ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED COMMERCIAL BUILDING TOWER DEVELOPMENT IN UPPERHILL NAIROBI FOR JABAVU VILLAGE LIMITED ON PLOT LR. NO 31/219

PROPONENT	ENVIRONMENTAL CONSULTANT
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SEPTEMBER 2014

SUBMISSION OF DOCUMENTATION

I, **Prof. Jacob K. Kibwage** on behalf of Africa Waste and Environment Management Centre submit the following Environmental Impact Assessment Study Report for **Commercial Building Tower Development** on Plot LR. No. 31/219 located in Upper Hill within Nairobi City County. To my knowledge all information contained in this report is accurate and a truthful representation of all findings as relating to the proposed project.

Signed at **NAIROBI** on this 2nd Day of September 2014.

Signature:……

Designation: **Lead Environmental Consultant NEMA Reg. No 0126**

SUBMISSION OF DOCUMENTATION

I,……,on behalf of **Jabavu Village Limited** submit this Environmental Impact Assessment Study Report for **Commercial Building Tower Development** on Plot LR. No. 31/219 located in Upper Hill within Nairobi City County.To my knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the proposed project.

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Signature……..

Designation: ……..

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ACRONYMS

B.O.D	Biochemical Oxygen Demand
Bgl	Below Ground Level
CCTV	Closed Circuit Television
COD	Chemical Oxygen Demand
EIA	Environmental Impact Assessment
EMCA	Environmental Management Coordination Act
EMP	Environmental Management Plan
Ft	Feet
Ha	Hectare
IEA	Initial Environmental Audit
IMCE	Inter-Ministerial Committee on Environment
KEBS	Kenya Bureau of Standards
KM	Kilometres
KVA	Kilo Volts Amperes
KWS	Kenya Wildlife Services
LPG	Liquefied Petroleum Gas
M.E	Structural Engineer
Mm	millimeters
NEAP	National Environment Action Plan
NEC	National Environmental Council
NEMA	National Environment Management Authority
NEMA	National Environment Management Authority
NGOs	Non Governmental Organizations
NPEP	National Poverty Eradication Plan
NW&SC	Nairobi Water and Sewerage Company
^{0}**C**	Degrees Celsius
PEC	Poverty Eradication Commission
PPE	Personal Protective Equipment
PPM	Parts Per Million
PVC	Polyvinylchloride
R.C	Reinforced Concrete
S.E	Structural Engineer
SHE	Safety Health and Environment
SQM	Square Metre
SWM	Solid Waste Management
TOR	Terms of Reference
TSS	Total Suspended Solids
V	Volts
WRMA	Water Resources Management Authority
WSSD	World Summit for the Social Development

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EXECUTIVE SUMMARY

The Proponent, Jabavu Village Limited**,** is proposing to construct a commercial building tower on Land Title No. Nairobi/ Block 31/219 at the junction of Upper Hill Road and Haile Selassie Avenue. The project plot area measures about 1.002 ha. The project will entail putting up a multiple use premise (45-storey building) that will comprise of two towers; one approximately 212.40 meters (696.9 feet) high and another one of about 137.40 metres (450.8 feet) high and associated facilities like parking bays occupying the middle ground. The plot preferred for the development has an area of about 2.5 acres.

The design for the commercial building tower provides for the construction of four components; a commercial component of about 30,000 square meters of total floor area, a residential component of about 10,000 square meters of total floor area, a hotel of about 15, 000 square meters of total floor area and a retail component of maximum 15,000 square meters. This make the total planned development to have an accumulated total area of 70,000 square metres.

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

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

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

Scope, Objective and Criteria of the Environmental Impact Assessment (EIA)

Africa Waste and Environment Management Centre (AWEMAC) a NEMA registered firm were appointed as the Consultants to conduct the Environmental Impact Assessment study of the proposed development. The scope of the assessment covered construction works which included ground preparation, masonry of the proposed development as well as installation of utilities required by the proposed office tower. The output of this work was a comprehensive Environmental Impact Assessment Study Report for the purposes of applying for an EIA study licence.

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

- The location of the proposed development.
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The technology, procedures and processes to be used, in the implementation of the project.
- The materials to be used in the construction and implementation of the project.
- The products, by-products and waste to be generated by the project.
- A description of the potentially affected environment.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated.
- To recommend a specific environmentally sound and affordable wastewater management system.
- Provide alternative technologies and processes available and reasons for preferring the chosen technology and processes.
- Analysis of alternatives including project site, design and technologies.
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of the foreseeable accidents and hazardous activities in the cause of carrying out development activities.
- Propose measures to prevent health hazards and to ensure security in the working environment for the employees and the management in case of emergencies.
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information.
- An economic and social analysis of the project.

Methodology Outline

Given the magnitude and nature of the proposed development project, a full environmental impact assessment study was opted for to ensure comprehensiveness and completeness of the assessment. The general steps followed during the assessment were as follows:

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

Description of the Project

Project site

The proposed development site herein referred to as the site is situated on the junction of Upper Hill Road and Haile Selassie Avenue within Upper Hill in Nairobi City .Rahimtulla Towers is approximately 100 meters to the east of the proposed development site. Glory café; a catering facility is located 50m to the east of the site. Just across the Upper Hill Road on the North of the site, there are Highrise flats (residential) which are approximately 35 meters from the site. The South western end of the site borders the Fit and Lean center which serves as a fitness and training center as well as a residential area while NHIF headquarters are located approximately 148 meters west of the proposed site. The South Eastern end of the site borders the proposed headquarters for Mwalimu National Co-operative & Credit Society, which is still under construction.

Several other office tower developments are doted within the Upper Hill area are under construction along the radius of Upperhill Road, Elgon Road, Hospital Road,Mara Road,Ragati Road and Haile Selassie Avenue as an indication of a fast growing business district.

Several mature trees were identified at the proposed construction site near the North eastern boundary of the development plot; four mature *Grevilia Spp*., three *Eucalyptus spp.*and five indigenous tree species. The proposed area of construction has a four unoccupied high rise residential flats with three levels each with a DSQ at the far south east corner of the premises.

The proposed project will entail putting up a multiple use premise (45-storey building) that will comprise of two towers; one approximately 212.40 meters (696.9 feet) high and another one of about 137.40 metres (450.8 feet) high and associated facilities like parking bays. The plot preferred for the development has an area of about 2.5 acres (1.002 ha). The development will revolutionize Nairobi's skyline setting a new standard in office accommodation in Kenya and East Africa.

Positive Impacts

The proposed project will come along with numerous positive impacts as exhaustively discussed within the report. They include: employment opportunities, gains in the local and national economy, increased efficiency in services provided to the people, optimal use of land, access to adequate parking space, better working condition for the rentals of office space, emergence of social amenities and services in the area, provision of affordable office and conferencing facilities, additional commercial, retail and accommodation facilities outlets in the area among others.

Negative Impacts

The proposed project will as well come along with some negative impacts, which include intensified use of the built-up environment, and use of an otherwise developed natural land resulting in a changed landscape. The loss of vegetation and replacement with a paved surface will increase run off into the neighbouring areas, carrying with it debris and

contaminants into the nearby water sources. There will be noise and dust generated during demolition and construction phase. Pressure on social amenities may also result, but at a rather small and temporary scale. Occupational safety risks associated with the development include accidents, risks of fire out-breaks, and increased vehicle traffic within the service roads e.g. Upper Hill Road,Haile Selassie avenue and Hospital Road.

Mitigation Measures

Mitigation measures to address identified negative impacts include landscaping and replanting areas where vegetation has been removed; sprinkling the soils with water if ground clearance is undertaken during the dry season; provision of appropriate Personal Protective Equipment (PPEs) to the workers during construction; and, sealing of the area during construction for the safety of passers-by. Such PPE should include dust masks, ear muffs etc. During the operational phase, both solid and liquid wastes will be generated. There should therefore be proper arrangement for the management of such. Fire hazards can also occur in both construction and operational phases. Mechanisms must therefore be put in place to address the fire hazards. Such arrangements include a fire escape plan and the provision of firefighting equipment. The proposed project is to be developed in an area that is already designated for such developments and hence, no conflict in land use is anticipated. A Traffic Impact Assessment Study has been undertaken to ensure to ensure that the development does not contribute to congestion of existing roads.

