

**ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT
FOR
THE PROPOSED RESIDENTIAL APARTMENT (ELITE TOWER) LOCATED
ON PLOT L.R NO. 209/2144/1, OFF WESTLANDS ROAD, NAIROBI COUNTY.**



Prepared

In Accordance with the requirements of

Environmental Management and Coordination Act (EMCA) CAP 387, Environmental (Impact Assessment and Audit) Regulations, 2003 under the Kenya Gazette Supplement No. 56 of 13th June 2003

For:

VAAL DEVELOPMENT & INVESTMENT LTD
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Prepared By:



Our Future, Our Responsibility

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Disclaimer:

This environmental impact assessment study report is based on information made available by the proponent to the Consultant and findings from field assessment. It is strictly confidential to the Proponent and any materials thereof should strictly be in accordance with the agreement from the Proponent. It is, however, subject to conditions in the Environmental (Impact Assessment and Audit) Regulations, 2003. The experts may not have independently verified all the information and accept no responsibility for the accuracy of information contained in such reports. Whilst this report and the opinions contained herein are accurate to the best of the experts' knowledge and belief, the experts cannot guarantee the completeness or accuracy of any description based on the supplied information.

ACKNOWLEDGEMENT

Tropospace Consultancy Limited takes this opportunity to thank VAAL DEVELOPMENT & INVESTMENT LTD (The proponent) for providing a chance to conduct this Environmental Impact Assessment Study for the proposed residential apartment. This was done in an endeavour to comply with the Legal requirements as stipulated in section 58 of the Environmental Management and Co-ordination Act (EMCA) CAP 387 and legal Notice No.8. Many thanks for availing all the necessary documents to enable the experts effectively carry out the Study. Neighbours are also acknowledged for their contributions during the public participation process.

EXECUTIVE SUMMARY

Introduction

For a very long time, many development projects worldwide had not taken into account the effects of projects on the environment. As a result, there has been unprecedented environmental degradation due to lack of environmental conservation resulting to unsustainable development. Some of these problems have been irreversible and costly. In Kenya for instance, the policies, programs and strategies did not integrate environmental issues into development. A comprehensive environmental policy was therefore needed to take care of the environment in a holistic way. This was achieved through enactment of the Environmental Management and Coordination Act (EMCA), CAP 387. The Act stipulates that Environmental Impact Assessment (EIA) is carried out on all the projects listed in the Second Schedule. It is in response to this provision, that this report has been prepared.

The proponent; **Vaal Development & Investment Ltd**, appointed Tropospace Consultancy Limited (Firm of Experts) to carry out the study for the proposed residential apartment and prepare a study report according to the EMCA, CAP 387 (EIA/EA regulations 2003). The proposed project entails demolition of an existing structure for the construction of a twenty level domestic building with 92 parking lots, 42No. two bedroom units and 120No. one bedroom units, totaling 162No. Units, a community hall, a swimming pool and other associated facilities and amenities

Project location and the surrounding environment

The proposed project shall be located on plot L.r No. 209/2144/1, off Westlands Road, Westlands Sub-County, Nairobi County on a plot measuring approximately 0.1027 hectares on GPS coordinates -1°-16'-12", 36°50'42" latitude and longitude respectively. Immediate neighbors within a radius of five hundred metres are buildings of the same high level for instance the Golden Tulip. Other structures/business enterprises within the area include among them; Nairobi Security Exchange, Villa Rosa Kempinski, Standard Chartered Bank Head Office, Java House (Orbit Place), a car hiring company, Misha Tower among others.

Site ownership

The site is owned by **Vaal Development and Investments Ltd** and all the relevant documents have been annexed in this report. The land is spacious enough to accommodate the proposed project

This EIA report is designed to inform the proponent and regulatory authority (NEMA) on the predicted environmental impacts (physical, ecological, socio-cultural, health and safety) likely to emanate from the proposed project activities. The report will further guide the proponent on environmental protection. An Environmental Management Plan (EMP) for the project has been proposed for implementation. The report will also assist NEMA in making an informed decision while approving the proposed project.

Scope

The study covered the physical extent of the project site and its immediate environs, implementation works of the proposed development (ground preparations, foundation, walling, fixtures and fitting) among other activities.

The objectives of the proposed development include:

- i. To construct 162 units and other auxiliary facilities in westlands area of Westlands Sub County, Nairobi City County hence meeting the current demand for habitable housing units in the area
- ii. To meet the economic desires of the proponent
- iii. To put the current land into more productive and economic use

The objectives of the study were to:

- i. Identify the anticipated environmental and social impacts of the project and scale of the impacts
- ii. Propose mitigation measures to be taken during and after the implementation of the project
- iii. Develop a comprehensive EMP with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing the measures

Methodology

The methodology of this study included: mobilization and planning; desk review of documents; field data collection; project data synthesis; public consultation and participation. A number of stakeholders were consulted for their inputs to the study through key informant interviews and completion of qualitative semi structured questionnaires. The applied field methodologies for data collection included: qualitative questionnaires; key informant interviews and random field visits to the project area.

Anticipated Environmental and Social Impacts

Below is a summary of the anticipated significant impacts and their proposed mitigation measures:

Both positive and negative impacts are anticipated to be associated with the proposed project during the ground preparation, construction phase, operation phase and decommissioning phase. In general, the following positive and negative impacts are associated with the proposed project.

Positive Impacts

- Provision of spacious residential houses,
- Provision of revenue to the county and country at large
- Creation of employment opportunities mainly during construction phase,
- Creation of market for supply of building materials,
- Optimal land use by the proponent.

Summary of negative impacts and their mitigation measures

Impact	Proposed Mitigation
Noise and excessive vibration	<ul style="list-style-type: none"> • Construction machinery, vehicles and equipment to be maintained regularly. • Comply with provisions of the Noise and Excessive Vibrations Pollution Control Regulations, 2009 for permissible noise and vibration levels. • Provision of adequate and appropriate PPEs to the workers. • Avoid hooting especially when passing through silent zones such as schools, churches, residential areas, offices and hospitals.
Soil and water pollution	<ul style="list-style-type: none"> • All heavy trucks and any other motorized machinery must be maintained well to avoid fugitive spills. • Equipment and washing activities during construction to be done in designated areas with impervious surface with interceptors for oily wastes.
Air Pollution (dust, gaseous emissions)	<ul style="list-style-type: none"> • Use dust screens to cover the buildings under construction to trap dust. • Provide appropriate personal protective equipment for employees exposed to dusts and gaseous emissions. • Fence the construction site. • Cover friable material loads with tarpaulins during transportation. • Observe speed limits of vehicles transporting materials.
Increased Solid waste generation	<ul style="list-style-type: none"> • Appropriate budgets for purchase of raw materials to reduce wastage through exposure to weather elements.

Impact	Proposed Mitigation
	<ul style="list-style-type: none"> • Solid wastes to be put in a designated area for appropriate disposal. • Segregation of waste at source so as to determine the recyclables. • Contract a licensed waste handler to collect waste at regular intervals. • Provide skips for wet and dry waste to hold before it is collected. • All wastes to be transported by NEMA licensed waste handlers and to be disposed in licensed disposal sites.
Increased traffic volumes	<ul style="list-style-type: none"> • Signage should be put in place to give warning and direct the traffic appropriately. • Adhere to Kenya Traffic laws.
Occupational safety and health hazards	<ul style="list-style-type: none"> • Compliance to all international, national or local health and safety standards that may exist during all phases. • Issuance of Personal Protective Equipment (PPE) and enforcing their use during construction and demolition. • Regular inspection, testing and maintenance of equipment and machinery. • Develop and implement site emergency response plans. • Training workers on health and safety precautions. • Provide fully stocked first aid kits. • Use of water sprays to arrest dust. • Containments of hazardous materials. • Fencing of the construction site to restrict onlookers/entry and curb accidents. • Installation of firefighting appliances. • Provision of proper solid waste collection and disposal amenities. • Provision of proper sewerage connections to prevent disease outbreaks.
Increased effluent waste generation	<ul style="list-style-type: none"> • Ensure that waste water pipes are not blocked or damaged so that the effluent can be delivered to the sewer line to avoid land and water contamination.
Increased water demand	<ul style="list-style-type: none"> • Use of water saving devices (e.g. low volume high pressure cisterns, time delay taps, automatic shut-off taps). • Put in place measures for quick detection and repair of pipes & tanks leaks.

Conclusion

The project activities will create employment; promote optimal use of land; and provide spacious housing units to be used by the looming population of Nairobi County. However, minimal negative impacts will also be experienced hence the need to mitigate them in order to reduce their effects on the environment.

Considering these positive benefits which will accrue as a result of the proposed development, and the ESIA report having found no major significant impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental Management and Monitoring Plan (EMMP) to the latter.

TABLE OF CONTENTS

CERTIFICATION	2
ACKNOWLEDGEMENT	3
EXECUTIVE SUMMARY	4
TABLE OF CONTENTS	9
ACRONYMS AND ABBREVIATIONS	11
1.1 General History.....	12
1.2 Background and rationale of ESIA study	12
1.3 Objectives of the project.....	12
1.4 Objectives of the ESIA study	12
1.5 Methodology.....	13
1.6 Terms of Reference (TOR).....	13
1.7 Scope of the study.....	14
2.0 PROJECT DESCRIPTION AND PHYSICAL ENVIRONMENT	17
2.1 Nature of the project.....	17
2.2 Project Location.....	17
2.3 Site description	17
2.4 Site ownership	18
2.5 Project description	18
3.0 STUDY AREA BASELINE INFORMATION	24
3.1 Introduction	24
3.2 Position and size of the County	24
3.3 Location of the proposed project site.....	24
3.4 Site ownership	24
3.5 Bio-Physical Environment.....	24
3.6 Physiography	25
3.7 Water Supply/Resources.....	26
3.8 Infrastructure	27
4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK.....	31
4.1 Relevant national policies.....	31
4.2 Legal framework.....	32
5.0 ENVIRONMENTAL IMPACTS	37
5.1 Description of the existing and anticipated impacts	37
5.2 Positive impacts.....	38
5.3 Negative environmental Impacts	39
6.0 PROJECT ALTERNATIVES	41
6.2 No project alternative	41

