trade or residential undertaking is obliged to install anti- pollution equipment for the treatment of waste emanating from such trade or residential undertaking.

Relevance

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

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

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

Time of the day;

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

These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Part II Section 4 state that: except as otherwise provided in these Regulations, no person shall
a) Make or cause to be made excessive vibrations annoys, disturbs, injures or endangers the comfort, response, health or safety of others and the environment; or

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

Part III Section 2 (1) states that any person wishing to a) operate or repair any machinery, motor vehicle, construction equipment, pump, fun, air conditioning apparatus or similar mechanical device; or b) engage in any commercial or residential activity, which is likely to emit noise or excessive vibrations shall carry out the activity or activities within the relevant

levels provided in the First Schedule to these Regulations. Any person who contravenes this Regulation commits an offence.

Section 13 (1) states that except for the purposes in sub-Regulation (2) hereunder, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations. These purposes include emergencies, those of domestic nature and/or public utility construction.
Section 14 relates to noise, excessive vibrations from construction, demolition, mining or quarrying site, and state that: where defined work of construction, demolition, mining or quarrying is to be carried out in an area, the Authority may impose on how the work is to be carried out including but not limited to requirements regarding a) machinery that may be used, and b) the permitted levels of noise as stipulated in the Second and Third Schedules to these Regulations.

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

4.5.6 Environmental Management and Coordination (Air Quality) Regulations, 2014

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

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

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

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

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

Responsibility for compliance

6. (1) A developer of a housing estate, a promoter of the construction, an owner of the premises or an Architect or an Engineer engaged in the design or construction of premises shall comply with these Regulations.
(2) An owner of premises, Architect and an Engineer engaged in the design, construction, extension or alteration of premises shall incorporate solar water heating systems in all new premises designs and extensions or alterations to existing premises.
(3) An owner or occupier of premises that has a solar water heating system shall use and carry out the necessary operational maintenance and repairs required to keep the installation in good and efficient working condition.
(4) An electric power distributor or supplier shall not provide electricity supply to premises where a solar water heating system has not been installed in accordance with these Regulations.

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

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

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

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

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

4.5.9 Environmental Management and Coordination (Conservation of Biodiversity regulations), 2006

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

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

4.5.10 County Governments Act, 2012

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

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

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

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

Relevance to the project

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

4.5.11 Land Planning Act cap 303

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

Relevance to the proposed project

The proponent has submitted architectural plans to Mavoko/Machakos County for approval.

4.5.12 The Land Act, 2012

This is an Act of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes. The Land Act of 2012 subsection (1) states that 'any land may be converted from one category to another in accordance with the provisions of this Act or any other written law.' it continues to state in subsection (2) that Without prejudice to the generality of subsection (1)

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

i. Compulsory acquisition;
ii. Reversion of leasehold interest to Government after the expiry of a lease; and
iii. Transfers; or
iv. Surrender.

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

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

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

(a) allocation;

(b) land adjudication process;

(c) compulsory acquisition;

(d) prescription;

(e) settlement programs;

(f) transmissions;

(g) transfers;

(h) long term leases exceeding twenty-one years created out of private land; or any other manner prescribed in an Act of Parliament.

Part viii of this ACT provides procedures for compulsory acquisition of interests in land. Section 111 (1) States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The Act also provides for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination.

4.5.13 The Land Registration Act, 2012

The Land Registration Act is place to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act applies to Subject to section 4, this Act shall apply to:

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

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

4.5.14 The Environment and Land Court Act, 2011

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

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

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

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

4.5.16 National Construction Authority Regulations, 2014

The NCA published the National Construction Authority Regulations 2014, the Code of Conduct and Ethics for the Construction Industry, and the NCA Strategic Plan (2015-2020)

to effectively regulate the construction industry in Kenya. Contractors operating or willing to undertake construction operations in Kenya are required by law to register through the National Construction Authority (NCA), which is constituted under Act No. 41 of 2011 Laws of Kenya. The NCA is mandated to clear builders and contractors as a way of eliminating rogue contractors in Kenya and malpractices in the building and construction industry. The Authority has provided the regulatory framework for registration and renewal of contractors.

It is tasked with the responsibility of inspecting construction and building projects around the country to ensure high quality of work and close projects posing health risks and collapse hazards.

4.5.17 Occupational Safety and Health Laws and Regulations

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

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

His Excellency the President assented into law this Act on 22nd October 2007 and the date of commencement declared as 26th October 2007. This is the main operational law for health and safety in Kenya today.

Duties of the proponent pertaining to safety and health

It is the duty a proponent to:-

i) Ensure absence/elimination of risks at the workplace.
ii) Provide information to employees to ensure safety and health at the project site.
iii) Carry out the workplace risk assessment and send a copy of the risk assessment to the Directorate of Occupational Safety and Health Services (DOSHS).
iv) Stop any hazardous activities.
v) Obtain a certificate of registration of a workplace with the Directorate of Occupational Safety and Health Services.
vi) Prepare safety & health policy and submit a copy to the Directorate of Occupational Safety and Health Services.
vii) Bring the content of the safety and health policy statement to the attention of employees.
viii) Prevent environmental pollution
ix) Send notice of accident occurrence, cases of occupational diseases and dangerous occurrence to DOSHS
x) To have the architectural plans of the project site approved by the Directorate of Occupational Safety and Health Services before construction activities commence. In approving the plans Directorate of Occupational Safety and Health Services will among other requirements ensure that:

- Space defining machine layout for intended use by operators will be within statutory limits
- Emergency exits are provided for and are designed to open in accordance to statutory requirements
- Sanitary conveniences are provided for with adequacy as to number of intended employees and are designed to have separate approaches
- First aid facilities like first aid room(s) are provided for,
- There is provision for adequate ventilation
- There is provision for storage of firefighting water storage tank with a capacity of at least 10,000 liters

xi) Ensure that no employee is discriminated against by virtue of:-
- Lodging a complaint about an unsafe condition at the workplace
- Being an active member of a health safety committee.

xii) Establish a health and safety committee whose composition should be in accordance to the (Health and Safety Committees) Rules L.N. 31of 2004, if he will employ 20 or more employees.

xiii) Carry out workplace health and safety audit on an annual basis.

Work Injury Benefits Act, No. 17 of 2007

This law was assented to by His Excellency the President on 22nd October 2007. Various sections in this law were nullified by the high court as they were found to be unconstitutional. This is an act of parliament designed to provide for compensation to employees for work-related injuries and diseases contracted in the course employment and for connected purposes. This is the law whose enactment led to the demise of the Workmen Compensation Act Cap 236.

