

**ENVIRONMENTAL IMPACT ASSESSMENT  
STUDY REPORT  
FOR  
PROPOSED SERVICED APARTMENTS ON PLOT L.R. NO.  
209/21520 LOCATED ALONG SUSWA ROAD IN  
PARKLANDS AREA OF NAIROBI CITY COUNTY.**



**This Environmental Impact Assessment (EIA) Study Report is submitted to the National Environment Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, Cap 387 and the Environmental (Impact Assessment and Audit) Regulations, 2003**

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## TABLE OF CONTENTS

Executive Summary .....	vii
Acronyms .....	xii
CHAPTER ONE: INTRODUCTION .....	1
1.1 General overview .....	1
1.2 Project Objectives .....	1
1.3 Objectives of EIA .....	1
1.4 Terms of Reference (TOR) .....	2
1.5 Methodology .....	3
1.6 Project Justification.....	4
1.6.1 Demand for housing.....	4
1.6.2 Size of the plot .....	4
1.6.3 Socio-Economic Benefits of the Project .....	4
1.6.4 Neighborhood Development Trend .....	4
1.6.5 Adjacent Land use analysis.....	5
CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION .....	6
2.1 Nature of the Project .....	6
2.2 Project Location and Size .....	6
2.3 Land Tenure, Use, Ownership and Management.....	7
2.4 Project Description.....	7
2.5 Construction Inputs .....	8
2.6 Construction Activities .....	8
2.6.1 Pre-Construction Stage .....	8
2.6.2 Construction Stage .....	9
2.6.3 Occupation Stage .....	11
2.6.4 Decommissioning Stage.....	11
2.7 Construction Products, By Products and Wastes .....	12
2.7.1 Products.....	12
2.7.2 By-Products.....	12
2.7.3 Wastes .....	12
2.8 Project Budget and Duration.....	12

CHAPTER THREE: BASELINE INFORMATION .....	13
3.1 PHYSICAL ENVIRONMENT.....	13
3.1.1 Climate.....	13
3.1.2 Topography and Drainage.....	13
3.1.3 Geology and Soils .....	13
3.1.4 Hydrology .....	13
3.2 BIOLOGICAL ENVIRONMENT .....	13
3.2.1 Flora .....	13
3.2.2 Fauna.....	14
3.3 SOCIO-ECONOMIC ENVIRONMENT.....	15
3.3.1 Land Use .....	15
3.3.2 Administration Offices.....	15
3.3.3 Educational Institutions .....	16
3.3.4 Religious Institutions .....	16
3.3.5 Commercial Activities .....	16
3.3.6 Security .....	17
3.3.7 Health Facilities .....	18
3.4 INFRASTRUCTURE .....	18
3.4.1 Roads and accessibility .....	18
3.4.2 Water supply .....	18
3.4.3 Sewer System.....	19
3.4.4 Storm Water Drainage .....	19
3.4.5 Solid Waste Management .....	19
3.4.6 Electricity.....	20
3.4.7 Communication.....	20
CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK.....	21
4.1 INTRODUCTION .....	21
4.2 NATIONAL POLICIES .....	21
4.2.1 The National Environmental Action Plan (NEAP).....	21
4.2.2 National Policy on Water Resources Management and Development (1999) .....	21
4.2.3 Policy Paper on Environment and Development (1999) .....	22

4.2.4 Sustainable Development Goals (SDG's).....	22
4.3 LEGAL FRAMEWORK .....	23
4.3.1 The Constitution of Kenya 2010.....	23
4.3.2 Environment Management and Coordination Act, EMCA Cap 387 and Amendment 2015.....	24
4.3.3 The Environmental (Impact Assessment and Audit) Regulations, 2003.....	25
4.3.4 Environmental Management and Co-ordination (Water Quality) Regulations, 2006 .	26
4.3.5 Environmental Management and Co-ordination (Waste Management) Regulations, 2006.....	26
4.3.6 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009.....	27
4.3.7 The Environmental Management and Co-Ordination (Air Quality) Regulations, 2014 .....	28
4.3.8 The Water Act, 2016.....	29
4.3.9 Occupational Health and Safety Act 2007.....	30
4.3.10 The Physical Planning Act of 1996 CAP 286.....	31
4.3.11 Public Health Act Cap 242 .....	32
4.3.12 County Government Act, 2012 .....	33
4.3.13 Energy Act, 2006 .....	33
4.3.14 National Construction Authority Act, 2011 .....	34
4.3.15 Building Code, 2000 .....	34
4.3.16 Penal Code CAP 63 .....	35
4.3.17 Land Registration Act, 2012 .....	35
4.3.18 The National Land Commission Act, 2012 (No. 5 of 2012) .....	35
4.4 INSTITUTIONAL FRAMEWORK.....	36
4.4.1 National Environmental Management Authority (NEMA).....	36
4.4.2 National Environment Tribunal (NET).....	36
CHAPTER FIVE: IMPACT ASSESSMENT, MITIGATION MEASURES AND CONSTRUCTION SAFETY.....	37
5.1 Existing impacts.....	37
5.2 Anticipated Impacts .....	37

5.3 ENVIRONMENTAL IMPACTS.....	38
5.3.1 Negative Impacts .....	38
5.3.1.1 Soil Erosion.....	38
5.3.1.2 Air Pollution .....	39
5.3.1.3 Noise and Excessive Vibrations.....	40
5.3.1.4 Oil Pollution.....	40
5.3.1.5 Solid Waste .....	41
5.3.2.6 Liquid Waste .....	42
5.3.2.7 Storm water drainage .....	42
5.3.1.8 Increased Water demand .....	43
5.4 SOCIAL-ECONOMIC IMPACTS .....	44
5.4.1 Positive impacts .....	44
5.4.2 Negative Impacts .....	44
5.4.2.1 Public Health .....	44
5.4.2.2 Insecurity.....	45
5.4.2.3 Fire .....	46
5.4.2.4 Increased Energy demand.....	46
5.4.2.5 Traffic Density .....	47
5.5 CONSTRUCTION SAFETY .....	48
CHAPTER SIX: CONSULTATIONS AND PUBLIC PARTICIPATION.....	49
6.1 Introduction.....	49
6.2 Objectives of the CPP .....	49
6.3 Methodology used in the CPP.....	49
6.4 Analysis of the Public Consultation findings.....	49
CHAPTER SEVEN: PROJECT ALTERNATIVES .....	51
7.1 Introduction.....	51
7.2 No Project Alternative .....	51
7.3 The Proposed Project Option .....	51
7.4 Alternative Construction Materials and Technologies .....	51
CHAPTER EIGHT: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMP).....	53

8.1 EMP FOR THE CONSTRUCTION PHASE .....	53
8.2 EMP FOR THE OPERATION PHASE .....	57
8.3 EMP FOR THE DECOMMISSIONING PHASE .....	59
CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS.....	61
References.....	62
Appendices.....	64

## **Executive Summary**

### **Introduction**

The effects of proposed projects worldwide on the environment had not been taken into consideration for a very long time. This led to 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, *Salsabil Heights Limited*, appointed the environmental experts to carry out the EIA for the Proposed Serviced Apartments and prepare the report in accordance to the dictates of EMCA, Cap 387. The proposed project will entail the construction of one block of twelve levels having one hundred sixty two (162) serviced apartments, forty eight (48) parking bays and other auxiliary facilities on plot LR No. 209/21520 located along Suswa Road in Parklands Area of Westlands Sub County, Nairobi City County.

The purpose of undertaking the EIA was to identify potential environmental impacts associated with the proposed project and provide recommendations on how to mitigate the negative impacts while maximizing on the positive impacts of the project. The EIA team evaluated the environmental impacts of the proposed project during design, construction, operation and decommissioning phases. The EIA Study report has documented relevant and feasible methods of mitigating likely adverse impacts that may arise out of all the phases of the proposed project.

### **Scope**

The scope of the report was to describe the project, document all baseline information, legal and regulatory frame work associated with project, analyze the project alternatives, assess the environmental impacts and develop mitigation measures for the negative impacts including designing Environmental Management and Monitoring Plan (EMP) for the project.



## **Project Objectives**

The objectives of the proposed project include:

- i. To construct one hundred sixty two (162) serviced apartments in parklands area.
- ii. To put the current land into more productive and economic use.
- iii. To meet the economic desires of the proponent.

## **Objectives of the EIA**

The objectives of undertaking the EIA were as follows;

- i. To identify potential environmental impacts of proposed project and assess the significance of these impacts.
- ii. To assess the relative importance of the various project alternatives.
- iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
- iv. To seek the views and concerns of all the Project Affected Persons (PAPs) in regards to the proposed project.
- v. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle.
- vi. To develop comprehensive Environmental Management Plan (EMP) for the project cycle 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.
- vii. To present the results of the EIA in such a way that they can guide informed decision making.

## **Methodology**

The methodology used in the EIA consisted of the following:

- i. Environmental screening of the proposed project in line with EMCA Cap 387, Legal Notice No. 150 of 2016. We established that the development falls under **High Risk Projects** (Urban development including establishment of new housing estate developments exceeding one hundred housing units).
- ii. A site reconnaissance and visual survey to determine the baseline information of the project area.

- iii. Analysis of the project documents such as the architectural plans with the proponent and project team.
- iv. Assessment of occupational health and safety issues during the implementation of the project.
- v. Seeking public views through a public meeting, direct interviews and administering of questionnaires.
- vi. Proposal of feasible mitigation measures to minimize anticipated negative impacts during the project cycle.
- vii. Preparation and submission of the EIA Study Report to the National Environment Management Authority (NEMA).

### **Environmental Impacts and Mitigation Measures**

The potential negative environmental impacts of the proposed project and possible mitigation measures are summarized below:

<b>Possible Impact</b>	<b>Mitigation Measures</b>
Air Pollution	<ul style="list-style-type: none"> <li>▪ Use of dust screens/nets around the construction site to contain and arrest dust.</li> <li>▪ Regular sprinkling of water on work areas to prevent fugitive dust violations especially during the dry spell.</li> <li>▪ Ensure no burning of waste such as paper and bottles on site/non-designated areas.</li> <li>▪ Covering and regular watering of the exposed stockpiles on site such as the sand and ballast.</li> <li>▪ Regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases.</li> </ul>
Noise Pollution	<ul style="list-style-type: none"> <li>▪ Construction works will be carried out during the day between 0800hrs to 1800 hrs.</li> <li>▪ The contractor shall use noise shields on noisy equipment such as corrugated iron sheet structures.</li> <li>▪ All noisy activities shall be scheduled concurrently during the construction to reduce the exposure period.</li> <li>▪ Operation of the noisy machinery shall be carried out when necessary and switch them off when not in use.</li> <li>▪ Provide and enforce use Personal Protective Equipment (PPE) by the workers at all times during the construction.</li> <li>▪ Regular maintenance of the machinery to reduce frictional noise.</li> <li>▪ Monitor noise levels as per NEMA &amp; NCC guidelines.</li> </ul>

Solid waste	<ul style="list-style-type: none"> <li>▪ Engage the services of registered waste handler to transport the waste at the designated areas.</li> <li>▪ Covering of trucks when transporting building materials and waste.</li> <li>▪ Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse.</li> <li>▪ Provision of waste management room at a strategic place within the apartments for segregation and disposal of the waste.</li> <li>▪ Efficient use of the materials to reduce waste and recycling/reuse where feasible.</li> <li>▪ Monitor waste in line with the waste management regulations</li> </ul>
Liquid waste	<ul style="list-style-type: none"> <li>▪ Channel all liquid waste to the existing sewer line along the road.</li> <li>▪ Conduct routine inspection and monitoring of the internal drains to identify and repair any leakages and blockages.</li> <li>▪ Provision of sanitary facilities to the workers during the construction and proper decommissioning of the facilities once construction is complete.</li> <li>▪ All waste pipes will have rodding eyes accessible from outside i.e. free to every part of the system for inspection, cleaning and repair.</li> <li>▪ Regular inspection and maintenance of the internal sewer system.</li> <li>▪ Residents should report any incidence of blockages in their units immediately they occur for prompt maintenance</li> </ul>
Increased water demand	<ul style="list-style-type: none"> <li>▪ Connect to the existing water supply after acquisition of the relevant permits.</li> <li>▪ The contractor will engage the services of water vendors to supplement the water supply.</li> <li>▪ Use of water efficient appliances and fixtures for plumbing products and white goods.</li> <li>▪ Provision of adequate underground and roof water tanks for water storage.</li> <li>▪ Prompt detect and repair of the water fixtures and fittings.</li> <li>▪ The proponent to ensure that rain water harvesting facilities is provided.</li> </ul>
Energy Demand	<ul style="list-style-type: none"> <li>▪ Use of solar energy as an alternative source of energy.</li> <li>▪ Install and routine maintenance of energy efficient fixtures and fittings.</li> <li>▪ Turn off the machinery and equipment when not in use.</li> <li>▪ Put off all the lights immediately when not in use.</li> <li>▪ Regular inspection and repairs of the solar panels.</li> </ul>
Increased Traffic	<ul style="list-style-type: none"> <li>▪ Ferry building materials during off-peak hours.</li> <li>▪ Employ traffic marshals to control traffic in and out of site.</li> <li>▪ Provide bill boards at the site/entrance to notify motorists and general public about the proposed project.</li> <li>▪ Enforce speed limits for construction vehicles especially along the roads leading to the site.</li> <li>▪ Develop a traffic management plan to ensure that the site vehicles do not interfere with the regular traffic along the access roads.</li> <li>▪ Ensure that the vehicles comply with axle load limits.</li> <li>▪ Employ well trained and experienced drivers.</li> </ul>

## **Conclusion and Recommendations**

Although potential adverse impacts were identified, various opportunities were also identified for the mitigation of these impacts. It is considered that with good environmental and social practices and procedures during project cycle, the development has potential benefits while avoiding environmental degradation. The implementation of the EMP developed in this report will ensure environmental protection, health and safety of the workers and the general public. It is therefore our recommendation that the proponent be granted EIA licence to implement the proposed project.