Table 1: Impacts and Mitigation Measures

Possible Impacts	**Mitigation measures**
Soil erosion	• Control earthworks • Install drainage structures properly • Ensure management of excavation activities • Landscaping of disturbed areas
Air pollution	• Stockpiles of earth should be sprayed with water or covered during dry seasons. • Provide dust masks for the personnel in dust generation areas • Sensitize construction workers on pollution control measurers
Noise pollution	• Sensitize workforce including drivers of construction vehicles • Install sound barriers for pile driving activity • Install portable barriers to shield compressors and other small stationary equipment where necessary • Put up signs to indicate construction activities • Maintain all equipment • Workers in the vicinity of high level noise to wear safety and protective gear
Dust Generation	• Spray stock piles of earth with water • Avoid pouring dust materials from elevated areas to ground

	• Cover all trucks hauling soil, sand and other loose materials • Provide dust screen where necessary
Exhaust Emissions	• Vehicle idling time shall be minimized • Alternatively fuelled construction equipment shall be used where feasible • Equipment shall be properly tuned and maintained
Water sources	• Proper Management of water usage to avoid unnecessary wastage of water • Avail storage tanks. • Rain water harvesting
Site cleanliness and sanitary facilities	• Special attention shall be paid to the sanitary facilities on site • Garbage shall be disposed off periodically by NEMA licensed waste collectors and dumping sites
Road safety and traffic	• Road signs on main roads • Enforce speed limits for construction vehicles • Implement Traffic Management Plan
Public health and occupational safety	• Ensure proper solid waste disposal and collection facilities • Ensure dustbin cubicles are protected from animals, rains and are well covered • Provide suitable safety gear for all personnel • Proper treatment of waste water
Vegetation disturbance	• Landscape the site by planting grass and trees at all disturbed areas • Care for the trees/plants

Conclusion

Considering the positive socio-economic and environmental benefits to accrue as a result of the development, and the EIA study having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental Management Plan (EMP) to the letter. Kenya as a country has a big shortage of such facilities hence the construction of the proposed development goes a long way in solving part of the huge problem of affordable office, commercial and recreational establishments.

1 INTRODUCTION

1.1 Background and Rationale for an Environmental Impact Assessment

The Proponent, Jabavu Village Limited**,** is proposing to construct a commercial building tower on Land Title No. Nairobi/ Block 31/219 at the junction of Upper Hill Road and Haile Selassie Avenue. The project plot area measures about 1.002 ha. The project will entail putting up a multiple use premise (45-storey building) that will comprise of two towers; one approximately 212.40 meters (696.9 feet) high and another one of about 137.40 metres (450.8 feet) high and associated facilities like parking bays. The plot preferred for the development has an area of about 2.5 acres.

The design for the commercial building tower provides for the construction of four components; a commercial component of about 30,000 square meters of total floor area, a residential component of about 10,000 square meters of total floor area, a hotel of about 15, 000 square meters of total floor area and a retail component of maximum 15,000 square meters. This make the total planned development to have an accumulated total area of 70,000 square metres.

Upper Hill has experienced remarkable growth and has become the preferred address for Multi-National Organisations, Large Corporations, Diplomatic Missions, Embassies etc. Some of theses include; the British High Commission, European Union, World Bank/IFC, Coca Cola East and Central Africa, British-American, Old Mutual, Commercial Bank of Africa, Equity Bank, Shelter Afrique etc.

Vision 2030 has earmarked Upper Hill as the financial hub for East and Central Africa tagging it the Vision City and has recently been championing for Upper Hill to be rezoned to allow taller buildings further reinforcing Kenya's move towards becoming a middle income economy by the year 2030. This push by vision 2030 is likely to see the plot rations increased and the height restrictions repealed, allowing construction of skyscrapers to international standards.

The Kenya Government policy on such projects, programs or activities requires that an Environmental Impact Assessment be carried out at the planning stages of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during the design, construction, operation and decommissioning of such projects, programs or activities. Therefore, in compliance with the law and to safeguard the environment, the proponent undertook this Environmental Impact Assessment and incorporated environmental concerns as required.

1.2 Scope and Criteria of the Environmental Impact Assessment (EIA)

1.2.1 Scope of the Report

The Kenya Government policy on all new development projects, programs or activities requires that an environmental impact assessment be carried out at the implementation stage of the proposed undertaking to ensure that significant impacts on the environment are taken into consideration during

the construction, operation and decommissioning of the facility. The scope of this Environmental Impact Assessment, therefore, covered:

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

1.2.2 Terms of Reference (TOR) for the EIA Process

Africa Waste and Environment Management Centre a registered Firm of Experts was appointed as the consultant to conduct the Environmental Impact Assessment of the proposed office development. The scope of the assessment covered the project site, surrounding and the utilities under the project. The output of this work is a comprehensive Environmental Impact Assessment project report for the purposes of applying for an EIA licence.

The main objective of the assignment was to assist the proponent to prepare a project report after carrying out an Environmental Impact Assessment (EIA) of the proposed project, to ensure that the proposed development takes into consideration appropriate measures to mitigate any adverse impacts to the environment. The study identified potential environmental impacts and possible concerns that interested and/or affected parties have with the development, as well as the associated prevention and mitigation measures for the negative impacts as stipulated in the Environmental Management Plan (EMP).

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

- The location of the project
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project.
- The objectives of the project.
- The technology, procedures and processes used, in the implementation of the project.
- The materials used in the construction and implementation of the project.
- The products, by-products and waste generated by the project.
- The environmental effects of the project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects
- To recommend a specific environmentally sound and affordable waste management system.
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, timeframe and responsibility to implement the measures.
- Provide an action plan for the prevention and management of accidents and hazardous activities in the cause of carrying out development activities.

- Propose measures to prevent health hazards and to ensure security in the working environment for the employees, customers and for the management in case of emergencies.
- Identification of gaps in knowledge and uncertainties which were encountered in compiling the information.

1.2.3 Data Collection Procedures

The data collection was carried out through questionnaires/standard interview schedules, use of checklists, observations and photography, site visits and desktop environmental studies.

1.2.4 EIA Organization and Structure

The EIA will be carried out to full completion within a period of 14 days from the date of undertaking. The Consultant (Lead Expert) coordinated the day-to-day functions and any related institutional support matters. Otherwise, all formal communications were directed to NEMA through the proponent.

1.2.5 Reporting and Documentation

The Environmental Impact Assessment Report from the findings was compiled in accordance with the guidelines issued by NEMA for such works and was prepared and submitted by the proponent for review. The Consultant ensured constant briefing of the client during the exercise. Description plans and sketches showing various activities are part of the Appendices.

1.2.6 Responsibilities and Undertaking

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

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

1.2.7 Methodology Outline

Since the proposed site is located within an area with no rich natural resources whose total effect to the surroundings could not be adverse and noting that the intended development and use of the facility will be in line with what exists in the surrounding areas, an environmental project report would be seen to be adequate. The general steps followed during the assessment were as follows:

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

1.2.7.1 Environmental Screening

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

1.2.7.2 Environmental Scoping

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

1.2.7.3 Desktop Study

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

1.2.7.4 Site Assessment

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

1.2.7.5 Reporting

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

2 DESCRIPTION OF THE PROPOSED PROJECT

2.1 Introduction

The project plot area measures about 1.002 ha. The project will entail putting up a multiple use premise (45-storey building) that will comprise of two towers; one approximately 212.40 meters (696.9 feet) high and another one of about 137.40 metres (450.8 feet) high and associated facilities like parking bays. The plot preferred for the development has an area of about 2.5 acres.

The design for the commercial building tower provides for the construction of four components; a commercial component of about 30,000 square meters of total floor area, a residential component of about 10,000 square meters of total floor area, a hotel of about 15, 000 square meters of total floor area and a retail component of maximum 15,000 square meters. This make the total planned development to have an accumulated total area of 70,000 square metres.

The development will revolutionize Nairobi's skyline setting a new standard in office accommodation in Kenya and East Africa. The proposed project hereby calls for an environmental impact assessment to identify the likely environmental impacts and provide adequate mitigation measures and ensure minimal impact to the environment.

The former Nairobi City Council in 1979, through the Department of City Planning and Architecture, zoned Upper Hill Area as an extension of the Central Business District (CBD) whereby land use in the area encompass Commercial, Office and Residential developments. Over time, there has been rapid development, and preference, of commercial buildings in Upper Hill area and currently only a few pockets of plots are undeveloped.

The developer has applied for change of user to be obtained from Nairobi City County Government and development plans submitted for approval.

2.2 Background to Upper Hill neighbourhood

Upper Hill is quickly becoming the prime office location in the Nairobi Metropolitan area. Many businesses have relocated to the area from the Central Business District, with companies now building their office headquarters in Upper Hill with the spectacular and modern skyscrapers. However, the growth of Upper Hill as a commercial hub is recent. Only 10 years ago, Upper Hill was a predominantly upper-middle class residential area, with many, old colonial houses occupying 1 or 2 acres of land. Today, it is resplendent with neat, organized rows of high-rise buildings housing blue-chip local and multinational companies. The area is home to several regional and local companies headquarters; Standard Chartered Bank, Equity Bank, KCB, Britam, UAP Insurance, Commercial Bank of Africa, the World Bank, Coca-Cola, City Bank, Price water Coopers, IFC among other big names. The area is also home to many government and parastatal institutions that are relocating from the city centre such as

Teachers Service Commission, Kenya National Library Services, Kenya Reinsurance(Kenya –Re) among others.*(see plates 1-4)*

Plate 1:Blue Shield Towers and Rahimtulla Towers are office towers within the vicinity

Plate 2: Equity Centre and Nic Bank Towers are office towers within the vicinity

Plate 3: Britam office towers within the vicinity

Plate 4: View of Upper Hill from the North

2.3 Location of the Project site

The project will be situated in Upper hill within Nairobi City along Upper hill road and about 70 meters left of Haile Sellasie Avenue. Rahimtulla Towers is approximately 100 meters to the east of the proposed site for development while Highrise flats are approximately 35 meters to the north of the site. The plot planned for the development has an area of about 2.5 acres.

