

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR PROPOSED INTEGRATED MIXED USED DEVELOPMENT (RESIDENTIAL APARTMENTS, SERVICED APARTMENTS, AND CONVENIENT RETAIL STORE) ON L.R NO. 28223/3 OFF KIAMBU ROAD, ALONG THE NORTHERN BYPASS, RIDGEWAYS, IN NAIROBI COUNTY



Lead Environmental Consultant	Project Proponent
Shadrack Kyalo Mbuta P.O.BOX 28634-00100, NAIROBI	Cytonn Investment Partners Eleven LLP P.O.BOX 20695-00200 NAIROBI

Date: 07/02/2017

EXPERTS AND PROPONENT DETAILS

PROJECT DETAILS

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR PROPOSED INTEGRATED MIXED USED DEVELOPMENT (RESIDENTIAL APARTMENTS, SERVICED APARTMENTS, AND CONVENIENT RETAIL STORE) ON L.R NO. 28223/3 OFF KIAMBU ROAD, ALONG THE NORTHERN BYPASS, RIDGEWAYS, IN NAIROBI CITY COUNTY

PROPONENT:

Cytonn Investment Partners Eleven LLP

P.O.BOX 20695-00200

NAIROBI

On Behalf of the Proponent:

Name:.....

Position.....

Signature.....

DateJanuary 2017.

ASSOCIATE EXPERT:

Signature.....

Date:January 2017

EUNICE WAHIGA KANYUNGU, REG. NO. 8064

P. O. BOX 152300 – 00100, NAIROBI.

LEAD EXPERT

Signature.....

Date:January 2017

SHADRACK KYALO MBUTA, LEAD REG. NO. 6315,

P. O BOX 60386-00200, NAIROBI.

EXECUTIVE SUMMARY

In pursuant to the Environmental Management and Coordination Act section 58 (1) and the Environmental Impact Assessment and Audit Regulations, 2003 part II, an environmental project study was carried out for the proposed comprehensive development project. The study was carried out in order to determine the anticipated environmental impacts of the proposed project and to identify the necessary mitigation measures in order to incorporate sustainable development aspects in the project cycle and at the same time with a view to obtaining the necessary approvals and licenses from NEMA.

Kenya being a developing country is urbanizing very fast and hence experiencing the challenges of urbanization. **Cytonn Investment Partners Eleven LLP** (herein referred to as the proponent) has proposed comprehensive development surrounding an integrated mixed used development (residential apartments, serviced apartments, and convenient retail stores) on L.R NO. 28223/3 off Kiambu road, along the Northern bypass in Ridgeways, Nairobi County.

Table of Contents

EXECUTIVE SUMMARY	3
1 INTRODUCTION	10
1.1 Project Overview and Location	11
1.2 Floor Plans	12
1.3 Project's benefits.....	14
1.4 Negative impacts of the project and mitigation measures.....	15
1.5 Construction phase impacts.....	15
1.6 Operational phase impacts	15
1.7 Possible decommissioning impacts.....	16
1.8 Construction phase	16
1.9 Mitigation measures of the project's negative impacts.....	17
1.10 Project design and construction phase	17
Change of User	17
1.11 Sources of raw materials.....	18
1.12 Noise pollution	18
1.13 Air pollution.....	19
1.14 Health and safety of employees at the workplace.....	19
1.15 Solid waste management.....	20
1.16 Traffic management	20
1.17 Habitat restoration.....	21
1.18 Water management	21
1.19 Operational phase.....	21
1.19.1 Water scarcity.....	21
1.19.2 Energy efficiency	22
1.20 Infrastructure and utilities on site.....	22
1.20.1 Water Supply.....	22
1.20.2 Foul Water Drainage	23
1.20.3 Solid Waste Disposal.....	23
1.20.4 Electricity Supply	23
1.20.5 Landscaping.....	23

1.20.6	Roads and Access.....	23
2	PROJECT BACKGROUND AND CONTEXT.....	24
2.1	Introduction.....	24
2.2	Background and Rationale for the EIA	24
2.3	Objectives.....	25
2.4	25
2.5	Scope	25
2.6	26
2.7	Terms of Reference (TOR) for the EIA Process.....	26
2.8	Approach and Methodology	28
2.9	Data Collection Procedures.....	28
2.10	EIA Organization and Structure	29
2.11	Reporting and Documentation.....	29
2.12	Responsibilities and Undertaking.....	29
2.13	Methodology Outline	29
2.14	Environmental Screening	30
2.14.1	Screening criteria.....	30
2.14.2	In line with the second Schedule of Legal Notice No. 101 of 2003, the following considerations were taken into account in determining the environmental screening criteria.	30
2.14.3	Results of screening criteria	31
2.15	EIA Study Report format.....	32
2.16	EIA organization and structure.....	33
2.16.1	Environmental Scoping	33
2.16.2	Desktop Study	33
2.16.3	Site Assessment.....	33
2.16.4	Reporting.....	33
3	THE PROJECT DESCRIPTION AND LAYOUT PLAN	34
3.1	Property Location	34
3.2	Project Proponent/Developer	35
3.3	Land Tenure and Ownership	35
3.4	Plot Size	35

3.5	Site Conditions.....	35
3.6	Construction process.....	36
3.6.1	Construction technology to be used	36
3.6.2	Construction material	36
4	BASELINE INFORMATION FOR THE PROPOSED PROJECT SITE.....	38
4.1	Introduction.....	38
4.2	THE PHYSICAL ENVIRONMENT	38
4.2.1	Climatic Conditions.....	38
4.3	Water Potential	39
4.4	Socio-Economic Attributes	39
4.4.1	Population.....	39
4.4.2	Economic Activities	39
4.5	Infrastructure and Utilities	40
4.5.1	Water Supply	40
4.5.2	Foul Water Drainage	40
4.5.3	Solid Waste Disposal.....	40
4.5.4	Electricity Supply	40
4.5.5	Landscaping.....	40
4.5.6	Roads and Access.....	40
5	RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS	41
5.1	Introduction.....	41
5.2	The Rio Declaration on Environment and Development	41
5.3	National Policies and Legislation	42
5.4	The Physical Planning Act (Cap. 286)	42
5.5	The Public Health Act (Cap. 242).....	44
5.6	The Building Code.....	44
5.7	The Penal Code (Cap. 63)	45
5.8	The Environmental Management and Coordination Act No. 8 of 1999.	45
5.9	The National Environmental Action Plan (NEAP)	46
5.10	The Factories and Other Places of Work Act (Cap. 514)	46
5.11	The National Shelter Strategy to the Year 2000.....	46

5.12	The Water Bill 2014	46
5.13	Institutional Framework.....	47
5.13.1	National Environmental Management Authority (NEMA).....	47
5.13.2	County Government of Nairobi.....	48
5.13.3	Director of Physical Planning.....	48
5.14	Conclusion	49
6	PUBLIC PARTICIPATION.....	50
6.1	Overview	50
6.2	Objectives of the Consultation and Public Participation (CPP) Exercise	50
6.3	Methodology used in Public consultation.....	50
6.4	Sources of information.....	51
6.5	Views raised.....	54
6.5.1	Positive Impacts	54
6.6	Negative Issues.....	55
6.6.1	<i>Dust emissions</i>	55
6.6.2	<i>Noise Pollution</i>	55
6.6.3	<i>Solid Waste Generation and Land degradation</i>	55
6.6.4	<i>Increased water and Electricity demand</i>	56
7	POTENTIAL ENVIRONMENTAL IMPACTS	57
	Impacts during Construction Process.....	57
	Positive Impacts	57
	Negative Impacts.....	57
i)	Noise Pollution	57
ii)	Sanitation and Health Hazards	58
iii)	Accidents and Safety Risks	58
i)	Mushrooming of Food Kiosks	58
	Impacts during Operational Phase.....	59
	Positive impacts.....	59
	Negative Impacts.....	59
	Impacts during Decommissioning Phase.....	60
	Summary of impacts.....	61

8	IMPACTS IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES	64
8.1	Introduction.....	64
8.2	Mitigation of Construction Phase Impacts.....	64
8.2.1	Efficient sourcing and Use of Raw Materials.....	64
8.2.2	Minimization of Run-off	64
8.2.3	Minimization of Construction Waste	65
8.2.4	Reduction of Dust Generation and Emission	66
8.2.5	Minimization of impacts on traffic flow	66
8.2.6	Minimization of Noise and Vibration.....	66
8.2.7	Health and safety of Workers on site	66
8.2.8	Reduction of Energy Consumption	67
8.2.9	Minimization of Water Use.....	67
8.3	Mitigation of Operation Phase Impacts	67
8.3.1	Ensuring Efficient Solid Waste Management	67
8.3.2	Minimization of Sewage Release	67
8.3.3	Ensure Efficient Energy Consumption.....	68
8.3.4	Ensure Efficient Water Use.....	68
8.4	Mitigation of Decommissioning Phase Impacts	68
8.4.1	Efficient Solid Waste Management.....	68
8.4.2	Reduction of Dust Concentration	68
8.4.3	Minimization of Noise and Vibration.....	68
9	ENVIRONMENTAL MANAGEMENT/MONITORING PLAN	69
9.1	Introduction.....	69
9.2	Environmental Monitoring and Evaluation	69
11	ALTERNATIVES FOR DEVELOPMENT.....	79
11.1	No Development Investment	79
11.2	Relocation Option.....	79
11.3	Exploration of Alternative Land Uses	80
11.4	Conclusion	80
11.5	Potential Negative Impacts and Mitigation Measures.....	80
12	CONCLUSION AND RECOMMENDATIONS	84

12.1	Conclusion	84
12.2	Recommendations	84
13	REFERENCES	85
14	APPENDICES	86
	<i>Picture 1: Site Conditions</i>	<i>35</i>
	<i>Picture 2: Martin Gitonga making a presentation about the project.....</i>	<i>53</i>
	<i>Picture 3: One of the participants (Lucy Karugu) airing her views.</i>	<i>54</i>
	<i>Map 1: Location Map.....</i>	<i>34</i>
	<i>Table 1: Summary of the results of the screening criteria</i>	<i>31</i>
	<i>Table 2: Summary of pertinent issues raised by Stakeholders</i>	<i>51</i>
	<i>Table 3: Types of Impacts</i>	<i>60</i>
	<i>Table 4: Anticipated Environmental Impacts.....</i>	<i>61</i>
	<i>Table 5: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN FOR THE PROPOSED COMPREHENSIVE DEVELOPMENT.....</i>	<i>70</i>
	<i>Table 6: The potential negative impacts and possible mitigation measures.....</i>	<i>80</i>

1 INTRODUCTION

The primary objective of the proposed project is the construction of an integrated mixed used development (residential apartments, serviced apartments, and convenient retail stores) on L.R NO. 28223/3 off Kiambu road, along the Northern bypass in Ridgeways, Nairobi City County.

