

**ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR PROPOSED
AFFORDABLE HOUSES AND COMPLIMENTARY FACILITIES DEVELOPMENT FOR
THIKA BUSTANI IN KIAMBU COUNTY**

PROPONENT:



**STATE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
MINISTRY OF LANDS, PUBLIC WORKS, HOUSING & URBAN DEVELOPMENT
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**SUBMITTED TO:
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)**

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MAY, 2025

Application Reference No:

FOR OFFICIAL USE

THE ENVIRONMENT MANAGEMENT AND CO-ORDINATION ACT
SUBMISSION OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Part A: DETAILS OF THE PROPONENT

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PART B: DETAILS OF THE ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT

- B1 Title of the project
- ENVIRONMENTAL IMPACT ASSESSMENT STUDY FOR THE PROPOSED DEVELOPMENT ON PLOT L.R. NO. 4953/667 IN THIKA BUSTANI IN KIAMBU COUNTY**
- B2 Objectives and scope of the project
- TO PROMOTE QUALITY AND STABILITY HOMES, INCREASE AFFORDABLE HOUSING SUPPLY, ENHANCE AFFORDABILITY & ACCESS, PROMOTE QUALITY & STABILITY, FOSTER INCLUSIVE COMMUNITIES FOR ALL KENYANS IN ACCORDANCE TO AFFORDABLE HOUSING ACT NO. 2 OF 2024.**
- B3 Description of the activities
- CONSTRUCTION TO COMPLETION OF THE PROPOSED AFFORDABLE HOUSING DEVELOPMENT PROJECT.**
- B4 Location of the project
- LATITUDE : -1.0401196 LONGITUDE: 37.085005**

Part C: DECLARATION BY THE PROPONENT

I hereby certify that the particulars given above are correct and true to the best of my knowledge.

ALBERT S. MUCHIRI

Name

Regional Lead Central
Position

[Signature]
Signature

On behalf of

Date: 07/OCT/2025

(Firm name and seal)

Part D: DETAILS OF ENVIRONMENTAL IMPACT ASSESSMENT EXPERT

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Part E: OFFICIAL USE

Comments:

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Officer..... Sign..... Date.....

Important Notes: Please submit the following:

- (a) Three copies of this form
- (b) 10 copies of the project report
- (c) the prescribed fees, to:

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The National Environment Management Authority,
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Disclaimer

This Environmental and Social Impact Assessment (ESIA) Report is being submitted in accordance with the terms and conditions of contract. It has been carried out in full observance of the EIA regulations and in compliance with the Environmental Management and Coordination (Amendment), 2015 Act subject to terms and conditions of the National Environment Management Authority (NEMA).

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Executive Summary

The State Department for Housing and Urban Development herein referred to as SDHUD was mandated to develop Affordable Housing and supporting Amenities infrastructure in the 47 counties across Kenya in light to this, the state department intends to construct the Thika Bustani AHP in Thika Town Constituency, Kiambu County.

The project shall be an upscale project that will fully showcase the ultra-modern vitality and vigor atmosphere

of Bustani region of Kiambu County while making full use of the geographic advantage, the public interest and the profound local culture. The components of the project as shown in the architectural drawings include:

BLOCKS	STOREY	UNITS
3No.Block A	1 st -10 th Floor	330 units
3No.Block B	1 st -10 th Floor	240 Units
SHOPS	GROUND FLOOR	32 Units
TOTAL		602 UNITS
Club House Community Basket Court	Ground floor	

The Kenyan Government policy on such projects and/or activities requires that an Environmental and Social Impact Assessment be carried out at the planning stages of the proposed development to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of such projects, programmes and/or activities. Therefore, in compliance with the law and to avoid unnecessary conflicts that may retard development in the country, the proponent undertook this Environmental and Social Impact Assessment and incorporated environmental and social concerns as required.

Environmental Impact Assessment is a tool for environmental Planning and has been identified as a key component in new projects. According to section 58 of the Environmental Management and Coordination Act (EMCA) No.8 of 1999 Section 9 (1), and Environmental (Impact Assessment and Audit) regulations, 2003, new projects of such magnitude must undergo Environmental and Social Impact Assessment. The Report of the same must be submitted to National Environment Authority (NEMA) for approval and issuance of relevant licenses. This was necessary as many forms of developmental activities cause damage to the

environment and hence the greatest challenge today is to incorporate sustainable development with environmental concerns at heart.

The project is subjected to environmental and social Impact assessment (ESIA) as listed in Legal Notice No 31 section 2(c) of Environmental Management and coordination Act, 1999. Therefore, ESIA was carried out with the aim of identifying and examining the positive and negative impacts the project implementation activities is likely to have on the socio-cultural and environment of the project area. This will ensure sustainability of the project by harmonizing the projects activities with the host environmental and social cultural set up of the project area a detailed and well guided stepwise approach was used to carry out the ESIA. Process. The process adopted participatory and evidenced approach. This involved; desk review, field visit, key informant interview, public participation, impact analysis and prediction, formulation of mitigation measures and coming up monitoring parameters.

This Environmental and Social Impact Assessment has identified both positive and negative impacts of the proposed project to the environment and proposes mitigation measures in the Environmental Management Plan developed to address potential negative impacts while enhancing positive impacts, during the construction, operation and decommissioning phases of the project, for overall environmental sustainability.

An Environmental and Social Management Plan (ESMP) has been formulated to ensure sustainable practices from the construction phase through to decommissioning. This plan outlines the activities, their potential impacts, and the steps to mitigate these impacts. It also sets out the implementation schedule, responsibilities, and where possible, the cost estimates for the proposed measures.

A monitoring plan is in place to track certain environmental performance indicators. This monitoring allows for the detection of changes and issues in environmental quality compared to the initial bio-physical and socio-economic conditions. It involves regular reviews of operations and maintenance activities to assess the effectiveness of the mitigation measures. This can help identify trends in environmental changes and anticipate unforeseen impacts.

It is highly recommended that the site management diligently implements the provided Environmental Management and Monitoring Plan. After the project is commissioned, mandatory Environmental and Safety Audits should be conducted in line with national regulations. The environmental performance of the site operations should be assessed against the measures and targets specified in this report

CHAPTER ONE: INTRODUCTION

1.1 Overview

Ministry of Lands, Public Works, Housing & Urban Development herein referred to as the proponent has proposed to embark on an iconic project development to construct affordable houses on Plot LR NO.4953/667 at Thika Bustani in Kiambu County. The exact location of the mentioned proposed project is along Kenyatta highway road in Thika, Kiambu County.

The assignment was guided by the Constitution of Kenya 2010, Environmental (Impact Assessment and Audit) Regulations 2003 and its subsequent amendments, Environmental Management and Coordination Act 1999 and its subsequent amendments and other relevant statutes and intentional framework Kenya is a signatory provides environmental and social management plan that will ensure the anticipated project negative effect are avoided minimized or abated through formulated mitigation measures. This will ensure the project positive impacts are actualized.

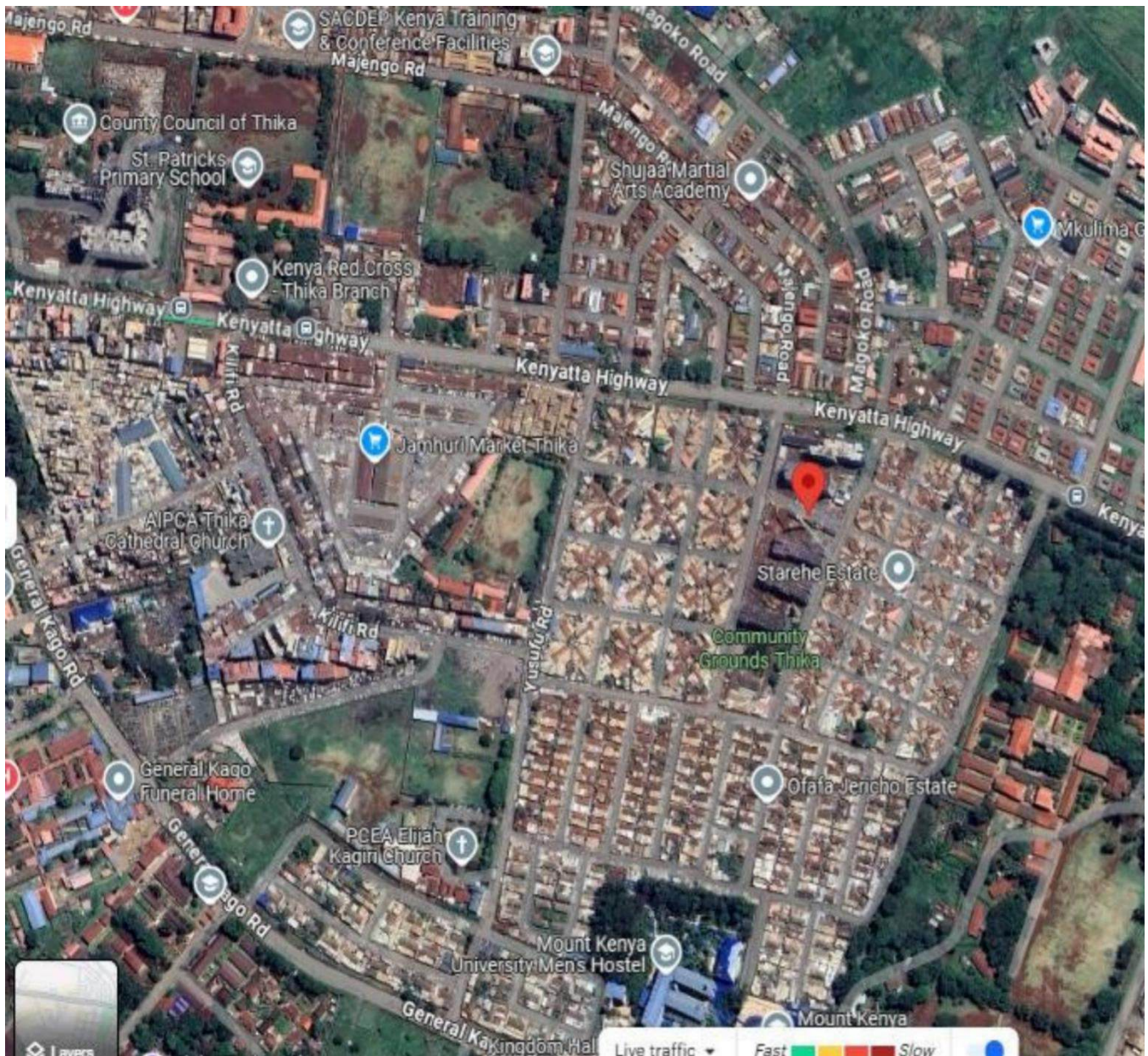
This report provides a comprehensive description of baseline information and project overview including consultative public participation, findings analysis, results and recommendations.

1.2 Project Background

The proposed project is located in Thika Town Constituency, Kiambu County;
Location of the project

LATITUDE : -1.0401196

LONGITUDE: 37.085005



1.3 Scope Objectives and Terms of Reference (TOR) for the EIA Process

Peter Weru Kinyua, a NEMA registered and licensed Lead Expert, Registration number 6229 was commissioned as the project Environmental Consultant assisted by Joseph K. Njoroge Lead Expert No. 1311 to conduct the Environmental Impact Assessment Full Study for the proposed residential development in Kiambu County. The scope of work entailed the independent verification of all environmental and social aspects of the project components and identifying the

gaps with applicable Performance Standards of all construction works of the proposed development around the project site, associated facilities and temporary activities, from ground preparation, masonry, and installation of service lines as well as the utilities required. The output of this work was a comprehensive Environmental and Social Impact Assessment report for the purposes of applying for a construction license and ensuring sustainable development.

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

- ❖ The physical location of the proposed development project
- ❖ A concise description of the national environmental legislative and regulatory framework, baseline information, and any other information deemed relevant to the project.
- ❖ The objectives of the proposed project.
- ❖ The technology, procedures and processes to be used, in the implementation of the project.
- ❖ The materials to be used in the construction and implementation of the project.
- ❖ The products, by-products and waste to be generated by the project.
- ❖ A description of the potentially affected environmental facets.
- ❖ The environmental effects of the project including the traffic, infrastructural, social, aesthetics, and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- ❖ Undertake a comprehensive public and stakeholder's consultation and participation process through stakeholder analysis and appropriate identification of applicable consultation methodology.
- ❖ To recommend a specific environmentally sound and feasible wastewater management system.
- ❖ Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- ❖ Analysis of alternatives including project site, design and technologies.
- ❖ An environmental management and monitoring plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe, responsibility to implement the measures and monitoring mechanisms.
- ❖ Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- ❖ Propose measures to prevent health hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies.

- ❖ An identification of gaps in knowledge and uncertainties, which were encountered in compiling the information.
- ❖ An economic and social analysis of the project.

1.4 Objectives of the ESIA study

1.4.1 General Objectives

The general objective of this environmental and social Impact assessment is to ensure that environmental concerns are integrated in all stages of development activities of the project, carry out

a systematic examination of the current status quo of environmental, and socio- cultural setup of the project and determine whether the proposed project activities will adversely impact on the physical and biological elements within the project area.

1.4.2 Specific objectives

The specific objectives of the EIA include

- i. To collect baseline environmental data in the proposed site.
- ii. To identify and assess possible environmental impacts during the construction and operation of the proposed development.
- iii. To seek views of stakeholders on pertinent issues related to the proposed Project.
- iv. To prepare residual impact list of those impacts that might not have any remedial measures and identify further steps towards sustainability of the Project.
- v. To develop an Environmental Management Plan (EMP) indicating mitigation measures for adverse impacts and enhance beneficial effects.
- vi. Preparation of ESIA Reports including a Project Report and ESIA Study Report for submission to NEMA,
- vii. Obtain appropriate EIA Licenses from NEMA.

1.5 Project scope

The scope of this Environmental Impact Assessment, therefore, covered:

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

1.6 Methodology Approach

1.6.1 Overview

The following methodological approach was used to ensure comprehensive analysis of the environments and socio- cultural characteristics of the project area.

1.6.2 Project Screening

This step was conducted through legal review and desktop studies to assess whether there was a need for Environmental and social impact assessment, and what level of assessment is necessary. This was done using a screening checklist in reference to Environmental Management and Coordination Act No. 8 of 1999, Legal notice No. 31 the Environmental (Impact Assessment and Audit)

(Amendment) Regulations, 2019 specifically the second schedule. The proposed project falls under category 2 of projects to be subjected to EISA study as provided for by the second schedule of the Environmental Management and Coordination Act of 2015 and Category B under the World Bank Environmental and Social Safeguards Policies as defined in the Bank's Operational Procedures (OPs).