Plate 5: Location of the proposed development site

Plate 6: Proposed development site with flats to be demolished

2.4 Site Analysis

From the initial analysis of the site by the project implementation team the site was analysed and found to be good with pleasant weather and wind direction was found to move north east to west.The site has low density built forms with four highrise structures to be demolished and has a pleasant view of the Railway Golf Course on Northern and North western side.The site has connections to major roads via subordinate roads and the site naturally slopes upwards from the roadside(Upper Hill Road)giving elevated scope of views as shown in the figure below.

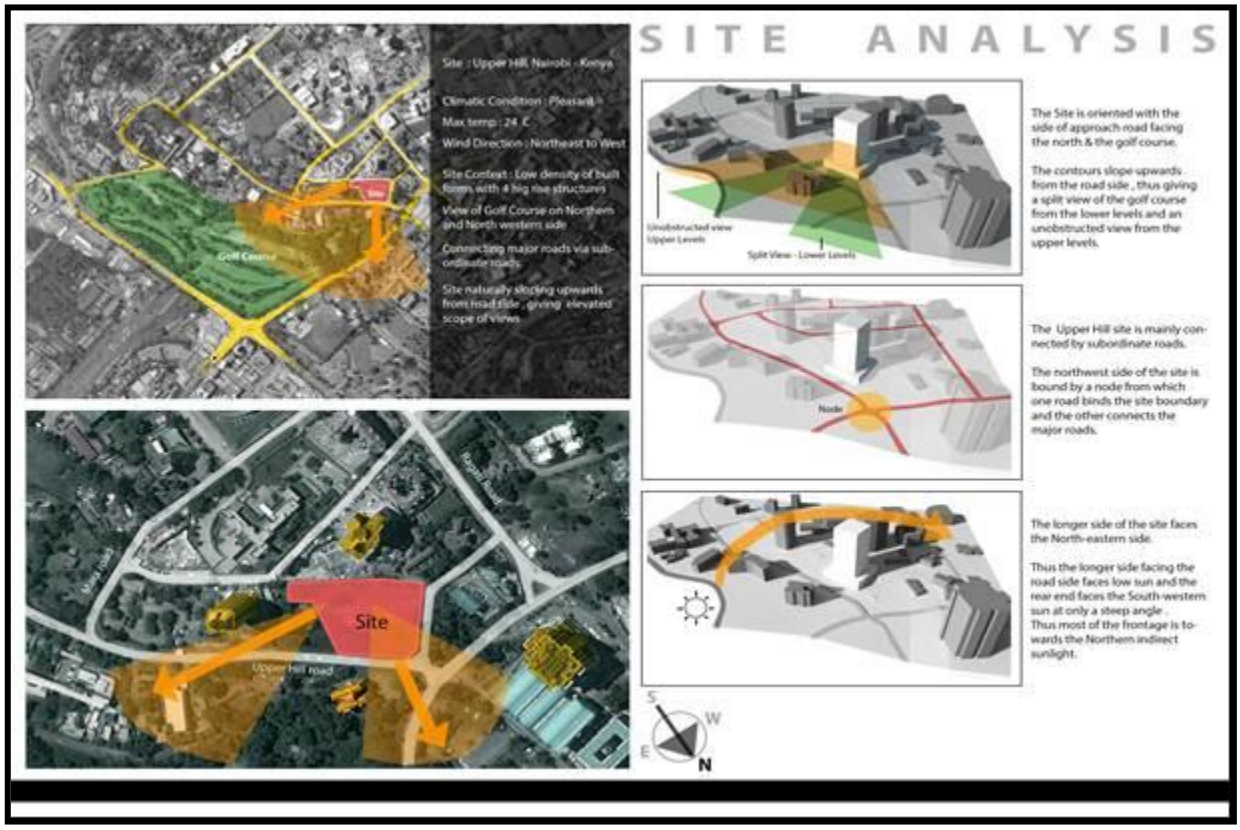


Fig 1: Proposed development site analysis summary

2.5 Neigbouring premises

Rahimtulla Towers is approximately 100 meters to the east of the proposed development site. Glory café; a catering facility is located 50m to the east of the site. Just across the Upper Hill road on the North of the site, there are Highrise flats, which are approximately 35 meters from the site. The flats are a real estate establishment and therefore a residential area. The south western end of the site borders the Fit and Lean center which serves as a fitness and training center as well as a residential area while NHIF headquarters are located approximately 148 meters west of the proposed site. The south eastern end of the site borders the proposed headquarters for Mwalimu National Co-operative & Credit Society which is still under construction.Several other office tower developments are doted within the upper hill area are under construction along the radius of Upperhill Road, Elgon Road,

Hospital Road,Mara Road,Ragati Road and Haile Selassie Avenue as an indication of a fast growing business district*(see plates 7 and 8)*

Plate 7: Mwalimu SACCO Ltd. Headquarters under construction next to the development plot

Plate 8: Rahimtulla Towers East of the proposed site

2.6 Description of the proposed project

The proponent intends to construct a business complex comprising; a commercial component of about 30,000 square meters of total floor area, a residential component of about 10,000 square meters of total floor area, a hotel of about 15, 000 square meters of total floor area and a retail component of maximum 15,000 square meters of total floor area amounting to 70,000 square metres.

2.7 Design of the Project

2.7.1 Foundations and plot coverage

The building will be founded on hard rock at a depth of approximately 8 m. Based on geotechnical investigations carried out on site, the rock that will be encountered will be excavated using machinery. However, if an outcrop of very hard rock is encountered, all possible means of breaking the rock will be explored before blasting is considered. The necessary licenses will be obtained before any blasting is done. Plot coverage will be 60% on ground level *(see fig 2 below)*

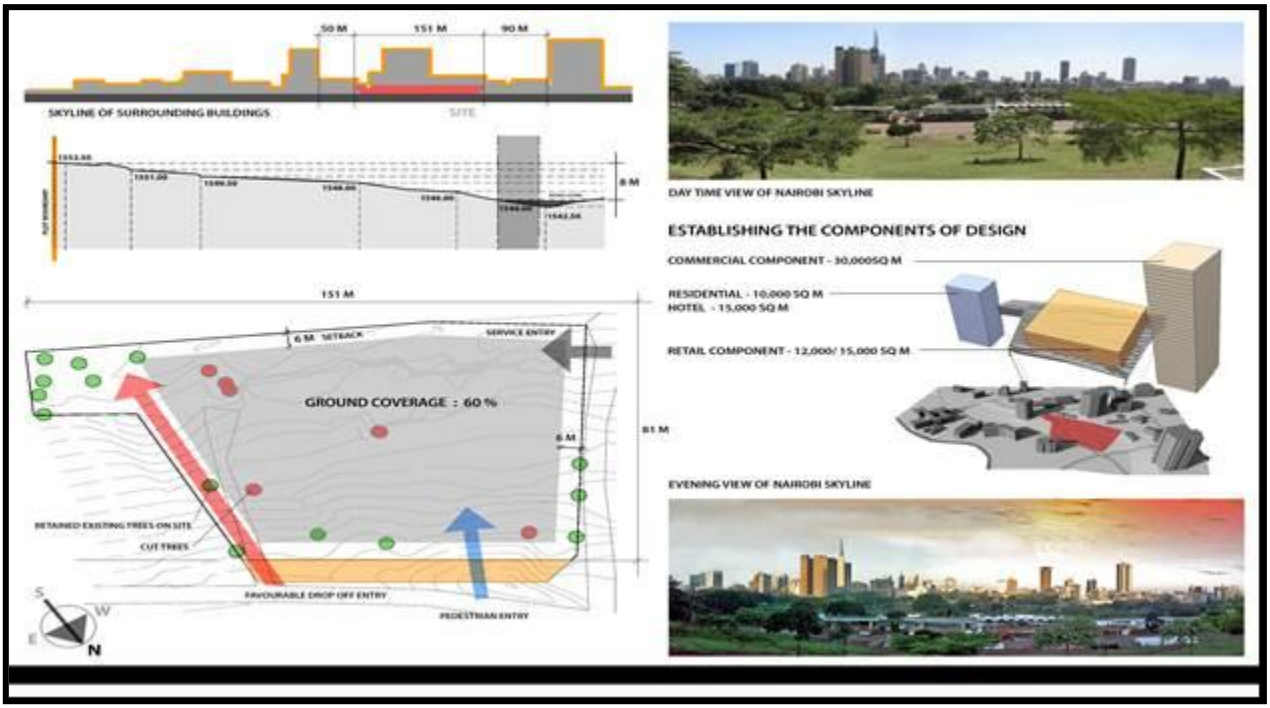


Fig 2: Ground coverage and layout plan

2.7.2 Main towers

Mostly, the business complex will comprise of two towers, the first one comprising majorly of office floor and the second one comprising majorly of guest rooms. The first tower as described above will have 45 floors with three basements, a lower ground level and an upper ground level. The second

tower comprising majorly of 22 typical guest room floors will have 30 floors with 3 basements, lower ground level, upper ground level and a service level.