The project proponents propose to develop 90 serviced apartments, 692 residential apartments and a convenient retail store on L.R NO. 28223/3 off Kiambu road. The project activities will entail

- Clearing the site
- Excavation works
- Building works
- Plumbing works
- External works
- Finishes.

The project site occupies 3.996 Ha.

The proposed development is a comprehensive and luxurious mixed use development located in Ridgeways, Nairobi approximately 10 km from the CBD, 300m from the junction of Kiambu Rd and the Northern Bypass, 5 minutes' drive from the Two Rivers Mall, the biggest shopping mall in East Africa, less than 10 minutes' to Windsor Golf Club and 15 minutes' from UNEP headquarters in Gigiri

This development sits on 9.87 acres of land and touches the Northern Bypass, was inspired by the need for a live-work and play environment that aims at bringing together people from different walks of life to share a luxurious and convenient lifestyle. The development comprises of residential and commercial spaces

The residential development consists of 1, 2 and 3 bedroom apartments. There are also 2 options of 3 bedrooms with a domestic servant quarter, standard and premium, and penthouses that occupy the topmost floor. The development has lots of green spaces, outdoor sitting spaces and recreational facilities including swimming pools, children's playgrounds, landscaped courtyards

and a health club. The development offers world class serviced apartments for both short stay and long stay residents

In addition, the proposed development offers convenience with over 20,000 square feet of retail and office space consisting of a mini-mart, convenience stores, salon and laundry among others. The proposed development will have a secure gated community with 24-hour CCTV surveillance and ample parking spaces Environmental concerns need to be an integral part of the planning and development process, and not just an afterthought. To avoid land use conflicts with the surrounding area, the proponent will undertake this EIA study and incorporated environmental concerns as advised by the authority. The objective of the EIA study is to identify potential and significant environmental impacts that are likely to occur if the project is implemented. Specifically, the scope of the study is to identify impacts likely to be caused to the environment, public health and socio-economic well-being. The benefits of conducting an EIA include:

- Screening out projects that are not environmentally sound
- Proposing modified designs to reduce negative environmental impacts
- Identifying feasible site and technology alternatives
- Predicting significant adverse impacts
- Identifying mitigation measures to reduce, offset, or eliminate major impacts
- Engaging and informing potentially affected communities and individuals
- Influencing decision-making and the development of terms and conditions

1.1 Project Overview and Location

- The Ridge is a comprehensive and luxurious mixed use development located in Ridgeways, Nairobi approximately 10 km from the CBD, 300m from the junction of Kiambu Rd and the Northern Bypass, 5 minutes' drive from the Two Rivers Mall, the biggest shopping mall in East Africa, less than 10 minutes' to Windsor Golf Club and 15 minutes' from UNEP headquarters in Gigiri.
- The Ridge, which sits on 9.87 acres of land and touches the Northern Bypass, was inspired by the need for a live-work-play environment that aims at bringing together people from

different walks of life to share a luxurious and convenient lifestyle. The development comprises of residential and commercial spaces

- The residential development consists of 1, 2 and 3 bedroom apartments. There are also 2 options of 3 bedrooms with a domestic servant quarter, standard and premium, and penthouses that occupy the topmost floor. The Ridge has lots of green spaces, outdoor sitting spaces and recreational facilities including swimming pools, children's playgrounds, landscaped courtyards, and a health club
- The development also offers world class serviced apartments for both short stay and long stay residents
- The Ridge offers convenience with over 20,000 square feet of retail and office space consisting of a mini-mart, convenience stores, salon and laundry mart among others
- The Ridge is a secure gated community with 24-hour CCTV surveillance and ample parking spaces

1.2 Floor Plans

- **Features of the 1 Bedroom Apartment**



- ❖ Size: 580 SQ FT (54 SQM)
- ❖ Open Plan kitchen
- ❖ Bedroom en-suite
- ❖ Cloak room
- ❖ Balcony with a view of the courtyard

- **Features of the 2 Bedroom Apartment**

- ❖ Size: 1066 SQ FT (99 SQM)
- ❖ Closed kitchen
- ❖ Master Bedroom en-suite
- ❖ Cloak Room
- ❖ Spacious Lounge

- **Features of the 3 Bedroom Apartment**

- ❖ Size: 1260 SQ FT (117 SQM)
- ❖ Closed kitchen



- ❖ Master Bedroom en-suite with Balcony
- ❖ Cloak room
- ❖ Lounge balcony with a view of the courtyard
- **Features of the 3 Bedroom Apartment with DSQ**
 - ❖ Size: 1335 SQ FT (124 SQM)
 - ❖ Closed kitchen
 - ❖ Master Bedroom en-suite with Balcony
 - ❖ Cloak room
 - ❖ Spacious lounge with a balcony overlooking the courtyard
- **Features of the 3 Bedroom Apartment with DSQ Premium**
 - ❖ Size: 1475 SQ FT (137 SQM)
 - ❖ Spacious Lounge
 - ❖ Closed kitchen
 - ❖ Master Bedroom en-suite with Balcony
 - ❖ Cloak room
 - ❖ Living room balcony with a view of the courtyard

1.3 Project's benefits

The project's direct benefits include but are not limited to the following;

- Income to the investor through sale/ lease of the apartments,
- Contribute towards meeting the demand for quality housing in Nairobi,
- Creation of job opportunities to skilled and non-skilled workers during construction,

- Support to local business establishment during construction phase and at operational phase of the project cycle,
- Both County and National Government will obtain revenue from the licensing and approving of the development,
- Government will obtain revenue from taxation and the 16% VAT imposed on construction material,
- It will improve the development ranking of the area.

1.4 Negative impacts of the project and mitigation measures

Against the background of the above positive impacts there will be negative impacts emanating from the construction process and subsequent use of the proposed apartments and possible decommissioning as discussed below.

1.4.1 Construction phase impacts

At construction phase the following negative environmental impacts are expected.

- Impact from change of user,
- Impact of sourcing for raw materials for the development,
- Destruction of the physical environment,
- Increased demand for water and energy resources,
- Solid waste and effluent generation,
- Air pollution,
- Noise pollution,
- Increased traffic,
- Occupational health and safety hazards for the employees.

1.4.2 Operational phase impacts

- Landscape changes and increase in population,

- Effluent generation,
- Solid waste generation,
- E-waste generation,
- Water and energy resource use,
 - Fire and safety hazards potential.
 - Traffic management

1.4.3 Possible decommissioning impacts

Three main impacts are expected at possible decommissioning.

- Financial loss on the part of the proponent,
- Loss of employment,
- Solid wastes,
- In-security.

Negative impacts of the project

1.4.4 Construction phase

- Impacts of sourcing raw materials from the environment,
- Impacts of site preparation activities i.e. excavation and clearing of any vegetation on site
- Occupational health and safety hazards posed to the workers at the construction site,
- Workforce effluent,
- Solid waste generation,
- Increased demand for water and energy resources,
- Air pollution,
- Noise and vibrations, and

- Traffic increase -Water use
- Operational phase
- Impacts on water resources (Scarcity, use and pollution from waste water disposal and seawater intrusion)
- Traffic increase and management
- Likely intrusion of the privacy of adjacent neighbors
- Generation of effluent
- Generation of domestic solid wastes
- Generation of E-waste
- Increased use of energy resources,
- Safety hazards emanating from potential for fire outbreaks, -Insecurity
- Possible decommissioning impacts
- Four main impacts are expected at possible decommissioning.
 - Financial loss on the part of the proponent
 - Loss of employment
 - Solid wastes
 - Security

1.5 Mitigation measures of the project's negative impacts

The following environmental impact mitigation measures are proposed for the development throughout the entire project cycle.

1.6 Project design and construction phase

Change of User

The neighboring Suraya, has high-rise buildings and has effectively mitigated against pollution and thus improvements could be made on their measures, meanwhile the

development (The Ridge) has carried out advertisements through print media and sideboards notices indicating the development intentions. In addition, the development is in line with the original master plan. The proponent to obtain change of user approval from the County Government of Nairobi and the Ministry of Lands.

1.7 Sources of raw materials

- The contractor will obtain raw materials for the construction from sources that are compliant with NEMA Regulations.
The contractor will procure quantities that are sufficient for the intended works only and recycle as far as practical to curtail wastage.
- The contractor will commit to extensive use of recycled raw materials as will be appropriate and in a manner that does not compromise the safety of the development.

1.8 Impact of site preparation activities

- Restoration of physical environment by ripping off compacted areas and landscaping.

1.9 Noise pollution

- Noise pollution to both neighbors and employees at the construction site will be mitigated in the following ways;
- Construction work and delivery of raw materials will be limited to day time hours only.
- Delivery of raw materials will exclude weekends.
- Concrete mixers will be located as far as practical from neighboring properties

- The contractor shall inform neighbors in writing prior to commencement of the development so that they are prepared psychologically at least two weeks in advance.
- Employees using equipment that produce peak sounds shall be provided with earmuffs
- The contractor will endeavor to comply with Noise Regulations (Legal Notice No. 61 of 2009)
- The contractor will register the site as a workplace with the Directorate of Occupational Health and Safety (DOHS)
- The contractor will use equipment's with silencers so as to minimize noise emission

1.10 Air pollution

Dust generation especially during the construction phase will be mitigated in the following ways; -The contractor will secure the site using appropriate dust screens.

- Building materials that are likely to produce dust such as ballast should be sprinkled with water before use
- Access road and dust surfaces at the construction site should be sprinkled with water twice a day
- Employees will be provided with appropriate dust masks

1.11 Health and safety of employees at the workplace

In order to manage the potential for injuries to employees during the construction phase, the contractor will ensure the following measures are implemented;

- Provision of adequate and appropriate Personal Protective Equipment (PPE) including safety shoes, helmets, gloves and overalls.
- Employees to be given the correct tools and equipment for the jobs assigned.

- Employees to be trained in the use of all equipment that they will be required to operate.
- Rest times and breaks will be strictly observed.
- First aid services and an emergency vehicle to be readily available at site.
- Moving parts of machines and sharp surfaces to be securely protected with guards to avoid unnecessary contacts and injuries during construction phase.
- The contractor to implement the provisions of the Occupational Safety and Health Act, No. 15 of 2007.