## **Acronyms**

CBD	Central Business District
CPP	Consultations and Public Participation
DRSRS	Department of Resource Surveys and Remote Sensing
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ERC	Energy Regulatory Commission
GRM	Grievances Redress Mechanism
HIV	Human Immune Virus
KBS	Kenya Bureau of Statistics
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forest Service
NCA	National Construction Authority
NCC	Nairobi City County
NCWSC	Nairobi City Water and Sewerage Company
NEAP	National Environment Action Plan
NEMA	National Environment Management Authority
NET	National Environmental Tribunal
No.	Number
OHS	Occupation Health and Safety
OSHA	Occupational Safety and Health Act
PAPs	Project Affected Persons
PPP	Public Private Partnership
SDG	Sustainable Development Goals
STI	Sexually Treatment Infections
TOR	Terms of Reference
VOC	Volatile Organic Compounds
WCC	Waste Collection Centre

## **CHAPTER ONE: INTRODUCTION**

### **1.1 General overview**

The housing sector in the country has faced major challenges but at the same time provided opportunities as one of the most lucrative sectors to venture into as a result of the huge demand for housing units. According to Cytonn Research on Nairobi Metropolitan Area Residential Report, there is an estimated accumulated housing deficit of approximately two million units in 2018 having grown from 1.9 million in 2017. This has been attributed to an estimated population growth of 3.3% in the County.

The housing deficit coupled with access to both prime and virgin land for residential development has provided a perfect opportunity for investors in the sector. In light of the above, *Salsabil Heights Limited* who is the project proponent has proposed to construct one block of twelve levels comprising of **one hundred sixty two (162) serviced apartments, forty eight (48) parking bays and other auxiliary facilities on plot LR No. 209/21520** located along Suswa Road opposite Highridge Chief Office in Parklands area of Nairobi City County.

### **1.2 Project Objectives**

The objectives of the proposed project include:

- i. To construct one hundred sixty two (162) serviced apartments in parklands area.
- ii. To put the current land into more productive and economic use.
- iii. To meet the economic desires of the proponent.

### **1.3 Objectives of EIA**

The overall objective of EIA is to ensure that environmental concerns are integrated in the proposed project in order to contribute to sustainable development.

The specific objectives are:

- i. To identify potential environmental impacts of proposed project and assess the significance of these impacts.
- ii. To assess the relative importance of the various project alternatives.
- iii. To propose mitigation measures for the significant negative impacts of the project on the environment.
- iv. To seek the views and concerns of all the Project Affected Persons (PAPs) in regards to the proposed project

- v. To generate baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle.
- vi. To develop environmental management and monitoring plan (EMP) for the project cycle.
- vii. To present results of the EIA in such a way that they can guide informed decision making.

#### **1.4 Terms of Reference (TOR)**

A scoping exercise was carried out to determine important issues to be addressed in the study and feasible alternatives to the proposed project. The TOR were submitted on 18<sup>th</sup> October 2018 in line with section 11 of the EIA Regulations and approved by NEMA (*Attached is the TOR approval letter*). Below are the TOR developed during the scoping exercise;

- i. the proposed location of the project;
- ii. a concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project;
- iii. the objectives of the project;
- iv. the technology, procedures and processes to be used, in the implementation of the project;
- v. the materials to be used in the construction and implementation of the project;
- vi. the products, by-products and waste generated project;
- vii. a description of the potentially affected environment;
- viii. the environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short term and long-term effects anticipated;
- ix. alternative technologies and processes available and reasons for preferring the chosen technology and processes;
- x. analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies;
- xi. an environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment; including the cost, time frame and responsibility to implement the measures;
- xii. provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the cause of carrying out activities or major industrial and other development projects;

- xiii. the measures to prevent health hazards and to ensure security in the working environment for the employees and for the management of emergencies;
- xiv. an identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
- xv. an economic and social analysis of the project;
- xvi. an indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures.

## **1.5 Methodology**

The methodology used for the preparation of this EIA Study Report was as follows:

- i. Screening of the proposed project in line with legal notice No. 150 of 2016 of EMCA Cap 387. We established that the development falls under **High Risk Projects** (Urban development including establishment of new housing estate developments exceeding one hundred housing units).
- ii. A scoping exercise that identified the key issues to be addressed in the assessment.
- iii. Documentary review on the nature of the proposed activities, policy and legal framework, environmental setting of the area and other available relevant data/information.
- iv. Consultations and Public participation with the Project Affected Persons (PAPs), proponent and the project team through a public meeting, administration of questionnaires and direct interviews.
- v. Physical investigation of the site and the surrounding areas using a pre-prepared checklist.
- vi. Reviewing the proposed project designs and implementation plan/schedules with a view to suggesting suitable alternatives.
- vii. Develop an EMP outlining the responsibilities, schedules, monitorable indicators and time frames among other aspects.
- viii. Preparation and submission of the EIA Study Report in line with the Environmental (Impact Assessment) Regulations 2003 to the National Environment Management Authority (NEMA).



## **1.6 Project Justification**

### **1.6.1 Demand for housing**

Article 43 (1) (b) of the Kenya Constitution empowers every citizen with a right to accessible and adequate housing and to reasonable standards of sanitation. According to World Bank 2017 report on Kenya Economic Update: Housing - Unavailable and Unaffordable, there is an estimated accumulated housing deficit of over 2 million units, and nearly 61% of urban households live in slums. This is because 244, 000 housing units in different market segments are needed annually to keep up with demand, while current production is less than 50, 000 units. This therefore calls for the development of apartments to meet the demand. Therefore, the proposed project will be within the overall policy direction of provision of affordable housing units in the country.

### **1.6.2 Size of the plot**

According to the Nairobi City Development Ordinances and Zones Guidelines, Parklands area is in Zone 3 which allows Commercial/Residential (High-rise Flats) at a minimum area of 0.05Hectares. At 0.1011 hectares, the plot is large enough to accommodate the proposed project while adhering to the planning standards and policies provided by the County Government.

### **1.6.3 Socio-Economic Benefits of the Project**

The proposed project will have numerous socio-economic benefits to the area and the country at large. Some of the following benefits will include the following;

- i. Provision of quality serviced apartments in the area in line with the Big Four Agenda on Affordable Housing.
- ii. Contribute towards the economic growth of our nation through revenue collection.
- iii. Provision of employment opportunities to both skilled and unskilled personnel throughout the project cycle.
- iv. Creation of market for goods and services during the project cycle.
- v. The optimal use of land, that is, increased utility of the parcel of land.

### **1.6.4 Neighborhood Development Trend**

The neighborhood is currently undergoing urban transformation with the previous single dwelling units being replaced by mixed development including apartments, commercial and institutions. The proposed project will therefore be in conformity with this trend which will

ensure better utilization of the land giving it higher quality and urban character as well as increase its profitability.

### **1.6.5 Adjacent Land use analysis**

The area has undergone development regeneration and restructuring in the recent years at a high rate as a result of its strategic location and closeness to the Central Business District (CBD). Due to high demand for apartments, the area is now characterized by High-rise Apartments such as ongoing construction of the Westin Apartments at the junction of Suswa and Mpaka Roads, Parklands Mosque and Suswa Heights. Therefore, the development will be in conformity with the current land uses.

***Plate 1: Ongoing Construction of Westin Apartments***



***Source: Field Work, 24/10/2018***

## CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND IMPLEMENTATION

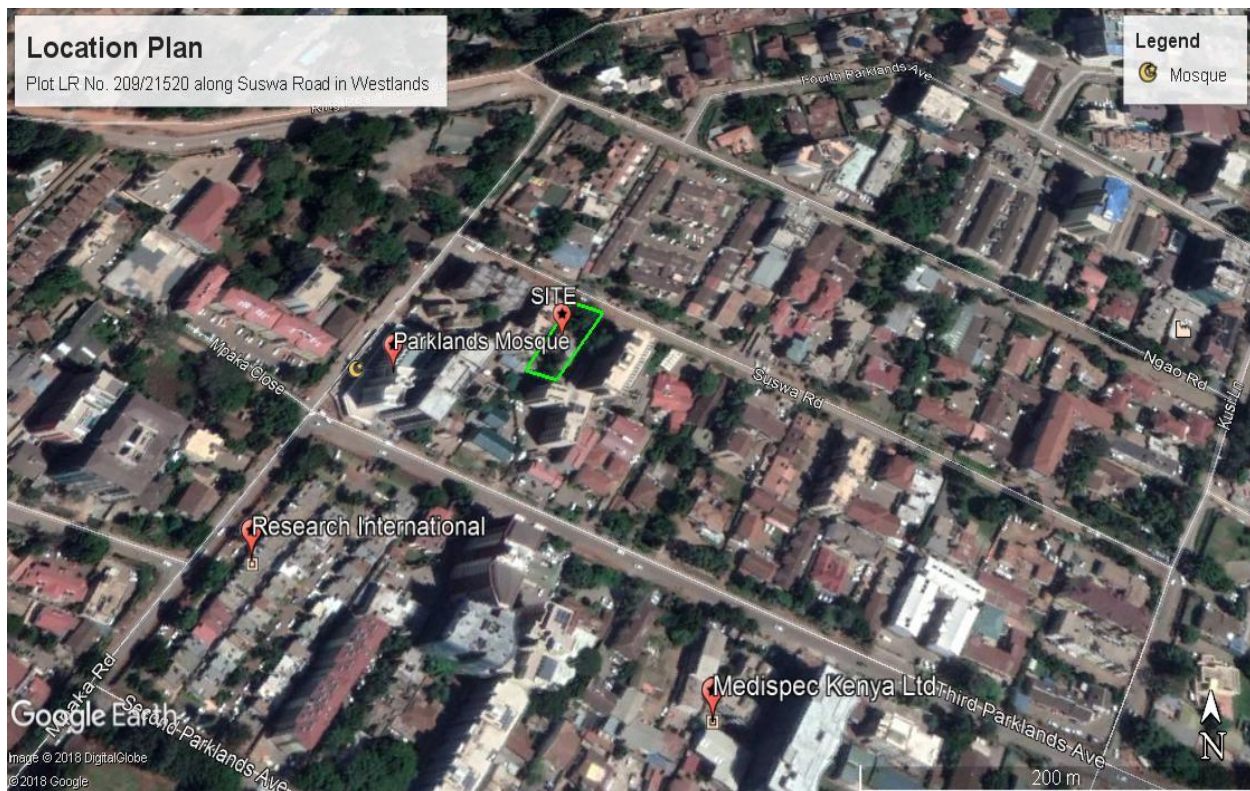
### 2.1 Nature of the Project

The proposed project will consist of one block of twelve levels comprising of one hundred sixty two (162) serviced apartments, forty eight (48) parking bays and auxiliary facilities. The existing wooden and masonry structures will be demolished to pave way for the proposed project. The project aims at provision of serviced apartments in line with the local physical planning policy and increase in the utility of the land in the area.

### 2.2 Project Location and Size

The project site is located along Suswa Road off Mpaka Road adjacent to Highridge Chief Office on latitude  $1^{\circ}15'23.07''S$  and longitude  $36^{\circ}48'43.51''E$  in Parklands Area of Westlands Sub County, Nairobi City County. The portion of the parcel of land to be developed measures approximately **0.1011 Hectares** (*Attached is copy of the ownership documents*).

