iPlan CONSULT (Intl) LTD.

Innovative Spatial Use - Planning for the Future

P.O. Box 28634 - 00100 NAIROBI

ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT FOR THE PROPOSED RESIDENTIAL HOTEL APARTMENTS ON PLOT L.R. NO. 4242/65 ALONG SAUNDERS CLOSE, OFF GETATHURU ROAD, KITUSURU AREA- NAIROBI CITY COUNTY

This Environmental Impact Assessment (EIA) Project Report is submitted to Kenya National Environmental Management Authority (NEMA) in conformity with the requirements of the Environmental Management and Coordination Act, 1999 and the Environmental (Impact Assessment and Audit) Regulations, 2003

PROPONENT

HIGHFIELDS DEVELOPERS LIMITED,

P.O. BOX 32705-00100,

NAIROBI.

APRIL 2017

DOCUMENT AUTHENTICATION

This Environmental Impact Assessment project report has been prepared by **iPlan Consult (Intl) Limited** (registered and licensed EIA /EA lead Experts No. 7597) in accordance with the Environmental Management and Coordination Act (EMCA) 1999 and the Environmental (Impact Assessment) and Audit regulations 2003 which requires that every development project must have an EIA report prepared for submission to the National Environmental Management Authority (NEMA). We the undersigned, certify that the particulars in this report are correct and righteous to the best of our knowledge.

EIA/EA LEAD EXPERT:

iPlan Consult (Intl) LTD (NEMA REG NO: 7597)
P.O BOX 28634-00100
NAIROBI
TEL: 02022251702 / 0203546499 CELL: 0721891005
EMAIL: sk.mbuta@gmail.com,iplanconsult1@gmail.com

Signature……**Date**……

SHADRACK K. MBUTA (EIA/ EA Expert Reg. No. 6315).

PROPONENT:

HIGHFIELD DEVELOPERS LIMITED,
P.O. BOX 32705-00600,
NAIROBI.

Signature……Date……

EXECUTIVE SUMMARY

Kenya being a developing country is urbanizing very fast and hence experiencing the challenges of urbanization. Highfields Developers Limited in Kenya has identified an investment opportunity in Saunders Close off Getathuru Road, Kitisuru, Nairobi City County. They intend to develop a Residential hotel Apartments with all attendant facilities on plot **L.R. No. 4242/65** along Saunders Close off Getathuru Road. The Nairobi CBD used to be where most residential hotel apartments were located, but over the past ten years many businesses have moved out and relocated to more traditionally residential areas, mainly because of heavy traffic, congestion and lack of expansion space. For instance, in Kitisuru, you now find a healthy mixture of offices and shopping centers inter- mixed with residential hotel apartment blocks. It is in line with this that the proponents wish to respond to that investment opportunity and provide the much needed services.

The plot is in a high potential area/location along Saunders Close off Getathuru Road. After intense feasibility studies the proponents have identified Residential Hotel Apartments as the best investment. It will provide accommodation for the ever increasing market available in Kenya. This is caused by the current economic dynamics where in the past few years the number of middle income earners has increased providing market for such developments.

The client has already applied for change of use from Residential to Hotel Block from the City council of Nairobi (please refer to the approvals/PPA 2 forms at the Appendix of the report). The proponent has engaged the services of reputable architects who have produced an environmentally friendly design.

The assessment deployed the following methods of data collection:

- Preliminary site visit and observation
- Review of relevant legislation and documents
- Use of primary and secondary data sources

This report therefore presents the results of the Impact Assessment in accordance with EMCA, 1999 and E.I.A/E.A regulations, 2003. The E.I.A study report evaluated the

effectiveness of the environmental considerations undertaken by the project proponent in safeguarding the environment to ensure sustainability. Once the Residential Hotel apartments are occupied, it will create income for the proponent who will lease the much needed rooms, reduce congestion in the Central Business District as well as offer job opportunities both during construction and occupation. So long as the mitigation measures outlined in this report are adhered to during the project Cycle, the proposed development will be environmentally sound.

Overview of the Project

The primary objective of the proposed project is to develop a two (2) block three Four (4) floors Residential Hotel apartments. The main design components of the project include, but not limited to the following:

- **BASEMENT 1 TO 2:** Parking space for 150 cars on block 1 and sixteen (16) resident rooms on block 2 in each floor.
- **GROUND FLOOR**: ball room, mariage, banquet, lounge area, kitchen, bar, wash rooms, a driveway on block 1, sixteen (16) resident rooms on block 2 and a water treatment plant.
- **1stFLOOR:** block 1 will have an exhibition space, washrooms and block 2 will have Forty eight (48) residents rooms/units.
- **2ndFLOOR**: conference rooms A and B, management office, food and beverage office on block 1 and Forty eight (48) residents rooms/units on block 2.
- **3rd FLOOR:** conference rooms, management office, food and beverage office on block 1 and Forty eight (48) residential units on block 2.
- **4H FLOOR:** Forty eight (Forty eight (48) Residents rooms/units
- Landscaped garden with trees and flowers
- Water tanks for storage of water
- All other attendant facilities and services

The development will have a total of 224 resident rooms and parking space for 300 cars.

Environmental Impacts and Mitigation Measures

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

Potential Negative Environmental Impacts	**Mitigation Measures**
1. Architectural incompatibility leading to distortion of neighbourhood aesthetic image	• Harmonize building scale with existing development in neighbourhood. • Harmonize detail, material and finishes for roofs and walls with existing development in the neighbourhood.
2. Disruption of existing natural environment and modification of micro-climate – - Increased development density - Increased glare/solar reflection - Reduced natural ground cover - Obstruction of ventilating wind - Increased surface run-off	• Development restricted to follow zoning policy/approved density – building line, plot coverage and plot ratio. • Careful layout and orientation of buildings to respect wind and sun direction. • Adequate provision of green and open space planted with grass, shrub and tree cover. • Minimum use of reflective building material and finishes for roof, wall and pavement.
3. Pollution and health Hazards - Dust and other construction waste - Noise generation from construction activities.	• Damping down of site e.g. sprinkling water to dusty areas on construction site. • Containment of noisy operation, including locating noise operations away from sensitive neighbors. • Construction work limited to day time only and take shortest time possible.
4. Increased loading on Infrastructure services -Increased vehicular and/or pedestrian traffic -Increased demand on water, sanitation services etc. -Increase surface runoff	• Have paved local access road and walkway system • Encourage rainwater harvesting • Provision of increased water storage capacity • Provide adequate storm water drainage system
5. Worker accidents and health infection	• Employ skilled and trained workers, provide protective clothing. • Prepare clear work schedule and the organization plan. • Have adequate worker insurance cover • Enforce occupational health and safety standards.
6. Increased social conflict	• Increased Housing stock in the area and Kenya • Increased economic activities –employment generation, income earnings and housing capital stock formation • Encourage formation of community policing and

	formation of neighbourhood associations

Conclusions and Recommendations'

The EIA process started early in the pre-feasibility stage and environmental aspects were therefore considered during the project design stages the proposal to have a comprehensive waste reticulation system connected to the NCC main sewer line. This proactive approach resulted in many significant environmental impacts being avoided, as the project team was able to amend design in order to manage environmental impacts, rather than manage the environmental impacts of particular designs.

In conclusion, results from EIA study show that the proposed residential apartment's development project has significant impacts on the environment. Implementation of an Environmental Management Plan will assist in dealing with environmental issues during the project cycle. There are also guidelines for addressing environmental health and safety. This project is recommendable for approval by the National Environment Management Authority (NEMA) for issuance of an EIA license subject to annual environmental audits after operating for one year. This will be in compliance with the Environmental Management and Coordination Act of 1999 and the Environmental Impact Assessment and Audit regulations, 2003.

Table of Contents

ACRONYMNS

C	Degrees Celsius
NCG	Nairobi County Government
EHS	Environmental Health and safety
EIA	Environmental Impact Assessment
EMAP	Environmental Management and Action Plan
EMCA	Environmental Management and Coordination Act
GoK	Government of Kenya
NEC	National Environmental Council
NEMA	National Environment Management Authority
KP	Kenya Power
OHSO	Occupational Health and Safety
TOR	Terms of Reference
WRMA	Water Resources Management Authority

APPENDIX

a) Copy of questionnaires
b) Copy of Title
c) Copy of the Architectural Drawings

CHAPTER ONE: INTRODUCTION

1.1 background and rationale of the project

The proponent has identified an investment opportunity in Kitisuru area. They intend to develop a Residential Hotel Apartment with parking spaces, conference facilities and attendant facilities on plot **L.R. No. 4242/65** along Saunders Close off Getathuru Road, Kitisuru area, the said plot belonging to **JAHANGIR KASSAMALI TEJANI**. Based on the results of a feasibility study, it was recommended that the development of the Residential Hotel Apartments be done on the above said plot.

The principle measure of sustainable development is that all activities which are carried out to achieve development must take into account the needs of environmental conservation. 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. Consequently a number of planning mechanisms have been put in place to ensure that minimum damage is caused to the environment. Environmental planning is also integrated with other planning processes such as physical planning, economic planning, and development planning. Environmental Impact Assessment (E.I.A) is considered part of environmental planning. 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).

As part of the EIA process, it is necessary to devise alternatives to avoid undesirable impacts. Besides the alternative, identification of impacts may also lead to the development of mitigation measures i.e. means of reducing the impacts. As a tool of environmental planning, E.I.A is therefore precautionary in nature. E.I.A is neither antidevelopment nor does it stop actions which impact the environment. It only requires that those impacts be considered. Most development activities impact the environment hence a “no impact”

interpretation of environmental impact assessment could lead to no development. But a "considerable impact" interpretation of E.I.A will lead to better development. If environmental impacts are ignored, the project may not be sustainable in the long-run, in which case the money invested in it will have been wasted. In this development proposal, the proponent intends to construct Residential Hotel Apartments on Plot **L.R. No.4242/65**. It has been established that such projects have a potential of causing significant impacts on the environment. It is under this premise that the proponent deemed it necessary to carry out an Environmental Impact Assessment (E.I.A) for the proposed project. Environmental Impact Assessment studies were carried out as per the provisions of the Environmental (Impact Assessment and Audit) Regulations, 2003 .This report is a product of the entire study and will be used in various decision making platforms including consideration for issuance of an EIA license by the National Environment Management Authority (NEMA).