The accesses to the building will be designed to ensure no traffic congestion. Acceleration/deceleration lanes will be provided and any recommendations by the traffic expert will be incorporated into the civil access roads design *(see fig 3 below).*

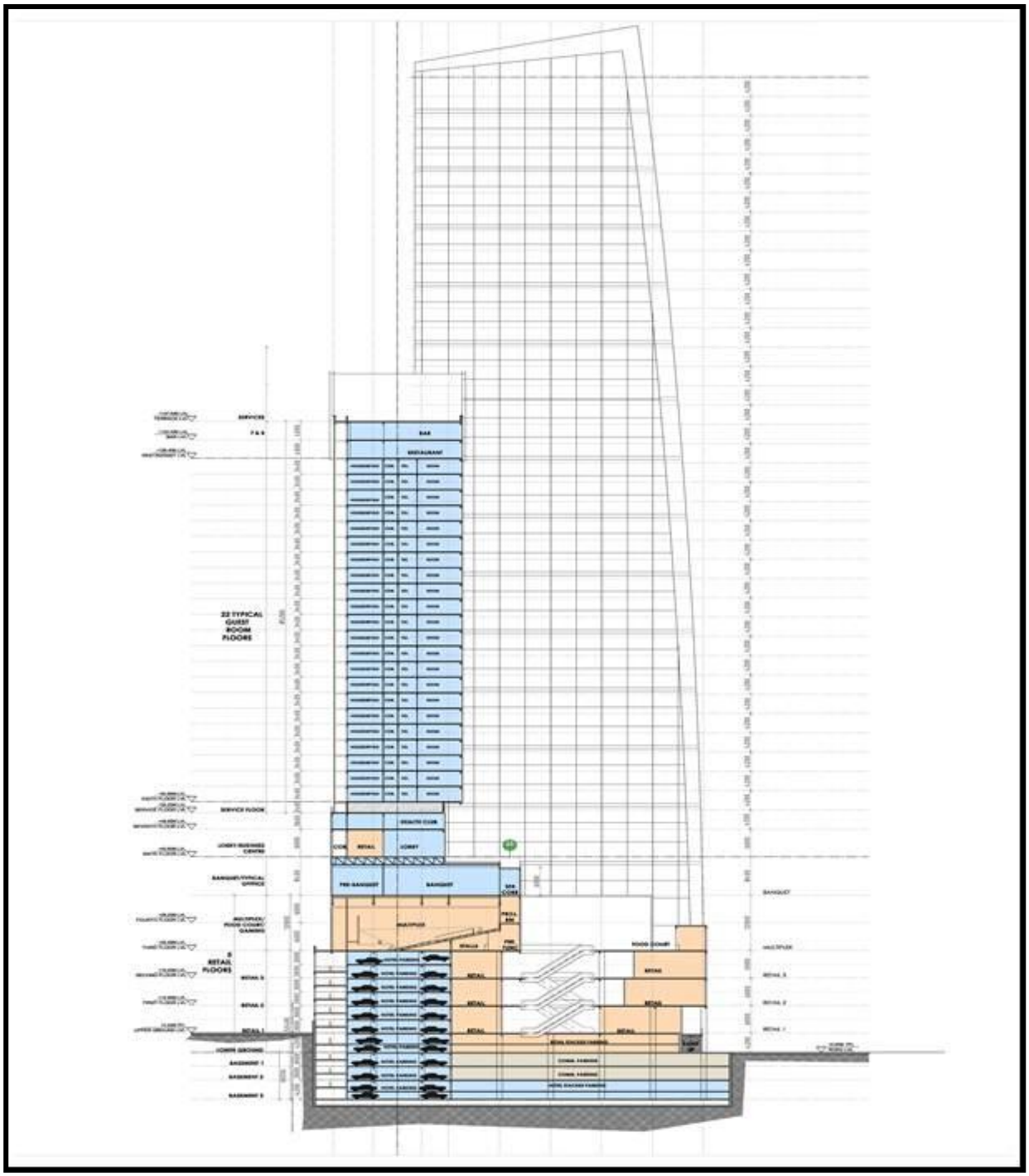


Fig 3: Proposed development vertical profile

2.7.3 Storm water management

The storm water will be discharged through city county drains along the roads adjacent to the development. Where necessary, the drains will be improved to cater for the expected increased storm water to ensure that no flooding into roads or neighboring properties takes place.

Foul sewage will be connected to the city sewer line and is expected to comprise of domestic waste and office type waste, without any industrial effluent.

The civil/structural materials anticipated to be used on the project are;

- Structural concrete out of cement, river sand and/or rock dust and ballast with approved additives if proposed by contractors.
- Reinforcement bars made up of square twisted bars and/or ribbed bars.
- Structural steel members comprising Universal Beams/Columns, Rolled Steel Channels/Angles/Tees and Hollow Sections (Rectangular, Square & Circular).
- Structural timber comprising Cypress and Pine or other approved timber that will be proposed by the contractor.
- Masonry blocks either from dressed quarry stones or machine cut stones.
- Foul/Storm drains will be out of precast concrete elements or PVC pipes.
- Road works paving blocks, kerbs channels and paving slabs will be out of precast concrete elements.