Relevance to the proposed project

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

Rules and Regulations

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

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

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

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

- The occupier of every workplace shall establish a health and safety committee;
- The committee shall consist of safety representatives from the management and the workers;
- Every member of the Health and Safety Committee shall undertake a prescribed basic training course in occupational health and safety within a period of six months from the date of appointment or election, and thereafter further training from time to time;

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

Relevance to the proposed project

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

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

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

Relevance to the proposed project

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

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

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

Relevance to the proposed project

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

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

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

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

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

Relevance to the proposed project

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

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

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

Relevance to the proposed project

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

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

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

Relevance to the proposed project

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

4.5.18 The Standards Act Cap. 496

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

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

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a

public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

4.5.20 Water Act, 2016

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

4.5.21 Physical and Land Use Planning Act, 2019

The government, at both national and county level, is tasked with the preparation of physical and land use plans. The national, county, inter-county and local plans are required to be integrated, and these plans shall collectively form the basis of how land is to be used in Kenya.

County governments to control development in their respective counties. All applications for development permission shall be made in the relevant county.

Development permission must be sought prior to undertaking any development. A developer who does not obtain such prior permission risks criminal sanctions and demolition of the unapproved works.

Members of the public are given the opportunity to give their views and raise objections to various matters e.g. the suitability of the national and county plans.

The Act lists developments that require development permission. In this regard, developments such as subdivision, amalgamation, change of user, extension of user, extension of lease and approval of building plans require development permission to be issued by the relevant county government.

Processing of easements and wayleaves require express development permission, as siting of educational institutions, base transmission stations, petrol stations, eco lodges, campsites, power generation plants and factories.

Development permission in respect of commercial and industrial use is a pre-requisite for other licensing authorities granting a licence for a commercial or industrial use, or occupation of land.

Relevance to the proposed project

The Proposed Project shall seek approval from the Physical Planning Department.

4.5.22 County Governments Act

The Act empowers county governments to protect the environment and natural resources with a view to establishing a durable and sustainable system of development. In addition, the county governments are responsible for development planning and control including the county spatial plans..

Relevance to the proposed project

The proponent will work in liaison with Machakos County Government to ensure compliance with land use requirements within the county.

4.5.23 The Penal Code (Cap. 63)

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

Relevance to the proposed project

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

4.5.24 The Traffic Act, 2012

The Traffic Act, 2012 gives provisions and guidelines that govern the Kenya roads transport sector. These guidelines are essential to private, public and commercial service vehicles in ensuring safety and sanity on the roads hence ensuring the environment; the human being a component is safeguarded. In section 41 The Act demands for installation and certification of speed governors for the commercial vehicles ferrying goods adjusted to the loading condition of such vehicles to a limit of 80 KPH, registration and competence of drivers.

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

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

In ensuring safety of all the persons in transit section 56 encourages that every public and commercial vehicle be fitted with inspected and first class first aid box and fire extinguisher. In ensuring compliance to this Act the contractor and developer shall ensure that all site drivers and all material suppliers to the site satisfy the provisions as stipulated in Act.

4.5.25 Persons with Disability Act (PWD), 2003

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

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

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

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

4.5.26 Public Health Act (Cap. 242)

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

4.5.27 Building Code 2000

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

5. PUBLIC PARTICIPATION

5.1 Introduction

Public consultation and participation process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA, Cap387 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development. Therefore, the chapter describes the process undertaken in the public consultation and public participation followed to identify the key issues and impacts of the proposed development. The objective of the consultation and public participation was to:

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

In addition, the process enabled,

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

5.2 Methodology used in Public consultation

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

- Key informant interviews and discussions
- Dissemination of questionnaires
- Field surveys, photography and observations
- Public Consultation Meetings (PCMs).


PUBLIC PARTICIPATION
Project Title:
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED GREAT WALL GARDENS 6 RESIDENTIAL DEVELOPMENT ON PLOT LR NO. 12581/7 & 12581/8 OFF MOMBASA NAMANGA ROAD INTERCHANGE, MAVOKO, MACHAKOS COUNTY.
Project Components:
• 25 Blocks, with a Total of 3,000 units • Shops 108 • Parking spaces 1,725
• Associated amenities: Boundary wall, Transformer house, Gate house, Garbage cubicles
CLIENT: PROF. JOSEPH KAMUYA MAITHA
CONSULTANT: KATRINA MANAGEMENT CONSULTANTS LIMITED
DATE: 24th June 2023
TIME: 10:00 A.M
VENUE: Proposed project site next to GWG 5
FOR COMMENTS, SUGGESTIONS AND CONCERNS ABOUT THE PROPOSED PROJECT
KINDLY CALL OUR TOLL FREE LINE 0775233525 OR SEND AN EMAIL TO Info@katrinamcl.co.ke


PUBLIC PARTICIPATION
Project Title:
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED GREAT WALL GARDENS 6 RESIDENTIAL DEVELOPMENT ON PLOT LR NO. 12581/7 & 12581/8 OFF MOMBASA NAMANGA ROAD INTERCHANGE, MAVOKO, MACHAKOS COUNTY.
Project Components:
• 25 Blocks, with a Total of 2,600 units
• Shops 108
• Parking spaces 1,725
• Associated amenities: Boundary wall, Transformer house, Gate house, Garbage cubicles
CLIENT: PROF. JOSEPH KAMUYA MAITHA
CONSULTANT: KATRINA MANAGEMENT CONSULTANTS LIMITED
DATE: 10 June 2023
TIME: 10:00 A.M
VENUE: Proposed project site next to GWG 5
FOR COMMENTS, SUGGESTIONS AND CONCERNS ABOUT THE PROPOSED PROJECT
KINDLY CALL OUR TOLL FREE LINE 0775233525 OR SEND AN EMAIL TO Info@katrinamcl.co.ke

Plate **2**: Posters within the project area inviting the public for a PCM

- Public Consultation Meetings: Public Consultation Meetings (PCM) were convened within the project area.

Plate **3**: PCM within the project site in progress

5.3 Consulted Stakeholders

A total of two physical Public Consultation Meetings was conducted at the project site and more consultations done through Zoom meetings questionnaires and emails.

Plate **4**: PCM at the proposed project site

5.4 Views expressed

From the field work surveys it was apparent that the proposed development was received with mixed reactions by the interviewed people as they anticipated numerous impacts both negative and positive alike. The neighbors/major stakeholders independently gave their views, opinions, and suggestions. Minutes of the PCMs are attached to this report.