#### *Plate 2: Site Location*



*Source: Google Earth, 2018*

### **2.3 Land Tenure, Use, Ownership and Management**

The parcel of land on which the subject development is proposed is held on leasehold interest for 50 years from 01/11/2003. The certificate of title is drawn under The Land Registration Act (No. 3 of 2012, Section 108) and The Land Act (No. 6 of 2012) as **Plot L.R. No. 209/21520** and the current registered proprietor is **Salsabil Heights Limited** (Post Office Box Number 25107 – 00603 Nairobi) who is hereby seeking the EIA Licence for the proposed project.

According to the Nairobi City Development Ordinances and Zones Guidelines, the area is in Zone 3 which allows Commercial/Residential (High-rise Flats) at a minimum area of 0.05 Hectares. Therefore, the proposed project is in line with the zoning of the area that permits flats. The proponent applied for a change of use from single dwelling to multiple dwelling (Serviced Apartments) and the approval granted by County Government on 13-09-2018 (**Ref: PPA-CU-AAB349**). (*See attached the ownership document and change of use approval*).

### **2.4 Project Description**

The proponent proposes to construct serviced apartments on the aforementioned piece of land comprising of 162 serviced apartments, 48 parking bays and other auxiliary facilities as described below:

- i. **Lower Basement level** comprising of twenty two (22) parking bays, underground water tank, mechanical room and storage room.
- ii. **Upper Basement level** comprising of twenty one (21) parking bays.
- iii. **Ground floor level** comprising of five (5) parking bays, Management offices, laundry room, salon, internal mini market, store, office, swimming pool, restaurant with a kitchen, a store and changing rooms.
- iv. **Mezzanine Level** comprising of internal mini market, saloon, two office spaces and mezzanine café.
- v. **First floor level** comprising of men and women gym areas, lounge, dry area/locker area, sauna and steam rooms, mechanical room and office.
- vi. **2<sup>nd</sup> to 10<sup>th</sup> Typical Floor levels** comprising of a lounge and eighteen (18) studio apartments having kitchen and washrooms.
- vii. **Roof level** comprising of solar panel area and laundry area having twenty three (23) washbasins.

viii. **Other salient features** include staircases, two lift lobbies, garbage disposal room, electrical services area, plumbing duct area, and reception

More fine details, specifications and features of the proposed project can be obtained from the drawings (*Attached are the approved architectural drawings*).

## **2.5 Construction Inputs**

The project inputs will include the following:

- i. The materials that shall be used will include stones, cement, sand, crushed rock (gravel/ballast), ceramic fixtures, reinforcement bars, wood/timber, glass, painting materials, plastic, electrical and mechanical fixtures. All these materials shall be obtained from licensed dealers who have complied with the environmental management guidelines and policies and approved by Kenya Bureau of Standards (KBS).
- ii. Several machines shall be used which will include earth moving equipment (excavators, loaders, wheel loading shovels and backhoe), material handling equipment (cranes and hoists), construction equipment (concrete mixers and vibrators) and Engineering vehicles (trailers, tippers and dumpers).
- iii. The project will require a labour force of both skilled and non-skilled workers. The skilled personnel will include the project consultants (architects, engineers, quantity surveyors and environmental experts) and the contractor with a team of foreman, masons, plasterers, carpenters, plumbers, welders, electricians, glaziers, painters and casual labourers.
- iv. Other construction inputs will include water and electricity from the main grid or provided by generators

## **2.6 Construction Activities**

### **2.6.1 Pre-Construction Stage**

This stage shall involve:

- i. Seeking of the appropriate approvals from the relevant authorities such as change of land user, demolition, hoarding and excavation permits.
- ii. Preparation of the preliminary architectural designs for the proposed project and submission to the County Government for approval.
- iii. Conducting a preliminary geotechnical exploration investigation for the project.

- iv. Appraisal of baseline conditions to determine supply and demand for required infrastructural services.
- v. Conducting an EIA and submission of the Study Report to NEMA for licensing.

### **2.6.2 Construction Stage**

This stage shall have several processes as discussed below:

#### **i. Demolition of the Existing Structures**

There is an existing wooden and masonry structure on the proposed site. The structures shall be demolished to pave way for the proposed project. Demolition permit shall be sought out by the exercise begins from the relevant authority. The exercise shall be limited to daytime only. The structures shall be pulled down manually and mitigation measures observed to reduce air (dust) and noise pollution, solid waste (demolition debris) and accidents. The debris will be re-used in the construction phase and/or transported for re-use in other construction projects.

#### ***Plate 3: Existing Wooden and Masonry Structures***



***Source: Field work, 24/10/2018***

#### **ii. Construction site preparation**

This will involve executing the preparation works to create favorable conditions for construction to begin. It will involve construction of a hoarding area along the road to prevent the public from falling objects, provision of sanitary facilities, utilities, material storage room and area for parking the construction machinery. There is an existing metallic structure at the northern part of the site which will be used as site offices, first aid office and materials offices. The contractor shall mobilize materials, workforce and machinery required for ground breaking.

### **iii. Excavation and Foundation works**

The backhoe, excavators, bulldozers, loaders and tippers shall be used for the excavation works to pave way for the construction of the foundation and the basement. The machinery will aid in the removal of the soils/rocks and transporting of the waste to an approved disposal site. Proper excavation and construction works shall be followed to ensure that the volumes for excavations are clearly defined. Shallow foundations which include the pad and strip footings shall then be constructed in liaison with the project structural engineer.

### **iv. Concrete and Masonry works**

The construction of the building will be carried out in line with the approved plans and comply with the specifications issued and approved by the project team and the proponent. Concrete works will involving the mixture of cement, sand and ballast in the specified ratios and pouring it in already constructed form work. The poured concrete will be cured for a specified period. The concreting will be supplemented by concrete mixers and vibrators. The internal and exterior walls will be built using machine cut stones sourced from a licenced supplier. The process will be under supervision of the project consultants including the environmental experts.

### **v. Structural Steel works**

The structural elements which include the slabs, beams, columns and foundation bases will be constructed using reinforced concrete. The structural steel will be used to reinforce the concrete since the concrete is weak in tensile strength. Structural steel works will involve steel cutting, welding and fixing on the already constructed formwork before concreting is carried out.

### **vi. Plumbing, Mechanical and Electrical works**

This phase will involve installation of water and waste water piping, electrical gadgets and appliances including lighting fixtures and connection of the electrical and mechanical configuration to the sewer line and existing power lines upon acquisition of the necessary approvals. All the electrical works will be carried out by a licensed electrician to the satisfaction of the Kenya Power and Lighting Company (KPLC). The phase will followed by an inspection and a report issued to the relevant authorities before approval is granted.

### **vii. Interior and Exterior Finishes**

After concrete and masonry works are completed, plastering will be carried out. The plastering will ensure the building is structurally strong, protect it from weather effects and give it an attractive look. This will be done both internally and externally in line with the specifications of

the project architect. After plastering, the painting of the development will be carried out with cement primer and eco-friendly zero Volatile Organic Compounds (VOC) paints.

viii. **Landscaping and Final clean up**

The final cleanup will be done once the construction activities are completed. All the waste will be reused where feasible and/or transported to designated approved dumpsites. Thereafter, a landscaping exercise will be carried out to improve the aesthetic value or visual quality of the site. This will include planting of grass bed and trees, establishment of a theme garden and lush grass lawns where applicable. It is noteworthy that the proponent will use plant species that are available locally preferably indigenous ones for landscaping.

**2.6.3 Occupation Stage**

This stage shall involve running and managing the development as per the laid down rules and procedures. The completed serviced apartments shall be leased out to interested tenants.

**2.6.4 Decommissioning Stage**

This is the stage where the final disposal of the serviced apartments and its associated facilities will be carried out after the expiry of the project life span. All relevant agencies including the project consultants will be notified before the decommissioning is carried out with a bid to ascertain guidelines on possible impacts and mitigation measures. Some of the project decommissioning activities will include;

- i. All equipment including the mechanical and electrical fixtures and fittings will be dismantled and removed from the site. Priority will be given to reuse of the equipment in other projects through auctioning to other contractors or reuse in another proponent's site.
- ii. The project components including the buildings, pavements, parking areas and perimeter fence will be demolished. The debris will be reused where feasible and/or disposal off by a licenced waste handler.
- iii. The site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species. The unsafe areas will be fenced until natural stabilization occurs.



## **2.7 Construction Products, By Products and Wastes**

### **2.7.1 Products**

The final product will be **one hundred sixty two (162) serviced apartments, forty eight (48) parking bays** and other auxiliary facilities.

### **2.7.2 By-Products**

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

- i. **Soil** generated during excavation will be reused elsewhere in the project and/or transported for disposal at designated areas by licenced waster handler.
- ii. **Excess sand, ballast and material stockpiles** will 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.
- iii. **Empty cans and drums** will be used to store water during construction and the damaged ones will be recycled.
- iv. **Pieces of timber/wood** will be used as formwork in other proposed projects.

### **2.7.3 Wastes**

The waste generated during construction will include construction and demolition debris, sanitary waste, excavated soil and rocks. The wastes that may likely to be generated during operation are solid waste such as paper, plastics, cans, glasses, metallic pieces, sanitary and organic waste. All liquid waste will be directed to the existing sewer line whereas the solid waste will be segregated, reused and/or recycled where appropriate and disposed at designated areas by licenced waste handler. The wastes shall be disposed by the proponent in accordance with the standards and documented procedures stipulated in the Waste Management Regulations of 2006.

## **2.8 Project Budget and Duration**

The proposed project is estimated by the project quantity surveyor to cost **three hundred million shillings (300,000,000)**. The project implementation works is estimated to take 2 years to completion.

## **CHAPTER THREE: BASELINE INFORMATION**

### **3.1 PHYSICAL ENVIRONMENT**

#### **3.1.1 Climate**

According to Nairobi County Integrated Development Plan of 2014, the County has a fairly cool climate resulting from its high altitude. Temperatures range from a low of 10°C to a high of 29°C. It has a bi-modal rainfall pattern. The long rains season fall between March and May with a mean rainfall of 899 millimetres while the short rains season falls between October and December with a mean rainfall of 638 millimetres. The mean annual rainfall is 786.5 millimetres.

#### **3.1.2 Topography and Drainage**

The site lies at an altitude of about 1500 meters above sea-level. It gently slopes towards the access road on its northern boundary. The site is well drained by use of natural drainage and permeable soils. There is also an already existing open drain along the road.

#### **3.1.3 Geology and Soils**

The soils are predominantly red loam soils just like most of the region. The developer is expected to carry out a geo-technical survey to establish the soil's carrying capacity as well the minimum foundation depth hence make appropriate designs that will put into consideration the findings of the survey.

#### **3.1.4 Hydrology**

The closest river to the project site is Getathuru River a tributary of Nairobi River which is at a distance of approximately 800 meters northwards from the project site. This is the nearest surface water and the property **does not** border any river or stream.

### **3.2 BIOLOGICAL ENVIRONMENT**

#### **3.2.1 Flora**

The site has no exotic plants species but is characterized by few grass, flowers and trees as shown on plate 4 below. There are ten trees within the property; nine mature trees and one which is not mature. Some of the trees will be cut to pave way for the proposed project and measures will be taken to replant observing the necessary relevant policies. The developer will seek tree cutting permit from the Nairobi County Director of Forestry before carrying out the activity.

***Plate 4: Vegetation within the site***



***Source: Fieldwork, 24/10/2018***

**3.2.2 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.

### **3.3 SOCIO-ECONOMIC ENVIRONMENT**

#### **3.3.1 Land Use**

According to African City Planner, Nairobi County has a population of 3.5 million and a density of 4,850 people/Km<sup>2</sup> and about 5.8 million people estimated to live in the city by 2025. This calls for planning towards sustaining the population. It is in line with this that the County has seen trends appearing to change in the land use inventory of the years. The neighborhood which was characterized with low density residential units like Parklands area is now changing to mix of different uses such as commercial, institutions and residential high-rise apartments.

This has seen developers put up high rise mixed use developments which are towering the landscape and also rise in the number of institutions within the area. Reference is made to Parklands Mosque, Suswa Heights and ongoing construction of Westin Apartments.

#### ***Plate 5: Westin Apartments***



***Source; Field Work, 31/10/2018***

#### **3.3.2 Administration Offices**

The administrative offices of the Highridge location and sub location are located adjacent to the project site. The chief and assistant chief promote good governance, accountability and participation of the people in the implementation of National Government programmes for sustainable development, ensure implementation of the National Government decisions to enhance peace, security and the rule of law and promote cohesion, integration and patriotism to enhance peace and national unity.

***Plate 6: Office of the Chief – Highridge Location***



***Source; Field Work, 31/10/2018***

### **3.3.3 Educational Institutions**

The area also has seen an increasing number of educational institutions due to the rising demand from the incoming population. The different educational facilities found in the area include pre-primary schools, primary schools, secondary schools, colleges and university. Some of the institutions found in parklands area include Arya Nursery School, Highridge Primary and Secondary School, Parklands Arya Girls Secondary school, Oshwal College and Agakhan University.