1.12 Solid waste management

- Wastes emanating from construction activities shall be disposed off at the designated dumpsites. Transportation of wastes from the site shall be done by a NEMA registered solid waste handler who will use appropriate vehicles for conveyance of wastes from site to designated sites.
- The reusable/ recyclable waste components will be sold out/ given out to willing buyers.
- Comply with the Waste Management Regulations, 2006

Effluent from workforce

- Procure temporary toilet facilities for use by the workforce

1.13 Traffic management

- Heavy commercial vehicles delivering raw materials shall observe designated speed limits for the area.
- Proper signage and warnings shall be placed on the access route to forewarn other motorists on the use of the road by heavy commercial vehicles

- Delivery of raw materials for the construction shall only be undertaken during weekdays
- All materials will be offloaded on the site and not on the road reserves
- The proponent will provide proper de-acceleration cum acceleration lane for vehicles delivering raw materials
- Sufficient parking for heavy commercial vehicles is available on site
- The contractor will make a temporary access road on site to aid in traffic flow in and out of the northern by-pass

1.14 Habitat restoration

Following the completion of the entire development, measures will need to be undertaken to restore degraded habitats and biodiversity and curb soil erosion. This includes landscaping and planting of sediment binding grasses and gardening.

1.15 Water management

- The contractor will ensure water conservation in all construction activities
- Water will be recycled as far as is practice without compromising on quality and health
- The proponent will supplement the reticulated supply by use of bowsers and from an existing borehole on site.

1.16 Operational phase

1.16.1 Water scarcity

- The proponent will install a waste water recycling plant that will mitigate against demand for water for sanitation and landscaping
- The proponent will install water saving infrastructure such as automatic tap systems and low capacity cisterns to reduce the demand for water by the occupants of the development

- The proponent will apply and obtain a permit from WRMA for abstraction of water from the existing borehole
- We recommend bi-annual monitoring on the quality of water from the borehole to ensure that it continually meets the standards set out under Schedule I of Legal Notice No. 120 of 2006
- Water from the borehole will be metered to determine consumption levels and the yield of the borehole overtime
- Rain and storm water harvesting infrastructure should be provided to further mitigate the demand for water from the borehole

1.16.2 Energy efficiency

- The project design includes windows and ventilation systems that allow for sufficient air circulation and lighting to lower the energy demand for the apartments.
- Installation of solar lighting and heating systems to complement electricity supply from the national grid is proposed.
- The proponent and tenants will procure energy saving systems such as bulbs, air conditioners, and cookers etc that have a low energy use rate.
- Energy saving tips will be provided for each of the apartment so that occupants are aware of their obligations to conserve energy.
- The proponent will comply with the Draft Energy Management Regulations published in Kenya Gazette Notice No. 6629 dated 19th May 2011.
-

1.17 Infrastructure and utilities on site

1.17.1 Water Supply

The plot will be supplied with water from the Nairobi City Water and Sewerage Company. The development will also incorporate a borehole on site and other options like water storage facilities to cushion against water shortage.

1.17.2 Foul Water Drainage

The project area is connected to the Nairobi City Water and Sewerage Company trunk sewer system. Foul water will be discharged into the trunk sewer system.

1.17.3 Solid Waste Disposal

A private contractor shall be engaged for waste collection and disposal at designated Nairobi City County approved waste disposal sites

1.17.4 Electricity Supply

The plot is already connected with electricity supply from Kenya Power Company.

1.17.5 Landscaping

The site is to be landscaped to plan so as to provide an aesthetically pleasant view. There will be green spaces within the compound. This will replace the trees and vegetation that will be cleared during excavation and site clearing stage.

1.17.6 Roads and Access

The proposed site shall be accessed through the fronting Northern by-pass. A traffic assessment report has been carried out and once approved, it shall be implemented.

2 PROJECT BACKGROUND AND CONTEXT

2.1 Introduction

This EIA Study report outlines the results of the EIA process for the proposed integrated mixed used development (residential apartments, serviced apartments, and convenient retail stores) on L.R NO. 28223/3 off Kiambu road, along the Northern bypass in Ridgeways, Nairobi City County and Legal Notice No. 101 of 2003. The assessment findings are presented in terms of the environmental and socio-economic considerations and observations recorded during site visits and report preparation.

The Terms of Reference for the EIA study were prepared and submitted to NEMA. These were approved as sufficient to guide the EIA Study, and the report preparation commenced.

2.2 Background and Rationale for the EIA

Currently the rates of urbanization and population growth worldwide are increasing fast and with it come the need for improvement in service provision especially in our urban areas.

Kenya's rates of urbanization are escalating and being a developing country; most of its urban population is forced to live in slums. Increased population due to rural-urban migration in search of job opportunities and or higher education in major towns of Kenya has increased demand for buildings, especially residential houses.

The sustainability of the ecosystem requires the balance between human settlement development and the natural ecosystem, which is a symbiotic relationship. This can be achieved through careful planning and the establishment of appropriate management systems. In modern times, the need to plan activities has become an essential component of the development process. EIAs are undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority. In Kenya, the competent authority is the National Environment Management Authority (NEMA).

Cytonn Investment Partners Eleven LLP (herein referred to as the proponent) has proposed an integrated mixed used development (residential apartments, serviced apartments, and convenient

retail stores) on L.R NO. 28223/3 off Kiambu road, along the Northern bypass in Ridgeways, Nairobi City County

2.3 Objectives

The overall objective of the study on the other hand is to ensure that all environmental concerns are integrated in all the development activities in order to contribute to the sustainable development. Specifically the objectives are:-

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

2.4 Scope

The study was conducted to ensure that significant impacts on the environment and socio-economic aspects are taken into consideration at all times during project implementation and operation phases. The scope of the study was mainly in the subject project and the immediate environs; and to some extent on the possible far reaching effects of the proposed activities.

The following was therefore covered:

- Description of the proposed project

- Design of the proposed project construction materials and methodology
- Evaluation of the location, Land ownership and use
- Baseline information; biophysical and socio-economic impacts of the proposed project.
- A review of the policy, legal and administrative framework
- Potential environmental impacts during project implementation and operation phases
- Potential mitigation measures and future monitoring plans.
- Social Impact Assessment; involvement of neighbors/general public in the area.
- Environmental Management and Monitoring plans.

2.5 Terms of Reference (TOR) for the EIA Process

Shadrack Kyalo Mbuta and Eunice Wahiga in consultation with other consultants of the project were appointed as a Consultant to conduct an Environmental Impact Assessment study for the proposed project.

The scope of the assessment covered site preparation works, construction works of the proposed development that included ground preparation, masonry and installation of service lines as well as the utilities required by the residents.

The output of this work was a comprehensive study report for the purposes of applying for an EIA approval and licensing.

The study included the necessary specialist studies to determine the environmental impacts relating to the biophysical and socio-economic aspects and to determine the issues or concerns from the relevant authorities and interested and/or affected parties.

The appropriate measures to ensure co-existence of the proposed development with other social and economic activities in the area are provided as part of Environmental Management Action Plan.

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

- a) Location of the proposed housing project
- b) A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- c) The objectives of the project.
- d) The technology, procedures and processes to be used, in the implementation of the project.
- e) The materials to be used in the construction and implementation of the project.
- f) The products, by-products and waste to be generated by the project.
- g) A description of the potentially affected environment.
- h) The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- i) To recommend a specific environmentally sound and affordable wastewater management system.
- j) Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- k) Analysis of alternatives including project site, design and technologies.
- l) An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- m) Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.

- n) 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.
- o) An identification of gaps in knowledge and uncertainties that were encountered in compiling the information.
- p) An economic and social analysis of the project.

2.6 Approach and Methodology

Having understood the scope of work presented by the Client, the expert undertook the task of EIA for proposed project by clearly defining the assignment into a number of discrete activities.

These activities facilitated development of a workable framework for the speedy and timely execution of the assignment. The EIA study was conducted in accordance with the Terms of Reference provided in the Environmental (Impact Assessment and Audit) Regulations, 2003.

To adequately address the environmental issues emanating from the implementation of the proposed project, the Consultant carried out environmental study at the proposed site and also the surrounding areas. The environmental study comprised the following activities: mobilization, consultation with stakeholders, a scoping exercise, desk and field studies, data analysis, impact identification, and analysis of health and safety issues associated with the proposed project.

2.7 Data Collection Procedures

First, the consultant undertook collection of data, which was carried out through questionnaires/standard interview schedules, use of checklists, observations, site visits, desk top environmental studies and scientific tests, where necessary in the manner specified in Part V (section 31-41) of the Environmental (Impact Assessment and Audit) Regulations, 2003. Then data collected underwent environmental screening and scoping to avoid unnecessary data

2.8 EIA Organization and Structure

The EIA was carried out to full completion within a period of one week from the date of undertaking. The Consultants coordinated the day-to-day functions and any related institutional support matters.

2.9 Reporting and Documentation

The Environmental Impacts Assessment Study report from the findings was compiled in accordance with the guidelines issued by NEMA for such works and was prepared and submitted by the proponent for consideration and approval. The Consultant ensured constant briefing of the client during the exercise.

2.10 Responsibilities and Undertaking

The Consultants undertook to meet all logistical costs relating to the assignment, including those of production of the report and any other relevant material. The consultants arranged for own transport and travels during the exercise. On the site of the proposed development, the proponent provided a contact person(s) to provide information required by the Consultants. The proponent also provided site plan(s) showing roads, service lines, buildings layout and the actual sizes of the sites, details of raw materials, proposed process outline, future development plans, operation permits and conditions, land-ownership documents and site history, and estimated investment costs.

- The output from the consultants includes the following:
- An Environmental Impact Assessment Study report comprising of an executive summary, assessment approach, baseline conditions, anticipated impacts and proposed mitigation measures,
- An Environmental Management Plan outline, which also forms part of the report recommendations.

2.11 Methodology Outline

The general steps followed during the assessment were as follows:

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

2.12 Environmental Screening

This step was applied to determine whether an environmental impact assessment was required and what level of assessment was necessary. This was done in reference to requirements of the EMCA, 1999, and specifically the second schedule. Issues considered included the physical location, sensitive issues and nature of anticipated impacts.

2.12.1 Screening criteria

2.12.2 In line with the second Schedule of Legal Notice No. 101 of 2003, the following considerations were taken into account in determining the environmental screening criteria.

- Ecological considerations (Biological diversity, sustainability, ecosystem maintenance)
- Social considerations (economic impacts, social cohesion and disruption, effect on human health, communication, effects on culture and objects of cultural value)
- Landscape impacts (views opened up or closed, visual impacts, compatibility with surrounding area)
- Land uses (effect of proposal on current land uses and land use potentials in the project area, possibility of multiple use, effects of proposal on surrounding land uses and land use potentials)
- Water (impact of proposal on water resources and drainage patterns or systems)

2.12.3 Results of screening criteria

The following table summarizes the results of the screening criteria.