5.4.1 Positive Views Expressed

5.4.1.1 Affordable Housing

The projects aim is to provide affordable low cost housing to the general public. The general public is enthusiastic that the proposed project will lead to increase in residential houses and this will lead to a surplus forcing the cost of houses to be moderated .

5.4.1.2 Employment Opportunities

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

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

5.4.1.3 Economic growth

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

5.4.1.4 Infrastructure improvement

The proposed development will attract a large population into the area, there is need to provide services and utilities that will serve the people conveniently without depleting the existing ones. The proponent plans to upgrade the road that links Shanghai Road to the Tuff form road to cater for the demand and reduce traffic in the area.

5.4.1.5 Increased Business Opportunities

Those with businesses along and around the area were optimistic that the increased number of visitors and customers in the area will result in an increased customer base to their business enterprises.

According to them, the number of customers will increase from the construction workers, the security and maintenance personnel including visitors who will be visiting the residential development during its operation phase.

5.4.1.6 Improved Security

Security will be ensured around the proposed development through distribution of suitable security lights and presence of 24 hour security guards. This will lead to improvement in the general security in the surrounding area.

5.4.2 Negative concerns expressed

5.4.2.1 Overloading of the existing infrastructure

Due to the large increase that the project tends to introduce into the area there will be continuous strain on the current infrastructure such as the sewer line and water which is a scarce commodity already in the area. The Proponent is advised to liaise with the county government, WRA and EPZ on ways to boost the current water supply to the area. The proponent plans to integrate water harvesting so as to have an additional source of water.

5.4.2.2 Dust emissions

The people expressed concern over possibility of generation of large amount of dust and exhaust fumes within the project site and surrounding areas as a result of construction works and transportation of construction materials. The proponent shall ensure that dust levels at the site are minimized through implementation of dust abatement techniques on unpaved, un-vegetated surfaces to minimize windblown erosion.

Sprinkling water in areas being constructed and along the tracks used by the transport trucks and diversions within the site will be done. Additional mitigation measures presented within the EMP will be fully implemented to minimize the impacts of dust generation.

5.4.2.3 Noise and Vibration Pollution

The residents expressed their fears over noise pollution that would come from the construction works and the vehicles during the operation phase. They requested the proponent to use minimum noise producing machines and to reduce the duration of idling of vehicles making deliveries. Residents were informed that maximum permissible noise levels as per the EMCA (Noise and Excessive Vibration Pollution Control) Regulations 2008 would be observed during the construction phase.

It is also recommended that quieter construction machines such as jack-in piling machines, which generate about 20 dB (A) less noise than bore piling machines be utilized. It is also recommended that the proponent consider using noise control equipment such perimeter noise barriers, which can reduce noise by 5 dB (A) to 10 dB (A). These measures will be effective in reducing construction noise, when used as part of a good noise management system.

5.4.2.4 Traffic snarl-ups

There will be increased vehicular movement in and out of the site. This will exert pressure on the existing roads around the site it's anticipated during occupation period. Construction period will be characterized by heavy motor vehicles leading and turning from and in to the site. The contractor will implement a traffic management plan for the trucks during the construction period

5.4.2.5 Solid Waste Generation

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

5.4.2.6 Public and Occupational Health and Safety Risks

Potential impacts during construction include: exposure to physical hazards from the construction activities, use of equipment; trips and fall hazards during construction of the upper floors and exposure to dust and noise. Construction workers are likely to have injuries and hazards as the construction works such as trenching and excavations as well as work at height unavoidably expose workers to occupational health and safety risks. The workers are also likely to be exposed to risk of construction noise and air pollution

5.4.2.7 The Zoning of the Area

One of the industries in the area is against the project stating that the area is an industrial zone, and the more the upcoming developments the more the issues the will face with the neighbors due to the nature of their operations.

5.4.2.8 Analysis of Stakeholder Questionnaires

Feedback from the stakeholders was also obtained from the distributed questionnaires and the analysis indicated that most stakeholders approved the project so long as their concerns were addressed. The table below provides a summary of the comments and issues raised on the stakeholders. Filled questionnaires and minutes from the PCMs are attached in the annexes.

Table **1**: Analysis of Stakeholder Responses

No.	Names	Organization/ Village	Positive Impacts	Negative Impacts	Recommendations
1.	Benson Mumo	Neighbour	The project will create employment for the youth	• Noise pollution	• Construct of new roads in the area
2.	Baraka Grama	Neighbour	• Increased security • Job opportunities for the youth	• Waste • Air pollution from dust	• Watering of the dusty roads
3.	Benjamin Pelo	Neighbour	• Building of public schools, market.	• Dust and Noise pollution	Proper collection of waste materials
4.	Samwel Mbugua	Neighbour	• Creation of revenue collection • Enhancing the aesthetic beauty of the surrounding.	• N\A	• N/A
5.	James Kioko	Neighbour	• Offer employment	• Congestion of vehicles	• Adjustment of the parking place • Balance the high chloride in water.
6.	Ben Ochieng	Neighbour	• Source of employment	• Noise and dust pollution	• Water the dusty roads
7.	Tom Odera	Neighbour	• Construction of better houses	• Dust	• Use nets to cover the place.
8.	Joshua Emokol	Neighbour	• Increased security	• None	• Keep the environment clean

No.	Names	Organization/ Village	Positive Impacts	Negative Impacts	Recommendations
9.	Songa Okoth	Neighbour	• Job opportunities for youths	• Air pollution	• N\A
10.	Lilian Anyango	Neighbour	• N\A	• Dust	• N\A
11.	Kevin Onyango	Neighbour	• Job opportunity	• Dust pollution	• Use more water on construction roads.
12.	Wilfred Rimoine	Neighbour	• Employment opportunities. • High economic growth	• N\A	• A new road for the neighbours
13.	Baraka Garame	Neighbour	• Boost business opportunities • High security within the area	• N\A	• N\A
14.	Baraka Yaa	Neighbour	• Increase in security	• Air pollution	• N\A
15.	Felix Jumba	Neighbour	• Creation of employment	• Air pollution	• Sprinkle water along dusty areas
16.	Baraka Ouko	Neighbour	• Job opportunities	• N\A	• N\A
17.	Lavender Olum	Neighbour	• Source of employment	• N\A	• Improve security around the area • Plant more trees • Avail the first aid kit
18.	Anne Kyalo	Neighbour	Boost business around the place	• N\A	• Additional of public schools in the area

6 POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

6.1 Introduction

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

6.2 Construction phase

6.2.1 Positive Impacts

6.2.1.1 Employment Opportunities

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

6.2.1.2 Gains in the Local and National Economy

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

6.2.1.3 Increased business within the surrounding

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

6.2.1.4 Optimal land use

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

6.2.2 Negative Impacts

6.2.2.1Noise Pollution

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials and workers to site. To be affected mostly are the residents of the neighbouring premises and the site workers since noise beyond the legally stipulated limit in the principal environmental act level is itself a nuisance.