1.2 Objective and Scope of Study

The objective of the E.I.A Study report is to carry out an Environmental Impact Assessment (E.I.A) for the proposed project, to meet the environmental compliances laid down by the Ministry of Environment. The scope of report would be as per the E.I.A guidelines outlined by the National Environment Management Authority (NEMA), for new construction projects. Generally, essentially the purpose of this E.I.A is to inform the decision makers, regulatory agencies, required to authorize actions, and the public regarding the anticipated environmental impact of the proposed development Residential Hotel Apartments, and possible ways to mitigate them.

The report includes a description of the project setting, a comprehensive evaluation of the site, baseline studies, predicted environmental impacts and governing legislations.

An Environmental Management Plan (EMP) will be prepared, which includes mitigation strategies, as well as measures and recommendations for the effective management of the impact of the project on the natural, social and economic environment.

1.3 Need for the Project

Rapid urbanization is a trend seen across the developing world, with the fastest rates of growth seen in Sub-Saharan Africa. Much of this is due to rural urban migration of people

in search of jobs and or higher education or higher standards of living. Urbanization rates in Kenya have mirrored those seen in other Africa countries and just like in other areas, the service provision, the housing sector as well as office development has not grown in tandem with the rates of urbanization. There is a big deficit between employment provision and creation hence the need to encourage such developments as they will create employment both during and after construction. The result of this has seen land use changes as well as raising development densities especially for Saunders Close off Getathuru Road, Kitisuru area where there are many similar developments.

The conceived project is designed to be within character of the current Residential Hotel Apartments development for Kitisuru area where such high rise Residential Hotel Apartment Blocks have been constructed and where this survey revealed that such developments are guaranteed of attracting the desired clientele. A survey sponsored by the proponent has established that demand exists for such development and that the target clientele would cherish an environment that meets the following criterion:

- Hotel within reasonable distances to Nairobi CBD
- An environment that will allow occupants to interact but with strict rules regarding
    - Enough parking
    - Security
    - Low congestion

The need therefore exists for providing flexible, a modern and cost effective Housing estate.

1.4 Local Context

The Nairobi CBD used to be where most of these Residential Hotel Apartments and offices were located, but over the past ten years many businesses have moved out and relocated to more traditionally residential areas, mainly because of heavy traffic, congestion and lack of expansion space. For instance, in Westlands, Kitisuru, Parklands, Upperhill and Mombasa road, you now find a healthy mixture of hotels, offices and shopping centers inter- mixed with residential apartment blocks. Today, many businesses are considering relocating and/or establishing their headquarters outside the Central Business District. This is because land is cheaper, and better facilities can easily be built and maintained elsewhere.

Other areas that are popular with Residential Hotel Apartments include Parklands, Upperhill, Ngong road, Mombasa Road, Gigiri where there are several embassies and UNEP headquarters. The proposed development will be located in Saunders Close off Getathuru Road, Kitisuru area. The Hotel Block will be a timely venture to alleviate the problem of lack of hotels; while at the same time contributing to the decongesting of the C.B.D. It will also be an investment/wealth creation for the proponents as well as creating jobs to the people who will work in the hotel.

1.5 The provision of urban services

The provision of basic urban services has not kept pace with the rapid growth of the city and this has been one of Nairobi's problems for a long time. The vast majority of the urban poor do not have access to such services, which are inadequate and not properly maintained. Whereas the urban population has doubled in size during the past decade, infrastructural development has proceeded far more slowly. The result has been an ever-widening gap between the need for and the supply of essential services.

Urban sprawl is associated with a rapidly deteriorating quality of life, with particularly adverse impacts on the urban poor who have the poorest access to the existing facilities. Mostly affected are housing, water supply, sewerage, and transport. Access to infrastructure has been dependent on income levels rather than population density, with higher standards of provision in high-income areas than in high-density, low-income areas. This property has proper access to the main services e.g. roads, Water, Electricity, Sewer, telephony etc.

- **Roads**

Most of the Roads in Nairobi are tar-marked and there are signs showing directions to certain neighborhoods. The city is connected to the Jomo Kenyatta International Airport by the Mombasa Highway which passes through Industrial Area, South B, South C and Embakasi. Ongata Rongai, Langata and Karen are connected to the city centre by Langata Road which runs to the south. Lavington, Riverside, Westlands etc. are connected by

Waiyaki Way as well as Lavington and Kawangware are connected to the CBD by Ngong Road and Uhuru Highway via Kenyatta Avenue.

Highways connect the city with other major towns such as Mombasa, Machakos, Voi, Kisumu, Nakuru, Eldoret, etc. Nairobi is currently undergoing major road constructions in order to update its infrastructure network. The new systems of roads, flyovers and bridges would cut outrageous traffic levels caused the inability of the current infrastructure to cope with the soaring economic growth in the past few years. It is also a major component of Kenya's Vision 2030 and Nairobi Metropolis plans. This particular property is accessed through Getathuru road which is tarmacked and in good condition. The proponent proposes to construct a nine meter road that will be used as the main access to this property.

- **Sewerage systems**

The sewage produced in urban areas consists of waste water, industrial effluent, and storm water, which may enter sewers through faulty or damaged manholes. The inadequate capacity of existing treatment plants results in the disposal of untreated sewage into Nairobi River and other small streams. This poses a health hazard to users of such streams. Approximately 58 per cent of Nairobi's population is served by the existing waterborne sewerage system, which suffers from a number of problems, including poor maintenance, illegal connections, use of toilets for the disposal of garbage, and deliberate blocking of sewage pipes for irrigation. The remainder of the population is served by septic tanks, conservation tanks, or pit latrines, which contribute to the pollution of groundwater and of piped water owing to seepage into pipes when the pressure is low. There are no foul or storm water connections to the sewerage systems in the slum and squatter areas. The area around the plot has a conventional sewer system hence the proposed project will use the same.

- **Solid waste disposal**

The NCC has the responsibility of collecting and disposing of solid wastes within its area of jurisdiction. However, lack of resources, especially vehicles, and the general apathy of

residents have led to uncollected waste piling up in several parts of the city. Some private companies now operate, and privatizing waste collection has been considered as a possible remedial measure, but has not yet been adopted as official policy. As Nairobi grows and the volume of refuse increases, the NCC should promote reclamation, re-use, and recycling of materials as a way of reducing the problems.

- **Pollution**

The main sources of atmospheric pollution are vehicles and industries. Vehicles emit fumes that contain carbon monoxide, nitrogen oxide, and sulphur dioxide. Lead and smoke are particulate matter produced by vehicles. Although the penal code is particular about emissions by motor vehicles, nothing so far has been done to reduce the level of air pollution in Nairobi. Industrial establishments, most of which are located in proximity to the residential estates of low income earners, also contribute to air pollution.

Surface water pollution in Nairobi has also reached an alarming level. The main surface water sources are the Nairobi and Ngong rivers. Clean when they enter the city, by the time they pass through it, they have collected all sorts of refuse, industrial effluent, and effluent from sewage works.

Noise pollution is on the increase, mainly from motor vehicles, locomotives, motor cycles, aircraft, industries, and construction sites. It may lead to health problems such as high blood pressure, mental illness, loss of hearing, fatigue, and irritability. With the new noise regulations introduced by NEMA noise pollution has gone down. Odour pollution arises from industrial activities such as food processing and chemicals production as well as urban farming. The unpleasant odours are caused by industries that use sulphur and nitrogen components, ammonia, hydrogen sulphide, and phosphorus, among others. As Nairobi industrializes the problem of odour pollution increases.

1.6 Urban development programmes, policies, and strategies

The problems associated with the development of Nairobi call for gearing up of urban development programmes, policies, and strategies to achieve sustainable growth. Because of the lack of a clear Planning strategy, the city has experienced an unplanned, haphazard pattern of development, leading to settlements containing incongruous mixtures of

activities, an over concentration of employment in the CBD and industrial area, resulting in traffic congestion and environmental pollution, and rapid growth of informal settlements. Coordinated and focused urban and regional policy strategies for the city region are lacking. In addition, there tends to be too much emphasis on the provision of services and too little on involving the people and their resources in the planning and development process.

- **Population**

Nairobi has experienced one of the highest growth rates of any city in Africa. Since its foundation in 1899, Nairobi has grown to become the largest city in East Africa, despite being the youngest city in the region. The growth rate of Nairobi is currently 4.1%. It is estimated that Nairobi's population will reach 5 million in 2015.

- **Economy**

Nairobi is home to the Nairobi Stock Exchange (NSE), one of Africa's largest. The NSE was officially recognized as an overseas stock exchange by the London Stock Exchange in 1953. The exchange is Africa's 4th largest (in terms of trading volumes) and 5th (in terms of Market Capitalization as a percentage of GDP). Goods manufactured in Nairobi include clothing, textiles, building materials, processed foods, beverages, cigarettes. Several foreign companies have factories based in and around the city.

- **Transportation**

One of the earliest problems that Nairobi faced during this period was that of traffic. It has been argued that in 1928 Nairobi was in fact the most motor-ridden urban centre in the world in proportion to its non-African population. Parking and speeding became major problems that were often discussed by the authorities. From 1929 a programme to tarmac all roads in the CBD was carried out.

Today transport in Nairobi can be split into five components: private vehicles, buses, Matatus, commuter trains, and taxis. Private vehicles are almost exclusively reserved for the middle- and

Upper-income groups because of the high cost of purchase and maintenance. The inherited transport patterns, together with the additional travel generated mainly by an increased population, exerted demands on the urban form and its infrastructure that they were ill

equipped to meet expectations. A major problem here has been the centralization of the civil service, commerce, and other service activities in the CBD and industrial area, where it is estimated that over 75 per cent of commuters are employed. Much of the employment in wholesale and retail trade, restaurants and hotels, transport and communications, finance, insurance, real estate, and business services is located within the CBD. The CBD has for a long time been subjected to numerous traffic problems, which are exacerbated by a lack of space in its vicinity. Expansion of the city has not been matched by an expansion in transport facilities and services.