Table 1: Summary of the results of the screening criteria

Criteria	Results
Ecological impacts	<ul style="list-style-type: none"> - Existing vegetation and trees at the site which will be cleared to pave way for the development - No endangered species of either plants or animals - No endemic species reported on site - Excavations will be undertaken and will impact on soil profile - Revegetation of unbuilt areas once the development is complete will introduce new flora at the site.
Social considerations	<ul style="list-style-type: none"> - Project could have an impact on adjacent property values - Project will meet housing demand for a growing urban population - Project will complement governments efforts to attain the social pillar associated with the development blue print for Kenya i.e. Vision 2030 - Project will create employment - Revenue to the government - No cultural or heritage issues at the site
Landscape impacts	-Views will be closed up for buildings that are less than 3 storey
Land uses	<ul style="list-style-type: none"> - The project necessitates change of user - The immediate neighbourhood is characterized by high rise developments and relatively low density settlement pattern

	<ul style="list-style-type: none"> - The wider neighbourhood has high-rise developments
Water	<ul style="list-style-type: none"> - Site will rely on water supply from the Nairobi Water and Sewerage Company supplemented with borehole water. - Water quantities and quality to be determined

2.13 EIA Study Report format

Legal Notice No. 101 of 2003 specifies the manner in which EIA reports shall be conducted and the format to be adopted as follows;

- The nature of the project,
- The location of the project including the physical area that may be affected by the proponent's activities,
- The activities that shall be undertaken during the project construction, operation and decommissioning phases, -The design of the project,
- The materials to be used, products and by-products including waste to be generated by the project and methods of their disposal,
- The potential environmental impacts of the project and the mitigation measures to be taken during and after implementation of the project,
- An action plan for the prevention and management of possible accidents during the project cycle,
- A plan to ensure the health and safety of the workers and neighboring community,
- The economic and socio-cultural impacts to the local community and the nation at large,
- The project budget, and
- Any other information that NEMA may require.

2.14 EIA organization and structure

A continuous sustained feedback mechanism was followed throughout the EIA exercise. This mechanism involved sustained consultations for information, opinion and clarification between the proponent and the experts. The proponent was also involved in the day to day activities that eventually lead to the compiling of the EIA study report and was instrumental in providing additional logistical support wherever required.

2.14.1 Environmental Scoping

The Scoping process helped narrow down onto the most critical issues requiring attention during the assessment. Environmental issues were categorized into physical, natural/ecological and social, economic and cultural aspects.

2.14.2 Desktop Study

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

2.14.3 Site Assessment

Field visits were meant for physical inspections of the site characteristics and the environmental status of the surrounding areas to determine the anticipated impacts. It also included further interviews with neighbors.

2.14.4 Reporting

In addition to constant briefing of the client, this environmental impact assessment report was prepared. The contents were presented for submission to NEMA as required by law.

3 THE PROJECT DESCRIPTION AND LAYOUT PLAN

3.1 Property Location

The property is located off Kiambu Road along the Northern bypass, in Ridgeways, Nairobi City County. It is located just after the Junction of Kiambu Road and the Northern By-pass. The project site borders a real estate development comprising of apartments and single dwelling houses.

Map 1: Location Map



3.2 Project Proponent/Developer

Cytonn Investment Partners Eleven LLP is the registered owner of the Plot L.R.NO.28223/3 under the Land Registration Act (2012) and is held on leasehold basis. A copy of the Title deed documents is attached.

3.3 Land Tenure and Ownership

The Plot L.R.NO.28223/3 is registered under The Registered Land Act (cap 300) and is held on leasehold basis. The registered owner is Cytonn Investment Partners Eleven LLP. A copy of the Ownership document is attached.

3.4 Plot Size

The property is on a site covering 3.996 hectares or thereabouts of land, which translates to approximately 9.87 acres.

3.5 Site Conditions

The property is currently vacant as shown on Plate below. The current land use is Agricultural. The site has predominately Blue gum trees and few mango, the indigenous trees are very few and also presence of vegetation on site and it is gently sloping from the bypass.



Picture 1: Site Conditions

3.6 Construction process

The preparatory activities to be undertaken at the site will be site clearance followed by the excavation to create trenches for use in laying footings for the development. Foundations will then be laid, and eventually the buildings. There will be use of machinery mainly for concrete mixing and lifting installations during the construction.

3.6.1 Construction technology to be used

Concrete mixing and mobile elevator equipments will be installed during the construction. Other equipments will include dump trucks and an assortment of hand tools. As such dust and noise will arise from the operations of the equipments and are likely to be issues of concern.

This requires the contractor to undertake the use appropriate technology that will reduce the impact of both noise and dust at the construction site.

3.6.1.1 Dust control technology

The contractor will deploy dust control screens to mitigate the impact of dust during construction activities. The effectiveness of the screens will mainly depend on their sizes since fine screens are more effective compared to course ones. Their effectiveness will also be a function of how well the site is covered. Worn out screens will need to be replaced on a regular basis and the contractor will ensure that the site is secured with screens throughout.

3.6.1.2 Noise pollution control technology

Use of machinery at the site will be a source of noise for the neighbors. The contractor will therefore have an obligation to use suitable noise reduction strategies. For example the contractor could fit silencers to machines that produce noise. Another strategy will be for the contractor to locate noise producing machines as far away as practical from the residential area. However due to the open field, the noise levels at the construction site are expected to be minimal.

3.6.2 Construction material

Structural construction of the site will largely apply ordinary materials that are not expected to have significant impact on the environment. Among the material to be used include:

- Mined sand and building blocks- to be obtained from quarries.

- Wood will be obtained from exotic species like casuarinas (*Casuarinaequisetifolia*) sourced from planted woodlots and licensed mangrove poles
- Cement-manufactured locally - to be obtained mainly from suppliers in Nairobi town,
- Water fittings (pipes, valves and joineries) and other secondary materials such as, papers, polythene materials, and fabrics will be obtained from Nairobi town,
- Paints and decorating materials will be sourced from local outlets in Nairobi town,
- Electrical cables, lifts and other machinery will be sourced from Nairobi town,
- Finishing materials such as tiles, block boards are likely to be imported from China or Dubai.

4 BASELINE INFORMATION FOR THE PROPOSED PROJECT SITE

4.1 Introduction

The following baseline information details on environmental, socio-economic and bio-physical characteristics of the site. It is meant to provide for a benchmark for continued monitoring and assessment of the impact of implementing the proposal on the environment.

4.2 THE PHYSICAL ENVIRONMENT

4.2.1 Climatic Conditions

Below is a summary of the climatic conditions of Nairobi where the proposed development is located:

4.2.1.1 Rainfall

Nairobi has a bimodal rainfall pattern, in which the maxima occur in March-April (long rains) and November-December (short rains). The simple rainfall regime is complicated by the uncertainty of rainfall from year to year. The average annual rainfall is 875mm, which may actually vary from 500mm to more than 1500mm.

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

4.2.1.2 Temperature

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

4.2.1.3 Topography

The site is located in a region of relatively higher elevation. The project area lies at an altitude of about 1,700m above sea level and is characterized by gentle slopes. It can be noted that the proposed site is gently sloping.

4.2.1.4 Geology and Soils

Soils in Ridgeways are developed on undifferentiated tertiary volcanic and basic igneous rocks. They are well-drained, shallow, dark reddish brown though in some places they are imperfectly

drained, very deep, dark gray to black, with calcareous, slightly saline deep sub-soil. They are of moderately high fertility.

4.3 Water Potential

Ndakaini, Ruiru, and Susumua dams are the principal sources of water for Nairobi. These dams are all on rivers emanating from the Aberdare Forest (one of Kenya's five "water towers"). Several factors compromise the city's water quality, ranging from natural phenomena such as the high fluoride content in groundwater, to anthropogenic factors such as poor wastewater treatment and environmental degradation both within the city and in the surrounding countryside. The Nairobi River Basin consists of three major rivers (Nairobi, Ngong', and Mathare) whose catchments are found within the Kikuyu and Limuru Hills.

The main rivers/streams traversing the investigated area are Ruaka River - which is permanent, and Giichi stream - which has ephemeral flows apparently fed by a surface dam upstream. The flood storms are reported to occur once in a year in the Ruaka River as rains subside. In terms of groundwater resource, the aquifers in the study area are adequately replenished from an underground storage reservoir that is several orders larger than the imposed abstraction, thereby ensuring reliable long-term water supply.

4.4 Socio-Economic Attributes

4.4.1 Population

The population in Nairobi City County is 3,138,369 which is an increase from 2,143,254 after the 2009 census(KNBS).This explains that the rate that people are migrating to the County has increased .Therefore more residential places and commercial facilities should come up to cater for the increased population.

4.4.2 Economic Activities

The main urbanization corridor in the area is the Northern bypass and Kiambu road. Urbanization is now spilling over onto the Agricultural land. The pressure has also led to sub-division of Agricultural land into uneconomical plot sizes.

The proximity of giant commercial facilities such as Two Rivers and the Ridgeways mall has aggravated the demand for housing in the area. The Northern By-pass has also opened up the area for development. As a result, the land values in the area have skyrocketed forcing developers to maximize returns on investments.

Land and building developments in the local neighborhood at large is mixed Residential, Institutional, and Commercial development. Such residential developments include Fourways Junction Estate, Two Rivers and Ridgeways mall.

4.5 Infrastructure and Utilities

4.5.1 Water Supply

The plot will be supplied with water from the Nairobi City Water and Sewerage Company. The development will also incorporate a borehole on site and other options like water storage facilities to cushion against water shortage.

4.5.2 Foul Water Drainage

The development area is served by the Nairobi City Water and Sewerage Company sewer system. The development will however have to connect to where the sewerage connection is .

4.5.3 Solid Waste Disposal

A private contractor shall be engaged for waste collection and disposal at designated Nairobi City County approved waste disposal sites. The contractor is NEMA approved.

4.5.4 Electricity Supply

The plot is already connected with electricity supply from Kenya Power Company.

4.5.5 Landscaping

The site is to be landscaped to plan so as to provide an aesthetically pleasant view. There will be green spaces within the compound. This will replace the trees and vegetation that will be cleared during excavation and site clearing stage.

4.5.6 Roads and Access

The proposed site shall be accessed through the fronting Northern by-pass.

5 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORKS

5.1 Introduction

In Kenya the requirement for development and existing projects to undergo EIA and EA respectively follows the enactment by the Kenya parliament of the Environmental Management and Coordination Act No. 8 of 1999 and section 3 of the Environment (Impact and Assessment) regulation No. 101 of 2003. Under this legal provision development projects are required to undergo the EIA process whose report is later submitted to NEMA for approval and awarding of a license after demonstrating that the possible negative environmental impacts of a given project will be effectively mitigated.

Similarly existing projects with a potential to impact on the environment, health and safety of communities are required to undergo an initial environmental audit and later annual self audits to determine compliance with environmental management plan.