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

Engineering controls modify the equipment or the work area to make it quieter. Examples of engineering controls are: substituting existing equipment with quieter equipment; retro-fitting existing equipment with damping materials, mufflers, or enclosures; erecting barriers; and maintenance.

Administrative Controls are management decisions on work activities, work rotation and work load to reduce workers' exposure to high noise levels. Typical management decisions that reduce worker exposures to noise are: moving workers away from the noise source; restricting access to areas; rotating workers performing noisy tasks; and shutting down noisy equipment when not they not operational.

Personal Protective Equipment Earplugs are the typical PPE given to workers to reduce their exposure to noise. Earplugs are the control of last resort and should only be provided when other means of noise controls are infeasible. As a general rule, workers should be using earplugs whenever they are exposed to noise levels of 85 dB (A) or when they have to shout in order to communicate.

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

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

- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase.

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

6.2.2.2 Quieter Equipment

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

6.2.2.3 Modifying Existing Old Equipment

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

6.2.2.4 Barrier Protection

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

6.2.2.5 Work Activity Scheduling

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

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

6.2.2.6 Disposal of Excavated rejected/ unusable materials

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

6.2.2.7 Solid Waste Generation

During construction solid waste will be generated. These include papers used for packing cement, plastics and timber remains among others. Dumping around the site will interfere with the aesthetic status of the area. This has a direct effect on the surrounding community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic interference, pest breeding, pollution of physical environment, invasion by scavengers and informal recycling communities. It is recommended that demolition and construction waste be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, where possible, the proponent shall ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed of. In addition, upon completion of the project, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marble and glass will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community groups, institutions and individual residents or homeowners.

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

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

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

6.2.3 Impacts Related to Occupational Health and Safety

6.2.3.1 Pre-Construction/Planning Phase

i. Approval of Architectural Plans

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

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

ii. **Notification of Building Operations and Works of Engineering Construction**

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

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

6.2.3.2 Construction Phase

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

Table **2**: Requirements to be adhered to during the construction phase of the project

Requirement	Relevant clause in the Law
1. Appoint a Site Safety Supervisor	Legal Notice No.40 of 1984
2. Provide Personal Protective and Equipment (PPE) to site workers i.e. a) Helmets/hard hats for head protection b) Goggles/shields for eye protection when necessary c) Ear protection (ear muffs or ear plugs) for those workers exposed to high noise levels d) Dust masks/respirators for protection from inhalation of air contaminants when necessary e) Body protection (overalls, reflector jackets or aprons as appropriate) f) Gloves for hand protection when necessary g) Foot protection (safety boots or safety shoes) h) Safety harnesses, when necessary, for prevention of falls from height	Legal Notice No.40 of 1984 as read together with Section 101 of OSHA, 2007
3. Acquire and display at a prominent place within site offices an abstract of Building Operations and Works of Engineering Construction Rules.	Section 121 of OSHA, 2007
4. Acquire and maintain a General Register	Section 122 of OSHA, 2007
5. Develop an occupational safety and health policy and ensure all workers are informed of its content.	Legal Notice No.31 of 2004 as read together with Section 7 of OSHA, 2007
6. Undertake the risk assessment exercise, compile a report and submit a copy to the Directorate of Occupational Safety and Health Services.	Section 6 of OSHA, 2007
7. Form a workplace Safety and Health Committee and have it trained on matters relating to Occupational Safety and Health.	Legal Notice No.31 of 2004 as read together with Section 9 of OSHA, 2007
8. Provide first aid i.e. a) Appoint and train using a government recognized trainer, first aiders b) Provide and maintain, to the prescribed standard, first aid box(es)/cupboards	Legal Notice No. 160 of 1977 as read together with Section 95 of OSHA, 2007

Requirement	Relevant clause in the Law
c) Provide and maintain a stretcher d) Provide and maintain a first aid room	
9. Ensure safe Housekeeping by:- a) Placing barrier tapes around pits, excavations and areas where construction works are ongoing b) Designating walkways and driveways for site safe movement. c) Neat arrangement of site material like timber, iron rods, cement, boards, used materials etc.	Legal Notice No.40 of 1984 as read together with Section 77 of OSHA, 2007
10. Ensure safety of workers at height by :- a) Providing and maintaining safe work platforms of the standards prescribed b) Providing and maintaining safe scaffolds of the standards prescribed c) Providing and maintaining safe harnesses d) Development of a permit to work document to be used risky work at height e) Providing and maintaining safe ladders	Legal Notice No.40 of 1984
11. Protect workers from adverse weather conditions by providing and maintaining adequate shelter at the site.	Legal Notice No.40 of 1984
12. Ensure medical examination is done to workers exposed to classified hazards e.g. excessive noise levels, hazardous dusts, chemicals, radiation etc.	Legal Notice No.24 of 2005
13. Cause the safety and health audit of the construction works to be conducted on an annual basis	Legal Notice No.31 of 2004 as read together with section11 of OSHA, 2007
14. Cause the fire safety audit of the construction works to be conducted on an annual basis	Legal Notice No.59 of 2007
15. Provide adequate and suitable sanitary conveniences to all persons employed	Section 52 of OSHA, 2007
16. Provide and maintain fire safety at site and camp by:- a) Providing firefighting appliances and instruction workers in their use b) Conducting fire drills as necessary c) Providing a documented fire emergency procedure	Legal Notice No.59 of 2007 as read together with sections 78, 81 and 82 of OSHA, 2007

Requirement	Relevant clause in the Law
d) Ensuring proper storage of highly flammable materials	
17. Ensure general welfare provisions to site workers by:- a) Providing clean wholesome drinking water b) Providing washing facilities c) Providing accommodation for clothing not worn during working hours	Sections 91, 92 and 93 of OSHA, 2007
18. Ensure plant and machinery safety at the site by:- a) Ensuring proper maintenance and repair of plant and machinery b) Guarding, fencing and encasing of dangerous parts, whichever the case may be, of plant and machinery c) Ensuring prescribed statutory examinations are carried out on plants e.g. cranes, air receiver etc. at prescribed intervals	Section 55 and 72 of OSHA, 2007
19. Notify occurrence of accidents and incidents to the Directorate of Occupational Safety and Health Services and ensure compensation when work injuries occur.	Section 31 of OSHA, 2007 and WIBA, 2007

6.2.3.3 Occupational and Public Health and Safety

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

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

Other measures that will be implemented will include:

- The workers, immediate neighbours and other stakeholders should be sensitized on the dangers and risk associated with the construction works for enhanced self-responsibility on personal safety.
- Appropriate sanitation conveniences should be provided at the site as required in the OSHA, 2007 and echoed in the Public Health Act.
- The proponent should ensure that the completed buildings are fitted with safety facilities including fire detectors, firefighting equipment, fire exits, adequate access and buffer between the residential development.