6.3 Alternatives to Site	42
6.3 Alternative land use	42
6.3 Alternative design	42
6.4 Alternative construction materials and technologies	42
CHAPTER SEVEN	44
7.0 MITIGATION MEASURES AND ENVIRONMENTAL MANAGEMENT PLAN (EMP)	44
7.1 Potential mitigation measures for Occupational Health and Safety	44
7.2 Potential mitigation measures for increased solid waste	44
7.3 Potential mitigation measures for water use and management	45
7.4 Potential mitigation measures for surface water drainage	45
7.5 Potential mitigation measures for air quality	45
7.6 Potential mitigation measures for accident prevention	45
7.7 Potential mitigation measures for site security	46
7.8 Potential mitigation measures for fire hazards	46
7.9 Traffic within the project area	46
7.10 Environmental Management Plan	47
8.0 PUBLIC CONSULTATION	54
8.1 Introduction	54
8.1.1 Objectives of the Consultation and Public Participation (CPP)	54
8.2 Analysis of the Public Consultation findings	54
9.0 ENVIRONMENT, HEALTH AND SAFETY (EHS)	56
9.1 EHS Management and Administration	56
9.2 Policy, Administrative and Legislative Framework	56
9.3 The Guiding Principles to be adopted by the contractor/proponent	56
9.4 EHS management strategy to be adopted by the contractor	56
9.5 Safety requirement at the project site during construction and operation period	57
9.6 Emergency procedure during construction and operation	57
10.0 PROJECT DECOMMISSIONING	58
10.1 Introduction	58
10.2 Purpose and objectives of decommissioning	58
10.3 Decommissioning Phase Impacts	58
10.4 Decommissioning Environmental Management Plan	61
11.0 CONCLUSIONS AND RECOMMENDATIONS	65
11.1 Conclusion	65
11.2 Recommendations	65
REFERENCES	66

ACRONYMS AND ABBREVIATIONS

CAP	Chapter
EHS	Environmental Health and Safety
EA	Environmental Audit
ESIA	Environmental Social Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EMMP	Environmental Management and Monitoring Plan
KPLC	Kenya Power and Lighting Company
NCC	Nairobi County Council
NEMA	National Environment Management Authority
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
TOR	Terms of Reference
CPP	Consultation and Public Participation

1.0 INTRODUCTION

1.1 General History

Worldwide, the need to pursue sustainable development guided by environmental, social, cultural and ethical considerations has been accorded high priority. The goal of sustainable development cannot be achieved without significant changes in the ways development initiatives are planned, implemented and managed. In order therefore to achieve these changes, humanity has to consider as a matter of priority environmental conservation, protection and security as essential elements of the entire process of sustainable development. Kenya has made significant steps in the implementation of environment-friendly legislations, significant of which is the Environmental Management and Coordination Act (EMCA) CAP 387 which makes Environmental Impact Assessment an essential element in the overall project management cycle.

1.2 Background and rationale of ESIA study

In an attempt to comply with national and international legislations and protocols, the proponent has contracted NEMA registered and licensed experts of Tropospace Consultancy Limited to carry out an Environmental/Social Impact Assessment for the proposed project. The assessment is meant to address any possible negative impacts and environment-related conflicts that may result from different phases of the proposed project. This will in the long term ensure not only a safe and clean environment, but also ensure that the proposed development activities are in conformity with the existing environmental rules and regulations.

1.3 Objectives of the project

The proposed project objectives are:

- To provide spacious residential houses;
- To meet the economic desires of the proponent;
- To put the current land into more productive and economic use.

1.4 Objectives of the ESIA study

The main objective of the ESIA study is to carry out a systematic examination of the present environmental situation within the project area, to determine whether the proposed project will have any adverse environmental impacts to the surrounding area. Specifically, the study set out to achieve the following objectives:

- i. To determine the compatibility of the proposed development with the neighboring land uses and evaluate local environmental conditions.
- ii. To identify and evaluate the significant environmental impacts of the proposed project with special emphasis on:

- Waste water management,
 - Water supply to the building and its implication to the neighboring people and facilities,
 - Solid waste management,
 - Noise and Air quality management.
 - Conformity with the surrounding environment
- iii. To evaluate and select the best project alternative from the various options available.
 - iv. To present the results of the ESIA that can guide informed decision making and
 - v. To incorporate the environmental management plan and monitoring mechanisms during implementation and operation phases of the project.

1.5 Methodology

- (i) Site reconnaissance and visual surveys to expound on the baseline information of the project area during screening and scoping.
- (ii) Seeking public views with the project neighbours through open ended questionnaires.
- (iii) Desktop review to obtain baseline data and secondary data.

1.6 Terms of Reference (TOR)

The following are the Terms of Reference for the proposed project as developed by the experts in conjunction with the project proponent;

- i. Assessment and description of location/site, objectives, scope, nature of the proposed project,
- ii. Analysis of the proposed project activities during the proposed project cycle; construction, operation, decommissioning phases,
- iii. Establish the suitability of the proposed project in the proposed location,
- iv. Review and establish all relevant baseline information as will be required by NEMA (Physical, Biological and Social Cultural and economic) and identify any information gaps,
- v. Description and analysis of policy legal and institutional framework including but not limited to Kenyan policies, laws, regulation and guidelines which have a bearing on the proposed project and will also serve as benchmarks for monitoring and evaluation, and future environmental audits,
- vi. In-depth description of the proposed project and associated works together with the requirements for carrying out the works,
- vii. Analysis of the designs, technology, procedures and processes to be used, in the implementation of the works,

- viii. Consultation and Public Participation (CPP): Identify key stakeholders and affected persons; hold a public meeting and provide /collect written evidence i.e. minutes,
- ix. Identify and analyze proposed project alternatives including but not limited to: Scale and extent; project site alternatives, no project alternatives, design alternatives, material alternatives and technologies alternatives,
 - x. Identify, predict and carry out in-depth analysis all actual potential and significant impacts on flora, fauna, soils, air, water, the social, cultural and community settings; the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated to be generated by the proposed project, both positive and negative throughout the project cycle,
- xi. Recommend sufficient mitigation measures for all the potential negative impacts identified,
- xii. Analyze occupational health and safety issue associated with the proposed project,
- xiii. Develop an EMP proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.

1.7 Scope of the study

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the neighboring environment as it may be affected by or may affect the proposed project. Any potential impacts, (localized or delocalized) are also evaluated as guided by EMCA CAP 387 and the Environmental (Impact Assessment and Audit) Regulations 2003. This report includes an assessment of impacts of the proposed site and its environs with reference to the following:

i) A review of policy, legal and administrative framework

Several policies, legal and administrative arrangements and protocols - both local and international - that have a direct bearing on the proposed development were reviewed. This was in an attempt to establish the frameworks within which the significance of the various impacts expected from the proposed development could be evaluated. These have formed the basis for the determination of the significance of the various impacts associated with the proposed project.

ii) Description of the proposed project

The proposed project has been described in terms of location and physical characteristics of the project area, design of the development, wet areas and service quarters, products, by-products and waste. This approach is important because it makes it possible to know the likely sources of impacts, how the impacts relate to one another in terms of being direct, indirect, cumulative, reversible etc. in order to suggest practical recommendations for their proper management.

iii) Review of the baseline information

Baseline information forms the basis of degree and magnitude of the impact since they give the conditions of the environment in terms of resources and impacts before the implementation of any project and its infrastructure. This helps in the monitoring exercise and for that matter brings into focus the extent of the accuracy of the prediction of the impacts in question.

iv) Assessment of the potential environmental impacts on the biophysical, socio-economic, religious and cultural aspects

Environmental aspects associated with any project are normally felt on natural or human elements. It is the direction, magnitude and extent of impacts on these elements that make the impact either positive or negative. These are the various social and physical parameters that are in continuous interplay within the general environment of any project and it is how the project will affect or will be affected by these parameters that eventually lead to positive or negative perception in environmental terms.

v) Proposition of alternatives

Any planning activity must strive to give practical alternatives with regard to resource allocation. EIA as a planning tool must therefore give options that can be pursued in order to get sustainable results. The alternatives are looked at in terms of product mix, site, technology, design, scale and extent. The comparisons of these with the proposed project give rise to the best project option.

vi) Development of mitigation measures

Mitigation and management measures are meant to limit the extent of negative impacts that may arise as a result of a particular development alternative. Potentially negative environmental impacts of a project may be bearable both to the environmental elements and the community depending on the mitigation measures suggested.

1.8 Justification of the project

1.8.1 Demand for Housing

Housing has for a long time been recognized as a basic human need, with even recent suggestions that it be made a basic human right.

The population of Kenyans towards the city centre and its surroundings has been rapidly increasing over the years resulting to the inability of most existing accommodation facilities to fully cater for the accommodation demand.

The proposed development therefore comes as a timely venture to cater for the existing accommodation deficit more specifically along Waiyaki Way.

1.8.2 Adjacent Land use analysis

Currently there are developments adjacent to the site. The common land uses are high-rise mixed development; the Golden Tulip, Villa Rosa Kempinski,, Standard Chartered Bank Head Office, Java House (Orbit Place) among others. At a radius of five (5) Kilometers, there are retail centers, health facilities and other community facilities which will be adequate to serve the incoming development.

1.8.3 Size of the plot

At approximately 0.1027 hectares, the plot is large enough to accommodate the proposed development. (See attached copy of title)

1.8.4 Economic Benefits

The proposed development will have various economic benefits. The proprietor will be able to generate more income thus enhance their livelihood. The NCC will raise extra revenue from both the enhanced Land Rates and approval fees. The central government will also get more revenue in the form of enhanced Land Rent.

1.8.5 Neighborhood Development Trend

The neighborhood of the plot is currently undergoing transformation with several mixed use developments coming up, including apartments, offices, hotels and institutions. The proposed development will therefore be in conformity with this trend which will ensure better utilization of the land giving it higher value.

2.0 PROJECT DESCRIPTION AND PHYSICAL ENVIRONMENT

2.1 Nature of the project

The proposed project involves demolition of an existing structure for the construction of the proposed residential apartment

The project site is will then be connected to key infrastructure such as domestic water, power connection, storm water drainage systems and a sewer line.