For the proposed development for the building, the key legislative and regulatory requirements relate to proper management of the environment as well as safety aspects. The legislative and legal frameworks would therefore seek to address the issues that include among others;

- Apply and obtain change of user from the Nairobi City County.
- Approval of building plans by the Nairobi City County,
- Occupational, Health and Safety during construction phase,
- Use of environmental resources to implement the proposal,
- Waste generation and disposal,
- Noise and air pollution.

5.2 The Rio Declaration on Environment and Development

The Rio Declaration on Environment and Development, or Agenda 21 – a program of action for sustainable development worldwide – was adopted by more than 178 governments at the United Nations Conference on Environment and Development, also known as the Earth Summit, held in Rio de Janeiro, Brazil from 3rd to 14th June 1992. Principle No. 10 of the declaration underscores

that environmental issues are best handled with the participation of all concerned citizens at all relevant levels. At the national level, each individual shall have appropriate access to information concerning environment that is held by public authorities. All states shall encourage and facilitate public participation by making such information widely available. Effective access to judicial and administrative proceedings, including redress and remedy shall also be provided.

The foregoing discussion is relevant to the proposed development because EMCA demands that the public must be involved before any development project that is likely to have adverse impacts to the environment is initiated by a proponent.

The Act has further established Public Complaints Committee (PCC) where the issues raised by the public in regard to any proposed development can be addressed.

5.3 National Policies and Legislation

Kenya's environmental policy and legislation are scattered in a multiplicity of resource and sector specific laws and policy papers. The institutions and departments that deal with environmental issues are equally numerous.

Sector specific laws are deficient in that they are characterized by fragmented and uncoordinated sectorial legal regimes that are developed to facilitate resource allocation and to deal with environmentally adverse effects of resource exploitation.

5.4 The Physical Planning Act (Cap. 286)

This Act is aimed at enhancing and promoting the integrated physical development of socio-economic activities. The act requires that any activity that constitutes development needs to be approved by the relevant local authority. It has made specific provisions in respect to the mandate of local authorities in development control and planning:

- Section 24(3): the Director may prepare a local physical development plan for the general purpose of guiding and coordinating development of infrastructure facilities and services for an area referred to in subsection (1), and for the specific control of the use and development of land or for the provision of any land in such area for public purpose.
- Section 25(b): a local physical development plan shall consist of such maps and description as may be necessary to indicate the manner in which the land in the area may be used.

According to Section 33 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:

- The proposal is not in conformity with approved development plan
- Such plan discloses a contravention of the physical planning (Building and Development) rules.
- The plans are not correctly drawn or omit to show information required.
- On such being required, a separate application accompanied by sets of plans has not been lodged in respect of buildings on separate plots or subplots
- The land or the proposed building or structure is not used for any purpose which might be calculated to depreciate the value of neighboring property or interfere with convenience or comfort of neighboring occupants
- The proposed building or land use is unsuitable, injurious to amenities or detrimental in respect of appearance or dignity or fails to comply with physical planning requirements in regard to sitting, design, height, elevation, size, shape, structure or appearance
- The building is likely to become objectionable on environmental grounds
- Roads of access, parking bays, vehicular and pedestrian circulation spaces or other services to the plot or premises are inadequate
- The building is not sited in a satisfactory position
- The system of drainage, including soil, waste and surface water of the plot, or subplot upon which the building is to or stand, is not satisfactory
- Provision has not been made for adequate natural light and ventilation, or
- Any other physical planning issue

Section 36 of the Act (Cap. 286) further compels that if in connection with a development application, a local authority is of the opinion that proposals for industrial location, or any other development activities (such as building developments) will have injurious impacts on the environment, the applicant will be required to submit together with the application an Environmental Impact Assessment report.

The above provision compares well to Section 29 (a), which confers upon local authorities the powers to prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area.

5.5 The Public Health Act (Cap. 242)

This Act aims at achieving a clean environment free of any nuisance so as to promote public health and safety. For the interpretation of the Act, Section 15 (IX) indicates that any noxious matter or wastewater discharged from any premise – such as a building – constitutes nuisance.

It equally stresses that no person shall cause a nuisance to exist on any land or premise occupied by him. Because of the above, the Act acknowledges that it shall be the duty of all local authorities to take all lawful measures for maintaining its area of jurisdiction at all times in a clean and sanitary condition for remedy of any nuisance or condition liable to be injurious to health.

To safeguard against this, Part X of the Public Health Act states that, where in the opinion of the Medical Officer of Health that food stuffs within a warehouse or a building are insufficiently protected, the owner shall be compelled to observe the required regulations, else he shall be guilty of an offense.

5.6 The Building Code

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

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

every building which comprises more than one storey, other than a small house, shall have fire resistance.

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

5.7 The Penal Code (Cap. 63)

Enacted in 1930, the chapter on “Offences against Health and Conveniences” of the Penal Code strictly prohibits the release of foul air which affects the health of other persons into the environment. Any person who voluntarily violates the atmosphere at any place, to make it noxious to the health of persons in general dwelling or carrying out business in the neighborhood or passing along public ways is guilty of misdemeanor, i.e. imprisonment not exceeding two years with no option of fine.

5.8 The Environmental Management and Coordination Act No. 8 of 1999.

The Environmental Management and Coordination Act (EMCA) of 1999, and its attendant Environmental (Impact Assessment and Audit) Regulations of 2003 provides for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya.

Section 58 (I) has underscored that any person being a proponent of a project shall before financing, commencing or proceeding with construction submit an EIA report to the National Environment Management Authority (NEMA) of Kenya.

Section 68 (I) gives NEMA the mandate to carry out environmental audits of all activities that are likely to have significant impacts on the environment. It authorizes environmental inspectors, as appointed by NEMA, to enter in any premise and determine how far the activities carried out conform to statements in the EIA study.

5.9 The National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in 1994. It was a deliberate policy to integrate environmental considerations into the country's social and economic development process. The integration was achieved through a multi-sectorial approach to develop a comprehensive framework that ensures that environmental management and conservation of natural resources is an integral part of our societal decision-making process.

5.10 The Factories and Other Places of Work Act (Cap. 514)

The Act aims at making provision for the health, safety and welfare of persons employed in factories and other places of work. Section 13 states that every factory shall be kept in a clean state and free from effluvia, arising from any drain, sanitary convenience or nuisance. Effective and suitable provisions are also proposed for ensuring proper ventilation, such as maintaining the circulation of fresh air in each workroom. Section 36 provides for precautions with respect to explosive inflammable dust or gas. The Section is specific that where in any building, if dust that could escape to work man's room and explode by ignition, steps must be taken to prevent such an explosion.

Section 41 compels that in every factory, there shall be maintained fire extinguishers, which shall be adequate and suitable in case of fire out-breaks. Similarly, it mandates every factory to provide adequate means of escape in case of fire outbreak for the employees. The Act further requires that if a factory worker is employed in any process involving exposure to wet or to any injurious or offensive substance, suitable protective clothing must be provided by the employer.

5.11 The National Shelter Strategy to the Year 2000

This strategy followed the international year of shelter for the homeless in 1987 and was formulated to advocate a change in policy in order to allow other actors to come in and assist the government in providing housing. The government was to simply facilitate other actors, such as the proposed housing developers, to invest in shelter.

5.12 The Water Bill 2014

This is an act of parliament that gives provisions on the regulation, management and development of water resources, water and sewerage services and for other connected purposes.

The fourth schedule of this act has effect with respect to abstraction of ground water and respective works. It states that a person shall not construct or begin to construct a borehole or well without having first given the authority notice of his or her intention to do so. It further explains that the person shall apply to the authority for a permit and shall comply with the requirements as may be imposed by the authority.

This act also gives guidelines under the fourth schedule on the proper conservation of ground water from contamination and pollution. It therefore states that the disposal of effluents or drainage from any household, stable factory, trade premises or oilier premises should be in such a manner that will prevent any such effluent or drainage from reaching the ground water.

5.13 Institutional Framework

The Environmental Impact Assessment for the proposed development is bound to be influenced by the operational interests of several lead agencies, whether exclusively or concurrently. These include, but not limited to the following key institutions:

5.13.1 National Environmental Management Authority (NEMA)

NEMA is the supreme regulatory and advisory body on environmental management in Kenya. NEMA is required to coordinate and supervise the various environmental management activities being undertaken by statutory organs with a view of promoting their integration into development policies, programs, plans and projects that provide sustainable development and a safe and healthy environment for all Kenyans. NEMA is equally mandated by the Environmental Management and Coordination Act to assess Environmental Impact Assessment reports and Environmental Audits and issue licenses of compliance/approval.

The key functions of NEMA through the National Environment Council include:

- Responsibility for policy formulation and direction for the purposes of the Act;
- Setting national goals and objectives and determining policies and priorities for the protection of the environment;

- Promotion of cooperation among public departments, local authorities, the private sector, non-governmental organizations and such other organizations engaged in environmental protection programs, and;
- Performing any such other functions as are assigned by the Act.

NEMA will remain in charge of coordinating all activities related to environmental management in the project area, such as enforcement of environmental impact assessments, as well as ensuring the preparation of environmental audits.

5.13.2 County Government of Nairobi

The County Government of Nairobi is the principle lead agency in all matters pertaining to physical development and development control within Nairobi County. County Government of Nairobi is empowered by the County Governments Act (2012) to carry out physical planning and development control within its area of jurisdiction.

5.13.3 Director of Physical Planning

The Physical Planning Act (Cap 286) established the office of the Director of Physical Planning, and defines the mandate of this institution. Of relevance to this study is that it acknowledges the establishment of the office of the Director of Physical Planning, who shall:

- Formulate national, regional and local physical development policies, guidelines and strategies;
- Be responsible for the preparation of all national, regional and local physical development plans;
- From time to time, initiate, undertake or direct studies and research into matters concerning physical planning;
- Advise the Commissioner of Lands and local authorities on the most appropriate use of land including land management such as change of user, extension of user, extension of leases, subdivision of land, and amalgamation of land, and;
- Require local authorities to ensure proper execution of physical development control and preservation orders.

5.14 Conclusion

The proposed project will be undertaken in adherence to the aforementioned relevant Laws and Legislations. The institutions guided by relevant policies and legislations must regulate urban development and planning projects. The above expression is envisioned as a basic principle component of coordinated and harmonious development in urban areas, and is one of the core pillars for attaining sustainable development. These provisions will therefore guide the proposed project.