6.3 Operational phase

6.3 1 Positive Impacts

6.3.1.1 Employment creation

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

6.3.1.2 Optimal use of land

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

6.3.1.3 Incorporation of collective waste management

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

6.3.2 Negative Impacts

6.3.2.1 Increased pressure on infrastructure

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

6.3.2.2 Vector breeding grounds

The proponent will put in place efficient storm water and waste management systems that will prevent the accumulation of rain water and uncontrolled waste, as well as an efficient collection system and off-site disposal.

However, if the project does not have well designed storm water drains, the rain water may end up stagnating and hence creating conducive breeding areas for mosquitoes and other water based vectors which may lead to human diseases like malaria. Poor solid waste management practices may also lead breeding grounds for pests such as rats and other scavenging animals.

6.3.2.3 Solid Waste Generation

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

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

6.3.2.4 Increased water utilization

The proponent will consider the installation of water-conserving automatic taps or push type taps. Moreover, any water leaks resulting from damaged pipes and/or faulty taps, will be promptly fixed by qualified staff. In addition, the proposed development residents will be sensitized on efficient water utilization.

6.3.2.5 Water Pollution

If the sites for dumping solid wastes are not well managed, they may cause contamination of ground water sources and also form breeding areas for various disease vectors.

The proponent will put in place an efficient waste management scheme that will prevent the accumulation of uncontrolled waste, as well as an efficient collection system and off-site disposal.

6.3.3 Impacts Related to Occupational Health and Safety

6.3.3.1 Fire hazards, Accidents and Incidents

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

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

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

Table **3**: Requirements to be adhered to during the operational phase of the project

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

Requirement	Relevant clause in the Law
5. Develop an occupational safety and health policy and ensure all workers are informed of its content.	Legal Notice No.31 of 2004 as read together with Section 7 of OSHA, 2007
6. Undertake the risk assessment exercise, compile a report and submit a copy to the Directorate of Occupational Safety and Health Services.	Section 6 of OSHA, 2007
7. Form a workplace Safety and Health Committee and have it trained on matters relating to Occupational Safety and Health.	Legal Notice No.31 of 2004 as read together with Section 9 of OSHA, 2007
8. Provide first aid i.e. a) Appoint and train using a government recognized trainer, first aiders b) Provide and maintain, to the prescribed standard, first aid box(es)/cupboards	Legal Notice No. 160 of 1977 as read together with Section 95 of OSHA, 2007
9. Ensure safe Housekeeping by:- a) Ensuring good machine layout and arrangement b) Designating and marking walkways, gangways and driveways for workplace safe movement. c) Proper arrangement of stocks and products	Section 77 of OSHA, 2007
10. Ensure safety of workers engaged in high risk activities by development of a permit to work document to be used in such activities	Section 77 of OSHA, 2007
11. Ensure good health of workers employed by:- a) Causing prescribed periodical medical examinations to be done on workers exposed to classified hazards e.g. excessive noise levels, hazardous dusts, chemicals, radiation etc. b) Causing pre-employment medical examinations to be done on workers to be employed in areas with classified hazards c) Causing post-employment medical examinations to be done on workers formerly employed in areas with classified hazards d) Causing prescribed medical surveillance to be done on workers employed in areas with classified hazards	Legal Notice No.24 of 2005 as read together with section103 of OSHA, 2007

Requirement	Relevant clause in the Law
12. Cause the safety and health audit of the workplace to be conducted on an annual basis	Legal Notice No.31 of 2004 as read together with Section11 of OSHA, 2007
13. Cause the fire safety audit of the workplace to be conducted on an annual basis	Legal Notice No.59 of 2007
14. Provide adequate and suitable sanitary conveniences to all persons employed	Section 52 of OSHA, 2007
15. Provide and maintain fire safety at workplace by:- a) Providing firefighting appliances and instruction workers in their use b) Conducting fire drills as necessary c) Providing a documented fire emergency procedure d) Ensuring proper storage of highly flammable materials	Legal Notice No.59 of 2007 as read together with sections 78, 81 and 82 of OSHA, 2007
16. Ensure general welfare provisions to site workers by:- a) Providing clean wholesome drinking water b) Providing washing facilities c) Providing accommodation for clothing not worn during working hours	Sections 91, 92 and 93 of OSHA, 2007
17. Ensure plant and machinery safety at the workplace by:- a) Ensuring proper maintenance and repair of plant and machinery b) Guarding, fencing and encasing of dangerous parts, whichever the case may be, of plant and machinery c) Ensuring prescribed statutory examinations are carried out on plants at prescribed intervals	Section 55 and72 of OSHA, 2007
18. Ensure control of air pollution, noise and vibration. The proponent will put measures in place to prevent the pollutant from accumulating in any workroom, and in particular, where the nature of the process makes it practicable, exhaust appliances shall be provided and maintained, as near as possible to the point of origin of the dust or fume or other impurity, so as to prevent it entering the air of any workroom and the dust, fumes or impurity shall not be allowed to enter into the atmosphere without undergoing	Section 89 of OSHA, 2007

Requirement	Relevant clause in the Law
appropriate treatment to prevent air pollution or other ill-effect to life and property.	
19. Notify occurrence of accidents and incidents to the Directorate of Occupational Safety and Health Services and ensure compensation when work injuries occur.	Section 31 of OSHA, 2007 and WIBA, 2007

6.4 Decommissioning phase

6.4.1 Rehabilitation

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

7. ANALYSIS OF PROJECT ALTERNATIVES

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

7.1 Relocation Option

Relocation option to a different site is not an option available for the project implementation. At present the landowner/developer does not have an alternative site. This means that the proponent has to scout for an alternative parcel of land. This is a delay that our economy can ill afford.

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

7.2 No Project Alternative

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

- No employment opportunities will be created for thousands of Kenyans who will work in the housing project area.
- Increased poverty and crime in Kenya.
- The economic status of the Kenyans and the local people would remain unchanged.