A clear manifestation of the unmet demand for public transport services are the daily stampede and jostling at most of the city's transport terminals, especially during the rush hours, and the overflowing number of passengers transported by the existing modes of public transport. Nairobi's transportation problems are due to neglect of maintenance, inadequate investment, poor management of traffic systems, breakdown of road discipline, and failure to develop an adequate policy and planning framework. It is against the backdrop of this that the proponent is proposing to put up Residential Hotel Apartments outside the CBD.

1.7 Land tenure, use, ownership, and management

Much of Nairobi's land, including the CBD, is publicly owned and leased to private owners, usually for 99 years. GOK leasehold covers most of the legalized residential areas, and corporate ownership of land in these areas has become increasingly widespread. Freehold land is privately owned either by individuals or by groups of individuals and can be put on the market for sale without limits to the period of ownership. This covers a small portion of Nairobi's land, being found in the western and north-western suburbs in areas such as Dagoretti, Mwimuto, Runda, and Gigiri. This particular property is leasehold from the Government of Kenya for a term of 99 years.

1.8 Terms of Reference

The terms of reference for the preparation of an E.I.A study report were:

- A critical look into project objectives

- The proposed location of the project site
- Description of project objectives.
- A concise description the national environmental legislative and regulatory framework, and any other relevant information related to the project
- Evaluation of the technology, procedures and processes to be used in the implementation of the project
- Evaluation of materials to be used in the construction and implementation of the project and their extended sources
- Description, evaluation and analysis of the foreseeable potential environmental effects of the project broadly classified into physical, ecological/biological and socioeconomic aspects which can be classified as direct, indirect, cumulative, irreversible, short term and long-term effects.
- Evaluation of the products, by-products and wastes to be generated by the project
- To propose/recommend a specific environmentally sound and affordable liquid and solid waste management system
- Evaluation and analysis of alternatives including the proposed project, project alternative, project site, design and technologies
- An Environmental Management Plan (EMP), proposing the measures for eliminating/minimizing or mitigating adverse impacts on the environment,
- Propose measures to prevent health and safety hazards and to ensure security in the working environment for the employees, residents and for the management in case of emergencies. This encompasses prevention and management of the foreseeable accidents and hazards during construction phase.

1.9 General Approach

A team of experienced environmental professionals was assembled to conduct the scope of report highlighted above, as required by NEMA. An iterative approach among the team members and other project professionals was adopted, facilitated by weekly team meetings as required. The E.I.A team worked very closely with proponents, project Architects and engineers. Baseline data for the study area were generated using a combination of:

- Field studies
- Analysis of maps, plans, aerial photos
- Review of reports and background documents
- Desk Top Studies
- Structured interviews 4

This project report provides relevant information and environmental considerations on the project proponent's intention to seek approval from N.E.M.A for the construction and completion of the development. The proposed project site lies within the jurisdiction of Nairobi City County; and bears land registration number **L.R. No 4242/65.**

1.10 Scope of Report

The Environmental Impact Assessment for the Residential Hotel Apartments Block will include but not limited to:

- Provision of a comprehensive description of all components of the project and the work to be undertaken during the project.
- Give an overall assessment of the existing physical and biological environment of the proposed development area.
- Present a socio-economic and cultural evaluation of the proposed development area and its surroundings.
- Identify and assess the potential impact of the project on the surrounding area, particularly as it relates to the cumulative impacts of this project on any existing developments.
- Assess the drainage structure, particularly with respect to existing natural drainage channels, proposed man-made drainage/water features or any proposed changes in topography. Potential impacts of increased surface runoff and sediment loading will also be addressed.
- Describe the construction methods to be employed during the proposed works.
- Describe the mitigation measures to be employed during the proposed works.
- Outline disposal of solid, liquid and any hazardous waste during the construction and operational phases.

- Determine the method, level and location of the sewage disposal facility and the potential impact of disposal on the environment.
- Give the timelines/scheduling for individual tasks to be undertaken.
- Detail an environmental Monitoring and Management Plan.

The Residential Hotel Apartments Block will be developed on the said piece of land that the developer already owns. The Architectural plans have been submitted for approval by all the relevant authorities. Building & civil works plans have been submitted to the Nairobi City County for approval. For full implementation of the project, the following pre-requisites will be met:

- Acquisition of funding to complement the developer's contribution.
- Appointment of established competent and capable contractors and consultants to undertake the development.
- Acquisition of approvals from the Nairobi City County.
- Acquisition of NEMA approval.

After the pre-requisites are met the proponent will then commission the development as is planned.

CHAPTER TWO: PROJECT DESCRIPTION, DESIGN AND CONSTRUCTION

2.1 Nature of the Project

This E.I.A Study report is based on information and consultations with the project proponent, the Architects, Quantity Surveyors, Engineers, Valuers and financial Analysists and details contained in the Drawings of the proposed project (attached at the Annex). The project highlights include:-

- **BASEMENT 1 TO 2:** Parking space for 150 cars on block 1 and sixteen (16) resident rooms on block 2 in each floor.
- **GROUND FLOOR**: ball room, mariage, banquet, lounge area, kitchen, bar, wash rooms, a driveway on block 1, sixteen (16) resident rooms on block 2 and a water treatment plant.
- **1stFLOOR:** block 1 will have an exhibition space, washrooms and block 2 will have Forty eight (48) residents rooms/units.
- **2ndFLOOR**: conference rooms A and B, management office, food and beverage office on block 1 and Forty eight (48) residents rooms/units on block 2.
- **3rd FLOOR:** conference rooms, management office, food and beverage office on block 1 and Forty eight (48) residential units on block 2.
- **4^{H} FLOOR:** Forty eight (Forty eight (48) Residents rooms/units
- Landscaped garden with trees and flowers
- Water tanks for storage of water
- All other attendant facilities and services

2.2 Ownership and Location of the Project

The proposed project site is located in Kitisuru area, along Saunders Close off Getathuru Road, behind. The lands tenure is leasehold and is registered under **JAHANGIR KASSAMALI TEJANI.** The plot is found on **Latitude -1.236705^{0}S** and **Longitude 36.754204^{0}E.**

2.3 Project Specifications

The following are specific descriptions of the project;

- The project site is located in an area of relatively low density and of controlled developments and the area has a high potential for developments especially residential and commercial use.
- An experienced consultant has made the final design of the project and the construction will follow details as given by the engineer on site
- The structures will be founded on solid ground using reinforced concrete strips laid on concrete blinding. The laying of the foundation will follow details as given by the structural engineers on site.
- The developments will be constructed using machine dressed stones, bound by mortar of concrete and sand.
- Drainage channels will be provided leading from run-off generation areas such as car parking and all paved areas and will drain in the NCC drainage channels as well as the sewer line.
- Water supply will be connected to the developments from boreholes and water tanks.
- Waste water will be channeled to a waste water treatment plant which will be constructed on site

More/ fine details for the development and specifications for the features of the proposed project have been given in the copies of the architectural and site drawings attached in the Annex.

2.4 Basic Infrastructure Requirements

The project will be constructed based on applicable standards of Kenya and any other standards which may be incorporated. The constructions will as well incorporate environmental guidelines, health and safety measures. The following are the main infrastructural requirements:

2.4.1 Construction Material

- The major materials required for construction of the proposed project will be steel, cement, bricks, metal, flooring tiles/stones, wood, sanitary and hardware items, electrical fittings, water and roof materials. All the items to be used in the proposed project will be as per the National Building Code specifications.
- Construction machines will include machinery such as trucks, concrete mixers and other relevant construction equipment. These will be used for the transportation of materials, mixing of materials and clearing of the vegetation and resulting construction debris. Most of the machinery will use petroleum products to provide energy.
- Most construction materials will be sourced locally but where the contractor deems necessary will import from other authorized countries especially the finishes.
- A construction labour force of both skilled and non-skilled workers will be involved.

2.4.2 Water

During the construction stage, water will be sourced from the Nairobi City Water and Sewerage Company (NCWSC), primarily through tankers, and stored. To supply the anticipated demand during operations, water tanks for water storage will be constructed/installed.

2.4.3 Power

Kenya Power and Lighting Company (KPLC) lines supply this area and there is adequate capacity to meet the demands of the facility, as well as any future expansions. Power will be supplied via a 24 kV Primary connected to the national grid, with a Secondary of 415 V. It is proposed that a back-up power supply of Diesel Generator will be installed to power critical loads only, in the event of any emergency. It is highly recommended that, these generators shall be silent sets housed in approved acoustic enclosures, so as to control the noise pollution required levels.

2.4.4 Parking Provisions

There will be adequate parking provisions within the building with each Basement floors having one hundred and fifty (150) parking bays making a total of three hundred (300) parking spaces. During construction, parking will be availed around the project site. This is crucial to accommodate vehicles and machinery delivering construction materials.

2.4.5 Roads and Street Lighting

The project location is accessed through Saunders road off Getathuru road. The road is well tarmacked making the area accessible in all seasons. After the construction phase the Residential hotel will have driveways for efficient movement within the project site. There will be adequate street lighting within the project location.

Figure 2: A section of Getathuru road

2.5 Environmental Requirements

2.5.1 Sewage System

The proposed site lacks an existing sewer line. During construction, a temporary toilet is proposed to dispose waste from the workers. The site will have an elaborate sewer system exceeding the requirements of NEMA. Construction activities will include the following;

- Excavation works and Foundation laying

- Construction works for the Four storey residential Hotel Block
- Setting up the sewerage treatment works
- Fitting the utilities for the building
- Procurement of construction materials from approved dealers
- Storage of the construction materials
- Transportation, storage of construction materials and disposal of the resulting construction wastes/debris using light machinery.
- All required kinds of works will be done by registered expertise.

The project will begin after the National Environmental Management Authority (NEMA) issues an approval to the proposed project and funds are released by the financiers. It is estimated to take approximately 18 months to complete.

2.6 By Products and Disposal Methods

In all construction projects, some waste or by products are usually produced on the project site. These wastes include; broken glasses, pieces of broken tiles, nails, pieces of broken wood and pieces of roofing materials. The contractor will emphasize on efficiency to minimize construction wastes. The removal and disposal of such refuse and other related wastes comes in handy. The contractor will work hand in hand with private refuse handlers and the Nairobi City County to facilitate waste handling and disposal from the site. The wastes will be disposed off into the approved dumpsites.