1.6.3 Project Scoping

The scoping process was carried out through a scoping checklist to help narrow down the most critical issues requiring attention during the full assessment. Environmental issues were categorized into physical, biological and socio-economic and cultural environments. This stage also involved discussions with the likely project affected person and other relevant stakeholders. The key benefits of scoping include:

- 1 Identification and engagement of key stakeholders
- 2 Identification the existing gaps
- 3 Ensures that the assessment focuses on the key likely environmental and social impacts

1.6.4 Desk Study

This involves the review of secondary documents relevant to the project scope. This includes but is not limited to;

- i Project designs layout
- ii Report and publication on biophysical factors of the project area,
- iii Climate and weather of the project area,
- iv Policy, legal and institutional framework such as Environmental Management and Coordination Act 1999, and Its Subsequent Amendment
- v Project bill of quantities
- vi Statistical abstracts such as KNBS, KPHS 2019, KDHS among others

1.6.5 Project site Survey and Assessment.

Field visits and survey of the project areas was conducted by the ESIA team to capture baseline

data and identify likely impacts that are to emanate from the proposed project implementation phases.

1.6.6 Stakeholders and public participation

To ensure Inclusivity of the ESIA process the mapped stakeholders including the projects affected person were consulted. This involved conducting one on one interviews with key institutional stakeholders identified. Interactive public participation meeting that involved focus group discussion with the project community and administering of household survey to the household within the project area. The information gathered was subsequently synthesized and incorporated into the ESIA Study Report.

1.6.7 Data analysis, interpretation and project impact assessment.

Quantitative and qualitative data collected from primary and secondary sources were analyzed by use of Statistical Package of Social Science, GIS software (Arc GIS 10.7) and expert interpretation. During the Impact Assessment Phase, the effects and impacts of the proposed Project were determined. To identify and assess the magnitude of potential impacts associated with or resulting from Project activities, the ESIA team used professional judgment from specialists, fieldwork, and other desktop analyses to identify potential impacts and their interactions.

1.6.8 Impact Assessment

The primary function of an environmental impact assessment study is to predict and quantify potential impacts, assess and evaluate the magnitude and their importance to develop an Environmental and Social management plan to mitigate the impacts. Environmental impacts could be positive or negative, direct or indirect, local or regional and also reversible or irreversible. Assessment of impacts depends on the nature and magnitude of the activity being undertaken and also on the type of mitigation measures that are envisaged as part of the project proposal. For the proposed project, the anticipated impacts are divided into three components of the project: impacts based on Project Location, impacts during Construction phase, and impacts during De-commissioning and Operational phases. The identified positive and negative impacts of the project are presented in the report.

1.6.9 Environmental and social Management and Monitoring Plan (ESMMP)

The Consultants have developed an Environmental and social Management and Monitoring Plan (ESMMP) to guide the project team in eliminating or reducing the project impacts to acceptable minimum/ standards. The ESMMP is based on good environmental practices of project

implementation and safety of the operations. The proposed ESMMP can be improved through continuous monitoring and audits during project implementation. The plan is provided in a matrix form in Chapter 9 of this report and it identifies the anticipated impact; proposed measures to be undertaken; monitoring indicators; the party responsible for implement the measures, and the estimated cost likely to be incurred to undertake the measures.

1.7 Reporting and documentation

The EIA Project Report from the findings is compiled in accordance with the guidelines issued by NEMA for such works and was prepared for submission by the proponent for consideration and approval.

CHAPTER TWO: PROJECT DESCRIPTION AND DESIGN

2.1 Project location

The proposed development is located in Thika Town Constituency in Kiambu County.

2.2 Project Cost

The total project cost will be Two Billion, One hundred and eighty nine million, four hundred and eighteen thousand, eight hundred and twelve (2,189,418,812) Kenyan Shillings. In pursuant to the fifth scheduled of environmental (Impact Assessment and Audit) Regulations, 2003, as reviewed vide Gazette Notice No.13211 of 2013 provides for EIA processing and monitoring fee of 0.01% of the total project cost to a minimum of Ksh. 35,000.

2.3 Design of the project

The proposed development will comprise construction of affordable houses containing one, two and three bedroom apartment units. This EIA study report is based on information and consultations with the project proponent, EIA experts, the architects and details contained in the architectural plans and drawings (of the proposed project). Ministry of Lands, Public Works, Housing & Urban Development intends to construct and operationalize these facilities to serve the projected clients with ultra-modern residential facilities.

Environmental concerns related to the proposed project will emanate from sourcing of raw materials for construction, actual construction processes, operation phase and a possible decommissioning. The materials to be used will include gravel, sand, coral blocks, cement, paint, wood and fittings. In terms of environmental resource usage, reticulated water supply and boreholes are the main sources of water for domestic use in the area, while energy is sourced from the national grid managed by the Kenya Power.

Environmental issues in the area include mainly disposal of waste water, solid wastes and traffic congestion.

BLOCKS	STOREY	UNITS
3No.Block A	1 st -10 th Floor	330 units
3No.Block B	1 st -10 th Floor	240 Units
SHOPS	GROUND FLOOR	32 Units
TOTAL		602 UNITS
Club House	Ground floor	
Community		
Basket Court		

Construction will be guided by national standards for both engineering and environmental compliance. The development will have the following environmentally sound characteristics: -

- i. Power conservation e.g., by use of occupation sensors for lighting and enhancing natural lighting during the day.
- ii. Use of water conservation techniques to ensure sustainability.
- iii. Proper water drainage and waste disposal guaranteed.
- iv. Sound Traffic Management System and Parking

2.3.1. Electrical system

The AHP will be connected to the electricity main line of the Kenya Power Company, which will be used in all phases of the project. The various components of the electrical system shall comprise Optimal Lighting system, single and twin socket outlet, lockable meter board with glass view panel. The necessary guidelines and precautionary measures relating to the use of electricity shall be adhered to.

2.3.2. Water reticulation system

Water from the municipality will be used during the construction phase. At the operation phase of the project, water will be sourced from the local municipal supply. There will be water storage tanks to increase water capacity at the project site to the required amount.

2.3.3 Waste/Sewerage & Storm water run-off

Grey water and effluent drainage from the project site will be connected to an elaborate sewer management system to prevent ground resources degradation. Solid waste management will consist of collections by dustbins in the apartments and along the corridors at designated points. The collected waste will later be transported to a waste treatment site a by NEMA licensed waste collector. All storm water drainage will be channeled into open storm water drain systems.

2.4. Project's Construction Activities

Construction activities will involve the following

2.4.1 Excavation and foundation works

Excavation will be carried out to prepare the site for construction of foundations, pavements and drainage systems. This will involve a combination of earthmoving machinery such as excavators, wheel loaders and trucks as well as manual labor.

2.4.2. Storage of materials

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

2.4.3. Masonry, concrete work and related activities

The construction of the building walls, foundations, floors, pavements, drainage systems, swimming pool among other components of the project involves a lot of masonry work and. General masonry include stone shaping, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces.

These activities are known to be labor intensive and are supplemented by machinery such as concrete mixers.

2.4.4. Structural steel works

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

2.4.5. Plumbing

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

2.5. The Project's Occupational Activities

2.5.1. Solid waste and waste water management

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

2.5.2. Cleaning

The proponent will be responsible for ensuring regular washing and cleaning of the pavements, the car park area, staircases, general areas etc. Cleaning operations will involve the use of substantial amounts of water, disinfectants and detergents.

2.5.3. General repairs and maintenance

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

among others.

2.6 The project's decommissioning activities

2.6.1. Demolition works

Upon the requirement for decommissioning, the project components including buildings, pavements, drainage systems and associated facilities will be demolished. This will produce a lot of solid waste, which will be re-used for other construction works or if not re-usable, disposed of appropriately by a licensed waste disposal company.

2.6.2. Dismantling of equipment and fixtures

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

2.6.3. Site restoration

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

CHAPTER THREE: BASELINE CONDITION

3.1 Overview

This chapter provides a description of baseline conditions of the project site and its environs. Baseline environment description is important as it provides an understanding of the area and aspects that might be negatively impacted on by the proposed project implementation. This understanding will be key in impacts identification and mitigation measures formulation.

3.2 Physical Environment Baseline Information

The proposed project site is in Thika Bustani, Kiambu County along Kenyatta high way in Thika town. The site is under the governance of the Kiambu County and therefore, it is within the coverage of the proposed Nairobi metropolitan city.

3.3.1 Climate

Kiambu and its environs enjoy a double (Bi-modal) seasonal rainfall pattern, the wetter and cooler part of the larger Nairobi area i.e., the Kikuyu plateau as opposed to the Athi plains in the east that are drier and hotter with high to moderate rainfall from April to May for the long rains and November to December for the shorter rains. The rainfall picks during the month of April and November annually but the regime have been disrupted owing to climate change. The average rainfall is normally below the range of 1200mm per annum and the distribution is poor and unreliable. The coolest months include June, July and some parts of early August, while the hottest months are December, January, February and September with temperatures oscillating between 15⁰C and 35⁰C. The timing of sunrise and sunset varies little throughout the year, due to Nairobi's close proximity to the equator.

3.3.2 Topography

Generally, undulating ranges to nearly level ground characterize the area's topography. The project site is gently sloping towards the lower western side of the area. The gradient of the project site can be considered to be gently sloping with a gradient of about 3%.

3.2.3 Soils

The major soil type in Nairobi area includes vertisols and lithosols. The vertisols are imperfectly drained to well drain and are shallow to very deep soils. They are dark red, friable to firm cracking clay soils that are solid in some places. The lithosols are somewhat excessively drained to well-drained, shallow, dark brown to dark reddish brown, friable to rocky and/ or strong clay loam.

3.2.4 Hydrology

The Nairobi area and its surroundings are environmentally characterized by sporadic water supplies which are quite erratic. This has a comparatively moderately low flow but of perennial character. Surface water sources in the entire of Nairobi area are not reliable due to the high levels of pollution. Nairobi River is like most of the rivers that drain the Aberdare forest

affected by the climatic patterns and the associated ground structural control and thus exhibits a characteristic low flow during the dry spells. Nairobi and its environments falls under Athi catchment area. All river waters and storm water sheds South-Eastwards and joins the Indian Ocean after a stretch of hundreds of kilometers.

3.2.5 Biological environment

Trees play an important role in our daily lives. They serve as important water catchment areas, air purification, act as wind-breaks, block noise and dust, carbon sequestration, soil erosion control, wildlife habitat, and add to aesthetic value among others. Within the proposed project area there exist a few trees The vegetation will be affected to pave way for construction. The following mitigation measures will be incorporated throughout the project cycle

- Landscaping and re-vegetation of all disturbed areas: after the construction phase landscaping will be done by planting combinations of plants and flowers which will improve the aesthetic value and contribute to microclimate modification.
- Trees that does not affect the site to be left intact

3.2.6 Neighboring facilities and features.

At the neighborhood of the proposed site there are existing modern commercial and residential developments. The adjacent neighbors to the site are residential and commercial units that vary in storey.

3.2.7 Administrative and Social Amenities.

It is worthy to note that the area is well served with social amenities and various administrative offices being at the city. The traders in this area are in a mixed economic status including the upper and lower middle class.

3.2.8 Security

The project site is within an area that could be considered secure; however, there are occasional incidences of mugging and carjacking in the evening and night hours. Most of the office and commercial blocks have hired security guards to guard their facilities. The facility has a well-established security system hence for the security for the project is guaranteed.

3.2.9 Street Lighting

The neighborhood to the proposed site have street lighting. Management of Kiambu County has considered installing security lighting within the neighborhood to improve security.

3.3 Infrastructure

The zone where this project is located has essential infrastructures to support this type of development. Kenyatta highway is in poor condition and needs to be upgraded by the Kenya Urban Roads Authority to an all-weather road. Power lines and communication masts are available at the project site area.

3.4 Water

According to World Health Organization water consumption is estimated to increase by approximately 19% by 2050. This is accelerated by population growth. The proposed project site area has piped water from THIWASCO. Additionally, the proponent will install water storage tanks to store water. Rain water harvesting shall be employed.

3.5 Sewer system

The project area is well served with a public sewer system provided by the THIWASCO. Therefore, effluent management will not be a problem once the proposed project is complete because the development shall be connected to the same.

CHAPTER 4: POLICY LEGAL AND INSTITUTIONAL FRAMEWORK

4.1 Overview

The policy, legal and institutional frameworks on health, safety, environmental standards and sustainable use of natural resource related to the activities at the development include the following:

- Policy Guidelines on Environment and Development (Sessional paper No.6 of 1999)
- The Constitution of Kenya, 2010
- The National Environment Action Plan (NEAP)
- The Environment Management and Co-ordination (Amendment) Act 2015
- The Physical Planning Act No. 6 of 1996
- Urban Areas and Cities Act, 2011
- Public Health Act, Cap 242
- Electricity Power Act No. 11 of 1997
- The Water Act, 2016
- Environmental Management and Co-ordination (Waste Management) Regulations, 2006 Legal Notice No.121
- Way Leaves Act, Cap 292
- The Noise and Excessive Vibrations Act, 2009
- Occupational health and safety, (OSHA) 2007
- Work Injury Benefits Act-No. 13 of 2007
- Employment act, No. 11 of 2007
- County Government Act
- Registration of Titles Act Cap 281
- National Construction Authority Act, 2014
- National Museum and Heritage Act, 2006 Cap. 216
- The Environmental Management and Coordination (Water Quality) Regulation 2006
- The Standards Act Cap. 496
- Affordable Housing Act, Act No. 2 of 2024

4.2. The Constitution of Kenya of 2010

This is the principal guiding law in the country from which all the subsidiary laws are drawn from. **Article 42** of the Bill of Rights of the Constitution grants every person the right to a clean and a healthy environment that should be protected for the benefit of present and future generations through legislative and other measures. **Article 62 Part 1 (f)** of the constitution also stipulates that the state shall ‘establish systems of environmental impact assessment, environmental audit and monitoring of the environment.

s through legislative and other measures’; Chapter 5 of the Constitution is dedicated to land

and the environment which illustrates that land be used and managed in a manner that is equitable, efficient, productive and sustainable; and Part 2 of Chapter 5 of the constitution is dedicated to

The Constitution of Kenya (2010), provides guidelines for any development project within the Kenyan territory. Article 118 of the Constitution provides for the need to conduct public participation.