### **3.3.4 Religious Institutions**

Religious institutions in the neighbourhood include mosques, temples and churches such as Parklands Mosque which is 50 meters from the property along Mpaka Road, Hindu Council of Kenya and CITAM Parklands.

### **3.3.5 Commercial Activities**

These commercial activities in the area are concentrated at a radius of one kilometer from the site and include shopping complex such as the Diamond Plaza and Sky mall with restaurant, supermarkets, leisure and recreation areas, merchandise, services and activities related to Malls and Retail & Shopping. Other commercial activities include financial institutions such as SBM Bank, Cooperative Bank of Kenya, Diamond Trust Bank and Prime bank, Agakhan Sports Club and light industries such as Shell and Oilibya Petrol Stations.

***Plate 7: Parklands Mosque***



***Source: Field Work, 31/10/2018***

### **3.3.6 Security**

There are security lights installed along the access road. These lights are used to promote security in the area, increase quality of life by artificially extending the hours in which it is light and also improve safety of drivers, riders and pedestrians. Security in the area is also beefed up by the nearby Parklands Police Station which is located approximately one kilometer from the proposed site.

***Plate 8: Electric lines and Security Light***



***Source: Fieldwork, 24/10/2018***

### **3.3.7 Health Facilities**

The health facilities located within 1500 meters radius from the project site are Aga Khan University Hospital, Mediheal Hospital, MP Shah Hospital and Avenue Hospital Parklands.

## **3.4 INFRASTRUCTURE**

### **3.4.1 Roads and accessibility**

The property is accessed along Suswa road off Mpaka road in Parklands Area, Westlands Sub-county of Nairobi County. The access road is currently under rehabilitation by the County Government. The accessibility of the site will be instrumental during project cycle.

#### ***Plate 9: Access Road***



***Source; Fieldwork, 24/10/2018***

### **3.4.2 Water supply**

The general area is served with water supplied by Nairobi City Water and Sewerage Company (NCWSC). The developer intends to connect to the main water supplier upon acquisition of the relevant permits from the company. However, to supplement the water supply from the company, the developer also intends to:

- i. Make arrangements with registered water vendors to supply water to the site in case of short-fall in the normal supply.
- ii. Install standard roof water collection systems for the roof catchments of the proposed building blocks. These include gutters, down pipes and suitable water storage tanks for the harvested rainwater. It will greatly help in minimizing pressure on the existing water supply.

### **3.4.3 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 County Government and Ministry of Health.

### **3.4.4 Storm Water Drainage**

There are already constructed open drains along Suswa road as shown on plate 10. The proponent will ensure that the drainage systems are designed and effectively constructed to manage the storm water derived from the parking area, driveway and the proposed project. Measures will also be put in place to install rain water harvesting facilities to reduce the surface run off from the proposed project.

***Plate 10: Open drains along the site***



***Source: Fieldwork, 24/10/2018***

### **3.4.5 Solid Waste Management**

The principle objective of waste management is to minimize the pollution of the environment as well as to utilize the waste as a resource. This goal should be achieved in a way that is environmentally and financially sustainable. The technologies for the management of the solid wastes will incorporate the segregation of waste at the source, reuse/recycle where feasible, transport to the place of processing, treatment and final disposal. The following waste management techniques shall be used in the different stages of the proposed project;



- i. **Pre-construction and Construction Phase:** Wastes at this phase shall be managed as follows;
  - Reuse of the demolition debris during the construction for earthworks
  - Segregation of the waste at the site. This may include reuse of the empty container for storage of water, reuse of timber/wood for formwork in the upper levels of the building and collection and reuse of steel bars and nails among others.
  - Excavated soils shall be reused for earthworks and landscaping
  - Engage services of a licenced waste handler to transport the waste to designated areas at regular intervals to avoid stockpiling of solid waste resulting to pollution within the site.
- ii. **Operation Phase**
  - Provision of waste management room for segregation of the waste before final disposal. Empty cans and plastic containers will be reused for storage of water.
  - Used paper shall be thrown in a designated dustbin pending disposal through a licensed waste handler.
  - Engage services of a licenced waste handler to transport the waste to designated areas at regular intervals.
- iii. **Decommissioning Phase**
  - Wastes generated during this phase shall be disposed at designated areas
  - All machinery and equipment shall be reused or sold/given to scrap material dealers and/or donated to charitable institutions such as children's orphanage.

### **3.4.6 Electricity**

The site is not served by electricity from the National grid but there are existing electric lines along the road adjacent to the property. The proponent will connect the proposed project to the national grid upon acquiring relevant permits.

### **3.4.7 Communication**

The area is well covered by communication facilities such a Telkom, Safaricom, Airtel among others. All these will facilitate communication during the project cycle.

## **CHAPTER FOUR: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK**

### **4.1 INTRODUCTION**

There are a number of national policies, laws and regulations that govern the protection, conservation and exploitation of the natural resources coupled with provisions for environmental management. They cover infrastructure, water, agriculture, forestry and health just to mention a few. Some of the key national laws, policies and regulations that have a direct bearing on the optimum operation of the proposed development are discussed herein.

### **4.2 NATIONAL POLICIES**

#### **4.2.1 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 initiatives/plans. 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. As a result of its adoption and implementation, establishment of appropriate policies and legal guidelines as well as harmonization of the existing ones have been accomplished and/or are in the process of development. Under the NEAP process, EIAs were introduced targeting the industrialists, business community and local authorities (now the county governments).

*The proposed project shall be implemented and operated based on these guidelines*

#### **4.2.2 National Policy on Water Resources Management and Development (1999)**

While the policy enhances a systematic development of water facilities in all sectors for promotion of the country's socio-economic progress, it also recognizes the by-products of this process as wastewater. It therefore calls for development of appropriate sanitation systems to protect people's health and water resources from institutional pollution. This implies that industrial and business development activities should be accompanied by corresponding waste management systems to handle the waste water and other waste emanating there from. The same policy also requires that such projects undergo comprehensive EIAs that will provide suitable measures to be taken to ensure environmental resources and people's health in the immediate neighbourhood are not negatively impacted by the emissions.

*The wastewater from the proposed project shall be directed to the existing conventional sewer system.*

#### **4.2.3 Policy Paper on Environment and Development (1999)**

The key objectives of the policy include;

- i. To ensure that from the onset, all development policies, programmes and projects take environmental considerations into account,
- ii. To ensure that an independent EIA report is prepared for any industrial venture or other development before implementation,
- iii. To come up with effluent treatment standards that will conform to acceptable guidelines.

Under this paper, broad categories of development issues have been covered that require a sustainable development approach. These issues relate to waste management and human settlement. The policy recommends the need for enhanced re-use/recycling of residues including wastewater, use of low or non-waste technologies, increased public awareness and appreciation of a clean environment. It also encourages participation of stakeholders in the management of wastes within their localities. Regarding human settlement, the paper encourages better planning in both rural and urban areas and provision of basic needs such as water, drainage and waste disposal facilities among others.

*The proposed project has been designed to cater the basic needs addressed in this policy paper.*

#### **4.2.4 Sustainable Development Goals (SDG's)**

On September 25th 2015, countries adopted the United Nations Sustainable Development Goals aimed at contributing towards ending poverty, protecting the planet, and ensuring prosperity for all as part of a new sustainable development agenda. The SDG's have very significant implications for investment needs and the role of the public sector is fundamental and pivotal. At the same time the contribution of the private sector is indispensable.

*The proponent shall be committed to the SDG's through the proposed development in the following ways:*

##### **Goal 3 -Good Health & Well Being**

The project will contribute to improved health and productivity through the provision of a safe and clean environment.

##### **Goal 6 -Clean Water and Sanitation**

The connection of the liquid waste to the sewer system and provision of adequate sanitary facilities shall improve water quality and sanitation by ensuring zero proportion of untreated wastewater is not discharged to the environment.

### **Goal 7 -Affordable and Clean Energy**

The implementation of an energy management system through good orientation, solar shading, natural ventilation, natural lighting, energy efficient fitting and appliances shall contribute to increased energy efficiency.

### **Goal 8 -Decent Work and Economic Growth**

Creation of employment opportunities during the project cycle shall contribute to reducing the proportion of youth not in employment. The proponent shall ensure an environment that emphasizes on protection of labor rights and promotes safe and secure working environments for all workers during the project cycle.

## **4.3 LEGAL FRAMEWORK**

### **4.3.1 The Constitution of Kenya 2010**

The Constitution of Kenya is the supreme law of the Republic of Kenya and binds all persons and all State organs at all levels of government. It provides the broad framework regulating all existence and development aspects of interest to the people of Kenya, and along which all national and sectorial legislative documents are drawn. In relation to environment, Article 42 on the Bill of Rights confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69; and to have obligations relating to the environment fulfilled under Article 70.

Article 43 (1) (b) states that every person has the right to accessible and adequate housing, and to reasonable standards of sanitation. Article 69 (1) (d) also stipulates that the state shall encourage public participation in the management, protection and conservation of the environment and utilize the environment and natural resources for the benefit of the people of Kenya. Section 2 of article 69 states that every person has a duty to cooperate with state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

*The proponent shall adhere to the provisions of the EMP provided in this report and ensure the right to a clean and safe environment is not infringed. Consultations and public participation with the affected community has been undertaken and questionnaires annexed in the report.*

### **4.3.2 Environment Management and Coordination Act, EMCA Cap 387 and Amendment 2015**

The Act states in section 3 (1) and (2) that every person is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment and that the entitlement to a clean and healthy environment under subsection (1) includes the access by any person in Kenya to the various public elements or segments of the environment for recreational, educational, health, spiritual and cultural purposes.

Part VI Section 58 (2) of the Act states the proponent of any project specified in the Second Schedule shall undertake a full environmental impact assessment study and submit an EIA Study report to the Authority prior to being issued with any licence by the Authority: provided that the Authority may direct that the proponent forego the submission of the EIA Study report in certain cases.

Section 58 (5) states that EIA studies and reports required under the Act shall be conducted or prepared respectively by individual experts or a firm of experts authorised in that behalf by the Authority. The Authority shall maintain a register of all individual experts or firms of all experts duly authorized by it to conduct or prepare environmental impact assessment studies and reports respectively. The register shall be a public document and may be inspected at reasonable hours by any person on the payment of a prescribed fee. Subsection (7) further states that EIA shall be conducted in accordance with the EIA regulations, guidelines and procedures issued under this Act.

Section 59 (1) states that upon receipt of an EIA study report from any proponent under section 58(2), the Authority shall cause to be published in the Gazette, in at least two newspapers circulating in the area or proposed area of the project and over radio stating:

- (a) a summary description of the project;
- (b) the place where the project is to be carried out;
- (c) the place where the environmental impact assessment study, evaluation or review report may be inspected; and
- (d) a time limit of not exceeding ninety days for the submission of oral or written comments by any member of the public on the environmental impact assessment study, evaluation or review report.

Subsection (2) and (3) of 59 states that the Authority may, on application by any person extend the period stipulated in sub-paragraph (d) so as to afford reasonable opportunity for such person to submit oral or written comments on the EIA report and the Authority shall ensure that its website contains a summary of the report referred to in subsection (1).

*The proponent has engaged the services of the environmental experts to conduct the EIA Study Report in line with the provisions of this Act. The environmental experts conducted the EIA in line with the regulations, guidelines and procedures issued under the Act.*

#### **4.3.3 The Environmental (Impact Assessment and Audit) Regulations, 2003**

These regulations stipulate how an EIA study 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 EIA Study Report making process. Section 4 (1) states that no proponent shall implement a project likely to have a negative environmental impact or for which an EIA is required under the Act or these Regulations unless an EIA has been concluded and approved in accordance with these Regulations.

Section 11 (1) states that an EIA study shall be conducted in accordance with terms of reference developed during the scoping exercise by the proponent and approved by the Authority. Section 13 (1) and (2) further states that proponent shall, on the approval of the terms of reference under regulation 11, submit to the Authority the names and qualifications of the impact assessment experts appointed to undertake the EIA study and authorized so to do in accordance with section 58 (5) of the Act and that every EIA study shall be carried out by a lead expert qualified in accordance with the criteria of listing of experts specified in the Fourth Schedule to these Regulations.

Section 17 (1) stipulates that during the process of conducting an EIA study under these Regulations, the proponent shall in consultation with the Authority; seek the views of persons who may be affected by the project. Part IV of the regulations states how an EIA Study Report is conducted, contents and information required, submission, timelines and review process.

*The proponent and consultant have undertaken this EIA Study report in line with all the provisions set out in these regulations. A public meeting, administration of questionnaires and interview were conducted to seek views of PAPs in line with these regulations.*

#### **4.3.4 Environmental Management and Co-ordination (Water Quality) Regulations, 2006**

The Regulations apply to drinking water, water used for industrial purposes, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife, and water used for any other purposes.