CHAPTER THREE: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The law has made provisions for the establishment of NEMA, which has the statutory mandate to supervise and co-ordinate all environmental activities in the country. The Environmental Management and Co-ordination Act, 1999, and the Environmental (Impact Assessment and Audit) Regulations, 2003, are the legislations that govern Environmental Impact Assessment (E.I.A) studies.

NEMA is the organ that has been established to exercise general supervision and coordination over all matters relating to the environment in Kenya. Furthermore, NEMA is the Government's principal instrument in the implementation of all polices relating to the environment. Policies and legislation highlighting the legal and administrative requirements pertinent to this project are presented below:-

3.1 The Water Act, 2002

Part II, section 18, of the Water Act, 2002 provides for national monitoring and information systems on water resources. Following this, sub-section 3 allows the Water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specific records may require to be kept by a facility operator and the information thereof furnished to WRMA.

Section 73 of the Act allows a person with license (licensee) to supply water to make regulations for purposes of protecting against degradation of water sources. Section 75 and sub-section 1 allows the licensee to construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon land for preventing pollution of water sources within his/her jurisdiction.

The waste water regulation, 2006 states that; No person shall:-

a) Discharge any effluent from sewerage treatment works, industry or other point sources into the aquatic environment without a valid effluent discharge license issued in accordance with the provisions of the Act. The proponent will not discharge any effluent into the environment as they plan to recycle the waste within the project.

b) Abstract ground water or carry out any activity near any lakes, rivers, streams, springs and wells that are likely to have any adverse impact on the quality or quantity of the water without an E.I.A license issued. The proponent proposes to apply for water connection from Nairobi Water Company hence there will be neither underground nor surface water abstraction.

3.2 Building code 2000

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local Authority for a permit to connect to the sewer line and all the wastewater should be discharged into sewers. The code also prohibits construction of structures or buildings on sewer lines. The above site is in an area that has sewer and connection will be done to the same

3.3 The Occupational, Health and Safety Act, 2007

The Act applies to All Workplaces where any person is at work, whether temporarily or permanently. The purpose of this Act is to: Secure the safety, health and welfare of persons at work; and Protect persons other than persons at work against risks to safety and health arising out of, or in connection with, the activities of persons at work.

3.4 The Physical Planning Act CAP 286

The physical Planning Act has provisions to control development and use of land in particular areas, especially where a project may involve subdivisions or amalgamation of land parcels, or located in an area otherwise reserved for other uses. The proponent has already applied for a change of user from residential to offices and the same has been granted on the plot.

Sec. 36 states that a local authority may, if deemed necessary require a submission of E.I.A report together with development application if they feel the project has some injurious effects on the environment. The proponent will undertake an E.I.A report on the proposed project and has contracted qualified Experts to undertake the report.

3.5 Local Government Act CAP 265

The sections of the Local Government Act that are relevant to this project include making by-laws in respect of suppression of nuisances, imposing fees for any license or permit issued in respect of trade or charges for any services. Local authorities are given power to

control or prohibit all developments which, by reason of smoke, fumes, chemicals, gases, dust, smell, noise, vibration or other cause, may be or become a source of danger, discomfort or annoyance to the neighbourhoods, and to prescribe the conditions subject to which such developments shall be carried on.

3.6 Public Health Act (Revised 1986)

Under this Act, every local authority or health authority is mandated to take all lawful, necessary

and reasonable practicable measures to prevent all injurious conditions in premises, construction condition or manner of use of any trade premises. Nuisances under this Act include any noxious matter or waste water, flowing or discharged from any premises wherever situated, into any public street, or into the gutter or side channel of any street or watercourse, or any accumulation or deposit of refuse or other offensive matter. Every municipal council and every urban area council may make by-laws as to buildings and sanitation.

3.7 National Environmental Legislative and Regulatory Framework

This project report has been undertaken in accordance with the Environment (Impact Assessment and Audit) Regulations, 2003, which operationalizes the Environmental Management and Coordination Act, 1999. The report is prepared in conformity with the requirements stipulated in the Environmental Management and Coordination Act No. 8 of 1999 (EMCA) and the Environmental Impact Assessment and audit Regulations 2003, Regulation 7 (1) and the Second Schedule.

Part II of the said act states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. In order to achieve the goal of a clean environment for all, new projects listed under the second schedule of Section 58 of EMCA No. 8 of 1999 shall undergo an Environmental Impact Assessment. This includes development activities such as this housing development. In addition to the legal compliance above, the following legal aspects have also been taken into consideration or will be taken into consideration before commencement of construction:

The Environment Management and Coordination Act (EMCA), 1999 provides for the establishment of an umbrella legal and institutional framework under which the environment in general is to be managed. EMCA is implemented by the guiding principle that every person has a right to a clean and healthy environment and can seek redress through the High court if this right has been, is likely to be or is being contravened.

Pursuant to section 25 (4) of EMCA, National Environmental Management Authority (NEMA) is required to restore degraded environmental sites using the National Environmental Restoration Fund. Currently, the restoration fund consists of 0.1 % levied from industries and other project proponents through the EIA process. Section 58 of the Act makes it mandatory for an Environmental Impact Assessment study to be carried out by proponents intending to implement projects specified in the second schedule of the Act which are likely to have a significant impact on the environment. Similarly, section 68 of the same Act requires operators of existing projects or undertakings to carry out environmental audits in order to determine the level of conformance with statements made during the EIA study. The proponent is required to submit the EIA and environmental audit reports to NEMA for review and necessary action.

Section 72 of the Act prohibits discharging or applying poisonous, toxic, noxious or obstructing matter, radioactive or any other pollutants into aquatic environment. According to section 73 of the act, operators of projects which discharge effluent or other pollutants into the aquatic environment are required to submit to NEMA accurate information on the quantity and quality of the effluent. Section 76 provides that all effluent generated from point sources are to be discharged only into the existing sewerage system upon issuance of prescribed permit from the local authorities.

Section 87 (1) makes it an offence for any person to discharge or dispose of any wastes, whether generated within or outside Kenya, in such a manner as to cause pollution to the environment or ill health to any person.

The proponent will have to ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration such as sewerage connections, solid waste management plans, and landscaping and aesthetic improvement programme are implemented and maintained throughout the project cycle. As well the proponent will have to ensure that appropriate measures to prevent pollution of underground and surface water are implemented throughout the project cycle.

3.8 The Environment (Impact Assessment and Audit) Regulations, 2003

On June 13 the 2003, the Minister of Environment, Natural Resources and Wildlife promulgated the Environment (Impact Assessment and Audit) regulations 2003 (E.I.A/EA Regulations) under section 147 of the EMCA. These regulations provide the framework for carrying out E.I.As and E.As in Kenya.

3.9 The Way Leave Act

The areas zoned for communication lines, sewer lines, power lines, water pipes etc are known as

way leaves. The way leave Act prohibits development of any kind in these designated areas. Thus any developer is bound by this Act to see to it that no development takes place in these areas. The proposed project will not encroach on any way leave and will leave the required space for such services.

3.10 Waste Management

3.10.1 Legal Notice No. 121: Section 4-6

Part II of the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 states that:-

4. (1) no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

(2) Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations.

(3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility. In addition, the Regulations state that: 5. (1) a waste generator shall minimize the waste generated by adopting the following cleaner production methods

a). Improvement of production process through:-

i. Conserving raw materials and energy;
ii. Eliminating the use of toxic raw materials; and
iii. Reducing toxic emissions and wastes

b). Monitoring the production cycle from beginning to end by:-

i. Identifying and eliminating potential negative impacts of the product;
ii. Enabling the recovery and re-use of the product where possible;
iii. Reclamation and recycling

c). Incorporating environmental concerns in the design and disposal of a product.

6. A waste generator shall segregate waste by separating hazardous wastes from non hazardous waste and shall dispose of such wastes in such facility as shall be provided by the relevant local authority. No person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by Authority under the provisions of the Act.

3.11 Other relevant Provisions

The following are the relevant environmental treaties to which Kenya is signatory in order of ratification:

• Montreal Protocol on Substances that Deplete the Ozone Layer (1987) ratified 9 November 1988

International treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion.

• United Nations Convention to Combat Desertification (1994), ratified 12 June 1994

An agreement to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

• **United Nations Framework Convention on Climate Change (1992)**, **ratified 30 August 1994** International environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992. The treaty is aimed at reducing emissions of greenhouse gas in order to combat global warming.

• **Convention on Biological Diversity (1992)**, **ratified 11 September 1994**

The International treaty was adopted at the Earth Summit in Rio de Janeiro in 1992. Its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

• **Kyoto Protocol (2004), ratified 25 February 2005**

An amendment to the international treaty on climate change, assigning mandatory emission limitations for the reduction of greenhouse gas emissions to the signatory nations.

CHAPTER FOUR: DESCRIPTION OF PROJECT AREA AND ENVIRONMENTAL SETTING

4.1 Physical Environment

This chapter has information on the location, bio- physical, socio and economic aspects of the project area. These are elaborately discussed in order to identify areas likely to be affected as a result of project activities. This study therefore considered the physical location, climatic data, geology, drainage, infrastructure, demography and socioeconomic information of the site.

4.1.1 Topography

The proposed project site is slightly sloppy. It slopes slightly from Getathuru road towards the rear end. Drainage is natural as it is favoured by the sloppy topography.

4.1.2 Climate

The site is in Nairobi hence experiences the climate of the city. Nairobi has an altitude of 1700 m or 5,500 ft. Nairobi enjoys a double (bi-modal) seasonal rainfall pattern, with high to moderate rainfall from April to May and November to December. The average rainfall is normally below the range of 500mm per annum and the distribution is poor and unreliable. Temperatures oscillate between 15^{o}C and 35^{o}C. There are no major water resources around the site except a small stream to the South East of the site which influences the drainage of the site, but the water is not safe for consumption hence the Nairobi Water and Sewerage Company water supply lines are present at the site and will serve as the primary water source.

4.1.3 Hydrology and meteorology

The area is characterized by a bimodal rainfall pattern with short rains experienced from October to December and long rains from March to May. The mean annual rainfall is about 900mm and an annual evaporation potential of about 1600mm. The area has a cool weather pattern with the said stream a few kilometers away.