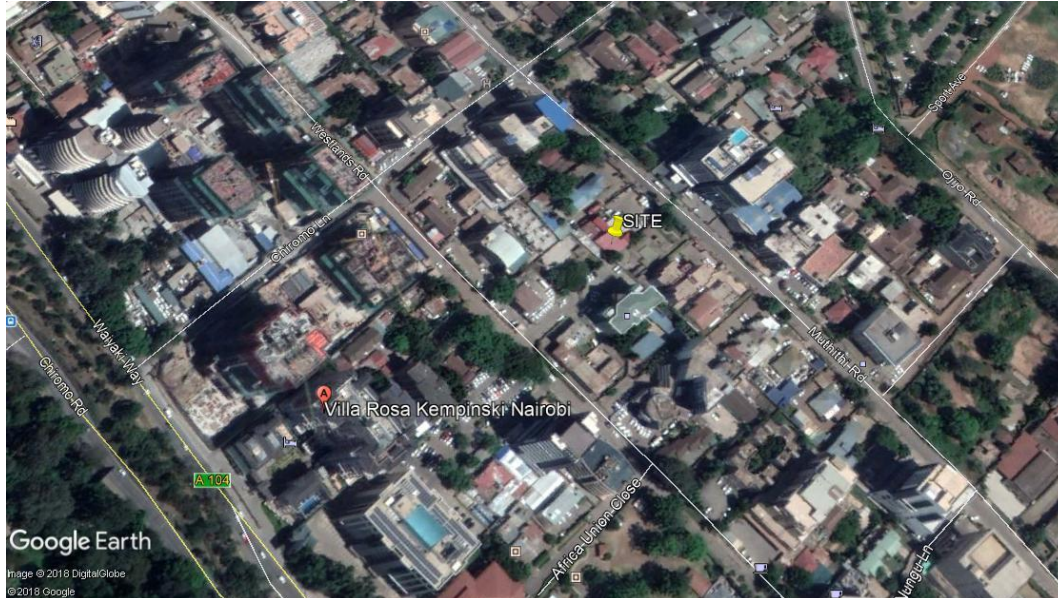
2.2 Project Location

The proposed project shall be located on plot L.r No. 209/2144/1, Westlands Road, Westlands Sub-County, Nairobi County on a plot measuring approximately 0.1027 hectares and on GPS coordinates $-1^{\circ}16'12''$, $36^{\circ}50'42''$ latitude and longitude respectively.

The land locations co-ordinates are:

Latitude: $-1^{\circ}16'13''$

Longitude: $36^{\circ}48'38''$



Map showing the general location of the proposed project site

2.3 Site description

Immediate neighbors within a radius of five hundred metres are buildings of the same high level for instance the Golden Tulip. Other structures within the area include among them; Villa Rosa Kempinski,, Standard Chartered Bank Head Office, Java House (Orbit Place) among others. The foresaid Westlands Area is predominantly a mixed use development area with most buildings being of both commercial and residential. The area continuous to attract interests in modern commercial and residential developments due to the increase in population in Nairobi Country. During the site

survey, no activity had commenced as the proponent wanted to meet all statutory requirements including the EISA License.

2.4 Site ownership

The site is owned by **Vaal Development and Investment Limited** and all the relevant documents have been annexed in this report. The land is spacious enough to accommodate the proposed project

2.5 Project description

The proposed project has been designed to comprise of;

- Basement 1 and 2; 22No. parking lots on each
- Basement 3; 26No. parking lots,
- Ground floor; 22No. parking lots
- 1st floor; 2No. 2bedroom and 6No. one bedroom
- 2nd to 20th floor: all this are typical in nature with 6No. one bedroom and 2No. two bedroom units on each

In summary the proposed development will have 92No. Parking lots, 42No. two bedroom units and 120No. one bedroom units, totaling 162No. Units, a community hall, a swimming pool and other associated facilities and amenities

2.6 Construction Inputs

The project inputs include the following:

- i. Construction raw materials i.e. stones, cement, sand, crushed rock (gravel/ ballast), ceramic tiles and other ceramic fittings, steel and wooden fixtures and fittings, glass, steel metals, timber, roofing materials, painting materials among others. All these should be obtained from licensed dealers, especially those that have complied with the environmental management guidelines and policies.
- ii. Construction machines including machinery such as trucks, concrete mixers, tools and other relevant construction equipment. These will be used for the transportation of materials, clearing of the site and construction debris, excavation works and other construction works. Most of the machinery will use electricity and petroleum products to provide energy.
- iii. A construction labour force of both skilled and non-skilled workers. These will require services such as energy, water supply and sanitation facilities.
- iv. Water for construction purposes.
- v. Power from the mains grid or provided by generators.

2.6 Construction Activities

2.6.1 Description of the Project's Construction Activities

2.6.1.1 Pre-construction Investigations

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

2.6.1.2 Sourcing and Transportation of Building Materials

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

2.6.1.3 Clearance of Vegetation.

The site is characterized by vegetation cover which includes grass and few trees. The vegetation will be cleared through cutting down of trees and grass, and removal of tree stumps to pave way for the proposed development. The proponent shall ensure as many indigenous trees as possible are used for re-vegetation as well as obtaining the necessary prerequisite permits and licenses before clearing the vegetation.

2.6.1.4 Storage of Materials

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

2.6.1.5 Excavation and Foundation Works

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

2.6.1.6 Masonry, Concrete Work and Related Activities

The construction of the foundations, building walls, floors, pavements, drainage systems and parking area among other components of the project will involve a lot of masonry work and related activities. General masonry and related activities will include construction of foundations,

superstructure construction, concrete mixing, stone shaping, plastering and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labor intensive and will be supplemented by machinery such as concrete mixers.

2.6.1.7 Structural Steel Works

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

2.6.1.8 Electrical Work

Electrical work during construction of the premises will include installation of electrical gadgets, devices 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. All the electrical works will be carried out by licensed electricians to the satisfaction of the relevant authorities.

2.6.1.9 Mechanical works

The mechanical works shall be done by qualified technicians under the supervision of the Project Mechanical Engineer and shall follow the set standards. The works will include and not limited the following:

- i. Plumbing and drainage
- ii. Service ducts accessible from all floor levels
- iii. Soil vent pipes (SVP) provided on doors and windows
- iv. Storm drains pipes
- v. Inspection chamber covers and framing
- vi. Underground foul and waste drain pipes

2.6.1.10 Landscaping

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

2.6.2 Description of the Project's Operational Activities

2.6.2.1 Residence

A total of 162 families will reside within the proposed development. Several family activities such as cooking, laundry, cleaning, leisure and recreational activities will thus accompany residence.

2.6.2.2 Solid Waste

The proponent will provide facilities for handling solid waste generated within the proposed development. These will include dust bins/skips for temporarily holding waste within the premises

before final disposal at the designated dumping site. The solid wastes from each unit will be assembled in the garbage collection point ready for disposal by a NEMA licensed waste handler. Private waste disposal companies that are approved by NEMA and County Government will be responsible for solid waste disposal.

2.6.2.3 Waste Water and Storm Water Management

Sewage generated from each unit will be discharged into the conventional trunk sewer system provide by the county government. Storm water will be properly channeled to improve drainage within the development.

2.6.2.4 Cleaning

The proponent will be responsible for regular washing and cleaning of the pavements and communal areas. The tenants/occupants of the residential units will be responsible for washing and cleaning their own residences. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

2.6.2.5 General Repairs and Maintenance

The housing units and auxiliary facilities will be repaired and maintained regularly during the operational phase of the project. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, repairs of refrigeration equipment, painting, maintenance of flower gardens and grass lawns, and replacement of worn out materials among others.

2.6.3 Description of the Project's Decommissioning Activities

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. The following should be undertaken to restore the environment:

- i. Remove all underground facilities from the site
- ii. The site should be well landscaped by flattening the mounds of soil
- iii. Planting vegetation which may include indigenous trees and flowers
- iv. All the equipment should be removed from the site
- v. Fence and signpost unsafe areas until natural stabilization occurs
- vi. Backfill surface openings

2.6.3.1 Dismantling of Equipment and Fixtures

All equipment including electrical and mechanical installations, furniture partitions, pipe work and sinks among others will be dismantled and removed from the site on decommissioning of the project. Priority will be given to reuse of this equipment in other projects. This will be achieved through resale of the equipment to other building owners or contractors or donation of this equipment to schools, churches and charitable institutions.

2.6.3.2 Site Restoration

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

2.7 Construction Products, By Products and Wastes

It is anticipated that the project will generate a variety of products, by-products and wastes during its construction and operational phases. The characteristics of the products, by-products and wastes are discussed in this section.

2.7.1 Products

The final product will be 162 housing units, 92 parking bays and other auxiliary facilities in one domestic block

2.7.2 By-Products

The by-products will be disposed-off as follows:

- i. **Soil:** The soil generated during excavation will be reused (if applicable) elsewhere in the project. Unusable soil will be transported for disposal at designated dumping sites by NEMA licensed waste handlers.
- ii. **Pieces of timber/wood:** Large pieces of timber/wood generated during the construction phase will be transported back to the contractor's yard for reuse in future while the small pieces of timber/wood will be disposed-off for use as fuel for cooking and heating.
- iii. **Empty cans and drums:** These will be used to store water during construction. The damaged ones will be disposed-off to registered scrap metal and plastic waste dealers.
- iv. **Excess sand, ballast and stock piles:** These can be used for future construction activities e.g. renovations. Upon completion of the project, these will be moved by the contractor to a suitable yard.

2.7.3 Wastes

The waste generated during construction will include construction debris, sanitary waste, excavated soil and rocks. The other wastes that may likely to be generated during operation are solid waste such as paper, plastics, cans, glasses, metallic pieces, and organic waste. These wastes will be

disposed by the proponent in accordance with the standards and documented procedures stipulated in the EMCA Waste Management Regulations of 2006.

2.8 Project Budget and Duration

The proposed project is estimated by the project quantity surveyor to cost **one hundred and fifty million shillings (150, 000, 000)**. The project implementation works is estimated to take 2 years to completion *upon obtaining all statutory approvals*



3.0 STUDY AREA BASELINE INFORMATION

3.1 Introduction

This chapter provides the general description of the profile of Nairobi County and the proposed project area with regard to the state of affairs on the various aspects. The aspects include but not limited to the physical, social, economic, ecological, political, and infrastructural, among others. It also provides a description of the area in terms of the location, size, physiographic and natural conditions; demographic profiles; human development indicators- infrastructural access, land and land use among others. The description of these aspects offers a “bird’s eye view” of the current state of affairs at Nairobi County, which has a bearing on the development of the proposed project.

3.2 Position and size of the County

Nairobi is situated at 1°09'S 36°39'E and 1°27'S 37°06'E and occupies 696 km². With a population of 3.36 million in 2011, Nairobi is the second-largest city by population in the African Great Lakes region after Dares Salaam, Tanzania. According to the 2009 census, in the administrative area of Nairobi, 3,138,295 inhabitants lived within 696 km². Nairobi is the 14th-largest city in Africa, including the population of its suburbs.