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

7.3 The proposed development alternative

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

7.4 Analysis of Alternative Construction Materials and Technology

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

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

7.5 Water Supply

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

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

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

- **Alternative Two - Combined Water Supply**

This is the option preferred by the proponent. A dedicated main water infrastructure system provided for the development. The water will be conveyed to a central storage tanks to balance the fluctuating water supply and for emergencies. Mavoko Water Company water supply may be supplemented by a borehole.

- **Alternative Three - Rain Water Harvesting**

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

8. CLIMATE CHANGE ADAPTATIONS AND MITIGATION STRATEGIES

Climate change has become real due to the past human activities. Among the main issues include global warming, change in weather patterns, extinction of species, dwindling resources etc. it is very important that we focus on various coping and adaptation strategies in an effort to mitigate and slowly reverse on the actions that aversely accelerate climate change.

It should be noted that environmental enhancement is a universal responsibility and everyone must take part during each and every action or activity because it is the cumulative individual actions that make or destroy the environment at large. Singly, one's action may appear negligible but that the accumulative effect from the millions of people across the globe.

Among the very important strategies include harvesting of rain water; harnessing solar power and designing of buildings to utilize natural lighting during the day. Harvesting of rain water shall not only reduce the strain on water resources but shall also greatly reduce surface runoff which eventually cause flooding, loss of life and damage to property. Harnessing of solar power also reduces the constraints to the power supply and reduce the negative impacts associated with production of power at various sources particularly the diesel-powered power generating plants.

Another very important strategy is sound waste management. The action plan should include reduction of waste generation at source, re-use and recycling. Waste reduction, recycling and re-use saves on resources and promotes a clean environment. Management of waste shall involve reduction of waste, segregation to encourage re-use and recycling and sound final disposal as provided by the Waste Regulations.

With the advancement of technology that exist today, wastewater treatment is another very important strategy where wastewater is treated and re-used. During construction, suitable technologies must be adopted to ensure that open areas allow for water percolation to recharge of underground water. This shall also reduce the surface runoff.

Adequate and suitable ventilation at the design stage shall also promote natural ventilation thus reducing the need for artificial ventilation and associated negative impacts. Where artificial ventilation must be put in place, substances that damage the environment must be avoided.

Water conserving systems must be put in place while tree planting should be practiced due to the role played by trees in cleaning the environment not to mention other important uses. When planting trees, the right species must be identified. The government's proposed target of achieving 10% forest cover must be institutionalized such that it becomes an objective in

every proposed project and thus more effort must be put in internalizing the objective in all people.

Among other design considerations is the incorporation of green technology in design and construction so as to reduce costs of lighting and air circulation

9. ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction

The Environment Management Plan is an important process of ensuring project sustainability and environmental and social protection. Whereas efforts are usually made to develop mitigation measures for a proposed project, it is during the operation lifespan of the project that actual impacts are noted or experienced.

It is therefore important to integrate in the environmental and social impact assessment process, an environment monitoring and management plan that includes the monitoring of the progress of mitigation measures being implemented while also monitoring the project for any new negative impacts that were not earlier considered or anticipated.

The proponent shall ensure that the Contractor understands and implements all specified mitigation measures during the construction period. The proponent's Supervising Engineer is responsible for assessing the Contractor's Environmental and Social Management Plan and internally implements the Management Plan to ensure that the Environmental and Social Impacts are monitored and managed in an environmentally and socially acceptable manner.

Monitoring systems should be set up by the Proponent during the operational phase, so that potential environmental problem areas can be detected well in advance and the appropriate remedial action carried out. The Proponent shall have a checklist of items that need to be monitored as a matter of routine or periodically over agreed intervals, depending on the nature of the aspect to be monitored. The types of parameters that can be monitored may include proposed mitigation measures or design features, or actual impacts. Depending on the nature of impact or aspect to be monitored, monitoring can be done as part of routine or periodic maintenance. However, socio-economic and ecological parameters can be effectively assessed over a longer time span.

9.2 Environmental and Social Management Plan

Environmental monitoring is an integral part of the environmental management process.

It rationally completes the process that begins with establishing the environmental baseline condition followed by carrying out the Environmental and Social Impact Assessment then Implementation of Mitigation Measures and Monitoring the success of those measures.

The Environmental and Social Management Plan (ESMP) is provided in the table below.

Table **4**: Environmental and Social Management Plan (ESMP)

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
Design Phase						
1.	Proposed Residential apartments	Landscape visual impact	– Design of infrastructure that conforms with the project site features (topography and aesthetics)	• The Proponent • Design Consultant	• Site infrastructure design blending with host environment	Approx. 500,000/=
2.	Proposed Residential apartments Sanitation Facilities	Soil and water contaminatio n	– Design appropriate containments for oils/other construction chemicals and sanitary waste from the contractor's camp.	• The Proponent • Design Consultant	• Availability of sanitary facility and paved containments in the design	Approx. 300,000/=
	Proposed Residential development	High Demand of Raw material	– Source building materials from local suppliers who use environmentally friendly processes in their operations – Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered – Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	• Project Manager & Contractor	• Proper record of materials and sources	As per the Bq
Construction Phase						
1	Soil Excavation at Proposed site	Soil Erosion	– Excavated soil is to be used for backfilling excavated areas while excess soil is disposed of off-site;	• The Proponent • Contractor	• Ground cover in constructed areas	Part of Construction Obligation

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
			– Soils are not to be left exposed to wind/water;		• Quality of surface water at the site	
2.	Construction of the Proposed Residential development	Air Pollution (dust, fuel and smoke emissions)	– Control speed of vehicles and Prohibit idling; – Spray water during construction; – Stockpiles of fine materials e.g. sand, cement and ballast should be wetted or covered with tarpaulin during windy conditions; – Maintenance vehicles & equipment regularly; – Provision of dust masks for use in dusty conditions; – Use serviceable vehicles/machinery to reduce smoke; – Workers in dusty areas on the site should be issued with appropriate PPE, according to their nature of work and working area.	• The Proponent • Contractor	• Records of machine and vehicle maintenance • Availability and use of Noise Masks • Low dust generation during construction	Approx. 500,000/= for air pollution prevention
3.	Construction of the Proposed Residential apartments site	Excess noise and vibration	– Use noise hearing protection devices when working with noisy equipment or noisy environment; – Use serviceable equipment with low noise emission; – Instruct truck/machinery operators to avoid raving engines; – Observance of strict working hours (preferably 8am-5pm) during construction;	• The Proponent • Contractor	• Records of machine and vehicle maintenance • Availability and use of Ear Muffs	Approx. 250,000/= for provision of noise pollution