Part II Section 4 (1) states that “Every person shall refrain from any act 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. Subsection (2) further states that “No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit”

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”.

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

#### **4.3.5 Environmental Management and Co-ordination (Waste Management) Regulations, 2006**

The regulations are contained in the Kenya Gazette No. 69, Legal Notice No. 121. 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 (1) and (2) states that “No person shall dispose any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle and that any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations”

Section 6 (1) stipulates that “Any person who owns or controls a facility or premises which generates waste shall minimize the waste generated by adopting the following cleaner production principles:

- i. Improvement of production process through conserving raw materials and energy, eliminating the use of toxic raw materials within such time as may be prescribed by the Authority and reducing toxic emissions and wastes,
- ii. Monitoring the product cycle from beginning to end by identifying and eliminating potential negative impacts of the product, enabling the recovery and re-use of the product where possible and reclamation and recycling,
- iii. Incorporating environmental concerns in the design, process and disposal of a product.

Section 9 states that “Any person licensed to transport waste shall collect waste from the designated area of operations or storage areas and shall deliver such waste to the designated storage site, disposal site or plant”

*The proponent shall engage the services of a licenced waste handler to transport waste to the designated areas. During occupation, the proponent has set aside two dustbin rooms to be used for collection and segregation of waste before disposal.*

#### **4.3.6 The Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009**

Section 3 (1) and (2) of the regulations states that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment except as otherwise provided in the Regulations. 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 can be controlled without much effort or expense to the person making the noise.

These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Part II Section 4 states that except as otherwise provided in these Regulations, no person shall

- a. Make or cause to be made excessive vibrations annoys, disturbs, injures or endangers the comfort, response, health or safety of others and the environment; or
- b. Cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.



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

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

*The contractor shall ensure that all construction activities are carried out between 0800hrs and 1800hrs on weekdays to ensure that the neighbors are not disturbed. The contractor shall also ensure that all machineries are in good working condition to reduce noise.*

#### **4.3.7 The Environmental Management and Co-Ordination (Air Quality) Regulations, 2014**

The objective of these Regulations is to provide for the prevention, control and abatement of air pollution to ensure clean and healthy ambient air. Section 5 states that no person shall act in a way that directly or indirectly causes, or is likely to cause immediate or subsequent air pollution; or emit any liquid, solid or gaseous substance or deposit any such substance in levels exceeding those set out in the first Schedule.

Further, clause 6 stipulates that no person shall cause or allow emission of the priority air pollutants prescribed in the second schedule to cause the ambient air quality limits prescribed in the first schedule to be exceeded.

Clause 25 (1) states that no person shall cause or allow the emission of visible air pollutants from a stationary or mobile vehicle in excess of the limits set out under the prescribed Standard.

Clause 33 states that no person operating construction equipment or handling construction material shall allow emission of particulate matter so as to adversely affect the limits set out in the First schedule.

Clause 35 states that no person shall cause or allow stockpiling or other storage of material in a manner likely to cause ambient air quality levels set out under the First Schedule to be exceeded.

Clause 38 stipulates that no person shall cause or allow emissions of priority air pollutants set out under the Second Schedule from disposal of medical waste, domestic waste, plastics, tyres, industrial waste or other waste by open burning.

*The proponent shall comply with these regulations and implement all mitigation measures provided in the EMP to prevent air pollution during the project cycle*

#### **4.3.8 The Water Act, 2016**

This Act of Parliament provides for the regulation, management and development of water resources, water and sewerage services.

Part II section 9 of this Act states that every person has a right to access water resources, whose administration is the function of the national government. Part III section 11 states the establishment of the Water Resources Authority (WRA) whose functions is stipulated in section 12 and include but not limited to receiving water permits applications for water abstraction, collection of water permit fees and water use charges.

Section 63 of the act states that every person in Kenya has the right to clean and safe water in adequate quantities and to reasonable standards of sanitation as stipulated in Article 43 of the Constitution.

Section 143 states that a person shall not, without authority conferred under this Act;

- a) willfully obstruct, interfere with, divert or obstruct water from any watercourse or any water resource, or negligently allow any such obstruction, interference, diversion or abstraction; or
- b) throw, convey, cause or permit to be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other offensive matter or thing into or near to any water resource in such manner as to cause, or be likely to cause, pollution of the water resource.

Section 147 states that a person who commits an offence under this Act, or under any Regulations or made under this Act, shall, if no other penalty is prescribed in respect of the offence, be liable to a fine not exceeding one million shillings or to imprisonment for a term not exceeding two years, or to both such fine and imprisonment.

*The proponent shall ensure that all provisions stated in the act and under any regulations are observed and that the EMP is implemented.*

#### **4.3.9 Occupational Health and Safety Act 2007**

This is an act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. The key areas addressed by the Act include:

- i. General duties including duties of occupiers, self-employed persons and employees.
- ii. Registration of workplaces.
- iii. Health General Provisions including cleanliness, ventilation, lighting and sanitary conveniences.
- iv. Machinery safety including safe handling of transmission machinery, hand held and portable power tools, self-acting machines, hoists and lifts, chains, ropes & lifting tackle, cranes and other lifting machines, steam boilers, air receivers, refrigeration plants and compressed air receiver.
- v. Safety General Provisions including safe storage of dangerous liquids, fire safety, evacuation procedures, precautions with respect to explosives or inflammable dust or gas.
- vi. Chemical safety including the use of material safety data sheets, control of air pollution, noise and vibration, the handling, transportation and disposal of chemicals and other hazardous substances materials
- vii. Welfare general provisions including supply of drinking water, washing facilities, and first aid.

Under section 6 of this act, every occupier is obliged to ensure safety, health and welfare of all persons working in his workplace. The occupier shall achieve this objective by preparing and as often as may be appropriate, revising a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy (Section 7). He is also required to establish a safety and health committee at the workplace in a situation where the number of employees exceeds twenty (section 9) and to cause a thorough safety and health audit of his workplace to be carried out at least once in every period of twelve months by a registered safety and health Advisor (Section 11).

To ensure machinery safety, every hoist or lift (section 63) and all chains, ropes and lifting tackles (section 64 (1, d)), shall be thoroughly examined at least once in every period of six months by a person approved by the Director of Occupational Health and Safety Services.

In relation to fire safety, section 78 (3) requires spillage or leaks of any flammable liquid to be contained or immediately drained off to a suitable container or to a safe place, or otherwise treated to make it safe. Furthermore, section 78 (5) states that a clear and bold notice indicating that smoking is prohibited should be conspicuously displayed in any place in which explosive, highly flammable or highly combustible substances, are manufactured, used, handled or stored.

In summary, this act will be used a guideline to ensure health and safety of workers is guaranteed.

*The proponent shall ensure that safety measures are implemented in use of tools and machinery within site and that protection of the workers and general public with any form of interaction with the construction site is observed as stipulated in the act.*

#### **4.3.10 The Physical Planning Act of 1996 CAP 286**

Part V - Control of development

30. (1) No person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33.

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable to a fine not exceeding one hundred thousand shillings or to an imprisonment not exceeding five years or to both.

(3) Any dealing in connection with any development in respect of which an offence is committed under this section shall be null and void and such development shall be discontinued. (4) Notwithstanding the provisions of subsection (2)—

(a) The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days;

(b) If on the expiry of the ninety days' notice given to the developer such restoration has not been effected, the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

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

which the land concerned is situated. The application shall be accompanied by such plans and particulars as are necessary to indicate the purposes of the development, and in particular shall show the proposed use and density, and the land which the applicant intends to surrender for;

- a. Purposes of principal and secondary means of access to any subdivisions within the area included in the application and to adjoining land;
- b. Public purposes consequent upon the proposed development.

36. If in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with the application an environmental impact assessment report. This Act provides for order in terms of development execution.

*The proponent shall submit the project designs to the county government for approval and comply with all the provisions of this Act.*

#### **4.3.11 Public Health Act Cap 242**

Part IX section 115 of the Act states that No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health.

Section 116 requires that the local authorities (county governments) take all lawful, necessary and reasonably practicable measures for maintaining its district (counties) at all times in clean and sanitary condition, and for preventing the occurrence therein of, or for remedying or causing to be remedied, any nuisance or condition liable to be injurious or dangerous to health, and to take proceedings at law against any person causing or responsible for the continuance of any such nuisance or condition.

Part XII Section 136 states that all collections of water, sewage, rubbish, refuse and fluids which permits or facilitate the breeding or multiplication of pests shall be termed nuisances and are liable to be dealt with in the manner provided by this Act. Section 138 states that no person shall within a township permit any premises or lands owned or occupied by him or over which he has control to become overgrown with bush or long grass of such a nature as, in the opinion of the medical officer of health, to be likely to harbour mosquitoes.

*The proponent shall contract a licensed waste handler to collect all waste from the site to disposal at approved dumping site. Sewage from the site shall be discharged into the*

*conventional sewer system. The proposed project shall be kept clean at all times and the proponent shall ensure all provisions of this act are implemented.*

#### **4.3.12 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 shall work in liaison with County Government and in particular the Water, Energy, Forestry, Environment and Natural Resources Sector.*

#### **4.3.13 Energy Act, 2006**

The Energy Act, 2006 was enacted on 2nd January 2007 establishes an Energy Regulatory Commission (ERC) mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, Public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to energy sector in Kenya. Section 30 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the EMCA Cap 387. Moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

#### **4.3.14 National Construction Authority Act, 2011**

The act is set to streamline, overhaul and regulate the construction industry in Kenya for sustainable development. The NCA establishes the authority and confers on its power to register contractors within the construction industry. The act requires all the contractors, both foreign and local contractors to be registered with the authority. The act also regulates the practices of foreign contractor by limiting their work to only tender work. The foreign contractors are licensed for only a specific period and once they certify they are in Kenya for that specific time. The foreign contractors must also produce a certificate of compliance. Furthermore they must lodge an affidavit with the NCA that once the project they have been licensed is over, they shall wind up their business. This prevents them from engaging in any other construction in the country.

#### **4.3.15 Building Code, 2000**

This gives general guidelines for the construction of buildings and attendant safety measures such as installation of firefighting appliances, fire escapes etc. It equally recognizes local authorities as lead planning agencies and thus requires every developer to submit building plans to the relevant local authority (county governments) for approval. The local authorities are in turn empowered to disapprove any plan submitted if it is not correctly drawn or does not provide sufficient information that complies with the relevant by-laws. Any developer who intends to erect a building, such as a residential block, must also give the concerned local authority a notice of inspection before the erection of the proposed structure.

After erecting the building, a notice of completion shall be issued to the local authority to facilitate final inspection/approval. No person shall therefore occupy a building whose certificate of completion has not been issued by the local authority. As a precaution against fire breakout, the by-law states that the walls of any premise shall be non-combustible throughout. Similarly, in every building which comprises more than one story, other than a small house, shall have fire resistance.

Section 214 indicates that, in any public building whose floor is more than 20 feet above the ground level, the council may recommend the provision of firefighting equipment that may include one or more of the following: hydrants, hose reels and fire appliances, external conations, portable fire appliances, water storage tanks, dry risers, sprinkler, drencher and water spray spring protector system.

#### **4.3.16 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 neighbourhood or passing along a public way is guilty of a misdemeanor”

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

#### **4.3.17 Land Registration Act, 2012**

According to section 26 subsection (1) states that the certificate of title issued by the Registrar upon registration, or to a purchaser of land upon a transfer or transmission by the proprietor shall be taken by all courts as prima facie evidence that the person named as proprietor of the land is the absolute and indefeasible owner, subject to the encumbrances, easements, restrictions and conditions contained or endorsed in the certificate, and the title of that proprietor shall not be subject to challenge, except on the ground of fraud or misrepresentation to which the person is proved to be a party; or where the certificate of title has been acquired illegally, unprocedurally or through a corrupt scheme. A certified copy of any registered instrument, signed by the Registrar and sealed with the Seal of the Registrar, shall be received in evidence in the same manner as the original. *Copy of land ownership documents is attached to this report.*

#### **4.3.18 The National Land Commission Act, 2012 (No. 5 of 2012)**

Pursuant to Article 67 (2) of the constitution, the functions of the commission are outlined in section 5 of the act as follows;

- i. To manage public land on behalf of the national and county governments;
- ii. To recommend a national land policy to the national government;
- iii. To advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;
- iv. To conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;
- v. To initiate investigations, on its own initiative or on a complaint, into present or historical land injustices, and recommend appropriate redress;



- vi. To encourage the application of traditional dispute resolution mechanisms in land conflicts;
- vii. To assess tax on land and premiums on immovable property in any area designated by law; and
- viii. To monitor and have oversight responsibilities over land use planning throughout the country.