Relevance: *It sets the backbone upon which all other laws are base.it further provides the basis upon which stakeholder engagements were undertaken. The project should observe the above stated conditions as far as environmental protection is concerned for instance protection of the rights of the neighboring communities and also protection of the water and other natural resources at the project area.*

4.3 Policy Framework

The broad objectives of the national environmental policy in Kenya can be summarized as below:

- 1 To ensure optimal use of natural resources while improving environmental quality.
- 2 To conserve natural resources such that the resources meet the needs of the present without affecting future generations from enjoying the same.
- 3 To develop awareness that inculcates environmental stewardship among the citizens.
- 4 To integrate environmental conservation and socio-economic aspects in the development process.
- 5 To ensure that national environmental goals contribute to international obligations on environmental management and social integrity.

To achieve the above policy objectives all developmental projects listed in the second schedule of EMCA 1999 and Legal Notice No 31 should undergo ESIA to ensure compliance with the environmental policy and legal frameworks. The following section provides details on the relevant policies in the country.

4.3.2 Kenya Vision 2030

Vision 2030 aims to achieve a “globally competitive and prosperous country with a high quality of life

by 2030” (GOK, 2007). Specifically, Vision 2030 aims at transforming Kenya into “a newly industrializing, middle-income country providing a high quality of life to all its citizens by the year 2030” (Ibid). The Vision describes six priority key sectors in acting as key growth drivers in the journey to 2030; On the environment front, Kenya aims to be a nation living in a clean, secure and sustainable environment by 2030 (Kenya Vision 2030). Kenya will also enhance disaster preparedness in all disaster-prone areas and improve the capacity for adaptation to global climatic change. In addition, the country will also harmonize environment related laws for better environmental planning and governance.

Relevance; The ESIA has the provision of ESMP to ensure protection of environment and social dimensions of the project sites.

4.3.3 National Land Policy, 2009

It was established under Sessional Paper No 3 of 2009 to guide Kenya towards efficient, equitable and sustainable use of land. Some key relevant issues:

The policy also addresses land management. Key issues include measures for protection are required with *sub-section 135* addressing how fragile ecosystems are to be managed and protected. *Sub-section 137* focuses on Protection of watersheds, lakes, drainage basins & wetlands shall be guided by among other principles prohibition of settlement and agricultural activities in the water catchment areas, identification, delineation and gazettement of all water courses and wetlands as well as integrated resource management based on ecosystem structure.

ii. *Section 3.4.3.3* addresses urban environment management principles on the face of the rapid urban development in the country. The section calls for control of waste dumping, regulation of quarrying activities and rehabilitation of material dumping sites and land.

Relevance: *This policy supports ESIA which identifies the land impacts and mitigation measures. Implementation should be done in a sustainable manner so as not to compromise land uses in the project area.*

4.3.4 The National Biodiversity Strategy, 2007

The overall objective of the National Biodiversity Strategy and Action Plan (NBSAP) is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity (CBD). It is a national framework of action to ensure that the present rate of biodiversity loss is reversed and the present levels of biological resources are maintained at sustainable levels for posterity. The general objectives of the strategy are to conserve Kenya’s biodiversity to sustainably use its components; to fairly and equitably share the benefits arising from the utilization of biological resources among the stakeholders; and to enhance

technical and scientific cooperation nationally and internationally, including the exchange of information in support of biological conservation.

Relevance: *The proposed AHP should not negatively affect biodiversity or result in loss of the existing biological resources.*

4.3.5 National Policy on Water Resources Management and Development

The National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999) was established with an objective to preserve, conserve and protect available water resources and allocate it in a sustainable rational and economic way.

Relevance: *The precaution related to water resource conservation and use have been identified. Further the contractor is required to apply for abstraction licensed and also ensure that the water resources in the project are sustainably exploited.*

4.3.6 The National Poverty Eradication Plan (NPEP) and the Poverty Reduction Strategies Paper (PRSP)

The objective of the NPEP is to reduce the incidence of poverty in both urban and rural areas by 50% by the year 2015 as well as strengthening the capabilities of the poor and the vulnerable groups to earn income. Also, it aims to narrow gender and geographical disparities and create a healthy, better educated and more productive population. The PRSP on the other hand has the twin objectives of poverty reduction and economic growth.

Relevance: *The proposed project is in line with the policy it will provide employment opportunities which is key to spur economic growth and financial support to the area's residents, thus trigger the vibrancy of the project area economy which will positively contribute to poverty eradication*

4.3.7 National Environmental Action Plan (NEAP)

NEAP was a deliberate policy effort aimed at integrating environmental considerations into Kenya's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision-making. The NEAP also established the process of identifying environmental problems and issues, raising awareness, building national consensus, defining policies, legislation and institutional needs and planning environmental projects.

Relevance: *The proposed project should therefore be implemented in a manner that factors in environmental concerns in the project set-up.*

4.3.8 Physical Planning (Building and Development Control) Regulations ,2009

Under the provisions of the Physical Planning (Building and Development control) Regulations; The Director of Physical Planning shall refuse to recommend any new building or proposed development, or alteration or addition to any existing building if:

- i. The proposal is not in conformity with approved development plan.
- ii. Such plans disclose a contravention of the physical Planning (Building and Development) rules.
- iii. The plans are not correctly drawn or omit to show information required.
- iv. On such being required, separate application accompanied by sets of plans has not been lodged in respect of building on separate plots or subplots etc.

4.3.9 Water Quality Regulations, 2006

The law is based upon the principle that everybody is entitled to a healthy and clean environment. Section 42, is pertinent to the implementation of this project. These Regulations shall 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.

Relevance. *The proponent shall strictly adhere to the provisions and requirements of these regulations. He must ensure all applicable water standards are observed to ensure clean, safe water for all purposes.*

•The proponent shall carry out an initial environmental audit after the first year of operation. The report shall include analysis of effluent as stipulated in the second schedule of this legislation.

4.3.10 Waste Management Regulations (2006)

This legislation gives guidelines for handling different kinds of waste. Some of the relevant sections to the proposed project are as follows:

Part II Section 1: No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle

Part II Section 6: 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:

- a) **Improvement** of production process through:
 - i. Conserving raw materials and energy

- ii. Eliminating the use of toxic raw materials within such time as may be prescribed by the Authority
- iii. Reducing toxic emissions and wastes
- b) **Monitoring** the product cycle from beginning to end by:
 - i. Identifying and eliminating potential negative impacts of the product.
 - ii. Enabling the recovery and re-use of the product where possible.
 - iii. Reclamation and recycling.

Incorporating environmental concerns in the design, process and disposal of a Relevance

The proponent will ensure that all waste is segregated before being transported to a designated waste treatment facility by a contracted NEMA licensed waste transporter. The proponent has put in place plans to use reuse their main waste product, that is potato peelings, as feedstock for generation of biogas.

4.4 Legal Framework

4.4.1 Climate Change Act 2016

Stipulates that each state department and national government public entity has a duty to integrate the climate change action plans, report on sectoral greenhouse gas emissions for national inventory among other duties (Part IV, section 5). Part 111 section 3 (j) also provides for the enhancement of energy conservation, efficiency and use of renewable energy in industrial, commercial, transport, domestic and other uses;

Relevance: *The project implementation should be in line with the provision of climate action plans in place as well as other relevant materials in place. This is to negate any activity that might contribute to climate change.*

4.4.2 Environment Management and Coordination Act, 1999 and subsequent amendments

Part II Section 3, subsection 1 of the Act 1999 states that ‘every person in Kenya is entitled to a clean and healthy environment in accordance with the Constitution and relevant laws and has the duty to safeguard and enhance the environment’. In order to achieve this goal, the projects listed under the Schedule No. 2 of EMCA must be subjected to Environmental Impact Assessment (EIA). The aim of EIA is to reduce negative environmental outcomes of the listed projects by implementing mitigation measures. The proposed project falls within the Second schedule and Legal notice No 31 must therefore comply with EMCA requirements in as far as EIA is required.

Relevance: *EIA has been conducted through field observation, field assessment and public participation and the report will be submitted to NEMA for project licensing.*

There are also several relevant regulations that have been formulated within the framework of EMCA 1999 that are **relevant to the proposed project** as discussed below:

Environmental (Impact. Assessment and Audit) (Amendment) Regulations, 2019

The regulations provide the level of the types of projects that need to be subjected to ESIA. It further gives the guidelines of undertaking, submission and approval of the ESIA Report according to the level of project risk (this report).

Relevance: *The project fall under medium risk. the ESIA has been conducted as per the outline provided and the final report will be submitted to NEMA for review and project licensing*

a. Environmental Management and Coordination, Conservation of Biological Diversity (BD) Regulations 2006

These regulations are described in Legal Notice No. 160 of the Kenya Gazette Supplement No. 84 of December 2006. These Regulations apply to conservation of biodiversity which includes Conservation of threatened species, Inventory and monitoring of BD and protection of environmentally significant areas, access to genetic resources, benefit sharing and offences and penalties.

Relevance: *The contractor is advised to avoid unnecessary cutting down of vegetation and where applicable plant indigenous vegetation within the project area. Details of this are in the ESMP in the project's report. The contractor is also expected to carry out landscaping once the AHP Project is complete.*

b. Environmental Management and Coordination (Fossil Fuel Emission Control) Regulations 2006

These regulations are described in Legal Notice No. 131 of the Kenya Gazette Supplement no. 74, October 2006, and will apply to all internal combustion engine emission standards, emission inspections, the power of emission inspectors, fuel catalysts, licensing to treat fuel, cost of clearing pollution and partnerships to control fossil fuel emissions used by the Contractor.

Relevance: *All importation of machines to be used for the project must be certified and regularly serviced to increase their efficiencies so as reduce wastages of petrol,*

diesel, oils and kerosene.

c. Environmental Management and Coordination (Air Quality) Regulations, 2014

The objective of these regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. The overall aim is to protect human health and safety. The general prohibitions, for instance Rule 5, 6, 7 and 8 prohibit any person from causing the emission of air pollutants (such as liquid and gaseous substances) and suspended particulate matter listed under Second Schedule (Priority air pollutants) to exceed the ambient air quality levels as stipulated under the First (Ambient air quality tolerance limits) and Third Schedule (Emission limits for controlled and non-controlled facilities).

Relevance: *The contractor is therefore required to keep particulate, especially dust, within acceptable limits.*

d. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) Control Regulations, 2009

These Regulations prohibit making or causing any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. It also prohibits the Contractor from excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment or excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.

Relevance: *Under the regulation, the Contractor is required to undertake quarterly monitoring of the noise levels within the project area during construction period to maintain compliance of the regulation. In addition, the contractor is required to seek for a license when the noise exceeds the recommended level.*

4.4.3 The sustainable waste management act No 31 of 2022

The objects of this Act shall be to—

- a) Promote sustainable waste management;
- b) Improve the health of all Kenyans by ensuring a clean and healthy environment;
- c) Reduce air, land, fresh water and marine pollution;
- d) Promote and ensure the effective delivery of waste services;
- e) Create an enabling environment for employment in the green economy in waste management, recycling and recovery;

- f) Establish an environmentally sound infrastructure and system for sustainable waste management;
- g) promote circular economy practices for green growth;
- h) mainstream resource efficiency principles in sustainable consumption and production practices

the Act shall apply to all types of waste as listed below;

1. Industrial wastes;
2. Hazardous and toxic wastes;
3. Pesticides and toxic substances;
4. Biomedical wastes;
5. Radio-active substances.

Relevance: *sustainable waste mitigation measures to have been identified and recommended in the report and responsibility stated in the ESMP regarding these wastes*

4.4.4 The Wildlife and Conservation Act 2013

The Act provides that wildlife should be conserved so as to yield optimum returns in terms of cultural, aesthetic, scientific and economic benefits. The Act requires that full account be taken of the inter-relationship between wildlife conservation and land use. The Act controls activities within the national parks, which may lead to the disturbance of wild animals. Unauthorized entry, residence, burning, damage to objects of scientific interest, introduction of plants and animals and damage to structure are prohibited under this law.

Relevance: *the Natural habitat for indigenous and native species should be maintained and not interfered. The project constructions should also avoid introduction of invasive species that may interfere with the carrying capacity of the project with addition, the construction workers are prohibited from hunting wild animals hence MUST be sensitized about this.*

4.4.5 Forest conservation and management Act ,2016

This is law was enacted by Parliament in 2005 to provide for the establishment, development and sustainable management including conservation and rational utilization of forest resources for the socio-economic development of the country. Section 8 of the Act requires all indigenous forests and woodlands to be managed on a sustainable basis for the purposes inter alia of conservation of water, soil and biodiversity, and sustainable production of wood and non-wood products.

Relevance: *No harvesting of trees by construction workers for firewood should be allowed, and introduction of alien plant species avoided and monitored and necessary steps taken.*

4.4.6 The County Governments, Act 2012

Section 114, sub section (1) and (2) require that a project of national significance in a County be preceded by mandatory public hearings for approval. Section 115, sub section (1) dictates public participation in the county planning processes as mandatory and be facilitated through the mechanism stated under this section. In addition, the Act further states in Section 108 under County Integrated Development Plan, (2) (b) provides a list of provisions a CIDP should identify.

Relevance: *This ESIA process will therefore involve the public at various levels to be in line with the Act.*

4.4.7 Water Act 2016

Water in Kenya is owned by the Government, subject to any right of the user, legally acquired. The control and right to use water is exercised by the Cabinet Secretary administering the Act, and such use can only be acquired under the provisions of the Act. The Cabinet Secretary also vested with the duty to promote investigations, conserve and properly use water throughout Kenya. Water permits may be acquired for a range of purposes, including the provision and employment of water for the development of power and other uses.

The Water Resources Management Rules empower Water Resources Authority (WRA) to impose management controls on land use falling under riparian land. It also enables any person with a complaint related to any matter covered by these rules to report to the appropriate office in WRA as per the Tenth Schedule which provides a format for report on complaints. Part A of the Sixth Schedule prohibits given activities on riparian lands to conserve and protect them.