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
4.	Construction of the Proposed Residential apartments site	Generation of Solid Waste	– Provide communal solid waste collection containers (skip) for the collection and storage prior to appropriate disposal; – Local Authority/NEMA to provide waste dumping site; – Engage a NEMA Registered Waste Collection Firm; – Excavation activities to be done during the dry season to avoid soil erosion and siltation of streams; – Site soil to be used to backfill excavated sites;	• The Proponent • Contractor • NEMA Registered Waste Collection and Disposal Firm	• Clean, Organized, Neat Site • Presence of waste collection receptacles • Contract with NEMA Registered Waste Disposal Firm	Approx. 350,000/= for waste containers 50,000/= per month for waste collection and disposal
5.	Construction of the Proposed Residential apartments site	Generation of Liquid Waste – used oil and other Chemicals (Hazardous Waste)	– Construct a paved containment for storage of oils and other liquid chemicals being used in the construction site; – Water containing pollutants such as cement, concrete, lime, chemicals and fuels shall be discharged into a temporary containment tank for removal from site; – Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered; – Provide containers for storage of used oils from vehicles /machines/equipment being used at the construction site;	• The Proponent • Contractor • NEMA Registered Used Oil Collection and Disposal Firm	• Presence of a paved area for storage of oils and other chemicals • Presence of used oil containers.	Approx. 80,000/= for paved containment & used oil containers. 20,000/= per month for collection and disposal of used oil.

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
			– Engage a NEMA Registered Firm for the collection, transportation and appropriate disposal of used oil;			
6.	Construction of the Proposed Residential apartments site	Risk of fire	– Provide firefighting equipment at the construction site area; – Contractor staff to be sensitized on firefighting equipment use; – No burning of materials is to be permitted at the site.	• The Proponent • Contractor	• Performance records • Presence of Fire Extinguishers at construction site	Approx. 150,000/= for fire extinguishers
7.	Construction of the Proposed Residential apartments site	Potential Pollution of Surface and Groundwater	– No disposal of domestic waste at the project site; – Provision of used oil containers at a central point; – Use of waste bins/proper waste management; – Pave parking area for trucks and direct drainage to containment;	• The Proponent • Contractor	• Water Quality Reports • Presence of Waste Bins	Approx. 10,000/= for communal waste containers 80,000/= per year

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
8.	Construction of the Proposed Residential apartments site	Safety of Workers and other visitors to construction site	• Use of construction site barrier tapes to isolate the site(working) area to bar intruders from accessing the area in case of a dropping object; • Appropriate head, hand and foot protection (PPE) during the manual clearing of vegetation and construction activities; • Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa. Maintain work productivity; • Construction site visitors require appropriate safety Gear.	• The Proponent • Contractor	• Workers have Safety Gear • Medical records • Emergency contacts for Hospital and Police available	Approx. 50,000/= for safety gear
9.	Construction of the Proposed Residential apartments site	Working at heights	• Testing of structures for integrity prior to undertaking work; • Implementation of fall protection including induction on climbing techniques and use of fall protection measures, • Provision of harnesses and scaffolds for working at heights; • Inspection, maintenance, and replacement of fall protection equipment ; • Use of helmets and other protective devices that are going to mitigate against scratches, bruises; lacerations and head injuries due to dropping objects[	• The Proponent • Contractor	• Medical Records and Training records • Availability and use of proper PPE • Availability of Fall Protection Equipment at the Construction Site	Approx. 50,000/= for special safety equipment

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
			• Provide first aid facilities at the site;			
10.	Construction of the Proposed Residential apartments site	Health issues of construction workers and Community	– Sensitize workers and community on sexually transmitted diseases especially STIs and HIV/AIDS which is spread through socialization and unprotected sex;	• The Proponent • Contractor • Ministry of Public Health	• Pamphlets on Health Matters • Records of disease incidences /prevalence	50,000/= for sensitization
11.	Construction of the Proposed Residential apartments site	Surface run off and sedimentation from construction activities	– Construction of effective drainages and culverts; – Plant soil binding grasses and other native plants	• The Proponent • Contractor	• Surface runoff water impact protection facilities in the project area	Construction Obligation
12.	Construction of the Proposed Residential apartments site	Sanitary facilities for construction workers	– Installation of appropriate sanitary facilities;	• The Proponent • Contractor	• Presence of Toilet Facilities for Workers and Visitors to the Construction Site.	Construction Obligation
13.	Construction of the Proposed Residential apartments site	Dangers of having Child Labour issues arising	– Contractor to be strictly advised not to engage any underage persons(under 18 years of age) to perform any form of work at the site during construction – Contractor will be required to comply with the Employment Act, 2007	• The Proponent • Contractor	• List of workers that does not contain underage persons	Construction Obligation

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
14	Construction of the Proposed Residential apartments site	Vehicular Traffic	– Employ traffic marshals to control traffic in and out of site – Ferry building materials during off-peak hours – Provide traffic control signs to notify motorists and general public about the construction works – Enforce speed limits for construction vehicles especially along the roads leading to the site – Employ well trained and experienced drivers – Contractor will develop and implement a Traffic management plan to mitigate possible accidents.	• Contractor	• Have a traffic marshal on site. • Put up road signage	200,000
15	Construction of the Proposed Residential apartments site	Potential Conflict	– Establish a grievance redress mechanism that is easy to access for neighbours and stakeholders to report their concerns as they happen – Continuous communication between the developers and the stakeholders on the progress of the project and its effects – Land transfer agreements should be formalized before the project start as per the laws of the land – Change of use from single residential dwelling to multiple residential dwelling	• Contractor/ Proponent	• Open communication	250,000
Operational Phase						

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
1.	Operation of Proposed Residential apartments Facility	Maintenance of facilities Working at heights	– Use of barrier tapes to isolate the maintenance areas; – Provide harnesses/scaffolds for working at heights; – Inspect and maintain fall protection equipment; – Use of protective devices to mitigate against injury; – Provide first aid facilities at the site;	• The Proponent • The Proponent Site Manager	• Use of Proper PPE and Equipment • Handouts on safety	Approx. 350,000/=
2.	Operation of Proposed Residential apartments Facility	Risk of Fire	– Install firefighting equipment within the development which include a combination of a sprinkler system for the parking levels, a hydrant, and a fire hose reel system. – Sensitize the residents on fire risks i.e. conduct regular fire drills. – Provide escape routes/emergency exits within the development. – Adapt an effective emergency response plan. – Regular inspect and maintenance of the firefighting equipment. – Provide emergency numbers at strategic points within the development.	• Proponent • Residents	• Handouts on Fire Hazards and Safety	Routine Site Operation Activity
3	Operation of Proposed Residential apartments Facility	Water use and increased demand	– During construction phase, use water economically to avoid wastage. – Conducting regular water system audits to identify and rectify any possible water leakages.	• Contractor/proponent	• Water meters • installed and reading recorded • Leak free taps.	700,000