6 PUBLIC PARTICIPATION

6.1 Overview

The Consultation and Public Participation Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58 on EIA for the purpose of achieving the fundamental principles of sustainable development. This chapter describes the process of the public consultation and public participation followed to identify the key issues and impacts of the proposed project. Views from the local residents and the business community who in one way or another would be affected or have interest in the proposed project were sought through interviews and structured questionnaires as stipulated in the Environment Management and Coordination Act, 1999.

6.2 Objectives of the Consultation and Public Participation (CPP) Exercise

The objectives of the Consultation and Public participation exercise were to:

1. Disseminate and inform the stakeholders about the project with special reference to its key components and location.
2. Create awareness among the public on the need for the EIA for the proposed project.
3. Gather comments, suggestions and concerns of the interested and affected parties.
4. Incorporate the information collected in the EIA study.

The public participation exercise enabled the establishment of a communication channel between the general public and the team of consultants, the project proponents and NEMA. The process also enabled the concerns of the stakeholders to be known to the decision making bodies at an early phase of project development.

6.3 Methodology used in Public consultation

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

- Key informant interviews and discussions
- Field surveys and observations

- Completion of the pre-designed questionnaires which captured all the phases of the proposed development
- Public meeting

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. The information gathered enabled the identification of the specific issues from the stakeholders’ response, which provided the basis upon which the aspects of the Environmental Impact Assessment was undertaken.

6.4 Sources of information

Public consultation was conducted by a team of qualified EIA experts 4th February 2017 at Kigwa Conference Hotel and the findings were comprehensively analyzed. The proposed mitigation measures suggested by the neighbors and other stakeholders have been integrated in the report. The list of participants who were interviewed is shown in the in the below.

Results of the Public Consultations Exercise

Due to the enormous social and economic benefit of the proposed project, there was no objection towards the development of the proposed comprehensive development. This confirms that the project is suitable and beneficial for the local area.

Table 2: Summary of pertinent issues raised by Stakeholders

Name of Stakeholder	Contacts	Comments
Dorothy M. Guchu	Violet Court, Fourways.	
		<ul style="list-style-type: none"> • Will benefit from the sewer connection that will be put in place.

		<ul style="list-style-type: none"> • Nets should be put in place during construction to control dust levels. • Security should be provided during the projects working hours.
Lucy Karugu	Violet Court, Fourways	<ul style="list-style-type: none"> • Increase the value of the neighborhood in total. • The project will increase the security of the area. • The borehole water drawn by the project should not affect the sourcing of water by other neighborhoods.
Jaqueline Wanjiku	Fourways.	<ul style="list-style-type: none"> • The proposed project is welcome. • Good management of the project in terms of code of conduct, hanging clothes and aerials. • Form a partnership to get a bigger pipe for water from Nairobi Water and sewerage Company. • Proper waste management should be observed within the site.
Sam	Kigwa	<ul style="list-style-type: none"> • The area will open up in terms of real estate growth. . • There should be great traffic control measures put in place to handle the traffic from the development joining the rest of the traffic in the neighborhood.
Kenneth Kinuthia	GARA , Fourways	<ul style="list-style-type: none"> • The project is good and helpful • Foster unity within the community where they could form one big organization to handle issues like security. • Noise control should be observed during the construction process.

Gregory Murunga	YMR (Part of the consultant)	<ul style="list-style-type: none"> • The project will be of significant positive effect to the value of land in the area. • The project should handle waste efficiently including the noise from the site (Consultant)
Waithera Kibinda	Fourways	<ul style="list-style-type: none"> • Increased business opportunities • Boost the security of the area. • Neighborhood will be more open to interaction among the people living here.
Joe Kinyanjui	Daisy court 5, Fourways	<ul style="list-style-type: none"> • The project faces no objection • Waste disposal should be given consideration in all aspects. • Traffic and pedestrian traffic should be addressed effectively



Picture 2: Martin Gitonga making a presentation about the project.



Picture 3: One of the participants (Lucy Karugu) airing her views.

6.5 Views raised

6.5.1 Positive Impacts

6.5.1.1 Employment Opportunities

The local community was optimistic that construction and operation phases of the project will open up new fields of employment.

6.5.1.2 Improved Security

With such a project in the area, the residents and local people felt there would be increased security since security measures and personnel will be instituted for the safety of the working machines, trucks and materials during construction and for general security of premises during operational phase of the project.

6.5.1.3 Economic Growth

The locals expressed forecasts of economic growth in the area as there will be an increase in money circulation during payment of workers and also after completion the value of the neighborhood will be increased.

6.5.1.4 Improved infrastructure

The project is also expected to improve infrastructure in the area which will also contribute to economic growth especially access roads which will be improved as a result of the project and with the bypass being expanded and the development integrating its traffic management plan , the level of infrastructure will definitely rise .

Optimal land use

The public were optimistic that the construction of the residential apartments, serviced apartments, and convenient retail stores will lead to opening up the area and also ensures optimal land use as compared to the current use or any perceived future use of the said plot.

6.6 Negative Issues

6.6.1 Dust emissions

There was expressed concern over possibility of generation of large amount of dust and fumes within the project site and surrounding areas as a result of excavations and other construction activities. The proponent shall ensure that dust levels at the site are minimized through the use of nets to cover the construction site thus reducing the rate of dust emissions.

6.6.2 Noise Pollution

The residents expressed their fears over noise pollution that would come from the excavations, machine operations and the transport vehicles used during the project. The proponent said that the contractor will be expected to use noise suppression machines during the construction phase.

6.6.3 Solid Waste Generation and Land degradation

Large amounts of solid waste will be generated during construction and operation of the project. These will include paper, timber, plastic, rejected materials, surplus materials, and excavated materials, among others. Solid wastes if not well managed have a potential of causing accidents and diminishing the aesthetic value of the land.

6.6.4 Increased water and Electricity demand

It is expected that both the workers and the construction works will create an increased demand for water in addition to the existing demand. Water will be mostly used in the creation of aggregates for construction works and for wetting surfaces for softening or hardening after creating the formworks, and also after construction due to the size of the project , the demand for water within the development . The contractor should obtain enough water for construction so as not to affect the supply of water to the neighborhood.

Conclusion

In conclusion the participation was wholesome with both positive and negative input which in addition to the above mentioned included privacy, sewer management systems and traffic. These were addressed by the mitigation measures provided to ensure that the development was in line with the comments. Attached herein are the layouts showing the proposed plan to connect to the Nairobi City County sewer system and the proposed foul water drainage works.

7 POTENTIAL ENVIRONMENTAL IMPACTS

Impacts during Construction Process

Potential impacts of the proposed project have been considered and the assessment of the various parameters carried out in accordance with NEMA guidelines. Potential impacts of the proposed project have been considered and the assessment of the various parameters carried out in accordance with NEMA guidelines.

Positive Impacts

i) Income Opportunities

The development of the proposed comprehensive development will create business opportunities by providing market to suppliers during the construction process. It will also lead to creation of employment both directly and indirectly during the construction phase. Casual laborers, semi-skilled and skilled labor professionals such as town planners, supervising engineer, contractor staff and architects among others will benefit from the employment opportunities created by the proposed project.

ii) Optimal Use of Land

The construction activities will promote the local economy and inter-linkages. Construction materials and operating the project have associated fees levied. The fees are paid to different parties like the local government and individuals and in return it is used to boost the local economy.

iii) Revenue Generation

The various payments for permits, licenses and approvals for the project are direct revenue to the local and national governments.

Negative Impacts

i) Noise Pollution

This will mainly be from the common construction machinery used at the site. Continuous exposure to noise levels above 85db can cause damage to hearing leading to occupation deafness.

However, the level of noise from common construction machineries is expected to be low in this threshold. Regardless, all construction activity will be carried out during the day and sound-attenuated equipment will be used.

ii) Air Pollution

There is likely to be pollution in terms of air and dust during the project's operational phase. Air pollution is likely to be from vehicle exhausts during transportation of materials to the site. The movement of tracks is also likely to cause excess dust.

ii) Sanitation and Health Hazards

There is likely to be littering during loading of refuse and uncontrolled human waste from workers on site. This can affect human and animal health, and will be appropriately mitigated.

iii) Accidents and Safety Risks

On any construction site, the risk of accidents and other related safety concerns is high. This danger is posed to the workers on site as well as the adjacent residents and passers-by. Thus, there is need to put in place measures to protect them against falling debris and construction waste.

i) Mushrooming of Food Kiosks

Usually, such development projects have the potential of attracting unplanned commercial activities that come to take advantage of the increased trade prospects. This often leads to mushrooming of kiosks, which are attracted by the prospects of increased business, especially selling food. Some have a potential to pollute the environment owing to lack of sanitation infrastructure. The proposed project intends to provide room for onsite provision of such support services.

ii) Disturbance of Flora and Fauna

In order to develop the proposed development, excavation and earth works will be involved. The main method of excavation to be used is trenching in order to accommodate the building foundation/footing. This will mean cutting down of the existing trees and vegetation within the site. During earthworks, there will be disturbances and displacement of small animals and birds that have inhabited the vegetation in the property.

iv) Visual Intrusion

During construction, the main visual impacts would occur during earthworks for the foundation of the building. This impact would be generally be confined to the site.

vii) Soil Disruption

Since the proposed project development involves digging up of trenches (earthwork) for laying out the foundation and hard landscaping, this is likely to disrupt the soil compaction and layout leading to poor water infiltration and seepage. It might also lead to poor drainage.

Impacts during Operational Phase

Positive impacts

As discussed in the earlier sections, there are numerous positive impacts that will be realized as a result of the successful execution of the proposed project. Some of these positive impacts include:

i) Strengthening of Local Economy

On completion, the development will lead to an influx of people in the area, hence bolstering local trade. This will have a positive impact on the economy and livelihoods of local communities.

ii) Overall Development

The proposed project will attract various support services, as well as create linkages to other necessary services. This in turn will promote the overall development of the project area.

iii) Optimal Use of Land

The proposed comprehensive development ensures optimal use of land. Considering that the proposed project site is currently vacant, and the scarcity of developed land in the area, the project enhances the returns on the limited developed land in this area. The project will promote sustainable development by providing a live-work and play environment.

Negative Impacts

i) Pressure on Existing Facilities

The proposed development is also likely to increase pressure on existing infrastructure such as roads, sewer, electricity and water supply. This would be due to increased human and vehicular densities in the project area.

iii) Proliferation of Uncollected Solid Waste

The proposed development is likely to contribute to an increased generation of solid waste. This has a potential of attracting disease vectors such as rats, flies, and cockroaches.

Impacts during Decommissioning Phase

The wastes produced during the decommissioning phase, if not well disposed off, can pose a threat to the environment and can be hazardous to both the people and kill the aesthetic nature of the area. These wastes include but not limited to:

- Paint
- Sand, gravel and cement
- Crashed stones and ballast
- Cement and soil
- Glass
- Concrete tiles and slabs

The above wastes will be adequately cleared from the site to mitigate against any negative impacts.