*The subject plot is a private property owned by the project proponent and does not constitute part of disputed public/private utility land/allocations. Attached is the ownership document.*

#### **4.4 INSTITUTIONAL FRAMEWORK**

##### **4.4.1 National Environmental Management Authority (NEMA)**

The objective and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director General appointed by the president heads NEMA. The Authority is mandated to co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilization of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya and identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA.

*The EIA Study report is submitted to the authority for review and licensing. The proponent shall work in liaison with the authority in complying with the provisions of EMCA and any other subsidiary legislation under the Act.*

##### **4.4.2 National Environment Tribunal (NET)**

The tribunal is formed under section 125 of the EMCA, Cap 387 and handles all cases related to environmental offences in the Republic of Kenya. If there will be any disputes to the proposed project, they will be presented to the tribunal for hearing and determination. Any person aggrieved by the decision or order of the tribunal may appeal against such decision or order to the High Court.

## CHAPTER FIVE: IMPACT ASSESSMENT, MITIGATION MEASURES AND CONSTRUCTION SAFETY

### 5.1 Existing impacts

At the time of our site visit and field survey, the following impacts existed within the project area;

- i. Littered solid waste which include paper, bottles and tree leaves
- ii. Noise pollution from the ongoing construction of Westin Apartments at the junction of Mpaka and Suswa roads

### 5.2 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 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	Temporaire	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 2: Anticipated Impacts**

Impacts	Construction	Occupation
Excess noise and vibrations	--	0
Air Pollution	--, Sh	0
Soil erosion	-	0
Increased water demand	--	--

Increased liquid and solid wastes	--	--
Occupational Safety and Health	-, Sp	-
Increased traffic along the road	-	-
Increased energy demand	-, Sh	--
Insecurity	-	0
Fire Safety	-	0

### 5.3 ENVIRONMENTAL IMPACTS

#### 5.3.1 Negative Impacts

##### 5.3.1.1 Soil Erosion

The proposed project will have a negative impact on the geology and soil of the project site. This will be as a result of excavation of the soils to pave way for the construction of the basements and foundation. The soils will be exposed to weather elements including wind and storm water resulting to soil erosion. The traversing of heavy machinery (excavators, back hoe and tippers) during the construction will lead to compaction and erosion of the soil. Uncontrolled soil erosion can have adverse effects on the local water bodies and lead to air pollution (dust).

##### *Potential Mitigation measures*

- i. Control over excavation works especially during rainy/wet conditions. Avoid unnecessary excavations and other soil disturbances that can predispose it to the agents of erosion.
- ii. Use of soil erosion control structures on prone areas within the site and measures such as suppressing open surfaces with water.
- iii. Ensure continuous covering of exposed soil as soil is moved around site and as soil stockpiles are formed and reformed.
- iv. Materials to be delivered on site in installments to reduce stockpiles.
- v. Avoid unnecessary movement of soil materials from the site.
- vi. Leveling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.

### **5.3.1.2 Air Pollution**

Air pollution will be a major negative impact during the construction phase as a result of increase in levels of fugitive dust emanating from the demolition, excavation, construction activities and stockpiled earth materials. This may be a public health hazard resulting to nuisance to the workers and the public. Air pollution may also be as a result of combustion of fossil fuels from the construction machinery. This is expected as a short term and reversible impact after the end of construction.

#### *Potential Mitigation measures*

- i. Use of dust nets/screens around the construction site to contain and arrest dust.
- ii. Regular sprinkling of water on work areas to prevent fugitive dust violations.
- iii. Minimize exposed areas through the schedule of construction activities to enable dust control.
- iv. Use environmentally friendly fuels such as low sulphur diesel.
- v. Ensure no burning of waste such as paper and plastic containers on sites/non-designated areas.
- vi. Minimize the period for idling of machinery and construction vehicles.
- vii. Restricting heights from which materials are to be dropped, as far as practicable to minimize the fugitive dust arising from unloading/loading.
- viii. Onsite dirt piles or other stockpiled material should be covered, wind breaks installed, water and/or soil stabilizers employed to reduce wind-blown dust emissions.
- ix. Where a vehicle leaving a construction site is carrying a load of dusty materials, the load shall be covered entirely by clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle.
- x. Provide Personal Protective Equipment (PPE) such as nose masks, goggles etc. to the workers in dusty areas on the site.
- xi. Regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases.
- xii. Ensure covering of loaded vehicles with clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle.
- xiii. Monitor the air pollution levels regularly as per the Air Quality regulations.

### **5.3.1.3 Noise and Excessive Vibrations**

Noise pollution will be negative impact and short term limited to the construction period. The noise will be caused by the construction activities, use of heavy machinery and vehicles during transportation of materials to and from the site. Since the site is near sensitive areas such as schools and mosque, the drivers shall ensure no hooting to minimize disturbance during transportation of materials. Vibrations will be experienced during the excavation of the basement, concrete vibration during concreting of the structural elements and hacking of the walls and building elements during plastering of the members.

#### *Potential Mitigation measures*

- i. Construction works shall be carried out only during the specified time i.e. from 0800hrs to 1800 hrs.
- ii. Use of noise suppressors or silencers or shields on noisy equipment such as corrugated iron sheet structures.
- iii. Reduce idling time of the machinery and the construction vehicles. Operate noisy machinery only when necessary and switch them off when not in use.
- iv. Noise barriers such as hoarding shall be installed before the construction begins.
- v. All noisy activities shall be scheduled concurrently during construction to reduce the exposure period.
- vi. Endeavor to use equipment installed with noise abatement devices as much as practicable.
- vii. Machineries shall be maintained regularly to reduce noise resulting from friction.
- viii. Workers shall be provided with suitable PPEs such as earmuffs when in noisy environment.
- ix. Drivers delivering materials shall avoid unnecessary honking of the trucks/vehicles.
- x. Bill board shall be provided at the construction site/gate notifying of the construction activity and timings.
- xi. Regular monitoring of noise levels at the site as per the regulations.

### **5.3.1.4 Oil Pollution**

Oil pollution will be a negligible impact which may be caused by spilling or leaking of construction machinery and vehicles during the project cycle. The construction machinery and vehicles use petroleum products which contain detrimental elements to the environment such as heavy metals (mercury, lead and sulphur). The machinery will be serviced regularly in the contractor yard away from the site to avoid spillage in the project site.

*Potential Mitigation measures*

- i. Routine inspection and regular maintenance of all machinery shall be done to avoid any oil leaks to the project site.
- ii. All oils/grease and materials shall be stored in a store in the contractor's yard away from site.
- iii. Maintenance shall be carried out in a well-designed and protected area and where oils/grease is completely restrained from reaching the ground. The areas shall be covered to avoid storm from carrying away spilled oils into the soil/water systems.
- iv. Proper disposal of oil handling materials such as drums, oily materials and cans at designated areas.
- v. All drainage facilities shall be fitted with adequate functional oil water separators and silt traps.

**5.3.1.5 Solid Waste**

Solid waste will be a major negative impact during the construction phase. The waste will include demolition and construction debris, excavated soils, cement bags, wood, broken glasses, containers, rods of metal, sharp objects such as nails, organic waste, paper, and plastic among others. The waste may result to blockage of drainage systems, choking of water bodies and have a negative impact to the human health. During occupation, waste may be organic emanating from the kitchen, paper, plastic and containers. The waste will be segregated at source and reused where feasible. A waste handler will be contracted to dispose the waste to the designated areas.

*Potential Mitigation measures*

- i. Engage the services of registered waste handlers to transport waste to designated disposal sites.
- ii. Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse, will facilitate waste handling during occupation phase.
- iii. Segregation of waste at the source during the project cycle.
- iv. Provision for dustbin cubicles at strategic places within the apartments.
- v. Efficient use of building material to reduce waste and recycling/reuse where feasible.
- vi. To manage waste in line with the Waste Management Regulations, 2006.

### **5.3.2.6 Liquid Waste**

There will be increase in liquid waste as a result of increase in population within the project site both during construction and occupation of the serviced apartments. Inadequate provision of sanitary facilities during the construction period may result to defecation of secluded areas within the site creating unsanitary conditions and source for fly infestation. Improper liquid waste disposal may be a threat to human health of both workers and the neighboring community and also result to contamination of water resources, land and air. All liquid waste shall be properly managed through connection to the sewer line.

#### *Potential Mitigation measures*

- i. Channel all liquid waste to the sewer line.
- ii. Provision of adequate and appropriate sanitary facilities for the workers during construction phase.
- iii. Proper decommissioning of the sanitary facilities shall be carried out once construction is complete.
- iv. Sanitary facilities shall be kept clean always through regular cleaning.
- v. The design of the internal sewerage system shall consider the estimate discharges from individual sources and the cumulative discharge of the entire project, that is, it will have the capacity to consistently handle the loads even during peak volumes.
- vi. All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in concrete surround. All manholes on drive ways and parking areas shall have heavy-duty covers set and double sealed airtight as approved by specialists.
- vii. Ensure regular maintenance of foul water drainage works at the premises to prevent clogging and fore-stall breakdowns.
- viii. Frequent monitoring of the internal drainage system.

### **5.3.2.7 Storm water drainage**

The construction of parking bays and the roof system of the proposed project will result to increase in the volume and velocity of storm water runoff due to reduction of recharge areas. This will lead to increased amounts of storm water entering the drainage systems resulting in overflow and damage to the systems.

*Potential Mitigation measures*

- i. Rain water harvesting facilities shall be installed to reduce the amount of rainfall reaching the surface.
- ii. Drainage channels shall be covered with gratings to avoid occurrence of accidents and entry of dirt.
- iii. Construct gently sloping drains to convey water at non-erosive speed.

**5.3.1.8 Increased Water demand**

This will be a major negative impact due to the considerable amount of water required during the project cycle. During the construction, water will be required for activities such as cement mixing, curing of concrete and drinking water for workers. On occupation, water will be required for cleaning, drinking, cooking and recreational activities such as the swimming pool. This may place some amount of strain on water supply by NCWSC.

*Potential Mitigation measures*

- i. The contractor shall use water bowsers and tankers to bring in water for construction activities i.e. during periods of high water demand (i.e. during slab formation). Water fetching shall however be subject to authorization by the relevant authority.
- ii. Provision of rain water harvesting facilities to supplement other sources of water supply
- iii. Use water efficient appliances and fixtures for plumbing products and white goods.
- iv. Provision of adequate underground and roof tanks for water storage.
- v. Encourage water reuse/recycling during construction and occupation phases where feasible.
- vi. Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. 'Keep/Leave the Tap Closed', etc. This will awaken the civic consciousness of the workers and residents with regard to water usage and management.
- vii. Prompt detect and repair of all the water fixtures and fittings.



## **5.4 SOCIAL-ECONOMIC IMPACTS**

### **5.4.1 Positive impacts**

There are a number of positive benefits associated with the proposed development as described below;

- i. Provision of serviced apartments will alleviate the shortage of the housing units in the area and the country at large.
- ii. The proposed project will create employment opportunities for both skilled and semi-skilled workers. During the construction phase, the project will employ masons, plumbers and electricians among others. For the operation phase, the project will employ cleaners, security guards, caretakers among others.
- iii. Increase in revenue to the government through payment of relevant taxes, rates, permits and fees. The project will contribute towards the national and local revenue earnings.
- iv. Provision of market for supply of building materials. During the construction phase, the project will require a lot of building materials sourced locally. This will have a positive impact towards the economic status of the supplies and to the national economy through V.A.T rates for goods.
- v. The proponent will receive returns on his investments through rentals of the serviced apartments.
- vi. Security of the area will be enhanced through distribution of suitable security lights and presence of 24 hour security guards. This will lead to improvement in the general security in the surrounding area.
- vii. The economy of the neighborhood will receive a boost especially during the construction phase due to the activities of the workers such as buying food, drink and commodities.
- viii. The proposed project will result to a more economical use of the land without significant environmental degradation.

### **5.4.2 Negative Impacts**

#### **5.4.2.1 Public Health**

During construction phase, there will be increased air and noise pollution which are considered harmful to human health. The neighbors and workforce involved shall be subjected to these environmental hazards putting them at high risk.

Waste material such as pieces of glass and nails left lying on the ground may cause injuries/accidents to the workers. Food for the construction workforce is usually provided by mobile individuals most of which operates without licenses. This can compromise health of the workers especially if such foodstuffs are prepared in unhygienic conditions.