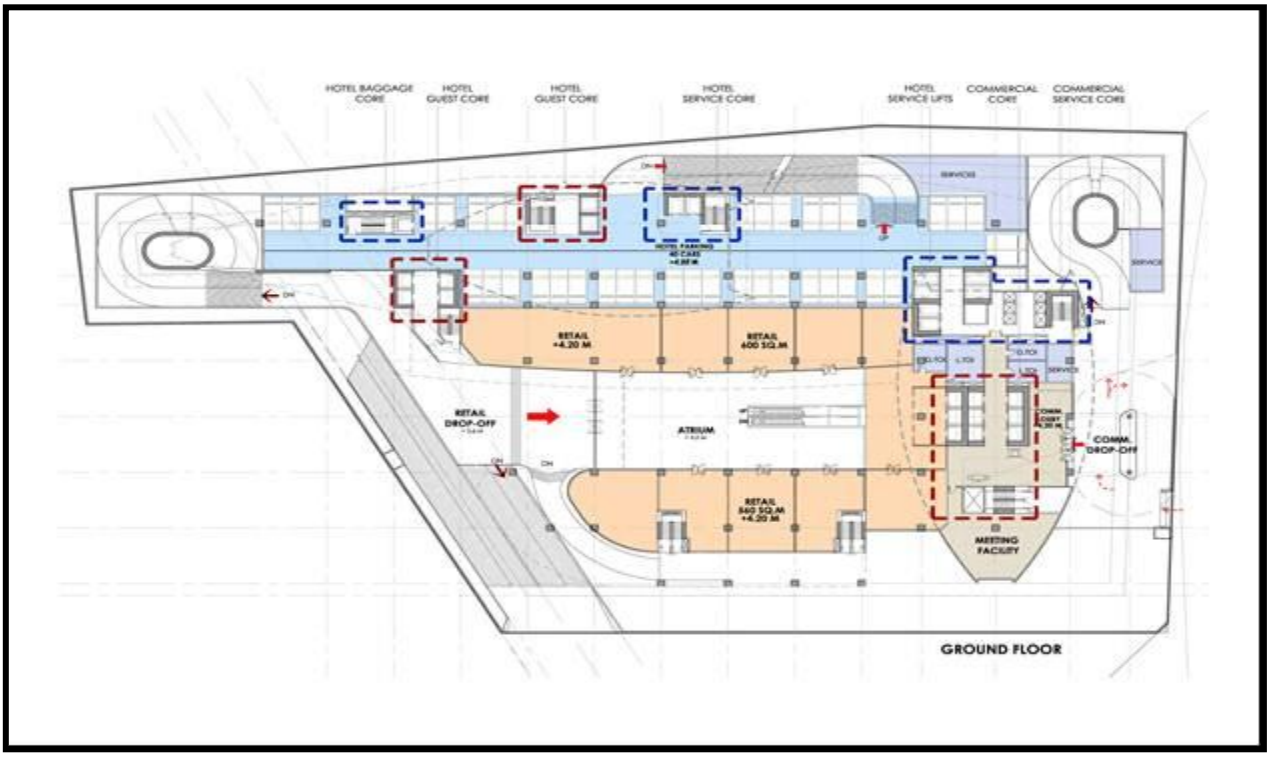


Fig 4: Ground floor plan

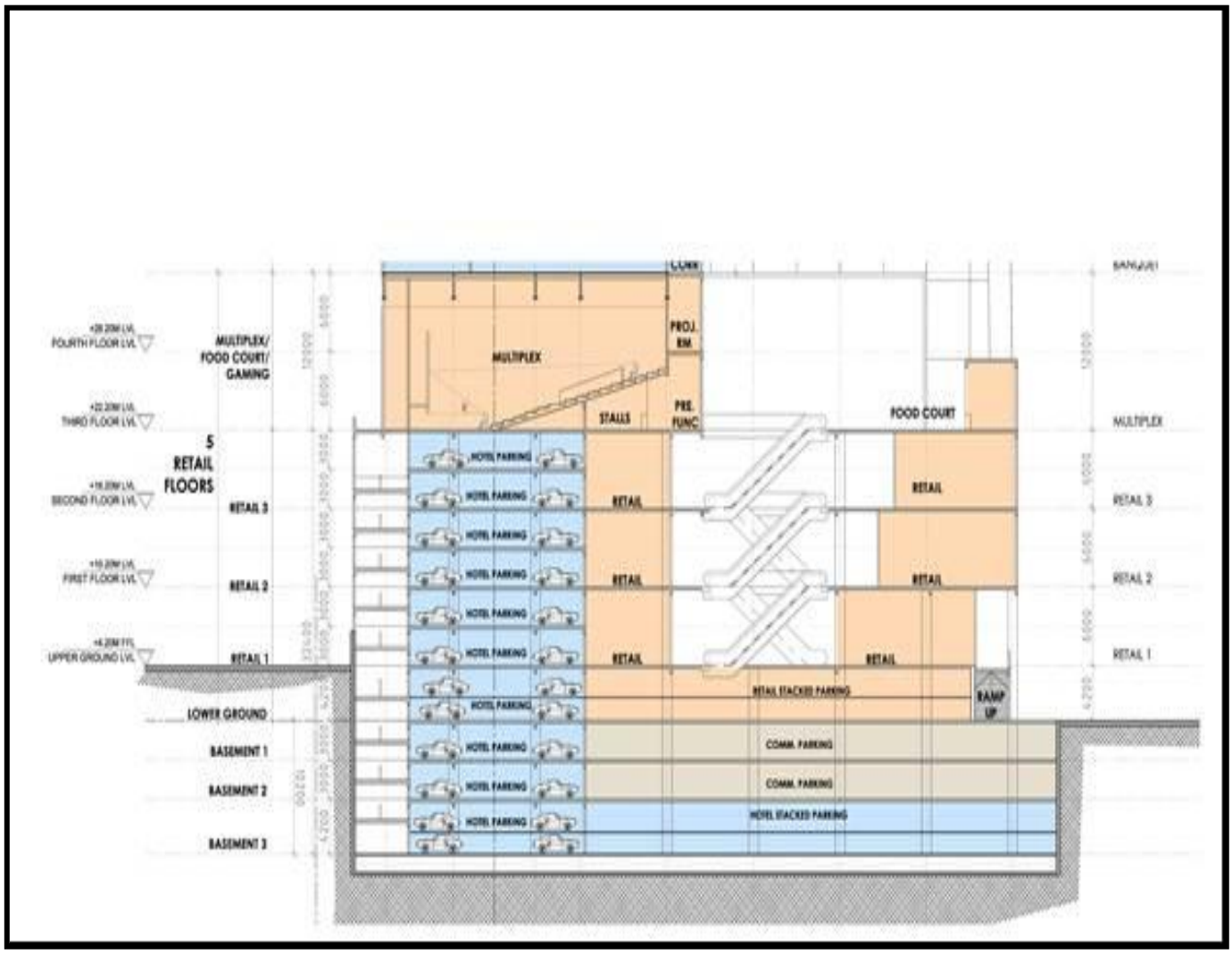
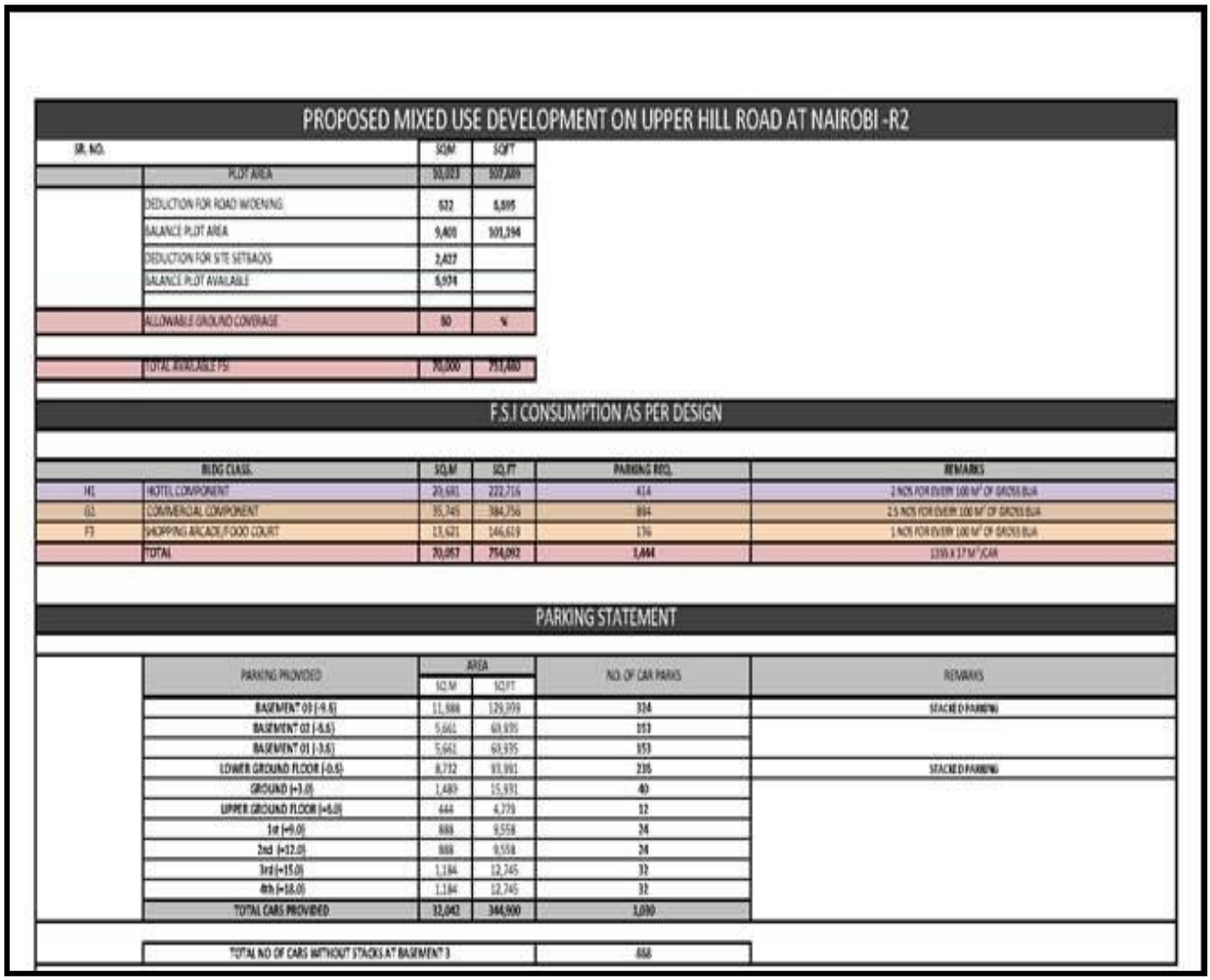


Fig 5: Proposed parking vertical profile



PROPOSED MIXED USE DEVELOPMENT ON UPPER HILL ROAD AT NAIROBI -R2

SR. NO.		SQM	SQFT
	PLOT AREA	10,023	107,889
	DEDUCTION FOR ROAD WIDENING	622	6,695
	BALANCE PLOT AREA	9,401	101,194
	DEDUCTION FOR SITE SETBACKS	2,427	
	BALANCE PLOT AVAILABLE	6,974	
	ALLOWABLE GROUND COVERAGE	60	%
	TOTAL AVAILABLE FSI	70,000	753,480

F.S.I CONSUMPTION AS PER DESIGN

	BLDG CLASS.	SQ.M	SQ.FT	PARKING REQ.	REMARKS
H1	HOTEL COMPONENT	20,681	222,716	414	2 NOS FOR EVERY 100 M² OF GFCFA BUA
G1	COMMERCIAL COMPONENT	35,245	384,756	884	2.5 NOS FOR EVERY 100 M² OF GFCFA BUA
F3	SHOPPING ARCADE/FOOD COURT	13,621	146,619	136	1 NOS FOR EVERY 100 M² OF GFCFA BUA
	TOTAL	70,057	754,092	1,444	1395 X 17 M²/CAR

PARKING STATEMENT

	PARKING PROVIDED	AREA SQ.M	AREA SQ.FT	NO. OF CAR PARKS	REMARKS
	BASEMENT 03 (-9.5)	11,588	129,359	324	STACKED PARKING
	BASEMENT 02 (-6.6)	5,661	60,935	153	
	BASEMENT 01 (-3.6)	5,661	60,935	153	
	LOWER GROUND FLOOR (-0.5)	8,732	93,991	236	STACKED PARKING
	GROUND (+3.0)	1,480	15,931	40	
	UPPER GROUND FLOOR (+6.0)	444	4,779	12	
	1st (+9.0)	888	9,558	24	
	2nd (+12.0)	888	9,558	24	
	3rd (+15.0)	1,184	12,745	32	
	4th (+18.0)	1,184	12,745	32	
	TOTAL CARS PROVIDED	32,043	344,900	1,030	
	TOTAL NO OF CARS WITHOUT STACKS AT BASEMENT 3			868	

Fig 6: Proposed floor area summary

2.7.4 Natural Ventilation

The building is being designed to encourage and maximize the use of natural ventilation by providing good internal comfort conditions throughout the year.