Relevance: *The contractor is supposed to seek for water authorization and abstraction permit or borehole drilling and abstraction license*

4.4.8 Occupational Health and Safety Act 2007

The Occupational Safety and Health Act No.15 of 2007 and the Subsidiary Legislation makes provisions for the health, safety and welfare of persons employed. The provision requires that all practical measures possible be taken to protect persons employed from any injury. The provisions of the Act are also relevant to the management (including handling, transportation and disposal) of hazardous and non-hazardous wastes, which may arise at the project site. It shall be the duty of the proponent and contractor to ensure workers safety is given priority during

project implementation phases. This can be achieved in several ways including:

- i. As highlighted in Section 6, by undertaking job risk assessments and adopting preventive and protective measures.
- ii. The contractor is required to also develop a health and safety policy and bring this to the notice of all employees as per Section 7.
- iii. Formation of Health and Safety committee at the workplace as stipulated in section 9.
- iv. Ensure all dangerous situations and accidents are reported within time and appropriate action taken.

- v. The construction workers will be required at all time to wear protective equipment's provided by the contractor while working as provided by Section 13 (1a).
- vi. Similarly, all plants and machinery in use shall be subjected to periodical examinations as provided by law to ensure safety according to Part VII.
- vii. Proper handling, labelling and transportation of chemicals and hazardous wastes such as petroleum, fuels etc. Section 84 requires that material safety data sheets for chemicals and hazardous substances be availed at the workplace.
- viii. General welfare issues are dealt with under Part X. These include provision of drinking water, washing facilities, first aid and accommodation for clothing not worn during working hours.
- ix. The construction site(s) shall be registered as workplace with the directorate of occupational safety and health services under the Ministry of Labour, Social Security and Services as stipulated in Part V. A safety and health audit, fire audit, risk assessment, and safety and health audit have to be conducted for the site at least once every year. Failure to do so attracts a fine not exceeding five hundred thousand shillings or imprisonment for a term not exceeding six months or both.

The proponent will therefore undertake the necessary registrations, take all measures to ensure the health, safety and welfare of persons employed, as well as undertake the relevant assessments as outlined above. In addition, subsidiary legislation that operationalizes the Act includes:

- i. Safety and Health Committee Rules of 2004;
- ii. Noise Prevention and Control Rules, 2005;
- iii. Medical Examination Rules, 2005;
- iv. Fire Risk Reduction Rules, 2007;

Relevance: *The contractor is supposed to register all work places with the DOSH and implement all required workmen safety measures as per the Act and in addition to providing wholesome water and safety gear for the workers.*

4.4.9 The Work Injury Benefits Act (WIBA), 2007

The WIBA Act provides for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes. Section 7(a) of the Act, on the obligations of the employer, requires an employer to obtain and maintain an insurance policy with an insurer approved by the State in respect of any liability that the

employer may incur under this Act to any of his employees. Section 10 (1) States that an employee who is involved in an accident resulting in the employee's disablement or death is subject to the provisions of this Act and entitled to the benefits provided for under this Act. It also states expressly that an employer is liable to pay compensation in accordance with the provisions of this Act to an employee injured while at work.

On First Aid covered in section 45 (1), an employer is supposed to provide and maintain such appliances and services for the rendering of first aid to his employees in case of any accident as may be prescribed in any other written law in respect of the trade or business in which the employer is engaged.

Relevance: *The contractor is required to purchase workmen insurance cover from an insurance company operating and registered in Kenya.*

4.4.10 The Public Health Act CAP 242

Part IX, section 115, of the Act prohibits any person or institution from causing nuisance or a condition likely to cause injury or which might be dangerous to human health.

In Part IX, section sanitation and housing requirements are set. These include maintaining cleanliness and ensuring facilities used by the project are suitable for human dwelling. This means that the main contractor and the proponent will be required to provide proper sanitary facilities and solid waste handling containers for use by the construction workers on site during construction phases. A licensed solid waste transporter will also be contracted to collect all solid waste from the site for dumping at approved sites. As well, section 116 of the Act mandates the relevant departments of the County government of Nyeri to take proceedings at law against any person causing or responsible for the continuance of any nuisance or condition liable to be injurious or dangerous to human health.

Relevance: *The contractor is required to subcontract NEMA licensed waste management company to collect waste from the contractor/engineer camps. Data on baseline health conditions have been collected and will be used to monitor health situation in the project area.*

4.4.11 HIV/AIDs Prevention and Control (Cap 246A)

This Act is to promote public awareness about the causes, modes of transmission, consequences, means of prevention and control of HIV and AIDS. It also seeks to positively address and seek to address conditions that aggravate the spread of HIV infection. It provides for measures for the prevention, management and control of HIV and AIDS, protection and

promotion of public

health and for the appropriate treatment, counselling, support and care of persons infected or at risk of HIV and AIDS infection.

This Act therefore requires the proponent and by extension the contractor to undertake HIV/AIDS awareness and training including provision of free testing facilities for the workers on site and the community. In addition, the contractor is required to provide free condoms to the workers

Relevance: *The contractor is required to subcontract HIV/AIDS expert to roll out the program among workers and the neighbouring community in conjunction with the county health department.*

4.4.12 The Environment and Land Court

The Land and Environment Court is established under the Environment and Land Court Act, 2011 (No. 19 of 2011). The court has powers to deal with disputes relating to environment, land administration and management. The court is also empowered to hear cases relating to public, private and community land and contracts or other instruments granting any enforceable interests in land.

Relevance: *If a dispute arises regarding the project impacts on an individual or community or the contractor and the owners of the borrow pit and is not resolved by the project Grievance Redress Mechanism it will be referred to the Land and Environment Court for arbitration.*

4.4.13 Employment Act, 2007

This Act declares and defines the fundamental rights of employees; minimum terms and conditions of employment; to provide basic conditions of employment of employees; and to regulate the employment of children, among other rights. Key sections of the Act elaborate on the employment relationship; protection of wages; rights and duties in employment; termination and dismissal and protection of children, among others.

Relevance: *It prohibits child labor, gives opportunities to both genders, and protects the employees from unnecessary harassment.*

4.4.14 The National Gender and Equality Act, 2011

National Gender Equality Commission (NGEC) is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution. NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEC

Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination.

Relevance: *Equal opportunity employment. Gender mainstreaming in the projects is a requirement and ensures that the concerns of women and men form an integral dimension of the project design, implementation, operation and the monitoring and evaluation ensures that women and men benefit equally, and that inequality is avoided. Contractor to provide facilities for both gender at the work place.*

4.4.15 The Sexual Offences Act, 2006

Observing a standard ethical work environment is recommended to ensure persons from both genders are not subjected to sexual offences. The Act also protects children against sexual defilement.

Relevance: *The contractor should put in place measures to negate against sexual related offences. This is in addition of taking necessary discipline actions against sexual offenders.*

4.4.16 Explosives Act Chapter 115

An Act of Parliament to consolidate and amend the law relating to the manufacture, storage, sale, transport, importation, exportation and use of explosives.

Relevance: *The contractor should seek necessary permits should there be need to use explosives.*

4.4.17 Physical and Land Use Planning Act, 2019

An Act of Parliament to make provision for the planning, use, regulation and development of land and for connected purposes.

The objects of this Act are to provide:

- a) The principles, procedures and standards for the preparation and implementation of physical and land use development plans at the national, county, urban, rural and cities level;
- b) The administration and management of physical and land use planning in Kenya
- c) The procedures and standards for development control and the regulation of physical planning and land use;
- d) A framework for the co-ordination of physical and land use planning by county governments;
- e) A mechanism for dispute resolution with respect to physical and land use planning;
- f) A framework for equitable and sustainable use, planning and management of land;
- g) The functions of and the relationship between planning authorities;

- h) A robust, comprehensive and responsive system of physical and land use planning and regulation; and
- i) A framework to ensure that investments in property benefit local communities and their Economies.

Part 3 of the act as well provides for provision of the following types of physical and land use development plan;

- i. National physical and land use development plan
- ii. County physical and land use development plan
- iii. Local physical and land use development plan
- iv. Special Planning area

Relevance: *The project implementation should be in conformity with the aforementioned plans.*

4.4.18 National Construction Authority Act No. 41 of 2011

The National Construction Authority (NCA) as established by an Act of Parliament (NCA Act No. 41 of 2011) is mandated to regulate the construction industry and coordinate its development. Section 5 (2b) of the aforesaid Act requires the Authority to “*advise and make recommendations to the Minister on matters affecting or connected with the construction industry.*”

The Authority has developed health and safety guidelines to be used on construction sites to prevent transmission of the coronavirus (COVID-19). Since construction workers are a vulnerable group as they are faced with the elevated risk of COVID-19 virus exposure in close-knit and unhygienic worksite conditions. Below is Summary of onsite Health and Safety Management measures that should be strictly adhered to during the COVID-19 Pandemic;

- i. Each construction site shall have an occupational health and safety officer/or a person in charge of the site sensitized on COVID-19 (names to be submitted to the respective NCA regional offices).
- ii. Body temperatures of construction workers and any other personnel visiting the site should be taken on arrival at the construction site and when they leave for home using non-contact infrared thermometer
- iii. Contractors are to employ administrative controls to aid in site worker separation and reducing people density through rotating shifts, separating

- trades/crews by piecework and other scheduled alternatives in line with the stipulated working hours by the Government of Kenya
- iv. Anyone who has a fever or flu-like symptoms, is vulnerable (by virtue of their age or underlying health conditions) or is living with someone in self-isolation should not be allowed access to site. If a construction worker develops a fever or flu-like symptoms while at work, they should be advised accordingly, return home immediately and follow the Ministry of Health's guidelines on self-isolation.
 - v. Sites entry systems that require skin contact, such as fingerprint scanners should be removed
 - vi. In addition to the normal construction site personal protective equipment (PPE) meant to protect the workers from hazards and dangers on the site, construction workers should be provided with facemasks and long-sleeved aprons for protection against COVID-19 infection from contaminated surfaces.
 - vii. Hand cleaning facilities should be provided at site entrances and exits.
 - Viii Site cleaning regime should be increased and enhanced
 - ix. Mobile money/online banks transfer systems for payment of wages and salaries is highly encouraged. Workers' mobile phones must also be sanitized in the morning.
 - x. The COVID-19 toll free number should be displayed on site

Relevance: *the contractor should strictly abide by onsite Health and Safety Management measures provided in the guidelines during the COVID-19 Pandemic*

4.4.19 Children Act, 2001

This is an Act of Parliament to make provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children; to make provision for the administration of children's institutions; to give effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child and for connected purposes.

The Act under section II, sub-section 10(1) states “Every child shall be protected from economic exploitation and any work that is likely to be hazardous or to interfere with the child’s education, or to be harmful to the child’s health or physical, mental, spiritual, moral or social development.”

Additionally, The Act under section II, sub-section 10(5) defines child labour as;

1. Any situation where a child provides labour as an assistant to another person and his labour is deemed to be the labour of that other person for the purposes of payment;
2. Any situation where a child’s labour is used for gain by any individual or institution whether or not the child benefits directly or indirectly; and
3. Any situation where there is in existence a contract for services where the party providing the services is a child whether the person using the services does so directly or by agent.

Relevance: *The contractor should ensure the project implementation is in compliance with the Act and the contractor should refrain from employing underage persons in the construction works.*

4.5 National Institutional Framework

There are various national institutions that are important in matters related to environmental management in Kenya. These are described in the following sections.

4.5.1 The National Environment Council

The National Environmental Council (NEC) is responsible for policy formulation and directions for the purposes of developing the EMCA. The Council also sets national goals and objectives, and determines policies, and priorities for the protection of the environment.

4.5.2 The National Environment Management Authority (NEMA)

The National Environmental Management Authority (NEMA) exercises general supervision and, co-ordination of all matters relating to the environment. NEMA is also the principal instrument of the government in the implementation of all policies relating to the environment. The Authority reviews EIA project and study reports for the proposed projects, visits the project sites to verify information provided in the report and issues EIA licenses if it considers that all the issues relevant to proposed projects have been identified and mitigation measures to manage them have been proposed

4.6 International Guidelines

The international guidelines key to this project are as presented

4.6.1 International Finance Corporation (IFC) Performance Standard (PS) 1 on Assessment and Management of Environmental and Social Risks and Impacts

it provides for

- i. Identification and evaluation of environmental and social risks and impacts of a project;
- ii. adoption of a mitigation hierarchy to anticipate and avoid, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, affected communities, and the environment.
- iii. Improvement in environmental and social performance through the effective use of management systems;
- iv. Mechanisms to ensure that grievances from affected communities and external communications from other stakeholders are responded to and managed appropriately;
- v. Mechanisms for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them;
- vi. Measures to ensure that relevant environmental and social information is disclosed and disseminated

Relevance; *Environmental and Social Risks should be evaluated through an Environmental and Social Impact Assessment and ensures to avoid, minimize and compensate for risks and impacts on communities and environment should be developed and continually reviewed in the ESMPs. Additionally, elaborate stakeholder engagement needs to be carried out throughout project planning and implementation.*

4.6.2 World Bank Environmental and social safeguard s

This provides for environmental and social assessment of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making

Relevance: *ESIA will be carried out and comply with the provisions further the project implementation activities should ensure safe working condition and consideration of local community engagement Protection of indigenous community in the area*

4.6.3 IFC PS 2 on Labor and Working Conditions

It provides for

- i. measures to promote the fair treatment, non- discrimination, and equal opportunity of workers;
- ii. measures to establish, maintain, and improve the worker-management relationship;
- iii. measures to promote compliance with national employment and labor laws
- iv. measures to protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in an organization's supply chain
- v. mechanisms to promote safe and healthy working conditions, and the health of workers and avoidance of forced labor

Relevance *the project implementation bound by local employment and labor laws; including occupational Safety and Health Act, 2007 to ensure safe and healthy working conditions*

4.6.4 IFC PS 3 on Resource efficiency and Pollution Prevention

Provides for measures to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. This also includes measures to promote more sustainable use of resources, including energy and water and reduction of project-related GHG emissions

Relevance. There should be continuous identification of all potential pollution sources and provide measures to prevent/mitigate pollution and impacts; conservation of energy and water during project implementation phases

4.6.5 IFC PS 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources

It provides for measures to

- i. Ensure the protection and conservation of biodiversity;
- ii. Ensure the maintenance of benefits from ecosystem services; and
- iii. Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Relevance *The project should protect the biodiversity within its landscape. this should also include monitoring of invasive species*

4.7 International Convention

Some of international conventions relating to the project include;

- i. Vienna Convention for the Protection of the Ozone Layer, 22 March 1985
- ii. Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 22 Mar. 1989
- iii. United Nations Framework Convention on Climate Change, 9 May 1992
- iv. Stockholm Convention on Persistent Organic Pollutants, 22 May 2001
- v. Kyoto Protocol to the United Nations Framework Convention on Climate Change, 11 Dec. 1997- The Kyoto Protocol specifies a quantified emission limitation and reduction commitment for each developed country Party as well as related rules for accounting. Agreed rules are applicable to the assigned amounts of Parties; land-use related activities; and the use of flexibility mechanisms (emissions trading (ET), the clean development mechanism (CDM) and joint implementation (JI).
- vi. Paris Agreement on Climate Change- built on the foundations of UNFCCC and the Copenhagen and Cancun Agreement- guides countries towards achieving reduced greenhouse gases emissions based on set Nationally Determined Contributions (NDCs).
- vii. Montreal Protocol on Substances that Deplete the Ozone Layer, 16 Sept.1987 Convention

CHAPTER 5: PROJECT POTENTIAL IMPACTS

5.1 Overview

This chapter discusses the likely anticipated impacts anticipated from the proposed project implementation. The implementation process might result in positive and/or negative impacts on the social, economic and environmental setup of the project area. Project analysis for this project encompassed three phases, namely construction, operation and decommissioning phase

The probable project impacts were identified through a thorough field survey, consultation with key stakeholders, public participation forums and household. Both positive and negative impacts likely to originate from the project are generally linked to the social, environmental and also economic aspects within the project area that the project will be implemented.