*Potential Mitigation measures*

- i. Depending on the occupational safety and health hazards anticipated while performing assigned job tasks, workers shall use properly fitting PPEs to avoid injuries and illness. These include working boots, overalls, helmets, goggles, earmuffs, masks, gloves etc
- ii. The contractor shall adapt a suitable emergence response plans to manage occurrence of anticipated hazards during construction phase.
- iii. Safety awareness may be gained through regular safety meetings, safety training or personal interest in safety and health.
- iv. Provide appropriate signage and warnings in work areas.
- v. Provide first aid facilities and ensure that workers are trained on emergency response such as first aid skills.
- vi. Local individuals preparing food for the workers at the site shall be controlled, monitored and evaluated to ensure that food is hygienically prepared.
- vii. Workers shall always be sensitized on social issues such as drugs, alcohol, diseases such as HIV/AIDS and STIs etc.
- viii. Provide adequate and functional sanitary facilities for the workers.
- ix. Comply with OSHA 2007 and all other relevant regulations governing health and safety of workplaces.

**5.4.2.2 Insecurity**

Insecurity may arise during the construction phase since intruders may try to steal the building materials stored within the site. This especially happens in cases where there is no fence and/or boundary wall.

*Potential Mitigation measures*

- i. The project site shall be enclosed using a perimeter wall and a guard house at the gate to beef-up security.

- ii. The proponent/contractor shall employ security guards who shall be stationed at the site 24 hours. The guards shall monitor the movement of people in and out of the property to ensure that intruders are kept away from the site.
- iii. The contractor shall provide adequate security during the construction period when there are no works on the site.
- iv. Security lights shall be installed around the property. The lights shall be switched on during the night hours and ensure that there are regularly maintained.
- v. CCTV cameras shall be installed at strategic points for monitoring and enhancing the security of the property during operation phase.

#### **5.4.2.3 Fire**

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 through proper training and sensitizations.

##### *Potential Mitigation measures*

- i. Hire competent and properly authorized electrical contractor to do the electrical works.
- ii. Post 'No smoking signs' where flammable materials are stored.
- iii. Conduct regular firefighting drills within the site.
- iv. Develop and post at the site fire emergency and evacuation procedures.
- v. Provide adequate number of appropriate firefighting equipment at strategic places within the property.
- vi. Train staff on the use of the available firefighting equipment. At least one person trained on handling firefighting equipment should be available through-out the construction phase of the project.
- vii. Organize for inspection and maintenance of fire equipment at least once in a period of six months.
- viii. Maintain on site telephone contacts for fire brigade, G4S fire brigade and St. Johns ambulance service provider.

#### **5.4.2.4 Increased Energy demand**

There shall be increased use of energy during the construction stage (fuel for running machinery and other equipment) and during operation phase (electricity used by the residents of the units). Energy conservation is thus fundamental and shall involve optimum use of petroleum products

(diesel and gasoline), electrical appliances (equipment), lighting systems and other electric machinery as used for different purposes. It also includes use of renewable energy sources.

*Potential Mitigation measures*

- i.* Turn off machinery and equipment when not in use.
- ii.* Monitor energy use during construction and set reasonable limit.
- iii.* Put off all lights immediately when not in use or are not needed.
- iv.* Install and routine maintenance of energy efficient appliances e.g. security lights, indoor lights etc.
- v.* Use of solar energy as an alternative source of energy. The solar panels proposed in the project shall be fully utilized and timely repaired in case of damage.

**5.4.2.5 Traffic Density**

Increase in traffic along the access road shall be experienced especially during construction phase since trucks shall be accessing the site to deliver construction materials and taking away construction wastes. This phase of the development may have a negative impact on the present road network in the area. During the operation phase of the project, there shall be a significant increase in the volume of traffic associated with the project activities.

*Potential Mitigation measures*

- i.* Recruit traffic marshals to control traffic along the adjacent roads.
- ii.* Set up traffic control/warning signs near construction site informing the motorists and the public of potential hazards. The signs shall be positioned in a way to be easily viewed by the public and mostly motorists.
- iii.* Develop a traffic management plan to ensure that site vehicles do not interfere with the regular traffic along the main roads or pose safety hazards to workers and the public.
- iv.* Ensure that construction vehicles do not cause nuisance to the public through obstructions and that the speed limit is observed.
- v.* In case the access road is damaged by the heavy trucks and machinery during the construction phase, the proponent shall rehabilitate the road.

## **5.5 CONSTRUCTION SAFETY**

The proposed site will involve construction activities that are dynamic to the workers engaged in the activities resulting to their exposure to a variety of safety hazards such as falling objects, working from rooftops or scaffolding, exposure to heavy construction machinery and electrocution while operating electrical equipment in moist areas. It is therefore a necessity to develop an EHS Management plan to regulate environmentally instigated diseases and occupational safety measures during construction and operation phases of the proposed project.

It is the obligation of the proponent and the contractor to ensure a safe and healthy environment at the workplace and within the neighborhood to prevent occupational diseases, avoid injuries, damage to property, control damage to equipment and enhance environmental sustainability through the developed sound conservation measures.

### **General Construction Guidelines**

Construction activities can be particularly hazardous and this calls for proper application of construction standards, use of approved construction materials and PPE, fire safety, electrical safety and other precautions are essential for safe construction work. The workers and public will be guided by the following principle:

- i. Do not walk, stand, or work under suspended loads. If you raise a load, be sure to crib, block, or otherwise secure the load as soon as possible.
- ii. Avoid placing unusual strain on equipment or materials.
- iii. Be prepared for unexpected hazards. BE ALERT ALWAYS! - DEVELOP and ADAPT an EMERGENCY RESPONSE PLAN for the proposed project.
- iv. Ensuring that PPE such as safety boots, helmet, goggles, ear muffs, and gloves are used at all times.
- v. Contractor and his agents shall use barriers and guards as necessary to protect employees from physical hazards. Danger warnings shall be placed as is necessary.
- vi. A well-stocked First Aid kit shall be provided to take care of accidents that may arise during job executions. This shall be placed under the charge of a responsible person who shall readily be available during working hours.
- vii. Employees will be expected to take personal responsibility for their safety, safety of colleagues and of the general public as it relates to the EHS management plan.

## **CHAPTER SIX: CONSULTATIONS AND PUBLIC PARTICIPATION**

### **6.1 Introduction**

EIA process is largely determined by effective Consultations and Public Participation (CPP) which basically provides a cornerstone for project planning and successful implementation. CPP process helps to facilitate the involvement and participation of PAPs throughout the project cycle and ensures a sense of responsibility and commitment towards implementing the proposed project.

### **6.2 Objectives of the CPP**

The objective of the CPP was to:

- i. Disseminate and inform the stakeholders about the proposed project with special reference to its key components and anticipated impacts;
- ii. Gather comments, suggestions and concerns of the PAPs;
- iii. Incorporate the information collected in the EIA report.

### **6.3 Methodology used in the CPP**

The CPP exercise was conducted between 24<sup>th</sup> October to 1<sup>st</sup> November 2018. In accordance to the EIA Regulations 2003 section 17c, appropriate notice was circulated to the PAPs on 24<sup>th</sup> October 2018 one week prior to the public *meeting (attached is the notice and delivery sheet signed by the AP)*. The exercise was conducted in different ways as follows;

- i. Interviews and discussions with the PAPs.
- ii. Public meeting which was held on 31<sup>st</sup> October 2018 at the project site.
- iii. Administering of questionnaires.
- iv. Field surveys and observations.

The purpose for the public meeting and interviews was to identify the environmental 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.

### **6.4 Analysis of the Public Consultation findings**

#### **Positive Issues**

- i. Creation of job opportunities.
- ii. Provision of studio apartments in the area.
- iii. Provision of social amenities.

- iv. Economic growth of the neighborhood.

### **Negative Issues**

The following are negative issues raised by the stakeholders;

- i. Increased traffic along the access road.
- ii. Insufficient provision of parking bays.
- iii. Pressure on the existing water supply.
- iv. Air (dust) and noise pollution especially during the construction phase.
- v. Increased storm water along the open drains may cause flood.

These negative impacts have been addressed in this report and especially through the EMP that the proponent is committed to implement in order to ensure sustainable development (*Attached are the filled questionnaires*).

### ***Plate 11: Public meeting within the project site***



***Source: Fieldwork, 31/10/2018***

## **CHAPTER SEVEN: PROJECT ALTERNATIVES**

### **7.1 Introduction**

The various project alternatives were analyzed for the proposed residential development. The options included the ‘No Project Option’, The Proposed Project Option, Alternative Design and Alternative Materials and Technologies. With such information, the reviewers will have a basis for decision making.

### **7.2 No Project Alternative**

This alternative implies that the status quo is maintained with no development of the Proposed Apartments and auxiliary facilities. This would avoid the realization of the impacts concomitant to the proposed development and provision of the housing units. However, with the demand for housing units especially in Nairobi City County, a lack of development of the proposed apartments will mean that the existing shortfall in residential units will continue to prevail unabated. The resources in the area would continue to be underutilized since the land lies idle and the numerous benefits to be gained associated with the proposed development would not be realized.

Therefore, the ‘No Option alternative’ is the least preferred and is deemed inappropriate on the basis that supply of housing units is a necessity in the county and the country at large.

### **7.3 The Proposed Project Option**

The proposed project will consist of one block of twelve levels with a total of one hundred sixty two serviced apartments and other auxiliary facilities. The project is in line with the planning of the area as the region is in Zone 3 which allows commercial/residential (High-rise flats). The government through the Big 4 Agenda on affordable Housing encourages developers to construct more apartments to alleviate the increased demand for housing especially in the urban areas. Thus, the project is a timely venture and this is the best option for the proposed site.

### **7.4 Alternative Construction Materials and Technologies**

The proposed project will be constructed using reinforced concrete, natural stones for the walling, cement for mortar and plaster works, structural steel, metal scaffolds and formwork. The concrete structure will be built using locally sourced sand, cement, metal bars and fittings that meet the Kenya Bureau of Standards (KBS) requirements. The metal scaffolds will be advantageous than timber because it will reduce the wasting of precious trees, has a longer lifetime, provides a steady and firm standing, easily assembled and dismantled and it increases



the work efficiency. The equipment that saves on water and energy will be given priority during the construction of the proposed project.

The technologies available include the conventional brick and mortar style, concrete frame construction, prefabricated concrete panels, timber construction, steel and aluminum frame and Expanded Polystyrene Technology. The proponent has preferred the use of reinforced concrete frame construction as the technology is durable, offers outstanding resistance to explosion and/or impact and performs well during both natural and manmade disaster. Reinforced concrete can also endure very high temperatures from fire for a long time without loss of structural integrity.

## CHAPTER EIGHT: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMP)

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 in the table 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 for all the phases, that is, Construction, Operation and Decommissioning phases.

### 8.1 EMP FOR THE CONSTRUCTION PHASE

**Table 3: Environmental Management and Monitoring Plan during construction phase**

Environmental Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring frequency	Estimated Cost (Kshs)
<b>Soil erosion</b>	<ul style="list-style-type: none"> <li>• Avoid unnecessary excavations and other soil disturbances that can predispose soil to agents of erosion.</li> <li>• Ensure continuous covering of exposed soil and stockpiles</li> <li>• Compact loose soils to minimize wind erosion</li> <li>• Avoid unnecessary movement of soil materials from the site</li> <li>• Use of soil erosion control structures on prone areas within the site and measures such as suppressing open surfaces with water</li> <li>• Materials to be delivered on site in instalments to reduce stockpiles</li> <li>• Levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> </ul>	Weekly inspection	150,000
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>• Regular sprinkling of water on work areas and access road to prevent fugitive dust violations</li> <li>• Careful screening of construction site to contain and arrest construction related dust</li> <li>• Enclosing, covering and watering of exposed stockpiles e.g. sand and ballast</li> <li>• Regular and prompt maintenance of construction machinery and equipment to minimize generation of hazardous gases.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> <li>- Drivers</li> </ul>	Daily inspection  Routine maintenance	250,000

	<ul style="list-style-type: none"> <li>• Ensure training of all personnel working on the project on air quality management during the construction</li> <li>• All drivers shall be under strict instructions to minimize unnecessary trips and idling of engines</li> <li>• Use environmentally friendly fuels such as low sulphur diesel</li> <li>• Restricting heights from which materials are to be dropped, as far as practicable to minimize the fugitive dust arising from unloading/loading</li> <li>• Provide personal protective equipment (PPE) such as nose masks, goggles etc. to the workers in dusty areas within the site</li> <li>• Monitor the air pollution levels regularly as per the Air Quality regulations</li> </ul>			
<b>Noise pollution</b>	<ul style="list-style-type: none"> <li>• Ensure construction works are carried out only during the daytime i.e. from 0800hrs to 1800 hrs.</li> <li>• Ensure that all workers are provided with and wear PPE at all times</li> <li>• Ensure use of suppressors or noise shields on noisy equipment</li> <li>• Ensure regular and prompt maintenance of the machinery and equipment to suppress frictional noise</li> <li>• Reduce idling time on trucks and other noisy equipment. Operate noisy machinery only when necessary and switch them off when not in use</li> <li>• Trucks used at construction site shall be routed away from noise sensitive areas where feasible and that the drivers avoid unnecessary honking of the trucks/vehicles</li> <li>• Comply with EMCA (Noise and Excessive Vibration pollution control) Regulations 2009</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> <li>- Drivers</li> </ul>	<p>Weekly inspection</p> <p>Routine maintenance</p>	150,000
<b>Solid and liquid waste</b>	<ul style="list-style-type: none"> <li>• Direct all liquid waste to the sewerage system</li> <li>• Engage services of a registered NEMA waste handler to dispose the waste regularly at approved disposal points</li> <li>• Ensure covering of the trucks during transportation of the building materials and waste</li> <li>• Segregate waste at the site, recyclable/reusable materials and hazardous waste for appropriate disposal</li> <li>• Sensitize workers on the reuse of materials where feasible</li> <li>• Ensure sanitary facilities are provide at the site and proper decommissioning after the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> <li>- Drivers</li> </ul>	Weekly inspections	250,000