3.3 Location of the proposed project site

The proposed project site is on plot L.r No. 209/2144/1, off westlands Road, Westlands Sub-County, Nairobi County on a plot measuring approximately 0.1027 hectares and on GPS coordinates -1°-16'-12", 36°50'42" latitude and longitude respectively.

3.4 Site ownership

The proposed development site belongs to **Vaal Development and Investment Ltd** and a copy of the title deed has been annexed

3.5 Bio-Physical Environment

3.5.1 Climate

The climate of the proposed project site in Westlands area identifies with that of the wider City of Nairobi.

Below is a summary of the climatic conditions of Nairobi

i) Sunshine and Solar Radiation Nairobi experiences a total of about 2,500 hours of bright sunshine per annum, which is equivalent to annual mean of approximately 6.8 hours of sunshine per day. July and August are characterized by cloudiness and during these months the average daily sunshine in Nairobi is 4 hours. Frequently there are several days in succession when the sun fails to penetrate the thick stratocumulus cover, although on other days the cloud does break to a greater or lesser extent for a short period. There is about 30% more sunshine in the afternoon than in the morning and it follows that westerly exposures receive more isolation than easterly ones.

ii) Rainfall

- Nairobi has a bimodal rainfall pattern, in which the maxima occur in March- April (long rains) and November-December (short rains). The simple rainfall regime is complicated by the uncertainty of rainfall from year to year.
- Average annual rainfall is 875mm, which may actually vary from 500mm to more than 1500mm.
- Thunderstorms may occur, nearly always during the afternoon or evening, during most months of the year but they are rare during the period of June/ August.
- Hail is comparatively rare in Nairobi City, being reported at any station on average less than once a year unlike other areas such as western part of Kenya.

iii) Wind Patterns A significant feature of the climate of Nairobi is the frequency with which the wind comes from the North East and to a somewhat lesser degree to the South East. These are the North East and South East Monsoon, which blow very steadily but without high intensity. Both wind run and mean wind speed are at a maximum in December. Winds also remain high during January, February and March which coincides with the period of higher potential evaporation. The proposed project site is South West of Nairobi City.

The strongest winds occur during the dry season just prior to the "Long Rains" when speeds of 20 to 2miles per hour are not uncommon from mid-morning to early afternoon; at other times of the year winds speeds are usually 10 to 15 miles per hour. During the night the wind is usually light. In the squalls sometimes associated with thunderstorms, short-lived of up to 70 miles per hour have been known to occur.

iv) Temperature Average daily temperature varies from 17° C in July/August, to 28° C in March. The maximum daily range of temperature is quite large 10° C to 30° C in May and February respectively.

v) Smog -Smog is common during the rainy season most common hazards to flying occur over this period. This is mostly associated with the development of towering cumulus and cumulonimbus clouds. A further hazard common in Nairobi is the formation of low stratus clouds during the early morning.

3.6 Physiography

- i) **Geology and Soils** The geology of Nairobi has been dominated by rifting and volcanism associated with tectonic movements. The proposed site lies in south east of the Nairobi CBD and has predominately red soil. This type of soil is not well drained but is fairly stable as it is unlined by rock crop

- ii) **Relief** The formation of the Rift valley has strongly influenced the geology and geomorphology of the Nairobi area. Nairobi region falls from the edge of the Rift Valley to the west with an elevation of 2,300 meters (7500ft) to 1,500meters (5,000ft) to the east of the city, with the centre itself at 1,700meters (5,500ft).

3.7 Water Supply/Resources

The project site being located outside the Central Business District of the larger Nairobi Central Business District; the main source of water supply is the Nairobi City Water and Sewerage Company (NCWSC). This will act as the source of water both for the construction phase and even after the completion of the project during its operation phase. It is therefore recommended that the main supply line into the project site be metered so as to help in the calculation of the charges in relation to the supplied quantity and the wastewater charges which is a fraction of the volume supplied.

There is no river/water body within the project site that will be affected by the proposed project

3.7.1 Sewer System

The general area is served with public sewerage system of NCWSC. The proponent therefore intends to connect to the trunk sewer for sewerage disposal. The internal sewer system of the proposed project will be suitably designed to collect all effluent / waste water from the development. All sanitary works will be done to the entire satisfaction of local authority and Ministry of Health, Public Health Office.

3.7.2 Surface Drainage

The surface water/run-off will mainly be directed to the open drains constructed along the access road. Increased surface run-off is anticipated from roof catchments of building structure; drive way and parking, which are partially impervious. Therefore, as rain falls much water/run-off is anticipated due to slight decrease in recharge areas. In connection to this, the volume of water reaching the drain system will be large and as such it greatly influences the design of effective surface drainage system of the proposed project.

In line with the above, surface drainage systems will effectively be designed and installed to manage the storm water such as may be derived from the parking, driveways and roof of the building blocks.

Open (concrete drainage-inverted concrete drains) channels will be used to drain the excess surface water/storm into the public drainage system along the access road.

3.8 Infrastructure

3.8.1 Energy and Telecommunications

The national electricity grid line which supplies the region passes through the project site and this makes it possible for the proponent to have the development supplied with the same being in a region that is well networked with the same. Electricity is already connected to the foresaid project site

3.8.2 Information communication technology (ICT) and telecommunications

This being an urban area, the growth of information communication and technology is high and many people are computer literate. Majority of the population are very familiar with ICT related applications. There are various ICT related outlets such as cyber cafes within the county. Communication infrastructures have been established across Nairobi to support development of ICT. There are various BTS in the neighboring area owned by different network providers

3.8.3 Transport Network

The project area is served by both private and public means of transport using either Nissan-Matatus, buses, taxis and motorbikes.

3.9 BIOLOGICAL ENVIRONMENT

This section describes key biological elements, including the identification and distribution of dominant, rare and the unique flora and fauna species within the proposed project site and other potentially affected areas.

3.9.1 Flora

The natural vegetation within NCC has been cleared to pave for the establishment of both residential, commercial, offices, hotels and other developments. The natural vegetation in the area has thus been gently modified. The remnants of the natural vegetation of the site and its environs are two trees and grass. We highly recommend that the proponent do a lot of landscaping to provide greenery and maintain a healthy environment.

3.9.2 Fauna

The project site is situated within a commercial/residential zone where human activities have altered the natural habitat for animals over the years. The property is characterized by few bird species. None of the faunal species observed are rare or endangered. It is expected that the area will be

populated by small mammals such as mice, rats, moles and other members of the rodent family. The project's effect may seem insignificant to such lives but it is of great concern to the environment at large. It would contribute to imbalances in the ecosystem as a result of removal of the vegetation cover i.e. grass and trees on site.

3.10 SOCIO-ECONOMIC ENVIRONMENT

3.10.1 Land Use

Urban Land use refers to spatial distribution of social and economic activities. Accordingly, an up to date land use inventory is frequently required to facilitate urban planning and growth patterns as well as monitoring urban expansion.

The neighborhood is generally characterized by a mix of different uses. Mostly, Westlands area is zoned for high density residential cum commercial area. The housing typology consists of mainly flats, apartments and business enterprises. Although most of the developments have been maintained at low levels, the trend appears to be changing with developers constructing high level buildings

3.10.2 Educational

There are different education facilities found within the project area which include; Nursery Schools, Primary Schools, Secondary Schools and Colleges

3.10.3 Public Purpose (Church)

Religious institutions in the neighborhood include churches, mosques and temples

3.3.4 Commercial Activities

These activities are concentrated along the westlands road and include shopping malls with supermarket, shops, and banks. Other commercial activities in the area include banks and light industry (petrol station such as the Shell Petrol station and Oil Libya). Banks found within the area include Diamond Trust Bank Centre, Equity Bank and Stanbic bank

3.3.6 Socio-Economic Importance of the proposed Development

The proposed development is in line with the government housing policy that aims at facilitating the attainment of adequate shelter and healthy living environment to all socio-economic groups in the country. The project will therefore help to increase quality housing infrastructure in the region by

investing in the construction industry and the proponent will also contribute towards the economic growth of our nation through revenue collection.

In particular, the proposed development will generate the following positive socio-economic impacts:

- i. Provision of houses, hence increase in the national/local housing stock and quality. This is in line with the government policy of providing housing and standard housing infrastructure to the society
- ii. The optimal use of land i.e. increased utility of the parcel of land, which is currently underutilized.
- iii. Boost local investment to both the government and the proponent. The proponent will benefit through renting / sale of the residential units and the government through levies and taxes.
- iv. Creation of market for goods and services. Many secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
- v. Provision of employment during both construction and occupational phases.
- vi. The proposed development will indirectly contribute towards enhancement of security in the neighborhood of the area.



An access road off Westlands road and the immediate neighborhood



High-rise buildings within a radius of 200M. (Pramukh Tower & Golden Tulip Respectively)

4.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Introduction

EIA is an instrument for environmental management and development control. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound. It is a condition that all developers conduct EIAs on the development projects.

EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed development with a view of taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on EIAs are contained in section 58 to 67 of the Act. According to section 68 of the EMCA CAP 387, the authority shall be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

There are a number of policies, laws and regulations that govern the protection, conservation and exploitation of the natural resources coupled with provisions for environmental management. These national policies, laws and regulations cover infrastructure, water, agriculture, forestry and health just to mention a few. The national environment action plan documents cover policy directions regarding integration of environmental concerns including EIA into development planning process.

4.1 Relevant national policies

The following national policies are of relevance to the proposed project;-

4.1.1 The National Environmental Action Plan (NEAP)

The NEAP was a deliberate policy effort to integrate environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision making.

Relevance to the proposed project

The NEAP has indicated how resources within particular sections of the country should be managed in order to ensure their sustainable utilization. The project should be implemented and operated based on these guidelines.

4.1.2 Environment and Development Policy (Sessional Paper No. 6 of EMCA CAP 387)

The aim of this policy is to harmonize environmental and development goals so as to ensure sustainability. The paper provides comprehensive guidelines and strategies for government action regarding environment and development.

Relevance to the proposed project

The interaction of the proposed project with physical elements may lead to some negative impacts. Mitigation measures are therefore necessary to ensure balanced coexistence of the project and the surrounding environment and facilities.

4.2 Legal framework

4.2.1 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 provide a legal and institutional framework for the management of the environmental related matters. This report has been prepared pursuant to section 58 (1) of this Act.

4.2.2 EMCA (Environmental Impact Assessment and Audit) Regulations, 2003

These regulations stipulate how an EIA project report should be prepared and specifies all the requirements that must be complied with. It highlights the stages to be followed, information to be made available, role of every stakeholder and rules to be observed during the whole EIA project report making process.