5.2 Impacts Identification

The proposed project impacts were identified through a number of ways. Issues raised during the consultative public meeting formed part of the impacts identified. Similarly, structured stakeholders' questionnaires issued were also key in identification of project impacts. A review of the project baseline environmental conditions was also used in identification of project impacts. Finally, the team of expert involved in the project was used their professional judgement in identification of the project impacts. Identified impacts were then categorized into Positive,

Negative and were classified as per the three phases of the project implementation. This includes

- i. Construction Phase
- ii. Operational Phase
- iii. Decommissioning Phase.

5.3 Positive impacts

Plate No.	Positive Impact	Justification
1	Provision of high-class, modern residential units	The proposed project is a residential development that will quest the much needed modern units in the Nairobi.
2	Employment creation	The establishment and construction shall provide employment opportunities to both the locals and outsiders both directly and indirectly. Directly; Through the hiring of the locals to provide skilled, semi-skilled and unskilled labor for the construction during the operational stage Indirectly; This shall be achieved by the employment granted to the quarry workers and material suppliers during the construction phase as they will not be directly involved in putting up the proposed development
3	Regional Growth	Through the project, the Muthaiga and Pangani region shall be increasing growth owing to this magnificent project
4	Contribution of Government Revenue	The proposed project shall go a long way in contributing to Government Revenue at both the County and National Levels by the payment for approvals by the Sub-county and payment of land-rates to the Sub-county, payment of taxes from materials bought etc

5.4 Negative Impacts

5.4.1 Loss of Biodiversity

Construction Phase

Within the proposed site, there is currently limited vegetative cover mainly composed of scattered trees and landscaping flowers and shrubs therefore the loss will not be significant. Some of the trees shall be cleared for the purposes of setting up the proposed construction.

Operational Phase

During the operational phase, the proposed landscaped areas should be set aside for the proliferation and sustenance of bio-diversity within and around the proposed project area.

Mitigation:

- Vegetation cover that does not interfere with the sitting of the project will be left intact.
- After completion of the project the proponent will rehabilitate the land by planting trees and ornamental flowers and beautification shrubs on the zoned areas.
- Project construction will disturb as little area as possible in order to minimize potential negative impacts to biodiversity.
- Demarcate areas within the proposed project plot which shall be restricted for use in tree planting and landscaping purposes
- Rain-water and water run-off may be collected and directed to the water storage tanks to be used in the toilets.

5.5 Effluent disposal

Developers construct houses without planning on how effluent will be disposed appropriately; hence waste water (raw sewage) is either channeled to a river, or disposed carelessly. Inadequate maintaining sewer line leads to blockage of pipes. Areas not served with a sewer line use septic tanks which also poses other risks if not well managed. Some are poorly constructed and others have inadequate water supply hence posing a dangerous health risk to the living organism including man.

Construction Phase

During the construction phase and due to the location of the proposed project plot, there is need to provide the construction workers and any/all visitors to the site with safe and healthy sanitation facilities

Operational Phase

The proposed project shall be composed of residential apartments and therefore, the anticipated effluent that will be produced will be of relatively high volume. The preferred waste management mechanism in the area is the existing sewer line by the Thika Water and Sewerage Company.

Mitigation

- Construction of a temporary workers' lay-down area
- Connection to the existing NCWSC sewer line
- Provision of adequate water supply
- Prompt cleaning of the system

- Adequate and periodic maintenance of the plant

5.6 Occupational Health and Safety Construction Phase

During the construction phase, there will be increased dust, noise and air pollution. The immediate

neighbors and the workforce involved would be subjected to these environmental hazards. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This can compromise health of the workers especially if foodstuffs are prepared in unhygienic conditions. The nature of the proposed project also poses an increased risk of physical injury to the workforce, visitors and/ or neighbors. There is also the added risk of disease spread due to e.g. poorly prepared/ handled food, contaminated water and poor social behavior.

Operational Phase

Such developments that are termed as medium to high density developments carry their own hazardous impacts ranging from physical injury from falls, household accidents, fire risk, disease spread, noise etc.

Mitigation:

- Carrying out of periodic (*monthly*) worker sensitization and training via a “**Safety Briefing**” of the workers by the Environmental Health and Safety Officer
- All workers should be provided with protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks and gloves.
- Construction crew at the site will be sensitized on social issues such as drugs, alcohol, diseases.
- A first aid kit should be provided within the site. This should be fully equipped at all times and should be managed by qualified person.
Upon project completion, the proponent shall assign qualified individual(s) to be full-time within the development for purposes of administering basic first-aid when and if such cases arise.
- The contractor should have workmen’s compensation cover. It should comply with workmen’s compensation Act, as well as ordinances, regulations and union agreements.
- Adequate sanitary facilities should be provided and standard cleanliness maintained.
- Food handlers preparing food for the workers at the site should be controlled, monitored and vetted to ensure that food is hygienically prepared
- Regular maintenance of machinery on site to mitigate against accidents attributable to mechanical failure
- Workers should be sensitized on and provided with evacuation procedures in case of fire.
- Workers should practice drills at least once a month to ensure that they have the

- knowledge to act accordingly in case of fire.
- Periodic fire and emergency drills to be carried out within the development during the operational phase
- The site shall be registered with the Directorate of Occupational Health and Safety.
- Proper hoarding to be put in place to ensure safety for neighbors and passersby especially on the Senate Towers set to undergo extension and renovation works
- Construction crew at the site will be sensitized on social issues such as drug and alcohol abuse and diseases such as HIV/AIDS
- Provide sufficient scaffolds and approved dust screens around the entire buildings during construction works
- The doorways in the apartments should be adequate for emergency purposes, open outwards. The stairways should be wide enough and located at both ends of the building and should be clear of any obstructions at all times. The construction of stairways should give provision for clients with special needs/disabilities.

5.7 Soil Erosion

The activities involved in the site preparation and construction phase of the development may have a major negative and moderate impact on soil and geology of the project site. This is due to the removal of vegetation from the area which will leave considerable areas of soil exposed to the elements, which may result in soil erosion. Heavy machinery will be traversing the site due to the construction activities this may lead to soil compaction and erosion of the soil. Uncontrolled soil erosion can have adverse effects on the local water bodies.

Hazardous substances such as diesel used for the operation of machinery and stand-by generators, may be stored on the property. This may have a significant negative long-term impact on soil quality in the area.

Operational phase

The building roofs and pavements will lead to increased volume and velocity of storm water or runoff flowing across the area covered by the buildings. This will lead to increased amounts of storm water entering the drainage systems, resulting in overflow and damage to such systems in addition to increased erosion or water logging in the neighboring areas.

Mitigation Measures

- Avoid unnecessary movement of soil materials from the site.
- Provide soil conservation structures on the areas prone to soil erosion mostly to reduce impact by the run-off.
- Control construction activities especially during rainy conditions
- Re-surface open areas after completion of the project and introduce appropriate vegetation.
- Provide suitable storm water drainage channels to effectively discharge water to safe areas. Channels need to be regularly maintained and repaired to avoid point discharge in case of breakages or blockages.
- Conduct landscaping after the project completion to maximally control any possible chance of soil movement.

- Employ water harvesting techniques to harvest rain water to minimize surface run-off

5.8 Surface drainage and increased run-off

Good drainage system is used to prevent land near human settlement from becoming saturated with water which collects or accumulate/ flood after a downfall or from other sources. Poor drainage causes dampness to building structures as well as water stagnation. Dampness is influenced by poor drainage, in the presence of warmth and darkness, breeding grounds for mosquitoes and other diseases carrying pests can be directly traced to it. Drainage of the general property/premise comes in handy to enhance effective flow of the much anticipated surface run-off emanating from the roof catchments and other areas within the site.

Construction works and paved roads could also result in additional run off through creation of impervious areas and compaction of soils. Impervious area and compacted soils generally have higher run off coefficients than natural area and increased flood peaks are a common occurrence in developed area.

Construction Phase

During the construction phase, there shall be a lot of water run-off emanating from e.g. watering the site to mitigate against dust and particulate matter pollution, rain water, cleaning and mixing of construction materials etc

Operational Phase

Water run-off shall be ample emanating from cleaning operations within the individual units, rain water and irrigation of the green-zones.

Mitigation

- During construction, the design of the drainage system should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site.
- Drainage channels should be installed in all areas that generate or receive surface water such as car parking, drive ways and along the building block-edges of the roofs.
- Channels should be covered by approved materials to prevent occurrence of accidents and entry of dirt that would compromise flow of run-off.
- Drainage channels should ensure safe disposal of run-off/surface water and should be self-cleaning
- Paving of the sideways, driveways and other open area should be done using pervious materials to encourage recharge and thus reducing water runoff volume.
- Development of a Storm-water Management Plan that minimizes impervious area infiltration by use of recharge area and use of detention and/or retention with graduated outlet control structures

5.9 Solid Waste

It is another national challenge which needs to be addressed. Waste collection within the area boundary is the responsibility of the Kiambu County, but since the council is faced with many

challenges, solid waste management being among them; private companies have come in to offer such services. Developers should comprehensively address the issues of waste in their planning before doing any construction to avoid creating illegal dumping sites within estates which pose a health risk to the residents. To curb this issues the proponent will make arrangements with Kiambu County to collect waste within the facility. Large amounts of solid waste will be generated during construction and operational phase. This will include metal cuttings, rejected materials, excavated materials, paper bags, empty cartons, broken glass among other materials from a construction site. Solid wastes if not well managed have a potential of causing disease outbreaks due to suitable breeding conditions from various pathogens. During the operational phase there will be massive generation of waste from the community.

Mitigation:

- The contractor or the proponent should work hand in hand with the private refuse handlers and the Kiambu County to facilitate waste handling, and disposal from the site. The resulting debris will be collected, transported and disposed off at suitably approved dumpsites.
- It is recommended that land clearance, excavation and construction waste be recycled or reused to ensure that materials that would be disposed of as waste are diverted for productive use. In this regard the proponent is committed to ensuring that construction materials are left over at the end of construction will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community and residents.
- Proponent should ensure the construction of a central waste collection point with bulk storage facilities and provide adequate waste receptacles at convenient points to prevent littering during occupation
- There should be adequate provision for separation of different wastes depending on their types. For example, a site for kitchen waste and waste from the institution's compound as well as segregation of biodegradable (natural wastes) and non-biodegradable waste
- All the waste disposal sites should be well fenced and access denied to any unauthorized persons.
- Signage to be incorporated within the development on proper waste management and on the importance of waste segregation to create awareness.

5.10 Noise

Noise is unwanted/undesirable sound that can affect job performance, safety and health. Psychological effects of noise include annoyance and disruption of concentration. Physical effects include loss of hearing, pain, nausea and interference with communications when the exposure is severe.

Construction Phase

It is postulated that the project will generate noise during the construction stage. There are

various anticipated sources of noise from the construction works ranging from machinery noise, hammering, cutting etc. contractor awarded the construction job are expected to abide by the set code in regard to workers discipline and the types of machinery to be used. It is recommended that this aspect be given significant weight during the pre-qualification and tendering process. Furthermore, the contractors are expected to use as much manual labor as possible to reduce any noise that would be generated by machinery.

The project site being located in a mixed use environment, the issue of noise needs to be strictly addressed to avoid disrupting residing and office operations.

Operational Phase

During the operational phase, there are anticipated to be various sources of noise as the proposed project within a learning institution with a high number of students, staff and visitors.

Mitigation Measures:

- Construction works should be carried out only during the specified time on weekdays preferably evening and night hours when learning and office operation are not taking place to avoid disruptions
- Machinery should be maintained regularly to reduce noise resulting from friction
- Provision of billboards at the construction site notifying of the construction activity and timings
- Sensitize drivers of construction machinery on effects of noise and how to manage it
- Workers in the vicinity of high-level noise to be provided with safety and protective gears such as ear muffs
- Provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- Contractor to consider offsite concrete mixing to reduce noise impact during concrete mixing
- Acquire the noise and excessive vibrations permit from NEMA for any demolition works to be conducted
- Access to the site must follow a designated route to reduce noise during movement by the transport vehicles
- Promote good neighborliness within the development to ensure project goodwill by adjacent neighbors.

5.11 Increased Water Demand

An increase in population in an area results in an increase in water demand hence exerting pressure on the existing water supply. Water is a major concern especially in construction sites.

Construction Phase

Although there is adequate water supply from the Thika Water and Sewerage Company THIWASCO, the proposed development may cause some strain to the existing water supply since construction activities are known to be heavy water consumers. There exists two boreholes on the site but conservation measures need to be employed to avoid over-extraction due to high demand.

Operation Phase

Occupation of the proposed development will bring about an increase in water consumption, which will have a direct impact to the main water supply especially if the supply remains constant. This calls for water harvesting and storage and sourcing for a more reliable and ample water supply

Mitigation

- Avoid wasting the water supplied to the site during construction
- Encourage water reuse/recycling during both construction and operational phases
- Roof catchments should be provided with rain water harvesting systems to enhance collection and storage of rain water. Such water can be used to flush the toilets and in cleaning to save on water
- Provide notices and information signs on means and needs to conserve water resource to awaken the civic consciousness with regard to water usage and management.
- Ideally, the scale, magnitude and nature of the proposed project demands for the supply of reliable clean water. The proponent intends to put up a massive water storage tank of approximately 200,000M³ to ensure a reliable water supply.