<b>Increased water demand</b>	<ul style="list-style-type: none"> <li>• Employ services of water vendors to supplement water supply</li> <li>• Use of water efficient appliances, fittings and fixtures at the site</li> <li>• Sensitize workers to reduce water wastage or reuse water where feasible</li> <li>• Connect to the NCWSC water supply after acquisition of relevant permits</li> </ul>	- Proponent - Contractor - Workers	Daily inspection	300,000
<b>Oil pollution</b>	<ul style="list-style-type: none"> <li>• Proper storage, handling and disposal of new/used oil and related wastes</li> <li>• Maintain construction machinery and equipment to avoid leaks</li> <li>• Maintenance of construction vehicles and equipment to be carried out in the contractors yard (off the site)</li> </ul>	- Proponent - Contractor	Routine maintenance  Weekly inspection	100,000
<b>Storm water drainage</b>	<ul style="list-style-type: none"> <li>• Routine maintenance of storm drains along the access road</li> <li>• Ensure efficiency of drainage structures through proper design and maintenance Proper installation of cascades to break the impact of water flowing in the drains</li> </ul>	- Proponent - Contractor	Routine maintenance	150,000
<b>Traffic congestion</b>	<ul style="list-style-type: none"> <li>• Employ traffic marshals to control traffic in and out of site</li> <li>• Ferry building materials during off-peak hours</li> <li>• Provide bill boards at the site/entrance to notify motorists and general public about the proposed development</li> <li>• Enforce speed limits for construction vehicles especially along the roads leading to the site</li> <li>• Ensure that the vehicles comply with axle load limits</li> <li>• Employ well trained and experienced drivers</li> </ul>	- Proponent - Contractor - Drivers	Daily inspection	250,000
<b>Health and safety of workers</b>	<ul style="list-style-type: none"> <li>• Ensure construction works are limited to daytime only</li> <li>• Workers to be adequately insured against accidents</li> <li>• All workers shall be sensitized before construction begins on how to control accidents related to construction.</li> <li>• Keep record of the public emergency service telephone numbers including Police, Fire brigade and Ambulance at strategic points</li> <li>• Provide first aid kits at strategic places in the site</li> <li>• Provide PPEs to the workers and ensure that they wear at all times</li> <li>• Ensure that the workers are registered with NHIF / NSSF and remits appropriate fees</li> <li>• Prepare a comprehensive contingency plan before construction begins on accident response</li> </ul>	- Proponent - Contractor - Workers	Daily inspection	200,000
<b>Insecurity</b>	<ul style="list-style-type: none"> <li>• Employ security guards to monitor movement of people in and out of the property Keep records of movement of people and vehicles in</li> </ul>	- Proponent - Contractor	Daily Inspection	200,000

	<ul style="list-style-type: none"> <li>and out of the construction site</li> <li>• Construct temporary barrier (iron sheet) around the site</li> <li>• Install security lights around the property</li> </ul>			
<b>Fire</b>	<ul style="list-style-type: none"> <li>• Provide fire fighting equipment at strategic points within the site</li> <li>• Ensure regular maintenance of fire fighting equipment</li> <li>• Sensitize the workers on fire risks and train them on first aid skills</li> <li>• Prepare effective emergency response plan</li> <li>• Provide emergency numbers at strategic points within the site</li> <li>• Use of signage at strategic places within the site such as 'No smoking signs' where flammable materials are stored</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Proponent</li> <li>- Workers</li> </ul>	<p>Monthly inspection</p> <p>Routine maintenance</p>	150,000

## 8.2 EMP FOR THE OPERATION PHASE

**Table 4: Environmental management and monitoring plan during Operation phase**

<b>Environmental/ Social Impact</b>	<b>Proposed Mitigation Measures</b>	<b>Responsibility for mitigation</b>	<b>Monitoring frequency</b>	<b>Estimated Cost (Kshs)</b>
<b>Liquid waste</b>	<ul style="list-style-type: none"> <li>• Ensure sanitary facilities are kept clean always through regular cleaning</li> <li>• Ensure regular maintenance of foul water drainage works at the premises to prevent clogging and fore-stall breakdowns</li> <li>• Frequent monitoring of the internal drainage system</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Periodic inspection  Routine Maintenance	150,000
<b>Solid waste</b>	<ul style="list-style-type: none"> <li>• Use of an integrated solid waste management system; through a hierarchy of options: source reduction, recycling, composting and reuse, will facilitate waste handling</li> <li>• Ensure segregation of waste (organic and inorganic) at source</li> <li>• Provide clearly marked dustbins cubicles to serve the specified use</li> <li>• Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures</li> <li>• Engage services of a registered NEMA waste handler to dispose the waste regularly at approved disposal points</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Periodic inspection	250,000
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>• Ensure regular collection and disposal of solid waste to avoid air pollution</li> <li>• Periodic maintenance of generator and water pumps</li> <li>• Comply with Air Quality regulations</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine inspection and maintenance	100,000
<b>Noise and vibration Pollution</b>	<ul style="list-style-type: none"> <li>• Installation of silencers on the generators and transformer rooms</li> <li>• Do annual noise measurements</li> <li>• Sensitize residents on minimal permissible noise levels</li> <li>• Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine inspection	150,000
<b>Storm water drainage</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of drainage structures</li> <li>• Inspection and maintenance of water harvesting gutters and storage tanks</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	Routine inspection and maintenance	100,000

<b>Increased water usage</b>	<ul style="list-style-type: none"> <li>• Use water efficient appliances and fixtures for plumbing products and white goods</li> <li>• Prompt detect and repair of all the plumbing products and white goods</li> <li>• Provision of rain water harvesting facilities to supplement other sources of water supply</li> <li>• Provision of roof/underground tanks for water storage</li> <li>• Regular maintenance of all the water components</li> <li>• Encourage water reuse/recycling where feasible</li> <li>• Provide notices and information signs to sensitize on means and needs to conserve water resource i.e. ‘Keep/Leave the Tap Closed’, etc. This will awaken the civic consciousness of the residents with regard to water usage and management.</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	<p>Routine maintenance</p> <p>Periodic inspection</p>	250,000
<b>Increased energy use</b>	<ul style="list-style-type: none"> <li>• Solar energy will be used as an alternative source of energy</li> <li>• Use energy efficient appliances such as LED bulbs for lighting</li> <li>• Switch off electrical appliances when not in use</li> <li>• Regular maintenance of all the electrical components</li> <li>• Regular inspection and maintenance of the solar panels</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	<p>Periodic Inspection</p> <p>Routine maintenance</p>	300,000
<b>Fire</b>	<ul style="list-style-type: none"> <li>• Install fire fighting equipment at strategic points within the building</li> <li>• Sensitize the residents on fire risks</li> <li>• Conduct regular fire drills</li> <li>• Prepare effective emergency response plan</li> <li>• Ensure regular maintenance of fire fighting equipment</li> <li>• Provide emergency numbers at strategic points within the buildings</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	<p>Routine Inspection and maintenance</p>	150,000
<b>Insecurity</b>	<ul style="list-style-type: none"> <li>• Engage services of security guards</li> <li>• Install and regular maintenance of the CCTV cameras</li> <li>• Place hotline numbers on strategic places</li> <li>• Sensitize residents on security precautions</li> <li>• Sensitize the residents on “<i>Nyumba Kumi Initiative</i>”</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Residents</li> </ul>	<p>Periodic inspection</p> <p>Routine maintenance</p>	150,000

### 8.3 EMP FOR THE DECOMMISSIONING PHASE

*Note: A due diligence environmental audit will be undertaken and submitted to NEMA at least three months prior to decommissioning and in line with the Environmental Management and Coordination Act No. 8 of 1999.*

**Table 5: Environmental management and monitoring plan during Decommissioning phase**

Environmental/ Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring Frequency	Estimated Cost (KShs)
<b>Demolition of existing structures</b>	<ul style="list-style-type: none"> <li>▪ Apply for demolition permit from relevant authorities before commencing the demolition exercise</li> <li>▪ Engage a registered private contractor to carry out the demolition</li> <li>▪ Provide workers with PPEs and train them before the demolition begins</li> <li>▪ Ensure that demolition exercise is carried out during the day time only</li> <li>▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> </ul>	Daily Inspection during the demolition period	500,000
<b>Air pollution</b>	<ul style="list-style-type: none"> <li>▪ Sprinkling of water regularly on dusty areas to suppress dust</li> <li>▪ Careful screening of the site to contain and arrest demolition related dust</li> <li>▪ Ensure demolition machinery and equipment are well maintained to reduce exhaust gas emission</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> </ul>	Daily Inspection  Routine Maintenance	200,000
<b>Noise pollution</b>	<ul style="list-style-type: none"> <li>▪ Demolition activities to be restricted to daytime (8am to 5pm)</li> <li>▪ Use of Suppressors /noise shields on noisy equipment</li> <li>▪ Ensure that all workers wear respective safety &amp; protective gear (PPEs)</li> <li>▪ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009</li> </ul>	<ul style="list-style-type: none"> <li>- Proponent</li> <li>- Contractor</li> <li>- Workers</li> </ul>	Routine Inspection	200,000
<b>Health and safety of workers</b>	<ul style="list-style-type: none"> <li>▪ All workers to wear PPEs e.g. helmets.</li> <li>▪ All workers shall be sensitized before demolition begins, on how to control accidents related to</li> </ul>	<ul style="list-style-type: none"> <li>- Contractor</li> <li>- Workers</li> <li>- Proponent</li> </ul>	Daily Inspection	250,000



	<p>demolition</p> <ul style="list-style-type: none"> <li>▪ Adherence to safety procedures shall be enforced</li> <li>▪ All workers shall be adequately insured against accidents</li> </ul>	-NEMA inspectors		
<b>Solid and liquid waste</b>	<ul style="list-style-type: none"> <li>▪ Ensure that all solid waste is disposed at designated areas by NEMA waste handler</li> <li>▪ Reuse of construction debris where feasible</li> <li>▪ Ensure refuse collection vehicles are covered to prevent scattering of wastes by wind during transportation</li> <li>▪ Ensure all persons involved in refuse collection are in full protective attire (PPEs)</li> <li>▪ Proper decommissioning of all the sanitary facilities</li> </ul>	-Contractor -Proponent	Daily Inspection	250,000
<b>Re-vegetation and comprehensive landscaping</b>	<ul style="list-style-type: none"> <li>▪ Implement an appropriate re-vegetation programme to restore the site to its original status</li> <li>▪ Ensure appropriate storm water runoff controls are implemented to prevent surface erosion</li> <li>▪ Monitoring and inspection of the area for indications of erosion shall be conducted and appropriate measures taken to correct any occurrences</li> <li>▪ Fencing and signs restricting access shall be posted to minimize disturbance to newly-vegetated areas</li> </ul>	-Contractor -Proponent	Random Inspection	350,000

## **CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS**

An EIA has been carried out for the proposed serviced apartments outlining the potential positive and negative impacts of the project. Beneficial impacts identified in the assessment include provision of serviced apartments, creation of employment opportunities, market for goods and services especially from various suppliers and increase in revenue for the county and national governments among others. The negative impacts identified include air and noise pollution, increased liquid and solid waste, increased traffic along the access road, increased energy and water demand and increased health and safety hazards during the construction phase of the project.

The proponent has committed to put in place various mitigation measures to alleviate the negative environmental, safety, health and social impacts associated with the proposed development. It is recommended that in addition to this commitment, the proponent should focus on implementing the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects.

It is also recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards. Therefore, we propose approval and an EIA licence be issued by NEMA based on the environmental management measures contained in the EIA Study Report.

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## **Appendices**

- i. Copy of ownership documents
- ii. Copy of expert practicing licenses
- iii. Copy of the Change of Use
- iv. Copy of architectural plans
- v. TOR Approval Letter
- vi. Copy of the invitation letter and delivery receipt
- vii. Copy of minutes of the Public Meeting and attendance sheet
- viii. Location map
- ix. Questionnaires