Relevance to the proposed project

The proposed project will be planned, designed, constructed and operated based on these regulations. It shall also be maintained and guided by the same regulations and an environmental audit study will be done periodically to monitor compliance with the set environmental standards.

4.2.3 EMCA (Water Quality) Regulations, 2006

The Water Quality Regulations (2006) are contained in the Kenya Gazette Supplement No. 68, Legal Notice No. 120. Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. It is an offence to

contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

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

Part II Section IV states that “Every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution”.

Part IV Section 24 states that “No person shall discharge or apply any poison, toxic, noxious or obstructing matter, radioactive wastes, or other pollutants or permit any person to dump any such matter into water meant for fisheries, wildlife, recreational purposes or any other uses”.

According to these regulations, “Every person shall refrain from any action which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of the Act”.

Relevance to the proposed project

The proponent/contractor shall take care and precaution not to pollute underground water or even surface water in anyway and if a pollution incidence occurs the contractor should notify the authority immediately.

4.2.4 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 is to protect human health and the environment. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source. The regulation requires licensing of transporters of wastes and operators of disposal site (sections 7 and 10 respectively). Of immediate relevance to proposed development for the purposes of this project report is Part II Sections 4(1-2), 5 and 6.

Section 4 (1) states that “No person shall dispose of any waste on a public highway, street, road, recreational area or any other public place except in a designated waste receptacle”.

Section 4(2) and 6 explain that the waste generator must collect, segregate (hazardous waste from non-hazardous) and dispose waste in such a facility that shall be provided by the relevant local authority.

Section 5 provides method of cleaner production (so as to minimise waste generation) which includes the improvement of production processes through conserving raw materials and energy.

In section 14 (1) every trade or industrial undertaking is obliged to install anti- pollution equipment for the treatment of waste emanating from such trade or industrial undertaking.

Relevance to the proposed project

The Developer shall ensure that the garbage collector contracted has a valid license from the National Environment Management Authority (NEMA).

So as to comply with this, the contractor shall take precaution not to dump wastes in areas not registered and designated as so. Further, the project proponent shall be required to ensure, through public education and other law enforcement mechanism to ensure that all road users don't dump wastes along the road.

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

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

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

Relevance to the proposed project

The contractor shall be required to abide by these measures; ensure that all machineries are in good working condition to reduce noise.

4.2.6 EMCA (Air Quality) Regulations, 2013

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 to the proposed project

The proponent shall implement the mitigation measures provided in the EMMP to prevent air pollution.

4.2.7 Occupational Health and Safety Act, 2007 CAP 514

The Act makes provision for the health, safety and welfare of persons employed in factories and other places of work. The provision requires that all practicable measures be taken to protect persons employed in the factory and other places of work from any injury. The provisions of the act are also relevant to the management of hazardous and non hazardous wastes, which may arise at the project site. The act provides that all measures should be taken to ensure safety, health and welfare of all the stakeholders in the work place.

Relevance to the proposed project

Workers and Neighbors’ safety will be given priority during construction phase of the project.

4.2.8 The Physical Planning Act of 1996, CAP 286

Part V clause 36 of the act requires that, “If in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development, will have injurious impact on the environment the applicant should be required to submit together with the application an environmental impact assessment report.”

Relevance to the proposed project

This Act provides for order in terms of development execution. This development should therefore comply with all the provisions of this law including land use zoning requirements.

4.2.9 The Penal Code CAP 63

Chapter XVII on “Nuisances and offences against health and convenience” contained in the penal code strictly prohibits the release of foul air into the environment which affects the health of the persons. It states “Any person who voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighborhood or passing along a public way is guilty of a misdemeanor”

Relevance to the proposed project

Waste disposal and other project related activities shall be carried out in such a manner as to conform to the provisions of the code.

4.2.10 County Government Act, 2012

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

The proponent will work in liaison with NCC and in particular the Water, Energy, Forestry, Environment and Natural Resources sector.

The plans provided in this report have been approved by the County Government of Nairobi a sign of compliance.

4.2.11 The Registration of Titles Act (Chapter 281)

According to section 23 (1) of this Act, the certificate of title issued by the registrar to a purchaser of land upon a transfer or transmission by the proprietor thereof shall be taken by all courts as conclusive evidence that the person named therein as proprietor of the land is the absolute and indefeasible owner thereof, subject to the encumbrances, easements, restrictions and conditions contained therein or endorsed thereon, and the title of that proprietor shall not be subject to challenge, except on the ground of fraud or misrepresentation to which he is proved to be a party.

Copy of land ownership documents is attached to this Report.

4.2.12 National Environmental Tribunal (NET)

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

5.0 ENVIRONMENTAL IMPACTS

5.1 Description of the existing and anticipated impacts

5.1.1 Existing impacts

There were no impacts at the time of the study. The proposed site had an abandoned single dwelling house.

5.1.2 Anticipated impacts

The anticipated impacts of the proposed project on the environmental elements are both positive and negative. The magnitude of each impact is described in terms of being significant, minor or permanent, short-term or long term, specific (localized) or widespread, reversible or irreversible. The assessment criteria for the significant impacts are as shown in the table below:

Table 5.1: Assessment criteria for significant impacts

Key	Type of impact	Key	Type of impact.
++	Major positive impact.	+	Minor positive impact.
--	Major negative impact	-	Minor negative impact.
0	Negligible/zero impact	NC	No change
Sp	Specific/localized	W	Widespread.
R	Reversible	Ir	Irreversible.
Sh	Short term.	L	Long term.
T	Temporary	P	Permanent

On the basis of information gathered during both the desktop and field study, the potential environmental impacts of the proposed project are as tabulated below.

Table 5.2: Potential environmental impacts

Impacts on Or due to	Construction and Decomissioning	Occupation	Remarks
Noise Pollution	-	0	<ul style="list-style-type: none"> During construction. This will however be very minimal. There shall be minimal noise pollution during operation stage as residential related activities cause insignificant noise. This will however not affect the peace of the neighbors as the area is predominantly a mixed use

			development area.
Air/Dust Pollution	-Sh	0	<ul style="list-style-type: none"> ▪ During construction, dust and exhaust emission from the construction activities, may pollute the ambient air. This will be minimal as the site will be dampened to reduce dust generation. Tarpaulins will be used to contain dust. ▪ Operation phase of the project is not associated with dust/air pollution.
Soil erosion	-T	0	<ul style="list-style-type: none"> ▪ Earthworks during project construction usually influence soil erosion. By incorporating appropriate proper drainage facilities both during construction and operation phases of the project, soil erosion problem will completely be minimized.
Water Resources	0	0	<ul style="list-style-type: none"> ▪ The proponent intends to use tap water for the construction activities from the pipe system of Nairobi water. Operation activities may not have significant impact on water resources within the project area.
Vegetation and flora	0	0	<ul style="list-style-type: none"> ▪ There will be minimal clearance of vegetation during excavation as the site has two trees and grass. The proponent will landscape the site once completed
Public Health	-	0	<ul style="list-style-type: none"> ▪ During the construction process onlookers and passersby maybe exposed to risk of falling objects, dusts e.t.c.

5.2 Positive impacts

There are a number of positive benefits associated with the proposed project. The following are some of the positive benefits anticipated:

- i. Increase in revenue to the county government and country at large.

- ii. Provision of spacious housing units.
- iii. Provision of employment opportunities during both construction and occupation phases of the project.
- iv. Utilization of land

5.3 Negative environmental Impacts

The issues that are seen as likely to negatively affect the environment and population therein include the following:

5.3.1 Public and Occupational Health and Safety Risks

During the proposed works, there may be increased risks to health and safety such as dust, air, and noise pollution. The workforce and general public involved would be more subjected to these environmental hazards and disturbances.

5.3.2 Increased Solid waste

The proposed activities will generate related solid wastes which include stones, wood, broken glasses, containers, rods of metal, sharp objects (nails) etc .On completion and occupation the project will generate waste mainly associated with residential activities.

5.3.3 Increased Water use and management

Implementation and operation phases of the project will create additional demand to the water supply within the project vicinity.

5.3.4 Increased Surface runoff

The drainage of the general site is necessary to enhance effective flow of the surface run-off expected from impermeable areas within the site.

5.3.5 Increased airborne emissions

The works will generate some dust that may have direct negative impact to the quality of air during construction phases.

5.3.6 Workplace accidents

Workers at the site may be exposed to various workplace accidents especially during construction period. These include being hit by falling objects and falling off from elevated heights among others. During operation period, accidents may include exposure to exposed electrical parts.

5.3.7 Site Security

Security of the site and those working within is of utmost significance and those operating within the facility must be assured of their security at all times. Security lapses that may lead to injury of occupants of the building and loss of personal property should be taken care of.

5.3.8 Fire hazards

The operations that lead to fire outbreaks include poor handling of electricity systems, faulty electrical equipment, carelessness etc. These should be avoided both during construction and operation phases of the project.

5.3.9 Traffic Snarl up within the project area

During delivery of the construction materials to the site trucks may cause a snarl up as they maneuver to enter and leave site. Proper signage should be ensured during delivery of materials.

6.0 PROJECT ALTERNATIVES

6.1 Introduction

This section examines alternatives to construction of the proposed development in terms of the site, products, materials, technology and waste management. Also, impacts of each alternative are identified, discussed and compared with those of this development proposal. With such information, reviewers have basis for decision making.

6.2 No project alternative

This option implies that the existing situation prevail i.e. no construction/development activity to take place. This option is mostly applicable in situations where the proposed project area is in ecologically sensitive areas. The land in which the proposed project is to be constructed is in a stable environment and therefore will not be affected by this development activity. From a socio-economic perspective the “no action” alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realized and the resources in the area would continue to be underutilized since the land lies idle. The “No Project Option” is the least preferred from the socio-economic and partly environmental perspective since if the project is not done:

- i. The economic benefits especially during construction i.e. provision of jobs for skilled and non-skilled workers will not be realized
- ii. There will be no generation of income by the developer and the Government.
- iii. The social-economic status of Kenyans and local people would remain unchanged.
- iv. The local skills would remain under utilized
- v. No employment opportunities will be created for Kenyans during operation phase.
- vi. Discouragement for investors to produce this level of standard and affordable developments.