5.12 Increased Power Demand

There will be high power consumption especially during occupation phase of the project. The existing power supply from the KPLC Sub-station may be inadequate and will need to be upgraded to enhance the power capacity and to avoid straining the existing supply. However the residents will be encouraged to conserve energy and to use energy conserving appliances as much as possible. Energy conservation involves proper use of electrical appliances, lighting systems for example use of energy saving bulbs, switching off of electrical gadgets used for different purposes and power supply when not in use.

Mitigation

- Upgrade the existing power supply system through establishing another Sub-station and a standby generator
- Use of energy saving appliances such as energy saving bulbs to save on energy demand
- All electrical appliances should be switched off when not in use
- Utilize natural light inside buildings to avoid using electricity for lighting during the day
- Invest in alternative sources of energy especially clean energy technologies such as solar energy for use in water heating
- Create awareness to the student community on the need to conserve energy e.g. through use of stickers with awareness messages such as ‘*Switch Off*’ or ‘*save energy*’ ‘*Switch Me Off*’

5.13 Potential Fire Hazard

Potential fire hazard from the development could emanate from LPG use in the cooking areas, electric cookers and faulty electrical appliances. This poses a major threat to facilities and the occupants of building in case of such occurrences.

Mitigation

- Installation of fire alarm system including fire detectors, smoke detectors and firefighting equipment
- Setting up appropriate emergency response measures
- Conducting regular fire drills
- Secure storage of all flammable materials and fuels such as LPG gas, laundry detergents and chemicals, paints and other workshop related materials.

5.14 Potential Disaster Risk

Disaster means an emergency event that occurs with little or no warning, causing extensive destruction of prosperity, lives and disruption of normal operations. Disasters can be divided into **Natural disasters** or **Man-made disasters**.

Natural disasters are calamities that occur without human involvement. They include earthquakes, floods, drought, landslides and volcanic eruption and windstorms.

The man-made disasters are calamities caused by the actions of human beings either directly or indirectly such as student unrest, food poisoning, industrial accidents, and chemical contamination, pollution and terror threats.

Mitigation measures

1. Develop a disaster Risk Reduction (DRR) Strategy

Disaster Risk Reduction refers to actions designed to minimize destruction of life, property and disruption of normal operations. There needs to be disaster risk strategy if the effects of disasters are to be minimized. This risk reduction strategy calls for the establishment of a Disaster Crisis Response Team with the mandate to prevent, mitigate and effectively prepare against potential disaster hazards. It also includes organizing and carrying out rescue and rehabilitation operations during and after a disaster has struck.

2. Early Warning Mechanisms

It is important to note that not all disasters are rapid or sudden. Some disasters develop over time and there is usually a lead time to receive information and react to early warnings. Careful monitoring and early warning are useful only if they help to avert potentially dangerous events or circumstances that can lead to emergency or disaster or if they lead to actions taken to minimize damage.

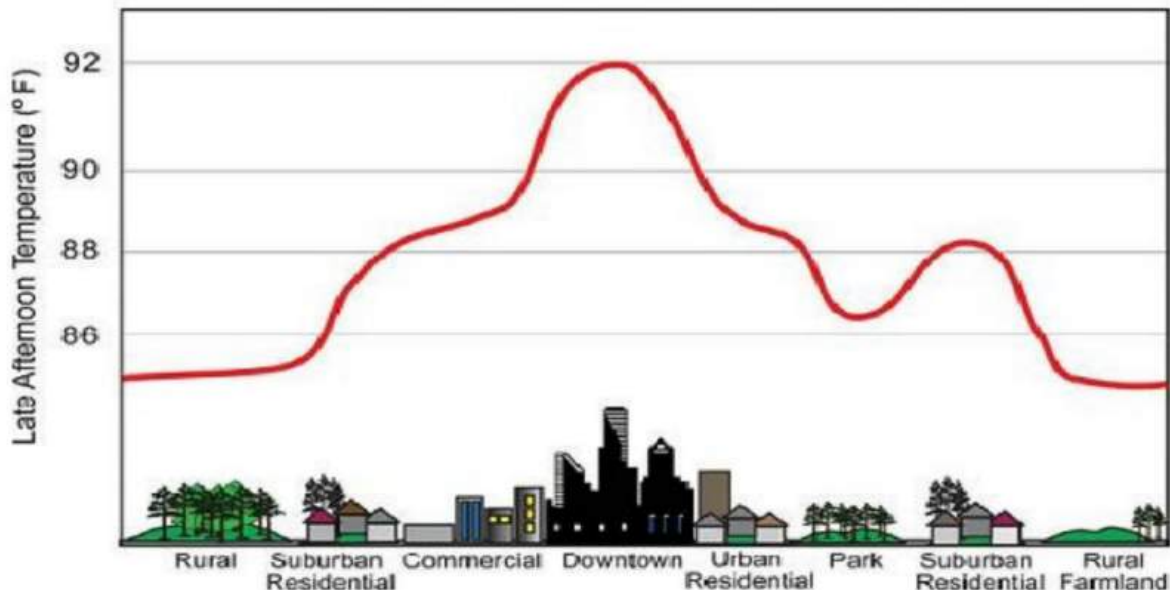
The purpose of monitoring and early warning is to enable remedial measures to be initiated and to provide more timely and effective relief through disaster and emergency preparedness actions. Early-warning mechanisms will provide the institution and other stakeholders with relevant information to enable them make informed decisions for evacuation or relocation. The following should be considered:

- Develop effective post evacuation maps at major entrances and exits to buildings, enclosed stairways and offices for use in case of emergency.
- Organize and practice drill sessions for fire, lockdown, shelter-in-place and other situations that the safety department determines necessary to practice to create awareness and train the employees on emergency procedures. Fire drills are required at least once a month. It is recommended that other drills follow the same format.

- The proponent should maintain well equipped emergency kit(s) comprising of items such as First aid kit, Whistles, Fire blankets, Flash torches, Fire extinguishers and Blueprints of the buildings
- The management needs to ensure that facility is safe from natural and human made disasters by observing the safety of their operating environments.
- Regular intelligence gathering to avert any anticipated disaster.
-

5.15 Increment in Ambient Temperatures

The materials to be used for making the structures (concretes, iron sheet roofing, glasses etc.) have higher heat absorption potential compared to the current vegetation cover in the area. During the daytime when the sun releases its incident rays to the earth's surface. Scientifically this has been found adverse effects on peoples and the ecosystems. Research has found that urban areas are relatively hotter than immediate neighboring rural and semi urban areas. The effects creates heat waves that have adverse effect on people's health and safety



Mitigation Measures

- ❖ The proponent will ensure **adequate landscaping** to reduce this effect (heat island effect) for a conducive learning environment created through evapotranspiration and plant's cooling effect.
- ❖ The proponent shall use **energy efficient** appliances and equipment's.
- ❖ Installing **cool roof**, it helps reflect back the sun's incident rays and heat away from building

5.16 Summary of Positive Impacts of the Proposed Project

The proposed development will have positive impacts to the proponent, society and the environment in general. Some of benefits include the following:

- Through construction of the proposed development, the project will ensure optimal use of the land to the great benefit of the country and its people with land being a scarce resource in Kenya

- Provision of modern, digital learning and research facilities
- Creation of market for goods and services and especially construction inputs which include raw materials, construction machinery and labor. Secondary businesses are also likely to spring up during the construction phase especially those providing foods and beverages to the construction workers.
- Create a major boost to the education sector through increased student enrolment
- Massive job opportunities for Kenyans both during planning, construction and operational phases. They include building contractors, architectures, structural engineers, mechanical engineers, surveyors, environmentalists, security agents, transporters, construction workers, site managers and foremen.
- Increase in revenue for the government; from processing of the building plans to the County and through annual rates.

5.17 Summary of Negative Impacts of the proposed Project

Against the background of the above positive impacts, there are a few negative drawbacks that are anticipated mostly during the construction of the project. They include the following:

- Loss of biodiversity from the project site which has a some trees and patches of grass
- Waste water management and disposal
- Increased water demand
- Increased power demand
- Solid waste management
- Oil spills during construction
- Dust emissions
- Accessibility to the existing road network
- Soil compaction, erosion and pollution
- Noise and vibrations
- Population density
- Increased traffic, both vehicular and human, along the roads that the site is accessible
- Air pollution during construction.
- Health and safety for the workers during construction phase

5.18 Summary of the Mitigation Measures

One of the objectives of the environmental assessment has been to identify measures to be taken by the proponent to mitigate environmental impacts. These will include:

- A code of practice to minimize construction noise, vibration dust and disturbance o the site.
- Planting of trees, and wild flowers to supplement the ground cover on the excavated area.
- Application of soil conservation measures to reduce surface runoff during wet seasons and especially during construction phase.
- Recovery of all debris generated and reuse of materials where possible e.g. the stone chippings which can be used as hardcore.
- Recycling and reuse of appropriate materials.

- Provision of security measures to deter intruders and protect them from the risk of injury; and fitting of noise mufflers on generator exhausts.
- Installation of oil/diesel separators on site to keep oils from storm runoff.
- Predetermined route to the site, oil spillages will be minimized by using right machinery that are regularly serviced and operators who are qualified following the operations instructions strictly.
- The contractor will ensure management of excavation activities, activities will be controlled especially if construction will take place during rainy season.
- After construction the proponent shall rehabilitate the land by removing any unnecessary materials that shall be covering the land and preventing natural biodiversity.
- To minimize potential impacts to bio diversity, grass cover that does not interfere with the sitting of the project will be left intact,
- Sensitize drivers of construction machinery on effects of noise; billboards will be suitably erected on the start of the project to psychologically prepare the people in the vicinity.
- Signs must indicate and inform the public when the works start and when it will be completed, construction activities to be restricted to daytime to avoid accidents and possible harm to gears provide barriers such as walls around site boundaries to provide some buffer against noise propagation.
- Vehicle speeds in the construction area will be limited to minimize dust in the area, discourage idling of vehicles i.e. vehicle and equipment engines will be turned off when not in direct use to reduce exhaust emissions.
- Regular maintenance of construction plant and equipment, engage sensitive construction workers.
- Provide personal protective Equipment such as nose masks to the workers on site, the construction contractor will water the site with exposed soil surface twice each day during dry weather.
- All residual waste materials to be recycled sold or disposed in an environmentally friendly manner. Wastes will be properly segregated and separated to encourage recycling of some useful wastes; dustbins will be provided at the construction site.
- A first aid kit will be provided within the site and it will be fully equipped at all times.
- Sanitary facilities will be provided, local individuals preparing food for the workers at the site will be controlled to ensure that food is hygienically prepared
- Construction crew at the site will be sensitized on social issues such as drugs, alcohol, diseases, ensuring proper solid waste disposal and collection facilities, ensure effective waste water management.
- Provision of safe drinking water, contractor to take an insurance cover for workers in case of major accidents on site.
- For the prevention of accidents the contractor shall adhere to the guidelines under the factories and other places of work act.

quarrying companies, hardware shops and interested individuals.

CHAPTER SIX

6.0 ANALYSIS OF PROJECT ALTERNATIVES

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

6.1 Site Relocation Option

The above land was registered as the proponent's by the in anticipation of maximally utilizing the plot. Considering that the land owner does not have another site and the strategic location of the site, this means that he has to look for land elsewhere. Searching for land to accommodate the space and size of the project and completing official transaction it may take a long time although there is no guarantee that such land could be available at a convenient fee in Thika area. The proponent will spend another one year on design and approvals since design and planning has to be according to the prevailing site conditions. Project design and planning before the stage of implementation will cost the proponent unnecessary large sum of money. Whatever has been done and paid up to this level will be counted as a loss to the developer. Assuming the proposed magnificent project will be given a positive response by the relevant authorities including NEMA, the project would have been delayed for about two year's period before implementation. This is a delay that the proponent can ill afford. This would also lead to a situation like no other project alternative option; the other consequences of this would be a discouragement to local/private investors especially in this sector that has been shunned by many public and private investors from the bone statements relocation of the project to different site is not viable hence it's ruled out.

6.2 No project Alternative

The no project alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from the extreme environmental perspective as it ensures non-interference with the current conditions. Under no project alternative, the proponent's proposal would not receive the necessary approval from NEMA, proposed project would not be constructed and there would be no demand for the development. This option will however, involve several losses both to the land owner and the community as a whole. The plot owner will continue paying rent of the plot while the property minimally benefits him. The no project option is the least preferred from the socio-economic and partly environmental perspective due to the following factors;

- Discouragement to the investors
- Land will not yield optimally
- No employment opportunities will be created for Kenyans bearing in mind that the proposed project will have employment opportunities both directly or indirectly during construction and operations phases and thus improve lifestyles and livelihoods
- Development of infrastructural facilities (roads, electrical etc. will not be undertaken).

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

6.3 Analyses of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves on energy and water will be given first priority without compromising on cost or availability factors. Heavy use of timber during construction is discouraged because of massive degradation of forests in Kenya. Timber from exotic and fast growing species would be preferred to indigenous species in the construction where need will arise.

6.4 Domestic Waste Water Management Alternatives

Five locally available technologies are discussed below:

6.4.1 Waste Water Treatment Plant

This involves the construction of a plant and use of chemicals to treat the effluents to locally acceptable environmental standards before it is discharged into the river nearby. It is usually expensive to construct and maintain but it is the most reliable, efficient and cost effective in the long term. The sludge obtained can be composted and used for agricultural and gardening purposes. This method requires a large truck of land and presence of a large river to dissolve the effluent to negligible levels for proper functioning. Owing to this reasons the method is deemed unfeasible and not preferable due to the existing more suitable alternatives as outlined below.

6.4.2 Use of Stabilization Ponds/Lagoons

This refers to the use of a series of ponds/lagoons which allow several biological processes to take place, before the water is released back to the river. The lagoons can be used for aquaculture purposes and irrigation. However, they occupy a lot of space but are less costly. No chemicals are used/heavy metals sink and decomposition processes take place. They are usually a nuisance to the public because of smell from the lagoons/ponds. This option is not preferable in the area because the required space is not only available, and the surrounding community is not likely to accept the option.