4.1.4 Soils

The soils of this area consist of Nairobi Trachhytes and phonolitic. The area has loamy soils rich in agricultural production and has some vegetation cover.

4.1.5 Geology

The Nairobi area is underlain by tertiary volcanic rocks such as the Ngong basalts, Ol Doinyo Narok agglomerate, Limuru quartz trachyte, Kerichwa valley tuff, Nairobi trachyte, Nairobi phonolite and the Mbagathi trachyte (Mulwa et al, 2005); these contribute to the different soils of

different areas.

4.1.6 Vegetation Types

The varied combination of altitude and soil result in the occurrence of seasonal vegetation types like montane forests and evergreen bush land found in higher areas of Kabete, Lavington, Kileleshwa, Chiromo, Langata, Dagoretti, Karen, Muthaiga, Gigiri and Kitisuru (Obare, 1991).

Savannah (mixture of trees and shrubs standing in tall dense perennial grass) type of vegetation and grassland is predominant in the lower regions of Eastlands, Nairobi National park and Embakasi. Cool and humid high ground areas such as Ngong and Karen are noted to have substantial exotic vegetation while most of the lower lying areas such as the Jomo Kenyatta International Airport, Embakasi and Dandora are covered by dry rangelands. The type of vegetation is influenced by elevation, geology, soils, climate and human influence.

4.2 Current Land Use

The plot is currently undeveloped hence and is registered under residential use.

Figure 3: Current situation on ground of the proposed site

4.3 Biological Environment

4.3.1 Flora

The project site has greatly been impacted by human activity, and hence no natural vegetation. There are however, a few planted trees – Landscaping providing a rich mix of vegetation ranging from agricultural crops like grass and trees include avocado, mangoes, cypress are scattered within the plot.

4.3.2 Fauna

Human activity has also impacted upon faunal species but some animal life was observed during the site visits, there are butterflies, beetles, ants, bees, birds, rats and mice. There is need to protect these faunal species to help maintain a balance within the ecological set-up.

4.3.3 Sensitive Habitat

Although there were no endangered species noted during the site visit, there is need to conserve

any perceived important areas to avoid disturbing any endangered species. Rats and mice are the only potential vectors in the project area.

4.4 Socio Economic Environment

4.4.1 Population

Nairobi has experienced one of the highest growth rates of any city in Africa. Since its foundation in 1899, Nairobi has grown to become the largest city in East Africa, despite being the youngest city in the region. The growth rate of Nairobi is currently 4.1%. It is estimated that Nairobi's population will reach 5 million in 2015.

4.4.2 Infrastructure

The zone where this project is located has essential infrastructures to support this type of development. It’s accessed through Saunders close off Getathuru road. Mobile Telephony is well evidenced by the numerous Base Transceiver Stations for Safaricom, Zain, Yu and Orange Services.

4.4.3 Social amenities

The public utilities are well distributed all over the neighbourhood. These include private schools, churches, hospitals etc. for recreation and shopping purposes.

4.5 Waste Management.

Kenya as a country is facing a lot of problems with its waste management and more so in urban areas. E.g. out of 1600 metric tons of solid wastes generated daily in the City by 2002, only 40 per cent was being collected. The accumulated mess of waste un-collection over the years has continued to be a bottle neck to Nairobi City administrators. By 1986, some of the City residents, who were able and willing to pay for the refuse-collection service, opted for Private Companies (PCs). Since then, over 70 companies have emerged in the city targeting large waste producers like supermarkets, offices, Hotels and residential apartments.

To ensure a clean and healthy environment, waste should be managed properly. Proper waste management enhances improved sanitary conditions that are associated with a reduction of disease incidences. The existing waste management practices in the neighbourhood of the proposed project site in general include:

4.5.1 Sewage, Wastewater, domestic & trade effluent:

Sanitation provision in Nairobi (the capital of Kenya) is grossly deficient, as in most cities in sub-Saharan Africa: most people do not have access to a hygienic toilet; large amounts of faecal waste are discharged to the environment without adequate treatment; this is likely to have major impacts on infectious disease burden and quality of life (Hutton et al. 2007).

A UN-Habitat (2003) report states that about 10% of the population is served by sewers, while 20% have septic tanks and the remainder use latrines; however, these appear to be very crude data. Certainly the business/institutional centre and wealthy/middle-income residential districts are served by the sewerage system or septic tanks. In informal settlements (about 60% of the population), about 24% of people are estimated to have a

latrine (improved or unimproved) or a flush toilet, while an estimated 68% use public toilets (mostly over-crowded low-quality latrines), and an estimated 6% resort to open defecation or defecation in plastic bags ("flying toilets") (NCWSC/AWSB 2009).

Nairobi has a large sewerage system, though estimates of coverage differ widely: about 10% of the population according to UN-Habitat (2003), about Forty eight (48) % of the population according to the government estimates (ROK 2002). The system currently serves only wealthy/middle-income residential districts, not low-income settlements; in some areas the sewer mains run close to or through informal settlements, and recent reports have suggested plans to provide sewered public latrines (NCWSC/AWSB 2009; see also WUP 2001); however, to the best of our knowledge these plans have not been implemented. UNEP (2007) reports various problems with this system, including poor maintenance, and suggests that existing treatment plants do not have the capacity to deal with the sewage collected by the system.

4.5.2 Solid waste:

It is envisaged that a lot of solid waste will be generated during and after construction (Occupation). Solid and liquid wastes should not be mixed together. In addition solid wastes should be sorted out depending on their nature e.g. biodegradable from non-biodegradable, reusable from recyclable, metallic from plastic and toxic from nontoxic prior to disposal. The proposed Residential Hotel apartments Block will generate wastes such as paper, which will form the bulk of the waste. Food waste will also be generated in the restaurants and offices as well.

NEMA, in line with the Environmental Management and Coordination (Waste Management) Regulations, 2006 requires all solid waste (unless the generator opts to recycle) to be dumped at approved sites. The neighborhood of the proposed site relies on private and City Council garbage collectors to dispose of solid waste. The Proponent will be required to contract a licensed solid waste transporter to collect and transport solid waste from the site for dumping at approved sites.

CHAPTER FIVE: DESCRIPTION OF THE EXISTING AND ANTICIPATED IMPACTS

5.1 Existing Impacts

There are hardly any negative environmental impacts on the site at the moment, except some little noise from vehicles plying Kenya Road.

5.2 Anticipated Impacts

Impacts can be positive or negative, direct or indirect. The magnitude of each impact is described in terms of being significant, minor or negligible, temporary or permanent, long-term or short term, specific/localized or widespread and reversible or irreversible.

5.2.1 Positive Impacts of the Proposed Project

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

- Creation of market for goods and services and especially construction inputs which include raw materials, construction machinery and labour.
- Provision of employment during construction and occupation stage
- Maximum utilization of the plot
- Decongesting the CBD
- Wealth creation for the proponent
- Provision of affordable high quality offices
- Creation of employment for office management, security services and other business to support the offices
- Economic-investment hence wealth creation for the proponent.

5.2.2 Negative Impacts of the Proposed Project

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

- Impact to soil (soil erosion and degradation) especially when laying the foundation
- Change in land use
- Destruction of the sensitive habitat

- Noise pollution
- Increased use of energy
- Increased vehicular transport
- Increased waste generation (both solid and liquid).
- Loss of vegetation on the site
- Air pollution as a result of dust particles emanating from construction activities.

Exhausts from the involved machinery will lead to increased levels of noxious gases such as sulphur, carbon and nitrogen oxides

- The health and safety of workers and immediate residents/neighbours may be compromised due to accidents, pollution and disturbance
- Need for parking spaces
- Fire risk
- Increased water intake that may result to low pressure in the water system.

5.2.3 Anticipated Environmental Impacts

On the basis of information gathered during the field study, potential impacts of the project are tabulated below. The effects of any form of impacts can be minimized by having an idea of the magnitude of each before the project is implemented. The magnitude of each impact is described in terms of being significant, minor or permanent, short-term or long term, specific (localized) or widespread, reversible or irreversible. Most of the impacts have been addressed in the proactive design of the project and other mitigations can only be guaranteed through active and responsible management committed to the propositions of the environmental management plan.

Table 5.1 Assessment criteria of significant impacts

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

The table below gives the potential environmental issues and impacts of the project. The impacts are relative to the information gathered during site visits, observation of the general area and consideration of the general construction activities/works.

Impacts on Or due to:-	Construction	Occupation	Remarks
Changes in Land use Extent.	_	-/0	The proposed project will not have a significant change in the land use of the area since the area has been zoned for residential cum commercial purposes. Furthermore, a change of use has been done to that effect.
Architectural incompatibility leading to distortion of neighbourhood aesthetic image	0	-/0	Harmonize building scale with existing development in neighbourhood. Harmonize detail, material and finishes for roofs and walls with existing development in the neighbourhood.
Disruption of existing natural environment and modification of micro-climate – - **Increased development density** - **Increased glare/solar reflection** - **Reduced natural ground cover and Obstruction of ventilating wind**	+	+	Development restricted to follow zoning policy/approved density – building line, plot coverage and plot ratio. Careful layout and orientation of buildings to respect wind and sun direction. Adequate provision of green and open space planted with grass, shrub and tree cover. Minimum use of reflective building material and finishes for roof, wall and pavement.
Pollution: Air/dust Noise Oil waste.	-t r - t r - Sh 0	0 - 0 0	During construction, dust and exhaust emission will be generated from the construction activities, concrete mixers and workers will generate noise and vibration that may have

			negative effect to the neighborhood. Petroleum oils and grease used in vehicles and construction machinery may spill or leak on/into the ground but these will be very negligible. Sound and up to date pollution control Measures will be put in place.
Site drainage	0	0	Storm water will result from the roof catchments of the proposed Hotel Block, paved areas such as parking lots and drive ways .Due consideration has been paid to the surface drainage systems of the site and roof catchments. Landscaping is encouraged.
Soil erosion	0	0	Soil erosion is not a problem at the site
Water Resources	- Sh	-	Water shall be used during the construction thus straining the supply. There will also be some increase in water use during occupation because of additional rooms. The existing supply is enough to cater for the increment and also the water is however metered and there will be no loss of revenue.
Increased loading on Infrastructure services	-/0	-	Provision of increased water storage capacity. Provide adequate storm water drainage system
Public Health (Worker accidents and health infection)	-0	NC	During the construction process, health threats will only be limited to the workers on site. During operation there will be no change compared to present conditions with regard to pollution. Employ skilled and trained workers and provide protective clothing. Prepare clear work schedule and the organization plan. Have adequate worker insurance cover. Enforce occupational health and safety standards.
Sites of Cultural Historical or Traditional Significance	0	0	There are no sites of cultural, historical or religious significance within the project boundary.
Disturbance Of public	-Sh	NC	Disturbance to the public would minimally occur due to noise and dust during construction and transportation of construction materials. After construction, change in noise levels compared to the current situation will be negligible.
Construction Materials	_	0	Building stones will be required for the construction of the rooms. Other materials will include piping, tiles, wood etc. All these will be sourced from suppliers who deal in them.