2.7.5 Water Services

The potable water service will be from bulk storage tanks located in critical areas of the commercial office tower. Potable water will be boosted to serve potable water outlets throughout the building including wash hand basins, the tenant equipment rooms, lift shafts, small washrooms and cupboards. For office areas the landlord will install risers with subsequent fit-out design and installation by tenant to suit space planning. Hose reels will be provided for the use of occupants in event of fire. Various protection systems including oil leak detection, local water leak detection, major water leak protection, water supply protection and high temperature alarms will be installed for critical installations.

2.7.6 Lighting Systems

Office lighting will be fitted using the latest energy saving equipment. The landlord's fit-out guide will require highly efficient light sources such as recessed T5 linear fluorescent luminaires with brightness limitation to control the glare with a colour temperature requirements. Lighting will be dimmable and be under daylight and occupancy controls. Landlord lighting will be managed by a lighting control system comprising central controllers, area controllers, lighting control modules, sensors, multi sensors and software. To save energy, provision is made for lighting controls with; daylight linked dimming, occupancy controls in spaces which are not continuously occupied including the car park, time and daylight sensor controls on external lighting, energy management, lamp management monitoring for failure and integration for control and monitoring of emergency lighting

2.7.7 Back-up Power Supply

Space should be provided for low voltage standby generators to support the complete building supply. Bulk fuel storage tank should be provided in the Basement area to support the generator for a minimum of 10 days normal operation. Property owner's UPS systems should be provided to protect the office tower operator's essential equipment, including Building Management, Security and associated systems. A complete earthing system including bonding of all exposed conductive parts of the electrical installation, supplementary bonding of metal work within the office tower and main equipotential bonding of the incoming services at the entry points should be provided. The earthing system to comprise earth electrodes, earth bars, protective conductors and all necessary earthing accessories and connectors.

2.7.8 Safety and Security Systems

A fully addressable automatic fire alarm system will be installed incorporating the functions of fire detection and alarm, voice alarm and emergency voice communication. The building should be provided with a distributed type Fire Alarm System comprising multiple alarm collection panels, linked into the a high integrity data collection reporting to the building Fire Command Centre and repeater panels as agreed with the fire service. A CCTV system will be installed with fixed cameras monitoring the main access points and final escape exits and additional key internal areas, including the car park, lift lobbies/communication corridors on each floor. The system will incorporate monitoring and recording facilities in the Fire Control Centre.

2.7.9 Communication Systems

Telecommunication rooms will be provided in the design for use of the telecoms provide(s) and connection to their external telecoms network(s). It is suggested in each room a local UPS and PDU distribution board shall be installed to feed power outlets. The PDU will be fed from the essential section of the main switchboard. A structured cabling network will provide a resilient, high bandwidth system for property owner services. It is also recommended that a containment and riser space be provided for tenant telecoms services from the utility providers.

2.8 Description of the Project's Construction Activities

2.8.1 Pre-construction Investigations

The implementation of the project's design and construction phase started with preliminary surveys and cost-benefit analysis to establish the need for a bigger and complex office. Investigations also covered identification of any existing legal and regulatory requirements that may affect the project at any stage of its implementation. The existing structures will have to be demolished to pave way for the construction.

2.8.2 Sourcing and Transportation of Building Materials

The proponent sources several building materials locally and expressed the confidence that the materials can be procured locally. The great emphasis laid on procurement of building materials from within the local area makes both economic and environmental senses since it reduces negative impacts of transportation of the materials to the project site through reduced distance of travel by the materials transport vehicles.

Building materials are transported to the project site from their extraction, manufacture, or storage sites using transport trucks. There are adequate road linkages for the purpose of smooth transport of building materials into the project site.

2.8.3 Storage of Materials

Building materials will be stored on site according to their need. Bulky materials such as rough stones, ballast, sand and steel can be carefully piled and covered on site. Materials such as cement, paints and glasses among others are to be stored in temporary storage rooms conveniently within the project site for this purpose.

2.8.4 Masonry, Concrete Work and Related Activities

The construction of the building's foundations, floors, and drainage systems among other components of the project involves a lot of masonry work and related activities. General masonry and related activities include reinforced structure of columns and beams filled with stone/block walls, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are labour intensive and are to be supplemented by machinery such as concrete mixers. In addition, activities such as concrete mixing and curing require large amounts of water.

2.8.5 Structural Steel Works

The building is to be reinforced with structural steel for stability. Structural steel woks involve steel cutting, welding and erection of forms for beams and slabs.

2.8.6 Roofing and Sheet Metal Works

Roofing activities include galvanized iron sheet metal cutting, raising the roofing materials to the roof, fastening the roofing sheets to the roof, fixing of the concrete tiles.

2.8.7 Electrical Work

Electrical work during construction of the premises will include installation of electrical gadgets and appliances including electrical cables, lighting apparatus and sockets. In addition, there are other activities involving the use of electricity such as welding and metal cutting.

2.8.8 Plumbing

Installation of pipe work for water supply and distribution will be carried out from the existing supply and then to associated facilities. In addition, pipe work will be installed to connect sanitary facilities with Nairobi Water and Sewerage system, and for drainage of storm water from the rooftop into the peripheral drainage system. Plumbing activities will include metal and plastic cutting, the use of adhesives, metal grinding and wall drilling among others.

2.8.9 Installation of Equipment

Several equipment will be installed within the building and other facilities especially the new extension of the offices. Equipment to be installed include air conditioning and refrigeration equipment, firefighting equipment, alarms, lighting systems, sanitary equipment and waste handling facilities, railings and others as needs be.

2.9 Description of the Project's Operational Activities

2.9.1 Tenancy and Related activities

This will be the main thrust of activities of the project as the area is an office and retail and recreational centre. The tenancy terms and conditions will be determined by the choice of the proponent who can employ caretaker to act on his behalf. Several environmental aspects are associated with shopping and office buildings and related activities including traffic congestion, human congestion etc.

2.9.2 Solid Waste and Waste Water Management

The proponent will provide facilities for handling solid waste generated within the facility. These will include dust bins and skips for temporarily holding waste within the premises before final disposal at the Nairobi city dumping site.

Sanitary waste from the premises will be discharged into N.W.S.C. sewerage system, while storm water from the roof of the premises will join Nairobi city storm water drainage system.

2.9.3 Cleaning

The proponent will be responsible for regular washing and cleaning the complex corridors, toilets and pavements. Individual tenants will be responsible for washing and cleaning their own premises. Cleaning operations will involve the use of substantial amounts of water.

2.9.4 General Repairs and Maintenance

The commercial office tower and its facilities will be repaired and maintained regularly during its operation phase. Such activities will include repair of building walls and floors, repairs and maintenance of electrical gadgets and equipment, repairs of leaking water pipes, painting, maintenance of flower gardens and grass lawns, and replacement of worn out materials among others.

2.10 Description of the Project's Decommissioning Activities

2.10.1 Demolition Works

Upon decommissioning, the project components including buildings, pavements, drainage systems, parking areas and perimeter wall will be demolished. This will produce a lot of solid waste, which will be reused for other construction works or if not reusable, disposed of appropriately by a licensed waste disposal company.

2.10.2 Dismantling of Equipment

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

2.10.3 Site Restoration

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

2.11 Building Materials and Energy Used

During the construction phase, several building materials will be required. Where possible, building materials will be sourced locally, with importation sought where necessary e.g. finishes & fittings. Materials such as sand, ballast and hard core can be obtained from quarrying companies in the surrounding areas.

The main sources of energy required for construction of the commercial complex include mains electricity and fossil fuels (especially diesel). The proponent will promote efficient use of building materials and energy through proper planning to reduce economic and environmental costs of construction activities.