6.4.3 Use of Constructed/Artificial Wetland

This is one of the powerful tools/methods used in raising the quality of life and health standards of local communities in developing countries. Constructed wetland plants act as filters for toxins. The advantages of the system are the simple technology, low capital and maintenance costs required. However they require space and a longer time to function. Long-term studies on plant species on the site will also be required to avoid weed biological behavioral problems. Hence it not the best alternative for this kind of project located in congested town settings.

6.4.4 Connection to a Sewer System

Connection to a sewer line will solve the waste management issue at a very minimal cost and in environmentally efficient manner. This is the most viable option because the proposed project area is served by the NCWSC sewer line and the proponent will therefore connect the development to the sewer line and adhere to all the set mitigation measures to ensure efficiency of the system.

6.4.5. Use of Septic Tanks

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is expensive to construct and requires regular emptying. Septic tanks if not well constructed and monitored can lead to blockages and leaks to the underground water. Bearing in mind that the Vision 2030 aims for a Kenyan nation that has a clean, secure and sustainable environment, due to the issues of environmental pollution the method is ruled out.

6.5 Solid Waste Management Alternatives

The proposed project will generate massive solid wastes both during demolishing of the existing buildings, construction and operational phases. An **integrated solid waste management** system is recommendable. The proponent will give priority to reduction at source of the materials. This option will demand a solid waste management awareness programme in the management and the tenants. Secondly, **recycling, reuse and composing** of waste will be an alternative in priority. This calls for a source separation programme to be put in place. The recyclable will be sold to waste buyers within Nairobi and the surrounding areas. The third priority in the hierarchy of options is combustion of the waste that is not recyclable in order to produce energy. Finally, **sanitary land filling** will be the last option for the proponent to consider.

6.6 Water Supply Alternatives

Water is becoming a scarce resource day by day in most parts of the country especially in urban area and towns. The scarcity is further exacerbated by climate change, environmental degradation and exponential Kenya's population growth. Kenya is termed as a water scarce country with about 700m³ per capita, 300m³ lower as per United Nations minimum recommendation of 1000m³ per capita, therefore the proponent should keenly look into methods of sustaining water supply.

6.6.1 Alternative one - Rain Water Harvesting

Rain water flowing into drainage systems during wet seasons should be harvested and used for various purposes. In addition, a lot of water can also be harvested from the roof of the building that will be put up on the project site. This water can be used for watering flower gardens and grass lawns, flushing toilets and general cleaning purposes. The method is only efficient only during the wet seasons and should not be used solely.

6.6.2 Alternative two – Tanker/Bowsers Water Supply

Several commercial water supply companies operate in Nairobi. These are usually licensed by Water Resources Authority (WRA) to supply water to clients when normal NCWSC water supply system is cut-off. The proponent can use these services as a supply option. However, this option is not sustainable since it's expensive and there is no guarantee of being supplied with clean water. Alternative three – Combined Water Supply

This is the most preferred water supply by the environmental consultants. A dedicated main water infrastructure system is to be provided for the development. It is proposed that there will be a new water main connection to serve the development from the existing Thika Water and Sewerage Company (TWSC)

main.

CHAPTER SEVEN

7.0 PUBLIC PARTICIPATION

7.1 Introduction

This chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed construction of affordable houses development in Thika Bustanii in Kiambu County.

7.2 Objectives of the consultation and public participation

The objective of the consultation and public participation was to:

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

In addition, the process enabled,

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

7.3 Background and Methodology

From the field work, it was apparent that the majority of the stakeholders were aware of the proposed project construction and the direct impacts. The proposed construction was nevertheless received with mixed reactions by the community as they anticipated numerous impacts both negative and positive alike. The neighbors and major stakeholders independently gave their views, opinions, and suggestions as in the best of their interest and in the interest of the factors that affected the circumstances, influences, and conditions under which their organizations exist. The purpose for such interviews was to identify the positive and negative impacts and subsequently promote proposals on the best practices to be adopted and mitigate the negative impacts respectively. It also helped in identifying any other miscellaneous issues which may bring conflicts in case project implementation proceeds as planned. In general the, the following steps were followed in carrying out the entire CPP process:-

- Identification of institutions and individuals interested in the process- database of the interested and affected parties
- Administration of questionnaires to the different target groups and local community members along the proposed project Site
- Meetings at various levels and with different target groups

7.4 Issues raised

This Sub-Section covers the views and opinions of the key stake holders who were consulted during the study. It highlights both positive and negative socio-economic and environmental impacts anticipated during the construction and operational phases of the project. This is followed by suggested mitigation measures that the developer should incorporate to minimize environmental degradation and promote sustainable development. The opinion and the expectations of the stakeholders are also highlighted.

7.5 Positive Issues

7.5.1 Improving Growth of the Economy

Through the use of locally available materials during the construction phase of the proposed project, material such as cement, concrete and ceramic tiles, timber, sand, ballast, electrical cables etc., the project will contribute towards growth of the economy by contributing to the gross domestic product. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of these raw materials will be payable directly to the producers.

7.5.2 Increased modern residential units

The Interviews revealed that the project will improve on the available ultra-modern development within the country.

7.5.3 Creation in Employment

The community was optimistic that the construction of the project will open up new fields of employment. Despite the fact that most of the project will need skilled labor force, the people expressed hope that they will be able to access employment once the project commences mostly as casual workers. This will be a source of income for several individuals and households and hence is expected to boost the GDP and improve the living standards of the people.

7.6 Negative Issues

7.6.1 Air Quality Reduction

Emissions in forms of dust, particulate matter, fugitive emission and, exhaustion from project machines and equipment are anticipated during the project construction phases. These emissions emanating from trucks and construction equipment are known to have adverse impact on the environment, plant and human health including effect on the upper to lower respiratory infections and silicosis condition.

- ✓ Activities likely to generate dust include speeding of vehicles on earth surface not palliated with water, excavation of earth materials in dry sections;

- ✓ Activities likely to generate particulate matter include loose material transportation, vehicle and machines exhaust emissions, operations at the batching plant, stone crushing machines, fire among others.
- ✓ Some of the particulate matter to be generated include sand, soot, cement, gravel and murram, among others; and
- ✓ Exhaust emissions likely to be generated include smoke, hydrocarbons and nitrogenous gases among others pollutants from vehicles, machinery and equipment exhausts.

People especially the neighboring community expressed concern over possibility of generation of large amount of dust and fumes within the project site and surrounding areas as a result of excavation works and transportation of construction materials. The proponent shall ensure that dust levels at the site are minimized through sprinkling water in areas being excavated and along the tracks used by the transport trucks and diversions within the site. Proper shielding of the site and installation of dust screens will be effected to trap dust and contain construction activities. Mitigation measures presented within the EMP will also be implemented fully to minimize the impacts of dust generation.

7.6.2 Noise Pollution

Some residents expressed their fears over noise pollution that would come from the construction works. They requested the proponent to use minimum noise producing machines and to reduce the duration of idling of vehicles making deliveries.

7.6.3 Waste generation

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paints and solvent containers, broken glass among others. Solid wastes if not well managed have a potential of causing accidents and disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. Some excavation materials will be rendered unusable and thus will have to be disposed off. This also applies to some of the soil/rocks which may not be reusable after excavation processes are complete. All these materials needs to be collected, transported and disposed off appropriately in approved designated areas. It is encouraged that other alternative uses of these materials should be found e.g. filling excavated areas at the site.

7.6.4 Increased water demand

It is expected that both the workers and the construction works will create an increased demand for water and electricity in addition to the existing demand. Water will be mostly used in the mixing of concrete for construction works and for wetting surfaces for softening or hardening after creating the formworks, watering dusty diversions and active construction sites. Water from the existing borehole should be used sustainably during construction. Suggestions have been made to the proponent to consider investing on alternative water sources e.g. harvesting rain water and constructing high capacity water storage tanks

which will otherwise relief the public water supply system.

7.6.5 Accidents and hazards during construction and Operation Phase

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

7.6.6 Expectations of the Surrounding Local Community

The respondents have high expectations regarding the proposed construction of the project and believe that once it starts operating;

- Many youths will be considered for employment by the contractor
- Local Residents will be allowed to supply some of the raw materials
- There will be improved infrastructure
- The associated negative environmental Impacts and health hazards will be addressed
- Environmental auditing and monitoring to minimize negative impacts associated with project.

CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MONITORING PLAN

8.1 Overview

This section discusses the strategies that will be implemented to mitigate the project's negative effects on the environment while maximizing its positive outcomes. The ESMP is a framework for alleviating a project's negative effects by examination of the project's design, inquiry into the project site, and information gleaned from dialogue with local citizens and institutional stakeholders. It's crucial that the proposed mitigation methods are technically feasible, environmentally safe, socially responsive, and legally acceptable.

What has to be managed, when it needs to be controlled, who is responsible for managing it and how much money is available to carry out the essential actions are all spelt out in the project's Environmental and Social Management Plan (ESMP).

It is important to highlight that critical factors and procedures may change over the course of the project's lifetime, hence the ESMP has been designed with ample room for dynamism and adaptability. Therefore, annual environmental audits will serve as the basis for a regimen of periodic evaluation of the ESMP.

8.2 Guiding principles

ESMP and EMP are directed by a variety of objectives including:

- a) To make it easier to put into practice the preventative and corrective measures identified in the ESIA
- b) To improve adherence to the applicable laws, policies and regulations.
- c) To define the project proponent's role and obligation in defining environmental protection and conservation measures.
- d) To ensure that the preventative measures will have the desired effect.
- e) To establish a process for monitoring the environment in order to respond quickly to unforeseen changes.
- f) To specify requirements for environmental audits and surveillance.
- g) To determine who among the involved parties needs more training.
- h) Increasingly incorporating best environmental practice ideas into standard operating procedures and crisis response plans.

The environment management plan is prepared with a view to facilitate effective environmental management of the project, in general and implementation of the mitigation measures in

particular. The EMP provides a delivery mechanism to address potential adverse impacts and to introduce standards of good practice to be adopted for all project works.

8.3 Responsibilities

It is critical for the success of the project that the Proponent and Contractor(s) maintain continuous and good communication. As an example, when NEMA requires certain actions to be taken by the Contractor(s), the Proponent shall communicate this information to the Contractor and monitor implementation to ensure compliance with the order(s).

The Project Manager will be responsible for day-to-day management of the project, serving as a conduit for information flow between the Contractor and the Proponent and enlisting the help of Consultants and/or Contractor(s) in resolving concerns raised by the project's different stakeholders.

The project management system's commitment to the following criteria is necessary given the aforementioned objectives and scope:

- i) The Contractor(s) should retain an environmental expert to monitor the implementation of the ESIA report's recommendations and the ESMP on a set timeline.
- j) The preferences and interests of affected parties are taken into account at any point when the project is adjudged to be conflicting with the interests of third parties.
- k) As much as possible, incorporate the planned environmental protection measures indicated in Chapter 7 into the project execution plan.
- l) National regulations and legal requirements pertaining to the environment must be upheld at all times during the course of the project's implementation.

To keep things going smoothly and reduce social tensions, it is necessary to handle any challenges or complaints that arise as a result of any property damage or loss that occurred during construction as soon as possible.

The success of the project depends on adhering to the procedures stated in this Environment and Social Management Plan and reevaluating the plan on a regular basis for its responsiveness to changing needs.

8.4 Costing

As will be noted from the plan, some impact mitigation activities which costing is not done. This is because costing for such activities may have been catered for, under another project component/phase for a similar or related activity. For instance, the cost of provision of dust coats and masks is entered once, as it is not expected that the contractor will have to buy this item again for all the purpose listed in the subsequent phases. A set of protective clothing will last one worker throughout the construction phase.

8.5 Plan Period

The EMP provided here is to cover the first year of the project's operations. It is then expected that an Environmental Audit will be undertaken at the end of the year to evaluate conformity to the EMP as well as identify any gaps and recommend corrective adjustments to the plan. This is then addressed through a loop mechanism from construction phase to operational phase to identify the success of the project versus the failures. This should be analyzed through the environmental criteria of impact and mitigations.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.0.1 CONSTRUCTION PHASE

Environmental / Social Impact	Proposed Mitigation Measures	Responsibility for mitigation	Monitoring means	Recommended frequency of monitoring	Estimated Cost (Kshs)
Demolition of existing structures	• Apply for demolition permit from relevant authorities such as NCC ,NCA and NEMA before commencing the demolition • Engage a registered private contractor to carry out the demolition • Provide workers with personal protective equipment (PPE) • The demolition exercise will be limited at day time only • All personnel working on the project will be trained prior to commencing the demolition • Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	-Project proponent -Contractor -NEMA inspectors	Inspection	Daily during the demolition process	50,000

	Noise and Air pollution • All active demolition areas will be watered at least twice a day to reduce dust. • Careful screening to contain and arrest demolition related	- Project proponent - Contractor - NEMA inspectors	Periodic checks	Daily during the demolition process	15,000 pm
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Demolition of existing structures	dust will be adopted • Use of equipment designed with noise control elements will be adopted where necessary. • Trucks used during demolition exercise on site shall be routed away from noise sensitive areas in the neighborhood, where feasible. • Idling time for pick-up trucks and other small equipment will be minimized to limited time. • Use of very noisy equipment will be limited to daytime only.				
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	Debris and related wastes • A registered private contractor will be engaged to collect demolition debris/wastes to avoid illegal final dumping at unauthorized sites will collect demolition debris. • All debris/wastes to be collected regularly to control air pollution and injury etc • All persons involved in refuse collection shall be in full protective attire. • All trucks hauling demolition debris/wastes shall be covered. • Exposed demolition debris of e.g. dust and sand, will be enclosed, covered, and watered daily before transported to disposal site.	- Project proponent - Contractor - NEMA inspectors	Periodic checks	Daily during the demolition process	22,000
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	Health and safety of workers • All workers will be sensitized before the exercise begins, on how to control accidents related to the demolition exercise • A comprehensive contingency plan will be prepared before	- Project proponent - Contractor - NEMA inspectors	Periodic checks	Daily during the demolition process	30,000
	demolition begins, on accident response. □ Adherence to safety procedures will be enforced at all stages of the exercise □ All workers, pursuant to labor laws, shall be accordingly insured against accidents. □ All workers will be provided and instructed to wear protective attire during demolition, including helmets.				
De-vegetation resulting from site clearance and excavation	□ Ensure proper demarcation and delineation of the project area to be affected by construction works. □ Apply for tree cutting permit from relevant authorities before cutting of any tree □ Preserve all trees located at the boundary of the plot	- Proponent - Contractor - Engineer - Architect	Periodic check s Routine maintenance	Weekly	15,000