			Undesirable, hazardous or unauthorized materials should not be used.

5.2.4 Social Impact Assessment

People within the project site and its area of influence were informed of the proposed development. There was no objection to the proposed project by the residents and other stakeholders in the project area. Most residents welcomed the idea and also commented on some issues of concern. A summary of the residents comments are as follows:

- The proposed project will generally improve the value of the project site.
- There will be enough offices for the high demand.
- Provision of business space for commercial services that are needed
- The construction of the offices will create employment opportunities for residents of the area.
- Construction noise, change in land use and high water intake during construction was raised as issues of environmental concern in general.

The residents who commented on this proposed for sound mitigation measures.

CHAPTER SIX: ISSUES OF CONCERN AND MITIGATION MEASURES

6.1 Occupational Health and Safety (OHS)

During construction, there will be increased dust, noise and air pollution. The immediate neighbours and workforce involved would be more subjected to these environmental hazards. Food for the construction workforce is usually provided by mobile individuals who usually operate without licenses. This can compromise heath of the workers especially if foodstuffs are prepared in unhygienic conditions.

Mitigation Measures

- The contractor should have workmen's compensation cover. It should comply with workmen's compensation Act, as well as ordinances, Regulations and Union Agreements.
- A first aid kit should be provided within the site. This should be fully equipped at all times and should be managed by qualified person.
- Adequate sanitary facilities will be provided and standard cleanliness maintained.
- Workers will be encouraged to eat at licensed hotels in the area where food is hygienically prepared.
- Workers to be trained on personal safety to avoid accidents.
- All workers should be provided with full protective gear. These include working boots, overalls, helmets, goggles, earmuffs, masks and gloves.

6.2 Increased Water Demand

Water is a major concern especially in construction sites. The proposed development may cause some strain to the existing water source since construction activities are known to be heavy water consumers. Occupation of the developments will bring about an increase in water consumption. The proponent will apply for connection with water supply from Nairobi City Water and Sewerage Company. In case of water shortage, there will be reserves at the storage tanks which will be constructed to store water.

Mitigation

- Install water meters for the apartments to ensure accountability and responsibility.
- There will be water tanks to take care of water shortages.
- Roof catchments should be provided with rainwater harvesting systems to enhance collection and storage of rain water. Such water can be used to water flower gardens and all kind of cleaning required on site.
- Encourage water reuse/recycling during both construction and operational phases.
- Avoid wasting the water supplied to the site.
- The contractors should use water bowsers to bring in water for construction activities especially during periods of high water demand subject to authorization.
- Provision of notices and information signs within the project to notify on means and needs to conserve water resource. On occupation of the apartments, metering per flat of water shall be done and conservation be promoted.

6.3 Construction Materials

All construction materials including pipes, pipe fittings, roofing materials, cement, building stones and sand should be sourced from accredited suppliers. Undesirable, hazardous, corrosives or unauthorized materials should not be used. This is because such materials may contaminate the water thus hampering its quality.

Mitigation

- Quality should be thoroughly controlled through regular tests.
- Only materials certified by KEBS should be used for construction
- Materials should be sourced from licensed dealers and suppliers.

6.4 Construction Waste

In construction projects, there are usually some wastes on the site. Removal and disposal of such refuse and other related wastes comes in handy. The waste should be disposed into the approved dumpsites.

Mitigation Measures

- The contractor or proponent should work hand in hand with private refuse handlers and the Nairobi City County to facilitate waste handling and disposal from the site.
- The waste materials should be properly segregated and separated to encourage recycling of some of them with the approval of the site engineer.

6.5 Increased Power Demand

There will be high power consumption especially during occupation phase. The developments will connect to the existing power line and this might strain the resource. However the apartment occupants will be encouraged to conserve as much energy as possible and energy conserving appliances should be used. Energy conservation involves proper use of electrical appliances, lighting systems and other electrical gadgets used for different purposes.

Mitigation

- All electrical appliances should be switched off when not in use.
- Put off all lights when not in use.
- Use a design that is environmentally sound to avoid use of electricity for air conditioning
- Use energy conserving electric lamps for general lighting.
- Utilize natural light inside buildings to avoid using electricity for lighting during the day.

6.6 Pollution

The construction activities on the site will result to increased dust and gas emissions. Such dust and gases have direct negative impact to the quality of air and hence animal/human health. Hooting of the involved vehicles and workers will generate noise and vibrations which may have

effect to the neighbourhoods. Petroleum oils and grease as used in vehicles and construction machinery may spill or leak on/into the ground.

Mitigation Measures

- Sound pollution control measures should be applied/ adapted
- Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of hazardous gases and other suspended particulate matter.
- Areas generating dust particles should be regularly sprinkled with water to reduce dust blowing out over the area and should be enclosed where possible to mitigate the effects of wind on them.
- Maintenance should be carried out in a well-designed and protected area and where oil/grease is completely restrained from reaching the ground.
- All oils/grease and materials should be stored in a site's store which is usually located in the contractor's yard.

6.7 Soil Degradation

This can occur during excavations for foundation laying. The excavated materials can be carried by water or water causing erosion.

Mitigation Measures

- Excavated materials should be removed promptly from the site o avoid erosion
- Avoid unnecessary movement of soil materials from the site
- Control construction activities especially during rainy any windy conditions
- Sprinkling of water to reduce dust
- Landscaping after completion of the project and introduce appropriate vegetation.

6.8 Flora

The vegetation on the site at the moment will be cleared to pave way for the project construction. There are no endangered species on the project site.

Mitigation Measures

- New vegetation will be introduced and managed on completion of the development to restore or improve the appearance of the site and also reduce soil erosion.
- Landscaping should be done within the site to improve site appearance after project completion.

6.9 Fauna

No major faunal species were observed as human activity has impacted negatively to the environmental fauna. There will be negligible disturbance to small animals/bird life especially during excavations. In general, construction activities might disturb fauna. Such small animal/bird life will have to find new nesting homes.

Mitigation Measures

- Ensure minimal disturbance of the environment
- Any destroyed vegetation will be restored after the completion of the project
- Landscaping and gardening will be done to restore aesthetic value as well as greening of the site.

6.10 Disturbance of the Public (Noise)

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

Construction activities will be generating noise and hence affecting other operations in the neighbourhood. Such noise will mainly emanate from the construction machinery and equipment which include trucks and other vehicles accessing the site not forgetting noise that would emanate from the workers on site and from the demolition activities.

Mitigation Measures

- Machineries should be maintained regularly to reduce noise resulting from friction.
- There should not be unnecessary horning of the involved machinery
- Construction works should be carried out only during the specified time

- Provision of bill boards at the construction site notifying of the construction activity and timings

6.11 Sewage and Effluents

Effluent/ sewage resulting from sanitary facilities and wastewater from the proposed developments is of significant concern with respect to the environment. It should always drain effectively into the proposed septic tanks systems via well designed and laid pipe networks.

Mitigation

- Ensure no undue interference with the laid drainage system.
- All drain pipes passing under the building, driveway or parking should be of heavy duty PVC pipe tube encase in 150mm concrete surround. All manholes on drive ways and parking areas should have heavy-duty covers set and sealed airtight as approved by specialists.
- All waste pipes should have cleaning roding eyes accessible from outside and free to every part of the system for inspection, cleaning and repair.
- Sanitary facilities should be kept clean always through regular cleaning.
- Ensuring the sewerage treatment plant is not overloaded to increase efficiency and minimize or eliminate incidences of untreated sewer spills to the environment
- Servicing the treatment plant to maintain its efficiency.

6.12 Air Quality

The construction activities on the site will result to increased dust and gaseous emissions. Some construction machinery and trucks, including small vehicles generate hazardous exhaust fumes such as Carbon Oxides (Cox), Sulphur Oxides (SOx) and Nitrogen Oxides (NOx). Dust particles as caused by wind and vehicles suspends in the air mostly during dry spells. Such dust and gases have direct negative impact to the quality of air hence animal/ human health.

Mitigation

- Provide personal protective equipments, materials and clothing such as nose masks and goggles to workers during demolition and construction phases.
- Regular and prompt maintenance of construction machinery and equipment. This will minimize generation of hazardous gases and other suspended particulate matter.
- Control over areas generating dust particles. Such areas should be regularly cleaned or sprinkled with water to reduce dust.
- Use environmentally friendly fuels such as unleaded gasoline.

6.13 Traffic Density

The proposed project will come along with increased vehicle traffic along the connecting routes especially during the construction and occupation phases. After completion there will be high traffic to and from the offices.

Mitigation Measures

- It is important that warning/ informative signs should be erected at the site. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.
- Drivers will be expected to observe strict traffic rules to reduce the risk of accidents or incidents.
- Provide enough parking spaces for the office occupants and for visitors.
- The traffic from the main road should be controlled especially during construction.

6.14 Solid waste.

The proposed activities will generate related solid wastes which include stones, wood, broken glasses, containers, rods of metal, pieces of iron sheets, sharp objects (nails) etc. If solid waste is not removed promptly away from the generation points it accumulates in to large heaps harboring rats, flies etc. which transmits disease not to mention bad odors on decomposition.