2.12 Solid Waste Generated

A lot of solid waste is expected to be generated during construction of the project and these will include metal cuttings, rejected materials, surplus materials, surplus spoil, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. The existing residential units will be demolished to pave way for the construction of the office tower. As such large volumes of solid waste

from the demolitions will be generated. The proponent has plans to minimize the generation of waste during construction and proper management of the demolition waste.

2.13 Liquid Effluents generated by the Project

During construction, liquid effluents emanating from the project site will include site drainage and run-off. Such run-off may result from curing processes and drainage of areas filled with storm water. The major liquid effluent during the operation of the project will be sewage. In addition, cleaning/washing operations will lead to generation of substantial amounts of liquid effluents.

2.14 Estimated Project Investment Cost

The project investment cost for the proposed commercial building tower is estimated at three billion, seven hundred and eighty one million, six hundred and twenty one thousand Kenya Shillings **(Kshs. 3,781,621,000.00).**

3 BASELINE INFORMATION OF THE STUDY AREA

3.1 Introduction

Upper Hill is within Nairobi the Capital City of Kenya. It is one of the fast growing cities in Africa. The city borders Eastern province on the East and Central province to the west. Nairobi is the most populous city in East Africa, with a current estimated population of about 3 million. According to the 2009 Census, in the administrative area of Nairobi, 3,138,295 inhabitants lived within 696km^2 (269 sq mi). Nairobi is currently the 12th largest city in Africa, including the population of its suburbs

Nairobi City has experienced rapid growth in terms of both population and physical expansion. The physical area of Nairobi has been expanding tremendously from 3.84 Km^2 in 1900 to 684 Km^2 in 1963, which is the current official size.

3.2 Drainage

Nairobi City lies in the Athi River Drainage Basin. The major rivers that cross the City include Nairobi, Ruaraka, Ngong, Athi and Mathare River. All these drain from the West and flow towards the Eastern direction as dictated by the topographical features. As the rivers pass through the City, industrial effluents, municipal waste and siltation heavily pollute them. However, the project site has no riverine ecosystems except small valleys that drain into City drainage.

3.3 Soils

Soils in Upper Hill area are mostly well-drained black cotton volcanic soils with hard rock beneath surfaces between 5m-8m depths.

3.4 Vegetation

Several mature trees were identified at the proposed construction site near the North eastern boundary of the development plot; four mature *Grevilia Spp*., three *Eucalyptus spp.*and five indigenous tree species. The proposed area of construction has a four unoccupied high rise residential flats with three levels each with a DSQ at the far south east corner of the premises.

3.5 General Climate

At 1,795 metres (5,889 ft) above sea level, Nairobi enjoys a moderate climate. Under the Köppen climate classification, Nairobi has a subtropical highland climate. The altitude makes for some cool evenings, especially in the June/July season when the temperature can drop to 10 °C (50 °F). The sunniest and warmest part of the year is from December to March, when temperatures average the mid-twenties during the day. The mean maximum temperature for this period is 24 °C (75 °F).

3.6 Topography

Nairobi lies at an altitude of 1680m above sea-level, but this height ranges from 1500m (to the east) to 2300m (to the West). It is located at longitude 36^o 50$'$ east and latitude 1^o 18$'$ South about 140 km South of the Equator and situated at an elevation of about 5,500 feet above sea level, placing its high affect for the cooler air to keep its temperatures moderate.

3.7 Climatic Conditions

Nairobi city lies so close to the Equator but being 1680m above sea-level, its temperatures are altitude-modified tropical, but not torrid. The mean annual temperature is 17^0 C and the mean daily maximum and minimum temperature are 23^o C and 12^o C respectively, (Chandler, 1971). On the other hand, the mean annual rainfall is 1080 mm falling in two distinct seasons: the long rains from March to May and the short rains from mid-October to December. The Northern and Western areas have a high rainfall; the East and South a low rainfall (Chandler, 1971).

The average annual temperatures of the area range from 18 to 20^oC, with average minima and maxima of 12–14 and 24 – 26^oC, respectively. The warmest period occurs from January to March. Average potential evaporation is between 1,550 and 2,200 mm per year.

3.7.1 Average Daily Temperatures

The average daily temperature throughout the year (**See table 4 below**) varies slightly from month to month with average temperatures of around 17 degrees Celsius during the months of July and August to about 20 degrees Celsius in March. But, the daily range is much higher, with the differences between maximum and minimum temperatures each day around 10 degrees in May and up to 15 degrees in February. Between the months of June to September, southeast winds prevail in the coastal parts of Kenya and last up to several days without a break. The clouds cause day temperatures to remain low and most times the maximum temperature stay below 18 degrees Celsius. The minimum temperatures also remain low during cloudy nights, usually hovering around 8 degrees Celsius and sometimes even reaching 6 degrees Celsius. Clear skies in January and February also bring colder nights. The highest temperature ever reached in Nairobi was 32.8 degrees Celsius and the lowest was 3.9 degrees Celsius.

Table 2: Average Daily Temperature in Nairobi City

Month	Mean Maximum ^{0}C	Mean Minimum ^{0}C	Mean Range ^{0}C
January	26.8	13.1	13.7
February	28.0	13.4	14.6
March	27.4	14.4	13.0
April	24.6	14.3	10.3
May	24.1	14.2	9.9
June	23.1	12.6	10.5
July	22.3	11.5	10.8
August	22.7	11.8	10.9
September	25.3	12.2	13.1
October	26.2	13.7	12.5
November	23.6	14.4	9.2
December	25.1	13.8	11.6
Year	24.9	13.3	11.6

Source: Nairobi District Development Plan 2002-2008

3.7.2 Average Humidity Values

Because of Nairobi's location just south of the equator in combination with humid air pumped in from the Indian Ocean, the humidity values for each day are generally on the higher end (**See table 5**).

Table 3: Mean Relative Humidity Values (%)

Time	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
9.00 A.M	79	74	82	86	85	85	83	85	82	80	36	83
3.00 P.M	45	37	43	53	55	59	53	53	50	47	57	54

Source: Nairobi District Development Plan 2002-2008

This is not to say that values are always high, since the easterly winds coming off the Indian Ocean tend to keep the temperatures standard throughout the country; therefore the "warm sticky" feeling is usually not associated with Nairobi as much as one would think. In the summer to autumn months of January to April, relative humidity values have been known to plummet to anywhere from 10% to 20%. The typical day, humidity-wise, starts off with nearly saturated in the morning hours, and steadily decreases throughout the remainder of the day.

3.7.3 Average Rain Amounts

With these routinely high relative humidity figures, it is not surprising that the Nairobi climate is one that produces much rain annually. In fact, from the past 50 years, the expected amount of rain could be anywhere in the range of 500 to 1500 mm, with the average ringing in at 900 mm. The majority of these rainfall figures crash down in Nairobi in one major and one minor monsoon seasons respectively. The major monsoon season occurs within the months of March to May, and is called the "Long Rains" by the locals. The minor monsoon seasons emerges within the October to December Months, and is called the "Short Rains" by the Nairobi citizens. That is what the meteorologists as a whole know about the monsoon seasons. What they do not know is exactly when these seasons will start. There is usually not an indication of when these rainy seasons will start, since it is difficult to determine when one starts and when the other finishes. Consequently, one may think there is only one rainy season when looking at the annual rainfall amounts (**See table 6**).

Table 4: Annual mean rainfall (mm) based on the records for 50 years

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
48	48	115	195	137	42	15	21	24	52	114	77

Source: Nairobi District Development Plan 2002-2008

3.7.4 Average Winds

Winds along the surface are predominantly easterly throughout the entire year. They are shifted to northeast between October and April, and they are shifted southeast between May and September. Right before the "Long Rains" season, the strongest winds occur, reaching speeds of 20 to 25 miles per hour. During the rest of the year, winds are usually at speeds of 10 to 15 miles per hour. During the night, the winds are calm.

3.7.5 Average Sunshine

Early mornings in Nairobi are often cloudy, but the sun peeks through by mid-morning. Throughout the year, there is an average of seven hours of sunshine per day. Thirty per cent more sunlight reaches the ground during the afternoon than in the morning. Of course, there is more sunshine during the summer months, when the sun is more overhead in the southern hemisphere. Infrequently during the rainy season the sun never show through the clouds. Even in August, the cloudiest month, there is an average of four hours of sunshine.

3.8 Hydrological Systems and Drainage Systems

The drainage system in Kenya is generally dominated by the Great Rift Valley, which runs in an approximately North-South direction, with water flowing from its flanks westwards to Lake Victoria and eastwards to the Indian Ocean. The project area has very well drained soils and there is no possibility of ponding observed.

3.9 Infrastructure

Due to rapid urban growth, provision of basic infrastructure for all has become an important concern of development planners in Nairobi. Basic infrastructural services that have deteriorated due to such rapid increase in population include: Solid Waste Management (SWM) system; Water and Sewerage Systems; Drainage and flood protection; Roads; Mass transportation; Electric installations; and telecommunications. Greater environmental pollution, congestion and problems have been the result of under-provision of such basic services.