From the analysis above, it becomes apparent that the “No Project Alternative” is not the appropriate alternative to the local people, Kenyans, and the Government of Kenya. This alternative describes a situation where the proposed development fails to be implemented. In case this happens, positive impacts associated with the proposed development will not accrue to the stakeholders, the development consultants, contractors and suppliers of materials. However, from an environmental conservation perspective, this alternative will be beneficial in the sense that any potential negative impacts associated with the project will be avoided. The “No Action Alternative” should not be adopted, as we need to encourage development so long as it is undertaken on a sustainable basis as per the environmental management plan developed in this report. In addition, adopting the no action alternative will mean that the existing shortfall in residential needs will continue to prevail

unabated. This is not viable since the proponent has already committed finances and land to a development project that suits development objectives. Construction of this development will create employment for both skilled and semi-skilled. If the project is abandoned, then the trickle-down of financial resources will not be felt in this area. In this respect, the “No project alternative” is deemed inappropriate.

6.3 Alternatives to Site

Currently, there is no other alternative site available to the proponent for the proposed development. Looking for suitable land to accommodate the scale and size of the project and completing official transaction on it may take a long period. In addition, it is not a guarantee that such land would be available. The project design and planning before the stage of implementation would call for cost; already incurred in the proposed development i.e. whatever has been done and paid to date would be considered as a loss to the proponent. Assuming the project will be given a positive response after (say relocation) by the relevant Authorities including NEMA, it (project) would have been delayed for a long period before implementation. The other consequence of this is that it would discourage both foreign and local investors especially in the building sector. In consideration of the above concerns and assessment of the current proposed site, relocation is not a viable option.

6.3 Alternative land use

Alternative land uses such as hotel, commercial may be considered for the site. However, given there is demand for residential units in the area as attributed by the feasibility study conducted by the proponent, coupled with the size of the plot and the net return, it is advisable for the proponent to undertake the proposed development.

6.3 Alternative design

The architectural design that was selected proved to be the most feasible. It provides sufficient housing requirements for the residents, a variety of units to choose from, privacy, security, recreational facilities among other specifications favorable for households. It concurs with the stipulated standards and specifications.

The proponent settled on this design as a unique design that best meets the objectives of the project.

Attached are the approved architectural drawings.

6.4 Alternative construction materials and technologies

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security, environmental and aesthetic requirements. Equipment that saves on water and energy will be given priority. The concrete pillars will be built using locally sourced stones, sand, cement, metal bars and fittings that meet the Kenya Bureau of Standards (KBS) requirements.

The alternative technologies available include the conventional brick and mortar style, prefabricated concrete panels or even temporary structures. Due to cost and durability, the brick and mortar style is most popular in Kenya.

Other various technologies include; concrete frame construction, timber construction, prefabricated space frame construction, steel frame and aluminum frame. The technology to be adopted will be most economical and one sensitive to the environment. Heavy use of timber during construction is discouraged because of destruction of forests. The exotic species will be preferred over indigenous species where need arises.

CHAPTER SEVEN

7.0 MITIGATION MEASURES AND ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 Potential mitigation measures for Occupational Health and Safety

During construction and decommissioning, the contractor will be required to prepare a waste management plan for the work sites and equipment store at the start of the project. The site is to be kept clean, neat and tidy at all times. The contractor shall implement measures to minimize waste and develop a waste management plan to include the following:

- All personnel shall be instructed to dispose of waste in designated waste containers.
- At the places of work, the contractor shall provide litter collection facilities.
- The final disposal site of the waste shall be done at the location that shall be approved by the engineer on site. This must be in full recognition of the existing legal requirements.
- There shall be provision of sufficient bins to store the solid waste produced on a daily basis.
- Wherever possible, materials used or generated by construction shall be recycled. Provision shall also be made of responsible management of any hazardous waste generated during the construction works.
- Workmen shall be provided with suitable protective gear (such as dust masks, ear muffs, helmets, overalls, boots etc) particularly during construction. There must be fully equipped First Aid kits on site and among them someone who has First Aid training and knowledge of safety procedures. In addition, the contractor must ensure workmen have insurance cover. The contractor will be required to adhere to Occupational Safety and Health Act (OSHA) of 2007, especially the building operations and works of engineering construction rules and its subsidiary and supplementary regulations on safety and public health in the construction activities.

7.2 Potential mitigation measures for increased solid waste

- Express condition shall be put in the contract that before the contractor by the proponent; he will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant.
- Materials from excavation of the ground and foundation works shall be reused for earthworks and landscaping.
- Bins/ receptacles shall be placed at strategic locations within the site as collection centres to facilitate separation and sorting of the various types of wastes.
- The contractor and proponent shall work hand in hand with private refuse handlers and NCC to facilitate sound waste management.
- The wastes shall be properly segregated and separated to encourage recycling of some useful waste materials i.e. some stone and concrete materials can be used as backfills.

- Use of an integrated solid waste management system through a hierarchy options i.e. source reduction, recycling, composting and reuse shall be encouraged. This will facilitate proper handling of solid waste during operation stage.
- The design provides a solid waste storage section for the development prior to collection by contracted waste handlers.

7.3 Potential mitigation measures for water use and management

- Installation of water conserving taps that can be turned-off when water is not in use will be done.
- Encouragement of water re-use/ recycling during both construction and occupation phases of the project.

7.4 Potential mitigation measures for surface water drainage

- Drainage channels shall be installed in all areas that generate or receive surface water. The channels will be covered with gratings or other suitably approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off.
- The channels shall be designed with regard to peak volumes.
- Paving of the sidewalks, parking and other open areas shall be done using pervious materials i.e. murrum to encourage water percolation thus reducing run-off volume.

7.5 Potential mitigation measures for air quality

- The contractor shall ensure workers have full protective gear. Workers shall also be sensitized on hazards encountered in such work environment.
- Tarpaulins shall be used if need be when dust levels become aggravated.
- Open burning of solid waste at any phase is discouraged

7.6 Potential mitigation measures for accident prevention

Occurrences of accidents may be prevented by observing the following:

- Ensuring that the operational manuals are available and accessible for every equipment /machinery used at the site.
- Proper maintenance of all machinery and equipment to prevent premature failure or possible accidents.
- Ensuring all electrical equipment and machinery are properly guarded and grounded.
- Only properly trained workmen to operate equipment or machinery and proper instructions in their safe operation is provided.

7.7 Potential mitigation measures for site security

Insecurity may arise during the construction phase since intruders may try to steal the building materials deposited on the site. This especially happens in cases where there is no fence.

- The project site will be enclosed using a perimeter wall to beef-up security and to control movement within the site.
- There will be a guard house at the gate. Security guards will be expected to monitor the gate of the facility to keep away the intruders and to control movement within the site.
- Contractor shall provide adequate security during the construction period when there are no works on the site.
- The guards stationed at the gates will document movements in and out of the site/property.
- Installation of CCTV cameras at strategic points for monitoring and enhancing the security of the property during operation phase

7.8 Potential mitigation measures for fire hazards

In this regard, the design of the project has provided and recommended implementation of fire fighting measures and control facilities. These include the following:

- All fire control and fighting facilities shall be installed following NCC fire masters requirements and approval.
- Conduct regular fire drills

7.9 Traffic within the project area

Within the immediate environs of the project site, the following traffic rules will be observed:

- A traffic marshal shall be stationed along the road for accessing the other plots within the project boundary to control vehicles during transportation of construction materials.
- Speed limits and all other road signs and traffic rules shall be strictly observed.
- Vehicles will be used for the purposes to which they are intended only.
- Parking shall be made available so as to be equivalent to the housing units provided

Potential Mitigation measures for Increased Energy demand

- Turn off machinery and equipment when not in use.
- Monitor energy use during construction and set reasonable limit.
- Put off all lights immediately when not in use or are not needed.
- Use energy conserving electric lamps for general lighting.

- Make use of alternative source of energy such as solar power. Solar panels proposed in the project shall be fully utilized and timely repaired in case of damage.

Conflict with the community

Projects of such magnitude usually attract public uproar (especially from the neighboring residents and community) if they are not made to own the project. Conflicts usually arise mostly from the foreseen negative impacts. Consultations with the neighbors and relevant stakeholders on the mitigation measures prescribed for the negative impacts should be done as a way of conflict prevention.

7.10 Environmental Management Plan

7.10.1 Significance of EMP

An EMP involves the protection, conservation and sustainable use of the various elements or components of the environment. The EMP for the proposed project provides all the details of project activities, impacts, mitigation measures, time schedules, costs, responsibilities and commitments proposed to minimize environmental impacts of activities, including, monitoring and evaluation and environmental audits during implementation and decommissioning phases of the project.

7.10.2 Environmental monitoring and audits

Environmental monitoring and audits are essential in Projects life span as they are conducted to establish if project implementation has complied with set environmental management standards for Kenya as spelt out in EMCA Cap 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003. In this Project, environmental monitoring and audit will be conducted to ensure that identified potential negative impacts are mitigated during the project's life span.

Environmental/ Social Impact	Proposed mitigation and monitoring aspects	Responsibility for monitoring/ intervention	Monitoring indicator	Estimated Cost/year
Increased solid waste	<ul style="list-style-type: none"> ▪ Construction waste should be recycled or reused to ensure that materials that would otherwise be disposed of as waste are diverted for productive uses. In this regard, the proponent/contractor should be committed to ensuring construction materials left over at the end of construction will be used in other projects rather than being disposed of. Some of the waste can be sold or donated or recycled/reused by construction companies, local community groups or institutions; ▪ It is recommended that during the construction phase the contractor and the proponent are expected to ensure that the waste is disposed of according to EMCA (Waste Management) Regulations, 2006 and the Nairobi County Government by – laws; ▪ Contracted waste handlers should be licensed to transport and dispose waste at approved dumpsites only. ▪ During transportation of waste, it should be covered to avert dispersion along the way. ▪ Express condition shall be put in the contract for the contractor to clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant. ▪ Bins/ receptacles shall be placed at strategic locations within the site as collection centers to facilitate separation and sorting of the various types of wastes. ▪ The proponent and contractor shall work hand in hand with private refuse handlers and NCC to facilitate sound waste management. 	Proponent/ Contractor	<ul style="list-style-type: none"> -Contract licensed waste handlers -Waste disposal at designated sites -No reports of illegal waste dumping 	100,000.00