Soil erosion	□ Ensure management of excavation activities □ Observe Efficiency of erosion control measures □ Control activities especially during rainy seasons □ Provide soil erosion control and conservation structures where necessary. □ Compact loose soils to minimise wind erosion □ Control earthworks	- Proponent - Contractor - Workers - NEMA inspectors - -	Inspection Routine maintenance	Daily; Once a month during project lifetime	17,000
Air pollution	□ Dust suppression with water-sprays during the construction phase on dusty areas □ All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality	- Proponent - Contractor	Inspection/ observation	Daily	30,000

	impacts during construction. □ Drivers of construction including bulldozers, earth-movers etc will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon and minimize idling of engines. □ Careful screening of construction site to contain and arrest construction-related dust. □ Exposed stockpiles of e.g. sand, will be enclosed, covered, and watered daily. □ Ensure construction machinery and equipment are well maintained to reduce exhaust gas emission □ Control speed and operation of construction vehicles	- County Public Health - Officer - Workers - NEMA inspectors			
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Noise pollution	□ Use of Suppressors on noisy equipment or noise shields for instance corrugated iron sheet structures □ Sensitize drivers of construction machinery on effects of noise □ Trucks used at construction site shall be routed away from noise sensitive areas where feasible. □ Maintain plant equipment to suppress frictional noise □ Construction activities to be restricted to daytime i.e. 8am to 5pm □ Workers in the vicinity or involved in high-level noise to wear respective safety & protective gear. □ Comply with EMCA (Noise and excessive vibration pollution control) Regulations 2009	- Proponent - Contractor - County Public Health - Officer - Ministry of Labour - Workers - NEMA inspectors	Inspection/observation	Random	25,000
Traffic and Road safety	□ Enforce speed limits for construction vehicles especially along the roads leading to the site □ Provide bill boards at the site/entrance to notify motorists and general public about the development □ Ensure that the vehicles comply with axle load limits □ Ferry building materials during off-peak hours	- Proponents - Contractor - Ministry of Transport - NEMA inspectors - Workers	Observation	Daily	100,000

	☐ Employ traffic marshals to control traffic in and out of site Employ well trained and experienced drivers. Ensuring free board haulage.				
Oil pollution	☐ Proper storage, handling and disposal of new oil and used oil and related wastes ☐ Maintain construction plant and equipment to avoid leaks ☐ Maintenance of construction vehicles to be carried out in the contractors yard (off the site) ☐ Provide oil interceptors along the drains leading from car wash and service bays	- Contractor - Workers	-Inspection -Observation	Daily	10,000
Storm water r drainage	☐ Proper installation of drainage structures/facility ☐ Install cascades to break the impact of water flowing in the drains ☐ Ensure efficiency of drainage structures through proper	- Contractor - -	-Inspection -Routine maintenance	During construction and on completion of each structure	150,000

	design and maintenance Provide gratings to the drainage channels	- -			
Health and safety of workers	□ All workers will be sensitized before construction begins, on how to control accidents related to construction. □ A comprehensive contingency plan will be prepared before construction begins, on accident response. □ Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance □ Accordingly, adherence to safety procedures will be enforced. □ Provide first aid kits at strategic places in the site □ All workers to wear protective gear during construction e.g. helmets. □ Provide clean water and food to the workers. □ Construction work will be limited to daytime only □ All workers will be adequately insured against accidents. □ Sensitize workers on the importance of NHIF and NSSF	- Contractor - Ministry of Labour - County public health officer - Workers - Proponent - NEMA inspectors - NCC inspectors - NHIF and NSSF officials	- Routine activities checks	Daily Monthly for remittance of appropriate fee	110,000

	Ensure that the workers are registered with NHIF and NSSF and remits appropriate fee				
Fire outbreak	☐ Install firefighting equipment as provided elsewhere in the report ☐ Sensitize the residents on fire risks i.e. conduct regular fire drills	- Contractor	-Observation	Random	80,000
	☐ Adapt effective emergency response plan ☐ Maintain fire fighting machinery regularly ☐ Provide emergency numbers at strategic points				

Solid and liquid waste	□ Ensure proper solid waste disposal and collection facilities □ Ensure effective wastewater management □ Design of sewerage system should be as provided in the approved plans □ Wastes to be collected regularly to control air pollution and vermin/insects etc. □ Receptacles will be provided for waste storage prior to collection. □ Sensitize workers on the 5 R's of waste management i.e. reduction, recycling, reuse, repurpose and refuse □ Refuse collection vehicles will be covered to prevent scatter of wastes by wind. □ Wastes will be collected by a licensed operator to avoid illegal final dumping at unauthorized sites. □ All persons involved in refuse collection shall be in full protective attire. □ As provided for by the Building Code, a temporary latrine will be provided on site to be used by construction workers	- Contractor - Proponent - County Public Health Officer - NEMA inspectors - Registered waste management company	-Routine Activities checks	Daily	50,000
Increased water demand	□ Management of water usage. Avoid unnecessary □ wastage Recycling or reuse of water where possible	- Contractor - Proponent	-Inspection -Observation	Random	60,000

	□ Make use of rain harvesting techniques such as roof □ f catchments to provide water □ Employ services of waters vendors to supplement the council's water supply □ Drill a borehole	- WRMA - Ministry of water - NEMA inspectors - Workers			To be included in the Bill of Quantities
Vegetation	□ Design and implement an appropriate landscaping and tree planting program to help in re-vegetation of part of the project area after construction. □ Introduction and maintenance of vegetation (trees, shrubs and grass) on open spaces and around the site □ Planting and grassing should be done just before the rains or irrigated on dry spells.	- Contractor - Proponent	-Inspection -Observation	Random	120,000
Record Keeping	□ Collection, analysis and document of relevant environmental data of the site	- Proponent/contractor	-Inspection	Weekly	20,000
Internal Audits	□ Monitoring will involve measurements, observations, evaluations, assessment of changes in water quality, Emergency plans, waste management, Noise levels, contractor safety etc.	- Proponent/contractor	Inspection	Monthly	10,000

Security	☐ Provide security guards and facilities during construction period ☐ The gate should always be controlled by the security men Construct a gate house ☐	- Contractor - Proponent	Observation	Daily	750,000
Increase in STI infections	☐ Sensitization of local communities and staff working on the project on dangers of free lifestyle	- Proponent & Ministry of Health	Voluntary screening Secondary data	Annual	-

8.0.2 ESMP FOR OPERATION PHASE

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) DURING OPERATION PHASE

Possible Impacts	Proposed Mitigation Measures	Responsibility for Mitigation	Monitoring means	Frequency for Monitoring	Estimated Cost (Kshs)
Sewage/water spillage	- Direct waste water to the city's sewer - Regular inspection and maintenance of the waste disposal systems	- Proponent - Occupants - County public health officer	Periodic checks	Periodic checks	50,000

Solid waste generation	• Ensure that wastes generated are efficiently managed through recycling, reuse and proper disposal procedures • Use of an integrated solid waste management system i.e. 5 R's of waste management • A private solid waste handler to be contracted to handle solid waste	- Proponent - Occupants - County public health officer	Periodic Checks	Periodic and surprise checks	60,000
Air pollution	• Cabro-paving on exposed areas • Proper landscaping and maintenance • Watering of uncovered areas • Periodic maintenance of generator, waterpumps and transformers	- Proponent - Ministry of Health - County public health officer - NEMA inspectors	Periodic Activities	Periodic and surprise checks	25,000

Traffic	• Provide warning lights and other signs to reduce risk of accidents • Provision of adequate on-site parking bays	- Proponent	Periodic and surprise checks		15,000
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	☐ Maintenance of the parking bays				
Health and safety	☐ Keep record of the public emergency service telephone numbers including: Police, Fire brigade, Ambulance ☐ Document an emergency response procedure ☐ Train residents on emergency response e.g through fire drills and first aid training Engage a caretaker to ensure maintenance of a clean environment	- Proponent - County Public Health Officer - Ministry of Labour - NEMA inspectors	Routine Activities	Periodic checks and Accident audits	22,000

Noise and vibration Pollution	❑ Installation of silencers on the generators and transformer rooms ❑ Provision of personal protective equipment for workers ❑ Do annual noise measurements. Do employee medical examination ❑ Comply with L.N. 25:Noise prevention and control rules, 2005 and L.N. 61: Noise and vibration pollution regulation, 2009 ❑ Sensitize residents on minimal permissible noise levels	- Proponent - County Public Health Officer - Ministry of Labour Workers NEMA inspectors	Periodic	Periodic checks	5,000
Security	❑ Engage services of security guards ❑ Install CCTV cameras ❑ Incorporate the community policing initiative ❑ Place hotline numbers on strategic places	- Propone - nt Occupan - ts	Routine	Periodic checks	50,000

Storm water drainage	❑ Proper maintenance of drainage structures/facility ❑ Provide gratings to the drainage channels	- Proponent	Inspection Routine maintenance	Once a month	100,000
In-house operation procedures regulations	❑ Ensure good maintenance of the drainage network. ❑ Institute appropriate monitoring procedures and guidelines on environmental performance, ❑ Establish environmental audit and protocol and schedule as per the EIA/audit regulations, encourage workers participation in environmental conservation aspects.	- Proponent	Routine operation procedure	Periodic	-
Increase water demand	❑ Harvest rain-water ❑ Install water conserving taps that turn off automatically when not in use ❑ Sink a borehole ❑ Provision of roof/ underground tanks for water storage	- Propone - nt Occupan ts	Routine maintenance Inspection	Daily	-

Energy	❑ Switch off electrical appliances when not in use. ❑ Switch off all lights immediately when not in use or are not needed. At end of functions take necessary measures to switch off lights immediately. ❑ Use energy conserving bulbs e.g. LED bulbs for general lighting. Make use of alternative source of energy such as solar power, which is renewable. The proponent should include solar power systems to the block.	- Proponent - Occupant	Routine maintenance Inspection	Daily	To be included in the bill of quantities
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8.0.3 ESMP FOR THE DECOMMISSIONING PHASE

ENVIRONMENTAL AND SOCIAL MANAGEMENT/MONITORING PLAN (ESMP) 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.

Expected Negative Impacts	Recommended Mitigation Measures	Responsibility Party	Time Frame	Cost (ksh)
1. Construction Equipment/ machinery/structures & wastes				
Scraps and other debris on site	- Use of an integrated solid waste management system i.e. through a hierarchy of options: - Waste materials generated as a result of project decommissioning activities will be characterized in compliance with standard waste management procedures/regulations. Disposal locations will be selected by the contractor/project engineer based on the properties of the particular waste stream.	Contract & Project or PropONENT	One-off	50,000
	- All buildings, machinery, equipment, structures and partitions that will not be used for other purposes should be removed and recycled/ reused say in other projects	Contract & Project or PropONENT	One-off	-
	- Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to approved dumpsites.	Contract & Project or PropONENT	One-off	-

2. Rehabilitation of project site

• Vegetation disturbance • Land deformation: soil erosion, drainage problems	- Implement an appropriate re-vegetation programme to restore the site to its original status - During the vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion; - Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; - Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	Contract & Project or Proponent	One-off	25,000
	- Comprehensive Landscaping	Contract & Project or Proponent	One-off	50,000
3. Safety of the project				
Occupational hazards	- Ensure that safety measures have been effectively integrated and positioned in respective areas of the project to control and manage hazards such as fire - Staircases and other hazardous areas should be suitably protected say using strong rails to avoid occurrence of accidents	Contract & Project or Proponent	One-off	-
4. Safety and Social-Economic impacts				

☐ Loss of income ☐ Reduced ability to support dependants ☐ Loss of quality of life ☐ Loss of benefits i.e. medical, insurance cover etc	- The safety of the workers should surpass as a priority of all other objectives in the decommissioning project - Adapt a project completion policy: identifying key issues to be considered. - Assist with re-employment and job-seeking of the involved workforce. - Compensate and suitably recommend the workers to help in seeking opportunities elsewhere. - Offer advice and counseling on issues such as financial matters.	Contractor		-
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CHAPTER NINE: CONCLUSION AND RECOMMENDATION

9.1 Conclusions

The proposed development project is a worthy cause by state Department and broadly with no doubt will contribute significantly to good working conditions and by extension spur economic development. An Environmental Management Plan (EMP) outline has been developed to ensure sustainability of the site activities from construction through operation to decommissioning. The plan provides a general outlay of the activities, associated impacts, and mitigation action plans. Implementation timeframes and responsibilities are defined, and where practicable, the cost estimates for recommended measures are also provided.

A monitoring plan has also been developed and highlights some of the environmental performance indicators that should be monitored. Monitoring creates possibilities to call to attention changes and problems in environmental quality. It involves the continuous or periodic review of operational and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted.

It is strongly recommended that a concerted effort is made by the site management in particular, to implement the Environmental Management and Monitoring Plan provided herein. Following the commissioning of the project, statutory Environmental and Safety Audits must be carried out in compliance with the national legal requirements, and the environmental performance of the site operations should be evaluated against the recommended measures and targets laid out in this report.

It is quite evident from this study that the construction and operation of the market sites will be of immense benefits to the residents of Wang'uru.

9.2 Recommendations

It is noted that the integration of environmental concerns in project implementation enhances sustainable development and improve service delivery. The following are preventive and mitigation of adverse impacts;

- i. The proposed project to be implemented in compliance with the relevant legislation and planning
- ii. The proponent to ensure implementation of the mitigation measures provided in the EMP
- iii. The proponent to monitor implementation of the EMP using the developed environmental

- management and monitoring plan
- iv. NEMA to consider, approve and grant an Environmental Impact Assessment License to the proponet

**ANNEX 1: PUBLIC PARTICIPATION NOTICES, MINUTES,PHOTOS AND
SAMPLE QUESTIONNAIRES**

**ANNEX 2: KIAMBU COUNTY CORRESPONDENCIES/STAKEHOLDERS
ENGAGEMENT**

ANNEX 3: ACHITECTURAL DRAWINGS

ANNEX 4: SITE LAYOUT MASTERPLAN

ANNEX 5: THIKA TOWN STRUCTURE PLAN

ANNEX 6: BUSTANI SURVEY PLAN

ANNEX 7: BUSTANI SUMMARY BILLS OF QUANTITIES

ANNEX 8: BUSTANI COMPREHENSIVE BILLS OF QUANTITIES

ANNEX 9: LAND OWNERSHIP DOCUMENTS