Table 3: Types of Impacts

Key	Type of Impact	Key	Type of Impact
++	Major positive impact	+	Minor positive impact
--	Major negative impact	-	Minor negative impact
0	Negligible/zero impact	NC	No change
SP	Specific/localized	W	Widespread
R	Reversible	ir	Irreversible
sh	Short Term	L	Long term
T	Temporary	P	Permanent

On the basis of the information gathered during the field study, potential environmental impacts of the project are tabulated below

Summary of impacts

Table 4: Anticipated Environmental Impacts

Impacts on or due to	Construction	Occupation	Remarks
<p>Pollution:</p> <p>- Air/dust</p> <p>- Noise</p>	<p>T</p> <p>T</p>	<p>ir</p> <p>ir</p> <p>0</p> <p>0</p>	<p>During construction air, dust and noise pollution will increase as a result of construction activities</p> <p>After construction, noise from traffic is not likely to significantly affect the current neighborhood</p>
Site Drainage	0	++	For proper storm water drainage, we shall use PVC pipes, scour checks and vitre drains in flat sections. For erosion protection, grassing will be used.
Flora and Fauna	-	0	There will be minor destruction to flora and fauna habitat during excavation and landscaping
Public Health	-t	-	<p>ir</p> <p>During construction increased dust, noise and air pollution levels could adversely impact public health, particularly in the direct impact zone</p> <p>During occupation health and safety guidelines setup will be adhered to</p>

Disturbance to the public	-t ir	-	Disturbance to the public would occur due to noise and dust during construction and traffic movement
Sites of Cultural, Historic or Traditional significance	0	0	There are no sites of cultural, historic or traditional significance.
Visual Intrusion	-t/p	+P	<p>During construction, visual intrusion is attributed to construction works including construction traffic</p> <p>After construction the visual intrusion will be permanent. However this will be positive as the building will improve the aesthetic value of the neighborhood</p>
Income generating opportunities	+t	++	<p>During construction, there will be employment opportunities available to contractors and consultants.</p> <p>A significant amount of employees will also be employed during occupation e.g. solid waste management staff, guards, caretakers etc.</p>

Construction Materials	+/-	0	<p>Building stone will be required for construction. Other materials will include steel, tiles, pipes, etc.</p> <p>All materials must be sourced from bona fide commercial suppliers, and undesirable, hazardous or otherwise banned materials should not be used.</p>
Solid Waste	-sh sp	-	<p>Construction waste will be disposed of at approved County Government of Nairobi dump sites.</p> <p>During occupation, the generated solid wastes will be collected by a private contractor.</p>
Clean up on completion	-sp	0	<p>The contractor should ensure that when works are completed, the site is left clean and tidy.</p>

8 IMPACTS IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES

8.1 Introduction

This chapter highlights the necessary mitigation measures that will be adopted to prevent or minimize significant negative environmental, health and safety impacts associated with the activities during its construction, operation and decommissioning phases. Allocation of responsibilities, time frame and estimated costs for implementation of these measures are presented in the environmental management programme (EMP).

8.2 Mitigation of Construction Phase Impacts

8.2.1 Efficient sourcing and Use of Raw Materials

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

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

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

8.2.2 Minimization of Run-off

The proponent will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site. These measures will include terracing and levelling the project site to reduce run-off velocity and increase infiltration of rainwater into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil

compaction within the project site, while any compacted areas will be ripped to reduce run-off.

8.2.3 Minimization of Construction Waste

It is recommended that demolition and construction waste be recycled or reused to ensure that materials that would otherwise be disposed off as waste are diverted for productive uses. In this regard, the proponent is committed to ensuring that construction materials left over at the end of construction will be used in other projects rather than being disposed of. In addition, damaged or wasted construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects. Such measures will involve the sale or donation of such recyclable/reusable materials to construction companies, local community groups, institutions and individual residents or homeowners. The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal.

It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once-used or recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste. Additional recommendations for minimization of solid waste during construction of the project include:-

- i. Use of durable, long- lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time
- ii. Provision of facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements
- iii. Purchase of perishable construction materials such as paints incrementally to ensure reduced spoilage of unused materials
- iv. Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste

- v. Use of construction materials containing recycled content when possible and in accordance with accepted standards.

8.2.4 Reduction of Dust Generation and Emission

Dust emission during construction will be minimized through strict enforcement of onsite speed controls as well as limiting unnecessary traffic within the project site. In addition, it is recommended that excavation works be carried out in wet weather; and traffic routes on site be sprinkled with water regularly to reduce amount of dust generated by the construction trucks.

8.2.5 Minimization of impacts on traffic flow

The proponent will put in place measures to address such concerns by ensuring that construction vehicles preferably deliver materials during off-peak hours when traffic volume is low. There will also be provision for caution signs on the access road to alert users on construction activities in progress in order to prevent occurrence of accidents. This will be achieved through proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road. In addition truck drivers will be sensitized to avoid unnecessary racing of vehicle engines at loading/offloading areas, and to switch off or keep vehicle engines at these points.

8.2.6 Minimization of Noise and Vibration

Noise and vibration will be minimized in the project site and surrounding areas through sensitization of construction truck drivers to switch off vehicle engines while offloading materials. In addition, they will be instructed to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, schools and hospitals. In addition, construction machinery shall be kept in good condition to reduce noise generation. It is recommended that all generators and heavy-duty equipment be insulated or placed in enclosures to minimize ambient noise levels.

8.2.7 Health and safety of Workers on site

The proponent is committed to adherence to the occupational health and safety rules and regulations stipulated in Occupational Health and Safety Act (Cap 514). In this regard, the proponent is committed to provision of appropriate personal protective equipment such as gloves; helmets, overall as well as ensuring a safe and healthy environment for construction

workers by providing sanitary facilities (toilets) and portable water while food will be bought by workers from the nearby hotels.

8.2.8 Reduction of Energy Consumption

The proponent shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used.

In addition, proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the proponent shall monitor energy use during construction and set targets for reduction of energy use.

8.2.9 Minimization of Water Use

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

8.3 Mitigation of Operation Phase Impacts

8.3.1 Ensuring Efficient Solid Waste Management

The proponent will be responsible for efficient management of solid waste generated by the project during its operation. In this regard, the proponent will provide waste handling facilities such as waste bins and skips for temporarily holding domestic waste generated at the site. In addition, the proponent will ensure that such disposed of regularly and appropriately. It is recommended that the proponent put in place measures to ensure that the occupants of the Houses manage their waste efficiently through recycling, reuse and proper disposal procedures.

8.3.2 Minimization of Sewage Release

The proponent will ensure that there are adequate means for handling the large quantities of sewage generated by the units being directed to the Nairobi City County sewer system with a connection from the development.

8.3.3 Ensure Efficient Energy Consumption

The proponent plans to install an energy-efficient lighting system for the project. This will contribute immensely to energy saving during the operational phase of the project. In addition, occupants of the apartments will be sensitized to ensure energy efficiency in their domestic operations. To complement these measures, it will be important to monitor energy use during the occupation of the houses and set targets for efficient energy use.

8.3.4 Ensure Efficient Water Use

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

8.4 Mitigation of Decommissioning Phase Impacts

8.4.1 Efficient Solid Waste Management

Solid waste resulting from demolition or dismantling works will be managed as previously described.

8.4.2 Reduction of Dust Concentration

High levels of dust concentration resulting from demolition or dismantling works will be minimized .

8.4.3 Minimization of Noise and Vibration

Significant impacts on the acoustic environment will be mitigated as described above.

9 ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

9.1 Introduction

Environmental management and monitoring involves, among others, the putting in place of sustainable environmental mitigation measures and monitoring plans. It is essential that the project is both environmentally friendly and appreciated by local residents. As already noted in chapter Eight of the report, the implementation of this project will have a lot of positive impacts on the local community, which will include creation of employment directly or indirectly.

9.2 Environmental Monitoring and Evaluation

Environmental monitoring and evaluation are essential in the project's lifespan as they are conducted to establish if the project implementation has complied with the set environmental management standards as articulated in the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, and its attendant Environmental (Impact Assessment and Audit) Regulations, 2003.

Section 68 (2) of EMCA empowers NEMA to appoint an inspector who may enter any land/premises to determine adherence to EMP and any other conditions that may have been issued with an EIA license. Section 68 (3) requires the proponent to keep accurate records of the project and make annual audits which should be submitted to NEMA. The Lead EIA/EA expert is equally charged with a responsibility to ensure that the EMP is fully implemented and that any unforeseen impacts are mitigated and advise the proponent accordingly.

Table 5: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN FOR THE PROPOSED COMPREHENSIVE DEVELOPMENT

Project Phase	Project Activities	Potential Impacts	Mitigation Measures	Means of Monitoring	Actor	Estimated Cost (Kshs)
Construction Phase	Construction of the proposed comprehensive development	Air Pollution	<ul style="list-style-type: none"> - Exposed stockpiles of e.g. dust and sand, will be enclosed, covered, and watered daily, or treated with non-toxic soil binders - There will be the use of nets to cover the construction site to manage dust emissions 	Regular	Contractor	Included in development
		Noise Pollution	<ul style="list-style-type: none"> - The use of noise suppression machines . - work will only be done during working hours and Saturday will be half work days. 			