	<ul style="list-style-type: none"> ▪ The wastes shall be properly segregated and separated to encourage recycling of some useful waste materials i.e. some stone and concrete materials can be used as backfills. ▪ Use of an integrated solid waste management system through a hierarchy options i.e. source reduction, recycling, composting and reuse shall be encouraged. This will facilitate proper handling of solid waste during operation stage. 			
Public and Occupational Health and Safety Risks	<ul style="list-style-type: none"> ▪ Regular drills shall constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep workers alert and ensure response mechanism in the case of incidences are improved. ▪ Use signage to warn staff and/ or visitors that are not involved in construction activities. ▪ Restrict non-essential staff from the construction sites. ▪ Strict instructions shall be given for drivers of heavy equipment. ▪ Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work ▪ Develop evacuation procedures to handle emergency situations. ▪ Speed controls by temporary speed bumps where necessary within the construction site. ▪ Compliance to all international, national and local health and safety standards that may exist. ▪ Clear marking of work site hazards and training in recognition of hazard symbols. ▪ Training of all personnel in fire prevention and protection. ▪ Regular inspection, testing and maintenance of equipment and 	Proponent / Contractor	Routine maintenance & inspection during Construction & operation Statutory safety and health reports Speed controls in place	90,000.00

		<p>machinery.</p> <ol style="list-style-type: none"> a. Provide full first aid kits at the construction yard. b. Use of water sprays to arrest dust. c. Containment of hazardous materials. d. Provide adequate protective gear to construction workers. e. Adhere to provisions of Occupational Safety and Health Act of 2007 and the rules formulated under it. 			
Increased Airborne emissions		<ul style="list-style-type: none"> -Control speed and operation of construction vehicles and switch off machines when not in use. -Use of tarpaulins at the construction buildings to confine dust. -Spray water on dry rough roads during dry weather to suppress dust -Cover loads of friable materials during transportation -Regularly service and maintain vehicles and mobile plants and machinery -Provide PPE e.g. nose masks to workers 	Proponent/ Contractor	<p>Air quality monitoring through observation and measurement if need be</p> <p>Use of PPE</p> <p>Covering friable loads.</p> <p>No dust complaints from neighbors</p>	60,000.00
Noise and excessive vibrations pollution		<ul style="list-style-type: none"> ▪ Machinery and equipment in use to be serviced regularly to ensure that they are in good condition to minimize excessive noise; ▪ Use piling system with lowest sound generation; ▪ Notify the public of construction activities that may be perceived of as noisy and intrusive prior to starting construction; ▪ Establish means for the public to contact the contractors in charge (i.e., provide telephone number, email, etc.) and methods to handle complaints; ▪ The use of hearing protection gears by workers when exposed to noise levels above 85 dB(A); ▪ Ensure that noise & excessive vibration from construction 	Contractor/ proponent	<ul style="list-style-type: none"> -Noise surveys -Provision of hearing protectors to workers - Maintenance logs of machinery 	150,000.00

	<p>activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level;</p> <ul style="list-style-type: none"> ▪ Construction work should strictly be undertaken between permissible time periods as stipulated in the second Schedule–Maximum Permissible Noise Levels for Construction Sites of EMCA(Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 ▪ Care when selecting equipment to avoid use of time worn or damaged machinery with high level of noise emissions that would have a negative impact in the environment. 			
Water and Waste Water management	<ul style="list-style-type: none"> ▪ All grey waste water to be channeled to the existing sewer line ▪ Routine checkups and monitoring of the drainage system to avoid leakages and blockages. ▪ Construction of separate storm water and waste water drain. ▪ Implement water saving devices for domestic water use e.g. dual flush toilets, automatic shut-off taps, etc.; ▪ Practice rain water harvesting; ▪ Conducting of regular audits of water systems to identify and rectify any possible water leakages; and ▪ Implementing a system for the proper metering and measurement of water use to enable proper performance review and management. 	Proponent/ Contractor	-Proper drains for grey and black water -Audit reports of water systems	40,000.00
Traffic Snarl Up	<ul style="list-style-type: none"> ▪ A traffic marshal shall be stationed within the project area 	Proponent/	Regular inspection.	-

	<p>for accessing the other plots within the project boundary to control vehicles during transportation of materials.</p> <ul style="list-style-type: none"> ▪ Maximum speed limit within this area will be 30km/hr. ▪ Speed limits and all other road signs and traffic rules shall be strictly observed. ▪ Vehicles will be used for the purposes to which they are intended only. 	Contractor		
Removal of vegetation cover	<ul style="list-style-type: none"> ▪ Landscaping with flowers, grass and trees. 	Proponent/ contractor	Presence of vegetation landscaping	25,000.00
Increased Surface run off	<ul style="list-style-type: none"> ▪ Drainage channels shall be installed in all areas that generate or receive surface water. The channels will be covered with gratings or other suitably approved materials to prevent occurrence of accidents and dirt entry that may compromise flow of run-off. ▪ The channels shall be designed with regard to peak volumes. ▪ Paving of the sidewalks and open areas shall be done using pervious materials i.e. murrum to encourage water percolation thus reducing run-off volume. 	Proponent/ Contractor	-proper drainage of surface run off	-
Fire Safety	<ul style="list-style-type: none"> ▪ Install firefighting equipment. ▪ Provide fire exits ▪ Ensure all workers are conversance with basic fire safety techniques ▪ Ensure Safe electrical installations ▪ Provide emergency numbers at strategic points. ▪ Provide adequate signage on fire action 	Proponent/ Contractor	Presence of fire extinguishers Presence of signage And emergency numbers Presence of fire exits	100, 000.00
Energy saving	<ul style="list-style-type: none"> ▪ Use of energy saving bulbs 	Proponent/	Throughout project	-

	<ul style="list-style-type: none"> ▪ Good practices: switching off lights, low watts bulbs, etc. ▪ Switching off machinery when not in use. 	contractor	cycle	
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NOTE

Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality. The EMPs outlined above addresses the identified issues of concern (potential negative impacts) and mitigation measures as well as roles, costs and monitorable indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMPs have considered both construction and occupation phases.

8.0 PUBLIC CONSULTATION

8.1 Introduction

This chapter describes the process of the public consultation followed to identify the key issues and impacts of the proposed project. Views from the local residents, stakeholders, surrounding institutions and development partners who in one way or another would be affected or rather interested in the proposed project were sought through administering of questionnaires and interviews as stipulated in the Environment Management and Coordination Act, cap 387.

Section 17 of the Environmental (Impact Assessment and Audit) Regulations 2003, states that an EIA should “*seek the views of persons who may be affected by the proposed project.*”

8.1.1 Objectives of the Consultation and Public Participation (CPP)

The objective of the consultation and public participation was to:

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

8.1.2 Methodology used in the CPP

The Consultation and Public Participation (CPP) process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA CAP 387 section 58, on EIA for the purpose of achieving the fundamental principles of sustainable development. The environmental assessment study exercise was conducted on the 24TH August 2018.

The exercise was conducted in different ways, namely;

- i. interviews and discussion,
- ii. field surveys and observations,
- iii. Administering of questionnaires,

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

8.2 Analysis of the Public Consultation findings

8.2.1 Positive Issues

- i. Creation of employment opportunities
- ii. Increase in habitable housing units in the neighborhood
- iii. Creation of business opportunities

8.2.2 Negative Issues

The following are negative issues raised by the neighbors/affected parties (AP) that need to be addressed;

- i. Increased traffic along the access road.
- ii. Increased water demand
- iii. Increased storm water along the open drains
- iv. Air and noise pollution (dust) especially during the construction phase
- v. Increased solid and liquid wastes
- vi. Pressure on the existing infrastructure

Annexed to this report are questionnaires and list of stakeholders consulted as it regards the proposed project. All the raised concerns have well been addressed in the proposed EMP owing to the fact that the proponent will fully implement it to the latter

9.0 ENVIRONMENT, HEALTH AND SAFETY (EHS)

9.1 EHS Management and Administration

The EHS is a broader and holistic aspect of protecting the worker, the workplace, tools /equipments and the biotic environment. It is an essential tool in determining the EIA study. The objective of the EHS on the proposed project is to develop rules that will regulate environmentally instigated diseases and occupational safety measures during construction and the operation phases of the proposed project by:

- Avoidance of injuries.
- Provision of safe and healthy working environment for workers comfort so as to enhance maximum output.
- Control of losses and damages to plants, machines, equipment and other products.
- Enhance environmental sustainability through developing sound conservation measures.

9.2 Policy, Administrative and Legislative Framework

It is the primary responsibility of the contractor/proponent to promote a safe and healthy environment at the workplace and within the neighborhood in which the proposed project will be constructed by implementing effective systems to prevent occupational diseases and ill-health, and to prevent damage to property.

9.3 The Guiding Principles to be adopted by the contractor/proponent

- Promotion and maintenance of high standards of health and safety for its employees, the neighboring population and the public at large.
- Ensuring protection of the environment and prevention of any form of nuisance/pollution.
- Commitment and exercise constant vigilance in order to provide employees, neighbors of the project and the environment, with the greatest safeguards relating to Environment Health and Safety.
- Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public.

9.4 EHS management strategy to be adopted by the contractor

The following strategies will be adopted to achieve the above objectives:

- Maintain an effective reporting procedure for all accidents.
- Provide appropriate tools and protective devices for the success of the project.
- Encourage, motivate, reward and support employees to take personal initiatives and commitment on EHS.

9.5 Safety requirement at the project site during construction and operation period

(a) The contractor

The contractor will ensure that:

- Safe means of entry and exit exist at the proposed project site.
- Ensure adequate briefing of job at hand on the safe system of work before commencement of work.
- A safety harness must be worn before entry into all confined spaces.

(b) The Traffic /Drivers

Within the construction premises, the following traffic rules will be observed: -

- Observe speed limits and all other signs and obey traffic rules.
- Use the vehicle for the purpose to which it is intended only.

9.6 Emergency procedure during construction and operation

An emergency situation means:

- Unforeseen happening resulting in serious or fatal injury to employed persons or the neighboring communities.
- Fire or explosion.
- Natural catastrophe.

In the event of such an emergency during construction, the workers shall:

- Alert other persons exposed to danger.
- Inform the EHS coordinator/contractor/proponent.
- Do a quick assessment on the nature of emergency.
- Call for ambulance on standby.
- When emergency is over all workers shall be notified by putting a message: “ALL CLEAR”

In the event of such an emergency during operation the workers shall: -

- Alert other persons exposed to danger.
- Ring the nearest police station.
- Call for ambulance on standby.

10.0 PROJECT DECOMMISSIONING

10.1 Introduction

Decommissioning is an important phase in the project cycle and comes last to wind up the operational activities of a particular project. It refers to the final disposal of the project and associated materials at the expiry of the project lifespan. If such a stage is reached, the proponent needs to remove all materials resulting from the demolition/ decommissioning from the site. In this specific project, decommissioning will be done before and after the development of the proposed project.