Mitigation

- The contractor or the proponent should work hand in hand with private refuse handlers and the Nairobi City County to facilitate waste handling, and disposal from the site. The resulting debris will be collected, transported and disposed off at suitably approved dumpsites.
- Provision of dustbin cubicles at the gate as the central collection point.
- Waste receptacles will be placed at strategic points to discourage littering.
- The materials should be properly segregated and separated to encourage recycling of some of them.
- Adhere to zoning policy/ specifications as is required by CCN

6.15 High Population

There will be a high number of outsiders/ visitors in the neighbourhood, during construction as workers and visitors and office occupants, suppliers. This can encourage idling and pose a security.

Mitigation

- Profiling all workers especially during construction for easier identification and to distinguish the idlers
- Erect a security wall and a gate for security purposes.
- Construction works to be done during daytime
- Private security firm to be contracted to provide security.

6.16 Accident/Disaster Prevention

The following rules will be observed to avoid accidents both during construction and occupation of the building.

Mitigation

- Ensure that the operational manuals are available and accessible for every equipment /machinery
- Properly maintain all machinery and equipment to prevent premature failure or possible accidents
- Provide accessible and clear escape routes that are marked
- Install enough firefighting equipments within reach

- Train workers and office caretakers on fire fighting and first Aid and personal safety
- Carry out fire and emergency drills to assess disaster preparedness
- Provide personal protection equipment during construction
- All electrical equipment and machinery shall be properly grounded
- Only properly trained employees to operate equipment or machinery and proper instructions in their safe operation shall be provided.

6.17 Security

Security of the site and those working and living within is of utmost significance. The house-dwellers within the facility must be assured of their security at all times. The security of the area is good since the site is near a Police station.

Mitigation

- Strategic installation of lighting as well as security alarms and backup systems
- There already exist security guards within the property who provide security in a 24-hour basis.
- The site shall be fenced.

6.18 Project Completion

Completion phase will involve; notification of intent to all relevant agencies and liaising with the project Consultants that is engineers, architects and environmentalists in a bid to ascertain guidelines on possible impacts and mitigation measures. On completing the construction works on the site, everything will be left in good order. To achieve this, the following should be accomplished:-

- Landscaping of open areas should be done. Such areas should be sealed from trenches and other depressions and vegetation introduced.
- All waste materials such as wood, glass, stones, sand and scrap metals should be removed from the site and be disposed appropriately.
- General rehabilitation of any excavated areas should be done and quality vegetation introduced to add aesthetic value to the site.

- All construction equipments should be removed after completion of the work.
- Bill boards erected on site will be removed to signify project completion.

CHAPTER SEVEN: ALTERNATIVES AND PROPOSED ACTION

7.1 Alternatives

The consideration of alternatives to a proposal is a requirement of many E.I.A systems. It lies at the heart of the E.I.A process and methodology. During the scoping process, alternatives to a proposal can be generated or refined, either directly or by reference to the key issues identified. A comparison of alternatives will help to determine the best method of achieving project objectives while minimizing environmental impacts or, more creatively, indicate the most environmentally friendly or best practicable environmental option.

7.2 The Proposed Development Alternative

In this development proposal, the proponent will develop the Hotel Block as planned after receiving the E.I.A Licence from the Authority. The project will be implemented thereby, realizing the proponent's goal of provision of office space. However, the development has to ensure that all environmental measures are complied with during the implementation and operation period. The proposed development alternative is composed of the proponent's final proposal, with the inclusion of the NEMA guidelines and regulations and procedures as stipulated in the Environmental Management and Co-ordination Act (EMCA) of 1999.

7.3 Alternative Site

There is no alternative site for the proposed project. The proponent did identify the plot earlier on and has invested many resources in terms of consultancy fees for the architect and other construction consultants. Also, the project proponent would spend long periods of time which would call for cost; already incurred in the proposed development i.e. whatever has been done and paid to date would be counted as a loss to the proponent.

7.4 The No Action Alternative

If the proposal fails to receive the anticipated approval from NEMA, the project will not be implemented and thus the developments will not commence. Provision of jobs for skilled

and non-skilled workers will not be realized and there will be no generation of income from the plot and hence the high demand for office space will not be met and this will impact negatively on the proponent's investment plan.

7.5 The Comparison of Alternatives

Under the proposed Development Alternative, the project will provide short term jobs for the workers during construction and ensure maximum utilization of the plot. There would be more benefits from the site and the anticipated negative environmental impacts will be minimal. Provided the Environmental Impact mitigation measures are implemented as well as adaptation of sound construction management practices, negative effects on the environment would not be expected.

CHAPTER EIGHT: ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

The environmental management plan involves risk management strategies that should be undertaken by the project proponent and the project manager to mitigate environmental degeneration. They are approaches to monitor, control, reclaim and restore the environment back to its appropriate state. EMPs for projects thus provide logical frameworks within which the identified issues of environmental concern can be mitigated, monitored and evaluated. Environmental monitoring involves measurement of relevant parameters, at a level of details accurate enough, to distinguish the anticipated changes. Monitoring aims at determining the effectiveness of actions to improve environmental quality.

The environmental management and monitoring plans have been developed and outlined to bring home the key findings of the Environmental Impact Assessment of the project in mention, recommending necessary mitigation actions, defining roles, monitor able indicators and the estimated cost.

The EMPs outlined in tables hereafter address the potential negative impacts and mitigation measures as well as roles, costs and monitor able indicators that can help to determine the effectiveness of actions to upgrade the quality of environment; as regards the proposed project. The EMPs have considered both construction and occupation phases.

8.1 Environmental, Health and Safety Management and Monitoring Plan

Environmental monitoring and evaluation are essential in the project 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.

In the context of the proposed project, design has made provisions for an elaborate operational monitoring framework for the following among others:

- Disruption of natural environment and modification of microclimate

- Air and noise pollution
- Proliferation of kiosks
- Workers accidents and health infections during construction process
- Proliferation of uncollected wastes

Table 8.1: Environmental, Health and Safety Management and Monitoring Plan

CONSTRUCTION PHASE				
ENVIRONMENTAL IMPACT	**MITIGATION MEASURES**	**RESPONSIBILITY**	**COST (KES)**	**MONITORING MEASURES**
Commissioning of the Construction Works	- Site hand-over and Ground breaking	Project team (Lead Consultant/Architect, contractor Proponent)	Part of/Covered in the Project Cost	Presence of the project Team
Securing the Construction Site	- Construction of Perimeter Wall and Hoarding	Contractor	Part of/Covered in the Project Cost	Presence of Perimeter Fence
Housing for Construction/ Site staff	Construction of Labour Camp	Contractor	300,000	Presence of Labour Camp
Security for Construction Material	- Construction of Site Stores - Construction materials to be delivered in small quantities to minimize storage problems	Contractor	100,000	Presence of Site store
Extraction and Use of Building Materials	- Availability and sustainability of the extraction sites as they are non-renewable in the short term - Landscape changes e.g. displacement of animals and vegetation, poor visual quality and opening of depressions on the surface	Contractor/Proponent /project team	Part of/Covered in the Project Cost	Material site rehabilitation
Collapse of Building during Construction	- Ensuring Building Strength and stability - Use of appropriate construction materials and reinforcements as per specifications - Ensuring building components are as per designs	Contractor/project team	Part of/Covered in the Project Cost	Presence of the project Team

	- Proper supervision - Ensure proper timelines are followed e.g. curing time			
ENVIRONMENTAL IMPACT	**MITIGATION MEASURES**	**RESPONSIBILITY**	**COST (KES)**	**MONITORING MEASURES**
- **Disturbance of Traffic flow during construction** - **Emissions of CO_2, NO_x and fine particulate matter**	- Proper signage - Awareness creation - Education to truck drivers	Contractor/Project team and general public	200,000	- Presence of site Notice Board /Hoarding - Presence of Security guards to control traffic - Presence of warning signs and education materials
Soil Excavation leading to site disturbance	- Excavate only areas to be affected by buildings - Dumping of excess excavated materials to sites designated by NEMA and Council - Restoration of sites Excavated	Contractor	700,000	Landscaping after completion of construction
Soil Erosion	- Create and Maintain soil traps and embankments. - Landscaping after completion of construction	Contractor/Proponent Architect/Site engineer Landscape Architect	300,000	Lack/Absence of Soil Erosion
Noise Pollution and Vibration	- Ensure use of serviced and greased equipment - Switch off engines not in use - Construction work to be confined to between 8am to 5pm - Ensure use of earmuffs by machine operators	Proponent and Contractor	Part of Routine operation procedure	Lack of complaints
Air Quality	- Water sprinkling of driveways or the use of biodegradable hydrant eg Terrasorb polymer will reduce dust emission during construction	Proponent and Contractor	Part of Routine	- Lack of complaints - Workers wearing

	- Ensure servicing of vehicles regularly		operation procedure	protective clothing and earmuffs
Risks of Accidents and Injuries to Workers	- Education and awareness to all construction workers - Ensure use of appropriate personal protective clothing - Provide First Aid Kits on site - Ensuring Building Strength and stability - Proper supervision	Proponent Contractor	Part of Routine operation procedure	- Presence of well equipped First Aid kit - Presence of Security Guards on site - Presence of a register on the site
Health and Safety	- Provide First Aid Kits on site - Proper signage and warning to public of heavy vehicle turning - Ensuring Building Strength and stability - Provide clean water and food to the workers - The contractor to abide by all construction conditions especially clause B12 which stipulates health safety and workforce welfare	Proponent Contractor	Part of Routine operation procedure	- Presence of well equipped First Aid kit - Presence of Security Guards on site - Presence of a register on the site
Solid Waste Generation	- Ensure waste materials are disposed of on Council and NEMA approved sites - Ensure re-use of materials that can be re-used - Use of the 3rs – Reduce, Re-use, Re-cycle	Proponent Contractor	300,000	- Absence of Solid waste on the site
Energy Consumption	- Use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability - Use of Standby Generators.	Proponent Contractor	100,000	- Presence of KPLC power lines - Presence of Generators
Excessive Water Use	- Excessive water use may negatively impact on the water source and its sustainability	Proponent Contractor	1,000,000	- Presence of NCWSC water lines - Metering of water
OCCUPATION PHASE				
ENVIRONMENTAL	**MITIGATION MEASURES**	**RESPONSIBILITY**	**COST (KES)**	**MONITORING**