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
			– Provide additional source of water to reduce pressure on the existing water source. E.g. through rainfall harvest, and borehole drilling. – Implement water saving devices in the washrooms e.g. dual flush toilets, automatic shut-off taps, etc. – The designs have water reservoirs for Storage. Provide roof & storm water harvesting amenities			
3.	Operation of Proposed Residential apartments Facility	Risk of liquid Waste	– Provide adequate and safe means of handling liquid waste at the premises – Conduct regular inspections for pipe blockages or damages and fix them appropriately – Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated – Comply with the provisions of Environmental Management and Co-ordination (Water Quality) Regulations 2006	• The Proponent Site Manager	• Regular monitoring of effluent handling facility	Approx. 250,000/= for provision of used oil containers
4.	Operation of Proposed Residential apartments Facility	The Proponent Site Solid Waste Management	• Provision of communal solid waste containers • Provision of secured solid waste collection containment where waste container is to be placed;	• The Proponent Site Manager	• Waste Collection and Disposal Reports • Presence of Waste Bins	Approx. 250,000/= for Waste Containers 30,000/= per month for

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
		during Operation	• Regular disposal waste depending rate fill up.			waste disposal by NEMA Approved Firm
5.	Operation of Proposed Residential apartments Facility	Health issues of Facility Workers and Community	– Sensitize workers and community on sexually transmitted diseases especially STIs and HIV/AIDS which is spread through socialization and unprotected sex; – Provide workers and community with condoms. – Encourage the Community to go for HIV Testing and Counselling in order to live a productive life;	• The Proponent • Ministry of Public Health • Local Administration	• Presence of a HIV Programme at the Facility • Records of disease incidences /prevalence.	450,000/= for sensitization and provision Of condoms.
		Traffic Density	• Provide traffic signs to reduce risk of accidents. • Provision of adequate on-site parking bays. • Regular maintenance of the parking bays. Provide separate entry and exit points for motorized and non-motorized traffic to ease traffic flow and avoid collisions.	• Proponent • Residents	• Routine inspection	150,000

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
6.	Operation of Proposed Residential apartments Facility	Monitoring and Evaluation of the effectiveness of project Mitigations	Implementation of monitoring of facility operations and success of proposed mitigations – Health Trends – Livelihood and socio-economic status of project area community; – Any new emerging issues, threats and benefits of the residential apartment facility	• The Proponent Site Manager • Local Administration	• Quarterly Reports on Facility performance	Routine Operation of the Facility
8.	Operation of Proposed Residential apartments Facility	Insecurity	– Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises – Liaise with the administration units such as the police & the area chief to provide regular patrols to protect the residents.	• Contractor/ proponent • Local administration	• Have a record of incidences	To be determined during implementation
Decommissioning Phase						
1.	Decommissioning of Proposed Residential Houses Facility	Air Pollution (dust, smoke, fuel emissions)	– Control of demolition vehicle speeds; – Prohibition of idling of vehicles; – Water is to be sprayed on building undergoing demolition during decommissioning o reduce dust emission; – Regular maintenance of vehicles and equipment; – Provision of dust masks for use in dusty conditions.	• The Proponent • Decommissioning Contractor	• Decommissioning Records	Approx. 150,000/= for nose protection equipment (dust masks)

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
			– Use of serviceable vehicles and machinery to avoid excessive smoke emission			
2.	Decommissioning of Proposed Residential Houses Facility	Noise pollution	– Noise reduction/ hearing protection devices when working with noisy equipment; – Use of serviceable equipment with low noise level; – Instruction to truck/machinery operators to avoid raving engines; – Use of noise protection (ear muff) during demolition;	• The Proponent • Decommissioning Contractor	• Decommissioning Records	Approx. 330,000/= for noise pollution mitigation
	Decommissioning of Proposed Residential apartments development	Demolition waste	– 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. – 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 – All foundations must be removed and recycled, reused or disposed of at a licensed disposal site – 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	• Project Manager & Contractor	• Decommissioning records	To be determined at the site

#	Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indictors	Cost (KShs)
			– Donate reusable demolition waste to charitable organizations, individuals and institutions			
3.	Decommissioning of Proposed Residential apartments Facility	Potential Injury to Workers	– Use of appropriate head, hand and feet protection (PPE) during demolition of structures – Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity;	• The Proponent • Decommissioning Contractor	• Availability of appropriate gear/Records • Use of Proper PPE	Approx. 200,000/= for PPE and other safety equipment
4.	Decommissioning of Proposed Residential apartments Facility	Working at heights	– Use construction site barrier tape to isolate the site to guard site visitors from accidents and injuries; – Implement a fall protection program that includes training in climbing techniques and use of fall protection measures, Provide Harnesses; – Use of helmets and other protective devices to mitigate against injury, – Provide first aid facilities at the site	• The Proponent • Decommissioning Contractor	• Availability of appropriate Safety Gear/Records • Proper use of PPE	Approx. 500,000/= for PPE and other safety equipment
5	Decommissioning of Proposed Residential apartments Facility	Site area rehabilitation and restoration	– Remove all demolished waste material; – Repair and restore project area site – Evaluate site contamination – Plant trees and other appropriate vegetation	• The Proponent • Site Restoration Contractor	• Site Pollution Report • Well restored site	100,000/= for site Pollution assessment

10. CONCLUSION AND RECOMMENDATIONS

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

The proponent of the proposed project is committed to implementing the outlined measures in this report to militate against the negative environmental, safety, health and social impacts associated with the Development cycle of the proposed housing project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects. It is also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. The outlined measures will effectively ensure the best possible environmental compliance and performance standards.

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

REFERENCES

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Noise Prevention and Control Rules 2005, Legal Notice no. 24, Government Printers, Nairobi Pollution prevention and abatement handbook – Part III, (September, 2001)

The Occupational Safety and Health Act, 2007, Government Printers, Nairobi

Annexes

Annex 1: BQ

Annex 2: Ownership Documents

Annex 3: PCM Minutes and Register

Annex 4: Plans

Annex 5: Questionnaires

Annex 6: TOR

Annex 7: Air quality Laboratory Results

Annex 8: Infrastructure report

Annex 9: Change of User