10.2 Purpose and objectives of decommissioning

The generally accepted purpose of decommissioning is to allow for release of valuable assets such as buildings and sites for alternative use, recycling and reuse of materials and the restoration of environmental amenity. In all cases, the basic objective is to achieve an end-point that is sensible in technical, social and financial terms, that properly protects workers, the public and the environment and, in summary, complies with the basic principles of sustainable development.

10.3 Decommissioning Phase Impacts

Table 10.1: Summary of Decommissioning Impacts

Impact	Type
Site Rehabilitation	Major Positive, localized Long term
Employment opportunities	Major positive, Short-Term, Localized
Livelihoods and Economic Loss	Major negative, short term, widespread
Solid waste generation	Major Negative, short term, localized
Excessive Noise and Vibration pollution	Major Negative, short-term Localized
Occupational/ Public Health and Safety Hazards	Minor negative, short term, localized
Displacement of tenants & workers	Minor negative, short term, localized
Dust and exhaust emissions	Minor negative, short term ,localized, irreversible

10.3.1 Positive Impacts

Rehabilitation-Site restoration

Upon decommissioning of the proposed project, rehabilitation of the project site will be carried out to restore the site to near to its' original state or better.

Employment Opportunities

For decommissioning to take place properly and in good time, several people will be involved. As a result, several employment opportunities will be created for the demolition.

10.3.2 Negative Impacts

Livelihoods and Economic Loss

The establishment and operation of the project will bring about a lot of positive changes to the lives of the people around it and also to the surrounding economy. Decommissioning of the project will thus mean a reverse of some of these gains, whereby many people will lose their source of livelihood from jobs to business ventures hence directly leading to a decline of the area economic stature and a drawback to the economy at large.

Mitigation measures

- Services associated with the development should be notified of intention of decommissioning in good time, so as to adjust;
- Redeployment of the affected workers where feasible.

Solid Waste Generation

Demolition of the project buildings and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, wood and, glass. Although demolition waste is generally considered as less harmful to the environment since it is composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain chemicals into the environment.

Mitigation measures

- All solid waste to be collected at a central location, and be stored temporarily until removal by a licensed solid waste handler;
- Contractor should adopt the method of selective demolition as far as practicable to enable the removal of wastes of the same category one at a time thus facilitating recycling of wastes for beneficial reuse and minimizing the burden on dumpsites;
- No dumping within the surrounding area is to be permitted. Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal. General waste is to be collected either by the County Government or via a licensed waste disposal contractor. The frequency of collections should be such that waste containment receptacles do not overflow;
- Waste generated at the site should be categorized by the contractor and disposed of in a suitable manner into different waste streams (including general and hazardous waste). Wherever possible recycling should be carried out;

- Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites;
- All rubble must be removed from the site to an approved disposal site as approved by the Engineer. Burying rubble on the site is prohibited;
- Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties during or after the decommissioning period of the project. These have to be disposed of at dumping site as approved by the County government.

Excessive Noise and Vibration pollution

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

Mitigation measures

- Construction machinery shall be kept in good condition e.g. greasing to reduce noise generation from friction of movable parts;
- Generators and heavy duty equipment be insulated or placed in enclosures to minimize noise levels during demolition works;
- Obtain special permit from NEMA to undertake demolitions works;
- Ensure that noise & excessive vibration from construction activities are within permissible levels as per the provision of the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This includes among others adhering to permissible noise and vibration level.

Dust and Exhaust Emissions

Large quantities of dust will be generated during demolition works. Particulate matter pollution is likely to occur during demolition and transportation of the construction waste. There is possibility of suspended and settle-able particles affecting the site workers and the surrounding neighbors' health. Exhaust emissions are likely to be generated during the demolition period by the various machinery and equipment to be used as well as motor vehicles used for the exercise.

Proposed mitigation measures

- Strict enforcement of onsite speed controls as well as limiting unnecessary traffic within the demolition site;

- Demolition site will be fenced off using tarpaulins;
- Friable loads of construction debris being transported must be watered to reduce dust;
- All areas disturbed during closure of the site that are not required for a specific activity must be re-vegetated;
- Diesel exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimized by regular checks and servicing of vehicles. Any construction vehicle found to be emitting excessive smoke should be withdrawn from the operations and accorded the necessary mechanical attention before it can continue.

Occupational /Public Health and Safety Hazards

Demolition works will inevitably expose workers and the public to occupational health and public safety risks. In particular, working with heavy equipment, handling and use of tools provoke certain risks. The construction workers are also likely to be exposed to risk of accidents and injuries resulting from accidental falls, falling objects, and injuries from hand tools and other equipment.

Proposed mitigation measures

- Decommissioning workers be issued with appropriate PPEs and the decommissioning contractor to enforce their use;
- Restrict onlookers/scavengers from site;
- Develop safe work procedures for demolition works.

Displacement of tenants & workers

The decommissioning of the project will result into displacement of the tenants and workers.

Mitigation measures

- Adequate notices to Interested and Affected Parties (IAP) should be made of the impending decommissioning to make arrangement for alternative arrangements.

10.4 Decommissioning Environmental Management Plan

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
A Environmental and social Impacts				
1.	Generation of solid waste	<ul style="list-style-type: none"> • All solid waste to be collected at a central location and stored temporarily until removal by a licensed solid waste handler; • Adopt the method of selective demolition as far as practicable to enable the removal of wastes of the same category one at a time thus facilitating recycling of wastes for beneficial reuse and minimizing the burden on dumpsites; • No dumping within the surrounding area is to be permitted. Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal; • General waste is to be collected either by the County Government or via a licensed waste disposal contractor. The frequency of collections should be such that waste containment receptacles do not overflow; • Waste generated at the site should be categorized by the contractor and disposed of in a suitable manner into different waste streams (including general and hazardous waste). Wherever possible recycling should be carried out; • Litter generated by the construction crew must be collected in rubbish bins and disposed of weekly at registered waste disposal sites; • All rubble must be removed from the site to an approved disposal site as approved by the Engineer. Burying rubble on the site is prohibited; • Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders wastes generated on the premises is placed, dumped or deposited on adjacent/surrounding properties during or after the decommissioning period of the project are disposed of at dumping site as approved by the County government. 	Contractor, Project Engineer in charge	200,000.00

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
A	Environmental and social Impacts			
2.	Soil erosion	<ul style="list-style-type: none"> • Re-vegetate the site with grass and trees of indigenous tree species. 	Contractor	-
3.	Air pollution	<ul style="list-style-type: none"> • Active earth work areas, stockpiles and loads of soil being transported must be watered to reduce dust; • All areas disturbed during closure of the site that are not required for a specific activity must be re-vegetated; • Diesel exhaust emissions from heavy machinery on site (excavators, front end loaders and hauling trucks) must be controlled and minimized by regular checks and servicing of vehicles; and • Any demolition machine found to be emitting excessive smoke should be withdrawn from operation and given mechanical attention. 	Contractor	150,000.00
4.	Noise and excess vibrations	<ul style="list-style-type: none"> • Use modern equipment, which produces the least noise. Any unavoidably noisy equipment should be identified and located in an area where it has least impact; • Use noise shielding screens. The operation of such machinery restricted to when it is actually required; • For mobile equipment fit efficient silencers and enclose engine compartments in plant vehicles; • For fixed plants, isolate source by enclosure in acoustic structure; • Carefully select fixed plant site for remoteness from sensitive areas; and • Raise barriers around noisy equipment. 	Contractor	120,000.00
5.	Safety and Health risks	<ul style="list-style-type: none"> • Decommissioning works workers be issued with appropriate PPEs and the decommissioning contractor to enforce their use; • Restrict onlookers/scavengers from site; and • Develop safe work procedures for demolition works. 	Contractor	-

No.	Activity / Issue	Action required	Responsibility	Estimated Cost (KES)
A	Environmental and social Impacts			
6.	Displacement of tenants and workers	<ul style="list-style-type: none"> • Adequate notice on the impending decommissioning should be given to Interested and Affected Parties (IAP) to enable them make arrangement for alternative arrangements. 	Proponent, contractor	50,000.00
7.	Livelihood and economic Loss	<ul style="list-style-type: none"> • Businesses associated with the development should be notified of intention of decommissioning in good time to relevant adjustment; and • Redeployment of the affected workers where feasible should be undertaken. 	Proponent	

11.0 CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusion

The proposed project will provide modern and spacious residential houses in Westlands Area and its environs. The activities for which the proposed development is intended are not such that they are likely to interfere with the peace of the neighbors. The project has been planned in full cognizance of the requirements of the neighborhood where it is to be implemented and all standard planning considerations have been taken into account and given the attention they deserve. The project is an environmentally low risk project and thus poses no significant threat to the environmental aspects of the area. The likely environmental impacts expected from the implementation of the building are minimal and will be restricted to construction stage. Appropriate mitigation measures have been put in place to take care of these both in the design of the project and recommendations elsewhere in this report.

11.2 Recommendations

The proponent and contractor are advised to implement Environmental Management and Monitoring Plan (EMMP) so as to reduce adverse impacts and boost good environmental practices. Guidelines on environment, health and safety must also be followed in order to reduce incidences of accidents, health problems and compromise to environmental well-being.

Recommendations for the prevention and mitigation of adverse impacts are as follows: -

- i. Ensure that worker's occupational health and safety standards are maintained mainly during construction phase.
- ii. The proponent should ensure that the proposed EMMP is fully implemented.
- iii. Construction activities must be undertaken only during the day i.e. between 0800 hours to 1700 hours. This will minimize disturbance to the general public within the proximity of the site/project especially the immediate neighbors.
- iv. Rainwater harvesting systems should be provided as well as standard storage systems to every unit to enhance collection of the run-off generated from the roof catchments.
- v. All solid waste materials and debris resulting from construction activities must be disposed off at approved dumpsites. There should be proper waste segregation to allow for recycling. Some excavation such as stone materials should be used for backfilling.
- vi. Once the construction is completed and fully occupied, the management should engage services of waste management companies registered by NEMA in compliance with the requirements of the Environment Management and Coordination (Waste Management) Regulations, 2006.

It's thus the recommendations of the experts that the project be allowed to go on by granting an environmental impact assessment license subject to adherence of the proposed EMP and conditions that will be on the EIA license.

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APPENDIX

Appendix I: Experts Practising License

Appendix II: Title deed

Appendix III: Change of Use

Appendix IV: Questionnaires

Appendix V: Architectural drawings