	Construction of the Foundation	Oil Spillage	- Ensure use of serviceable vehicles	Regular checks	Contractor	Included in development cost
		Noise Dust Soil destruction	- Ensure removal of all materials brought in during construction			
Construction Phase	Construction of the superstructure	Oil spillage. Noise Soil destruction	Ensure NO oil spillage occurs Ensure use of manual labor and hand tools	Periodic checks	Contractor	Included in development cost

	Building works	<ul style="list-style-type: none"> - Dust - Noise - Worker accidents - Health infection 	<ul style="list-style-type: none"> -Employ skilled and trained workers and provide protective clothing - Prepare clear work schedule. -Have adequate worker insurance cover - Provide sanitation facilities and clean drinking water - Enforce occupational health and safety standards - Adequate collection and storage of waste will be provided on site, and safe transportation to designated areas. 	Regular checks	Contractor	Included in development cost
	Procurement and Transportation of	<ul style="list-style-type: none"> -Oil Spillage - Material spillage 	<ul style="list-style-type: none"> -Ensure NO spillage occurs 			

	<p>construction materials</p>	<ul style="list-style-type: none"> - Littering the site - Soil compaction - Heavy vehicle traffic 	<ul style="list-style-type: none"> - Ensure the use of serviceable vehicles - Ensure no littering of the open spaces - Ensure safe storage of materials - Construction vehicle drivers will be under strict instructions to minimize unnecessary trips - All trucks hauling soil, sand and other loose materials shall be covered - Traffic speed of construction/ other vehicles will be restricted to not more than 15 mph 	<p>Periodic checks</p>	<p>Property manager</p>	<p>30,000.00 p.a</p>
--	-------------------------------	--	--	------------------------	-------------------------	----------------------

<p>Operation Phase</p>	<p>Storm water discharge</p>	<ul style="list-style-type: none"> - If not well managed could lead to flooding and property 	<ul style="list-style-type: none"> - Ensure the storm water drains flow 		<p>Civil Engineer, Mechanical Engineer</p>	
-------------------------------	------------------------------	---	--	--	--	--

			<ul style="list-style-type: none"> - Use PVC pipes, scour checks and vitre drains in flat sections. - For erosion protection, grassing should be used. For the waste water reticulation, provision for a waste water treatment plant. - Connection to a conventional sewer. 			
	Annual environmental Audit	<p>- Noncompliance with the provisions of EMCA (1999) could result in closure of the facility.</p>	<p>- Undertake initial environmental audit after completion</p> <p>- Undertake annual environmental audit of the development in compliance with the EMCA 1999</p>	Annually	Property manager	50,000.00 p.a
	Proliferation of	- Bad odor	- Wastes to be collected regularly to	Regular	Property	20,000

	solid wastes	<ul style="list-style-type: none"> - Destruction of the aesthetic value of the property - Negative impact on human health 	<p>control</p> <ul style="list-style-type: none"> air pollution and vermin/insects etc. - Provide proper solid waste disposal and collection facilities 	checks	manager	per month
			<ul style="list-style-type: none"> - Resource recovery will be encouraged once the project takes off so as to shrink waste 			
			<ul style="list-style-type: none"> stream and recover non-recyclables - Availability of dustbin cubicles protected from rain and animals - 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 protective gear 			

Decommissioning Phase	Health public and occupation safety	- Accidents -Spillage	- Ensure all hazardous areas are marked. Provide safety regulations and first aid kits in accessible areas.	Periodic Checks	Property Manager	50,000 pa
	Waste Water Disposal	If not properly managed could compromise sanitary hygiene of the building.	-The proposed comprehensive development shall be connected to the Nairobi City County sewer system . - Regular checks of the sewer line to ensure it is in proper working condition - Water harvesting and recycling .	Periodic Checks	Property Manager	Inclusive in development cost.
	Water wastage	Leaking taps and hose reels	- Installation of pressurized faucets -Management of water usage - Change all water valves that are leaking - Avoid unnecessary wastage of water - Ensure all firefighting equipment are in	Periodic Checks	Property Manager Mechanical Engineer	Inclusive in development cost.

			good working condition			
	Demolition	Flora and fauna disturbance	<p>- Implement an appropriate re-vegetation programmed to restore the site to its original status.</p> <p>-Appropriate surface water runoff controls will be taken to prevent surface erosion.</p> <p>- Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences</p>		Contractor	
TOTAL						1,180,000.00

11 ALTERNATIVES FOR DEVELOPMENT

A thorough assessment shows that the negative impacts likely to be caused by the project can be mitigated successfully. Various alternatives of the proposed development are appraised in this chapter.

11.1 No Development Investment

The nil intervention describes a situation in which the proponent does not undertake the proposed building development. This option would imply economic loss to the proponent, as well as to the local and national economies. The proponent will continue paying land rent and rates for a piece of land that is not earning income. The locals would lose in terms of employment generation as this would be foregone if the site is not developed. The cost of labor is estimated at KShs.200,000,000.00 (*Two hundred million only*). The Central Government would also lose the tax income that would be generated by the project if implemented.

11.2 Relocation Option

The other option available for the project implementation is for the proponent to relocate it to an alternative site. At the moment, the proponent does not have an alternative site. This implies that they have to buy another piece of land elsewhere. Looking for land of the similar size and market location and completing official transactions might take over one year, with no guarantee that the land would be available, and if such land is available, its cost might be beyond affordable for the proponent. The proponent will have to restart the planning, design, and approval of the project afresh. The proponent will need to re-engage professionals like EIA lead/audit experts and physical planners to assess the viability of the new site.

In a year's time, the cost of labor and construction materials would have increased tremendously given the current high inflation rate in the country. This could lead to a situation like zero option and the project may no longer be viable leading to eventual abandonment. The standoff will discourage local and international investors from investing in industrial and/or construction industry.

11.3 Exploration of Alternative Land Uses

From the field survey it was established that industrial use cannot be compatible with the existing developments in the neighborhood since it is predominantly a residential area. The commercial facility and recreational facilities will blend well with the current land use since there are similar facilities 1km away from the site

11.4 Conclusion

The alternative option analyzed has implications, which makes the current design option proposed by the proponent to be more viable. It is concluded that:

- The alternative is likely to lead to noise and air pollution to the surrounding and it would not be compatible to the surrounding residential developments.
- There are several residential, commercial and recreational establishments in the neighborhood whose construction the County Government of Nairobi has approved. The proposed development will therefore blend easily with the current developments in the area.

11.5 Potential Negative Impacts and Mitigation Measures

The potential negative impacts and possible mitigation measures for the proposed building development are summarized on the table below:

Table 6: The potential negative impacts and possible mitigation measures

Potential Negative Environmental Impacts	Mitigation Measures
Air/ Dust Pollution	All machinery and equipment should be maintained in good working condition to ensure minimum emissions including carbon monoxide, oxides of nitrogen and sulphur Masks should be provided to all personnel in dust

	<p>generating areas throughout the period of construction</p> <p>The project site should be enclosed by dust screens to minimize the effects of construction-related dust on surrounding users</p> <p>Exposed stockpiles e.g. of sand should be enclosed, covered and watered daily, or treated with non-toxic soil binders</p>
<p>Site Safety</p> <ul style="list-style-type: none"> - Construction Debris - Fire Safety - Worker Safety 	<p>Construction of adequate hoarding around the existing buildings prior to commencement of any works</p> <p>Clear placement of signage to warn pedestrians and surrounding users of threat of falling debris</p> <p>Provide and regularly maintain adequate firefighting equipment</p> <p>All site staff to be trained on fire safety procedures, emergency response and use of firefighting equipment</p> <p>Establish fire assembly points</p> <p>Install a fire alarm</p> <p>Prepare comprehensive Accidence Response Plan</p>

	<p>prior to commencement of construction</p> <p>All workers should be trained on proper accident response procedure prior to commencement of construction</p> <p>Strictly enforce adherence to on-site safety procedures</p> <p>All workers to wear appropriate PPE while on site</p>
<p>Solid Waste Management</p>	<p>Construction waste will be disposed of at approved County Government of Nairobi dumpsites and by properly registered private contractors.</p> <p>Waste to be sorted and disposed of in accordance to Legal Notice 120 of 2006, Waste Regulations.</p> <p>Waste generated during the project operational phase will be collected by a private contractor for final disposal</p> <p>Provide covered receptacles for waste disposal and storage throughout the project site</p> <p>All persons involved in waste collection and disposal shall be in appropriate PPE</p>
<p>Disruption of existing natural environment and modification of micro-climate:</p>	<p>Development restricted to approved density – building line, plot coverage and plot ratio</p> <p>Careful layout and orientation of buildings to respect</p>

<ul style="list-style-type: none"> - Increased development density - Obstruction of ventilating wind - Increased surface run-off 	<p>wind and sun direction</p> <p>Minimum use of reflective building material and finishes for roof, wall and pavement</p> <p>Reuse of excavated soil for landscaping and planting trees and flowers to restore part of the biodiversity within the site</p>
<p>Traffic Management</p>	<p>Provide adequate on-site parking</p> <p>Construction vehicles shall be under strict instructions to minimize unnecessary trips</p> <p>Traffic speeds for construction and other vehicles coming to and fro the project site shall be restricted to 15 mph</p>

12 CONCLUSION AND RECOMMENDATIONS

12.1 Conclusion

Completion of the project will have very high positive social and economic impacts on the area. Its completion will provide 90 serviced apartments, 692 residential apartments and a convenient retail store. Implementation of the proposed project will provide employment opportunities for local residents as well as contribute positively to the local economy.

12.2 Recommendations

- That the National Environment Management Authority does consider, approve and grant the required Environmental Impact Assessment License to the proponent of the proposed development with respect to the piece of land, L.R NO. 28223/3 off Kiambu road
- That the County Government of Nairobi does support this application for Environmental Impact Assessment License by the proponent for the proposed development with respect to Plot L.R NO. 28223/3 off Kiambu road
- That the Director of Physical Planning does support this application for Environmental Impact Assessment License by the proponent for the proposed development on L.R NO. 28223/3 off Kiambu road Nairobi City County. .
- That the study report here now presented is sufficient and meets the requirements of the Environmental (Impact Assessment and Audit) Regulations 2003.

13 REFERENCES

1. Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009, Government Printer, Nairobi
2. Kenya Gazette Supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government printer, Nairobi
3. Kenya Gazette Supplement Acts Building Code 2000, Government Printers, Nairobi
4. Kenya Gazette Supplement Acts Local Authority Act (Cap. 265), Government Printers, Nairobi
5. Kenya Gazette Supplement Acts Penal Code Act (Cap.63) Government Printers, Nairobi
6. Kenya Gazette Supplement Acts Physical Planning Act, 1999, Government Printers, Nairobi
7. Kenya Gazette Supplement Acts Public Health Act (Cap. 242) government printer, Nairobi
8. Kenya Gazette Supplement Acts Water Act, 2002, Government Printers, Nairobi
9. Kenya Gazette Supplement Number 56. Environmental Impact Assessment and Audit Regulations 2003, Government Printers, Nairobi
10. Kenya Gazette Supplement Number 57, Environmental Management and Coordination (Controlled Substances) Regulations, 2007, Government printer, Nairobi
11. Kenya Gazette Supplement Number 68, Environmental Management and Coordination (Water Quality) Regulations, 2006, Government printer, Nairobi
12. Kenya Gazette Supplement Number 69, Environmental Management and Coordination (Waste management) Regulations, 2006, Government printer, Nairobi
13. Noise Prevention and Control Rules 2005, Legal Notice no. 24, Government Printers, Nairobi
14. Pollution prevention and abatement handbook – Part III, (September, 2001)
15. World Bank (1991), Environmental Assessment sourcebook volume I: Policies, procedures and cross-sectoral issues. World Bank, Washington.

14 APPENDICES

- Copy of Land Ownership Documents/Lease Documents.
- Certificate of Incorporation
- Architectural Drawings and site plans
- Public meeting minutes
- A list of Consultative meeting attendants for the proposed project
- Sample of Public Consultation Questionnaires