IMPACT				MEASURES
Architectural incompatibility leading to distortion of neighbourhood aesthetic image	- Harmonize building scale with existing developments in neighbourhood. - Harmonize detail, material and finishes for roofs and walls with existing development in the neighbourhood.	Architect Proponent Contractor	Part of/Covered in the Project Cost	- Compatibility with the neighbourhood
Solid Waste Generation and Management	- Regular inspection and maintenance of the waste disposal systems during operation phase - Establish a collective waste disposal and management system - Provide waste disposal bins to each house well protected from adverse weather and animals - Ensure waste materials are disposed of on Council and NEMA approved sites - Use of the 3rs – Reduce, Re-use, Re-cycle	Proponent Estate Managers	1,000,000	- Presence of NEMA registered waste management companies - Presence of waste handling bins - Absence of wastes
Liquid Waste Generation and Management	- Regular inspection and maintenance of the waste disposal systems during the operation phase - Connection to Sewer system	Proponent Estate Managers	150,000	- Conventional sewer line - Presence of waste handling bins - Absence of wastes
Increased loading on Infrastructure services - Increased vehicular and/or pedestrian traffic - Increased demand on water, sanitation services	- Have paved local access road and walkway system - Encourage rainwater harvesting - Provision of increased water storage capacity - Provide adequate storm water drainage system	Contractor Proponent Estate Managers	600,000	- Absence of run-off - Presence of good roads - Pavements and drainage channels
Traffic	- Provide adequate parking facilities within the project site	Contractor/Proponent Residents	Routine operation	- Presence of amble parking in the

			procedure	premises
Increased social conflict	- Increased Housing stock in the area and Kenya - Increased economic activities –employment generation, income earnings and housing capital stock formation - Encourage formation of community policing and formation of neihgbouhood associations	Contractor Proponent Neighbourhood associations Estate Managers		
Storm Water impacts	- Provide roof gutters to collect and direct roof water to drains - Construct drains to standard specifications - Develop a storm water drainage system and linkage to natural drains	Proponent contractor	300,000	Absence of Flooding and dampness in the building
Disruption of existing natural environment and modification of micro-climate – - Increased development density - Increased glare/solar reflection. Reduced natural ground cover/surface run-off and obstruction of ventilating winds	- Development restricted to follow zoning policy/approved density – building line, plot coverage and plot ratio. - Careful layout and orientation of buildings to respect wind and sun direction. - Adequate provision of green and open space planted with grass, shrub and tree cover. - Minimum use of reflective building material and finishes for roof, wall and pavement.	Project team (Contractor Proponent, Architect or Lead Consultant, etc)	300,000	Proper orientation Planted trees/Landscaping
Insecurity	- Ensure secure perimeter wall where applicable - Have a single entry point that is manned 24 hours	Contractor, Proponent Neighbourhood associations Estate Managers	300,000	Presence of perimeter wall Presence of day and night security guards
DECOMMISSIONING PHASE				

Building Safety	Assess the condition of buildings to ascertain usefulness	Engineer/Proponent	600,000	Engineer and Tests on the building
Land and Building use	Ascertain the Planning development policy	Local Authority Physical Planner	150,000	Consultants present
Absence of Decommissioning Plan	Prepare decommissioning plan	Proponent/Architect	800,000	Demolition plan prepared Approval of the same by
Accidents/Injuries	Securing the Site by fencing off	Contractor/Proponent	90,000	perimeter fence
Un-disconnected Services- Power, Water, telephone, sewer etc	Ensure disconnection of all services. Remove all surface and underground cables & wiring	Contractor	45,000	Absence of cabling
Solid Waste Generation (demolition waste)	- Ensure waste materials are disposed of on Council and NEMA approved sites - Ensure re-use of materials that can be re-used -Use of the 3rs – Reduce, Re-use, Re-cycle	Proponent/Contractor	40,000	Absence of Debris
Noise and Vibration	- Ensure use of serviced equipment - Switch off engines not in use - Demolition work to be confined to between 8 to 5pm -Ensure use of earmuffs by workers	Proponent/Contractor	30,000	

CHAPTER NINE: DECOMMISSIONING

9.1 Introduction

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

- Remove all underground facilities from the site
- The site should be well landscaped by flattening the mounds of soil and
- Planting indigenous trees and flowers
- All the equipment should be removed from the site
- Fence and signpost unsafe areas until natural stabilization occurs
- Backfill surface openings if practical

The table below shows the proposed decommissioning plan:

Table 9.1. EMP for Decommissioning

Expected Negative Impacts	**Recommended Measures**	**Responsible Party**	Time Frame	Cost (KShs)
1. Construction Machinery/Structure & Wastes				
Scraps material and other debris	Use of an integrated solid waste management system i.e. through a hierarchy of options. Wastes generated as a result of facility decommissioning activities will be characterized in compliance with standard waste management procedures. The contractor will select disposal locations and the local council based on the properties of the particular waste generated.	Project Manager & Contractor	During decommissioning	2,500,000

	All buildings, machinery, equipment, structures and partitions that will not be used for other purposes should be removed and reused or rather sold/given to scrap material dealers.	Project Manager & Contractor	During decommissioning	-
	Where recycling/reuse of the machinery, equipment, structures and other waste materials is not possible the materials should be taken to approved dumpsites.	Project Manager & Contractor	During decommissioning	-
Rehabilitation of project site				
Vegetation disturbance Land deformation: soil erosion, drainage problems	-Implement an appropriate re-vegetation programme to restore the site to its original status. -During the vegetation period, appropriate surface water runoff controls will be taken to prevent surface erosion; -Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences; -Fencing and signs restricting access will be posted to minimize disturbance to newly-vegetated areas;	Project Manager & Contractor	During decommissioning	1,000,000
Social- Economic impacts				
-Loss of income -Loss of Office facilities	The safety of the workers should surpass all other objectives in the decommissioning project. -Adapt a project – completion policy; identifying key issues to be considered. -Compensate and suitably recommend the workers to help	Project Manager & Contractor	During decommissioning	2,000,000

	in seeking opportunities elsewhere. -offer alternative office facilities			

CHAPTER TEN: CONCLUSION AND RECOMMENDATIONS

From the foregoing analysis, the social and economic rating for this project is highly positive. Evaluation of alternatives has already shown that options are limited and costly. Already the proponent has sunk a substantial amount of money in the project up to the design stage.

Further delay of the project is denying all stakeholders the anticipated benefits of the investment; while, redesigning or relocation will lead to loss of time and money that is already tied in the preliminary costs of the project

The project does not pose any serious and negative environmental impacts. Adequate mitigation measures have been proposed to address any of the negative impacts arising from the project.

The project will create employment and improve income earnings. The project will boost the diminishing office supply in the country and more so in urban areas.

The proposed project design has integrated mitigation measures with a view to ensuring compliance with all the applicable laws and procedures. The proposed project will be implemented after approvals by among others, the City County of Nairobi, Physical Planning Department and NEMA. During project implementation and occupation, Sustainable Environmental Management (SEM) will be ensured through avoiding inadequate/inappropriate use of natural resources, conserving nature sensitively and guaranteeing a respectful and fair treatment of all people working on the project, general public at the vicinity and inhabitants of the project.

In relation to the proposed mitigation measures that will be incorporated during construction phase, the development's input to the society; and cognation that the project is economically and environmentally sound, establishments are considered beneficial and important. It is our considerable opinion that the proposed development is a timely venture that will subscribe to proponent's timely investment.

It is thus our recommendation that the project be allowed to go ahead with the implementation provided the outlined mitigation measures are adhered to. Major concerns should nevertheless be

focused towards minimizing the occurrence of impacts that would degrade the general environment. This will however be overcome through close follow-up and implementation of the

recommended Environmental Management and Monitoring Plans (EMPs).

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

- The proponent should therefore follow the guidelines as set by the relevant departments to safeguard and envisage environmental management principles during construction and operation/occupation phases of the proposed project.
- It is important that warning/ informative sign (bill boards) be erected at the site. These should indicate the operation hours and when works are likely to be started and completed. The signs should be positioned in a way to be easily viewed by the public and mostly motorists.
- All solid waste materials and debris resulting from construction activities should be disposed off at approved dumpsites.
- All construction materials e.g. pipes, pipe fittings, sand just to mention a few should be sourced/procured from bonafide / legalized dealers.
- During construction all loose soils should be compacted to prevent any erosion. Other appropriate soil erosion control measures can be adapted. Any stockpiles of earth should be enclosed, covered or sprinkled with water during dry or windy conditions to minimize generation of dust particles into the air.
- Once earthworks have been done, restoration of the worked areas should be carried out immediately by backfilling, landscaping/ levelling and planting of suitable tree species.
- Proper and regular maintenance of construction machinery and equipment will reduce emission of hazardous fumes and noise resulting from friction of metal bodies.

- A fully equipped first aid kit should be provided within the site.
- Workers should get food that is hygienically prepared. The source of such food should be legalized or closely controlled.
- The contractor should have workmen's compensation cover and is required to comply with workmen's compensation Act as well as other relevant ordinances, regulations and Union Agreements.
- The contractor should provide adequate security during the construction period.

REFERENCES

1. Kenya gazette supplement Acts 2000, Environmental Management and Coordination Act Number 8 of 1999. Government printer, Nairobi
2. Kenya gazette supplement Acts Building Code 2000 by government printer, Nairobi
3. Kenya gazette supplement Acts Land Planning Act (Cap. 303) government printer, Nairobi
4. Kenya gazette supplement Acts Local Authority Act (Cap. 265) government printer, Nairobi
5. Kenya gazette supplement Acts Penal Code Act (Cap.63) government printer, Nairobi
6. Kenya gazette supplement Acts Physical Planning Act, 1999 government printer, Nairobi
7. Kenya gazette supplement Acts Public Health Act (Cap. 242) government printer, Nairobi
8. Kenya gazette supplement number 56.
9. Environmental Impact Assessment and Audit Regulations 2003. Government printer, Nairobi
10. United Nations (1987) The Rio Declaration on Environment and Development
11. United Nations (2000) The World Commission on Environment and Development
12. Sombroek W. G., Braun H. M. M. and Van der Pouw B. J. A., 1982, Exploratory Soil Map and Agro-Climate Zone Map of Kenya, Nairobi