Nairobi city is well served with good communication and transport network such as air, road, and railway. It is centrally located to serve the Eastern African Countries. Bus and train stations are within an easy walk of the City centre. The main Railway line runs from Mombasa through Nairobi to Malaba. The Network facilitates transportation of agricultural products from Western Kenya to the Coast. The city is a hub of road transport connection other major towns in the country. On air transport Jomo Kenyatta International Airport makes it easy to transport goods from all over the world into the country and vice versa.

The major source of water is the water supplied by the Nairobi Water and Sewerage Company. However, in the project area and indeed many areas within Nairobi has a high potential for underground water use by digging boreholes and shallow wells to substitute for the other sources of water supply. Energy in its various forms is used to varying degrees, but by far the most important is

electricity, wood fuel supplemented by fossil fuels is used in relatively very few residents. Other sources of energy such as solar, wind and biogas are rarely used.

3.10 Population

Nairobi City hosts over 3.5 million inhabitants while the annual growth rate is estimated at 7% and a density of 3079 persons per sq. Km. Nairobi records one of the highest urban population densities in the country.

3.11 Economic Activities

The major economic activities in Nairobi include businesses in informal and formal lines. Some of the investments in the city are industries, farming and office complexes. The city also is a home of a number of international UN organizations for example United Nations Environmental Programme (UNEP) Agency. Due to its population, Nairobi provides numerous opportunities for trade at various scales. Because of these characteristics, it is considered the commercial centre for Kenya and even East Africa. Owing to its huge economic potential, Nairobi was once the headquarters of the East African Community (EAC). Because of these characteristics, it is considered the commercial centre for Kenya and even east Africa. Owing to its huge economic potential, Economic activities within the proposed project site are Insurance brokers, Media Consultancy, Estate holdings, and Academic Institutions.

3.12 Waste Management

Out of 1600 metric tons of solid wastes generated daily in the City by 2002, only 40 per cent was being collected (Kibwage, 2002). Out of this total the Nairobi City Council and Private Companies combined, only manage to dispose only 47.1 per cent of the total garbage turnover. The accumulated mess of waste 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). BINS (Nairobi) Services Limited (BINS Ltd) and Domestic Refuse Disposal Services Limited (DRDS Ltd) were the two private companies that came into the field of Household Waste Management (HWM) in 1986 and 1987 respectively. Since then, over 70 companies have emerged in the city targeting large waste producers like supermarkets, offices, Hotels and residential apartments. The prevailing waste disposal need therefore calls for the need of waste disposal facilities like an incinerator.

4 RELEVANT LEGISLATIVE AND REGULATORY FRAMEWORK

4.1 Introduction

Environmental impact assessment is a tool for environmental conservation and has been identified as a key component in new project implementation. According to section 58 of the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, second schedule 9 (I), and Environmental (Impact Assessment and Audit) Regulation, 2003, both new and old projects must undergo Environmental Impact assessment and Audits. The report of the same must be submitted to National Environmental Management Authority (NEMA) for approval and issuance of the relevant certificates.

There is a growing concern in Kenya and at global level that many forms of development activities cause damage to the environment. Development activities have the potential to damage the natural resources upon which the economy is based. Environmental Impact Assessment is a useful tool for protection of the environment from the negative effects of developmental activities. It is now accepted that development projects must be economically viable, socially acceptable and environmentally sound.

4.2 Environmental policy

This EIA has been prepared to fully comply with environmental and social safeguard policies and procedures as outlined in the World Bank Safeguard Policies for Projects with regional impacts and as per various Regulations by National Environment Management Authority, in Kenya.

4.3 Relevant Kenya Policies

The policies that are relevant to the proposed project include the following:

4.6.1 Policy Paper on Environmental and Development (Sessional Paper No. 6 of 1999)

This policy was formulated on the basis of the National Environment Action Plan (NEAP) process of 1994. The policy's major objective is to harmonize environmental and developmental concerns to ensure sustainability. Furthermore, this policy ensures that environmental issues are taken into consideration before the commencement of development policies, programmes, plans and projects. The proposed project is therefore consistent with the Sessional Paper No. 6 of 1999.

4.6.2 Physical Planning Policy

The current policy governs the development and approval of all building plans as provided for in the Physical Planning Act (Cap 286). The proposed project will be subjected to the provisions of this policy and legislation.

4.6.3 Public Health Policy

The prevailing public health policy calls upon the project proponent to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. The proposed development has been designed by professional engineers and architects and as such will have all amenities/utilities that are essential for safeguarding public health for all people using the facilities.

4.6.4 The Sessional paper No.4 on Energy

The Sessional paper No.4 on Energy of Kenya's vision is to promote equitable access to quality energy services at the least cost while protecting the environment and thus it does recognize the importance of harnessing and utilizing solar energy. Additionally, the Sessional Paper states that, The Government recognizes the great potential of this source of energy and will encourage the development and utilization of appropriate technologies in attaining its vision. It is recommended that the proponent consider harnessing solar energy that can be utilized to power common areas within the proposed office development.

4.6.5 The Kenya Vision 2030

The Economic Pillar of Vision 2030 seeks to improve the prosperity of all regions of the country and all Kenyans and as such the development blueprint recognizes projects such as the Proposed Office Tower to be a necessary prerequisite in attaining the Kenya's Vision 2030.

Moreover, Environment's cleanliness and security is ensured via protection and conservation and conservation of sensitive areas such wetlands and wildlife corridors and migratory routes which can be done by conducting project's Environmental and Social Impact Assessments and developing of comprehensive mapping of land use patterns in Kenya.

4.6.6 The Kenya National Climate Change Response Strategy

The purpose of this strategy is to put in place robust measures needed to address most of the challenges posed by climate variability and change through thorough impact assessments and monitoring of various projects. According to Climate Change Projections, in this country we are likely to experience hotter drier sunny seasons, warmer wetter rainy seasons, a rise in sea levels and an increase in extreme weather events. These climactic changes will impact on our daily lives and the buildings that we work and live in must be adapted to cope with such changes. With time both existing buildings and the construction of new buildings will have to adapt to cope with the conditions climate change may produce. A range of new ways to design, construct, upgrade and occupy buildings so that they are more energy efficient as well as resilient to threats such as flooding and drought is proposed.

In the construction sector, priority inclusion areas should include energy efficient innovations and technologies, and utilization low-carbon appliances and tools; the utilization of eco-friendly energy resources such as wind, solar, biogas, small hydros, etc; as well as possible utilization of biofuels.

4.4 Institutional arrangements

Environmental Impact Assessment (EIA) is a methodology used to identify the actual and probable impacts of the projects and programmes on the environment and to recommend alternatives and mitigating measures. The assessment is required at all stages of project development with a view to ensuring environmentally sustainable development for both existing and proposed public and private sector development ventures. The National EIA regulations were issued in accordance with the provisions of Environmental Management and Coordination Act (EMCA) of 1999. The EIA Regulations must be administered, taking into cognizance provisions of EMCA 1999 and other relevant national laws. The intention is to approve and license only those projects that take into consideration all aspects of concern to the public as they impact on health and the quality of the environment.

4.5 Institutional Framework

At present there are over twenty (20) institutions and departments which deal with environmental issues in Kenya. Some of the key institutions include the National Environmental Council (NEC), National Environmental Management Authority (NEMA), the Forestry Department, Kenya Wildlife Services (KWS), Water Resources Management Authority (WRMA) and others. There are also local and international NGOs involved in environmental issues in the country.

4.6.1 National Environmental Management Authority (NEMA)

The objective and purpose for which NEMA is established is to exercise general supervision and co-ordinate over all matters relating to the environment and to be the principal instrument of the government in the implementation of all policies relating to the environment. A Director- General appointed by the president heads NEMA. The Authority shall:

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plan, programmes and projects with a view to ensuring the proper management and rational utilisation of the environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.
- Take stock of the natural resources in Kenya and their utilisation's and consultation, with the relevant lead agencies, land use guidelines.
- Examine land use patterns to determine their impact on the quality and quantity of the natural resources.
- Carry out surveys, which will assist in the proper management and conservation of the environment.
- Advise the government on legislative and other measures for the management of the environment or the implementation of relevant international conservation treaties and agreements in the field of environment as the case may be.
- Advise the government on regional and international environmental convention treaties and agreements to which Kenya should be a party and follow up the implementation of such agreements where Kenya is a party.

- Undertake and co-ordinate research, investigation and surveys in the field of environment and collect and disseminate information about the findings of such research, investigation or survey.
- Mobilise and monitor the use of financial and human resources for environmental management.
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under EMCA.
- Initiate and evolve procedures and safeguards for the prevention of accidents, which may cause environmental degradation and evolve remedial measures where accidents occur.
- Monitor and assess activities, including activities being carried out by relevant lead agencies in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impeding environmental emergencies is given.
- Undertake, in co-operation with relevant lead agencies programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other entities in that regard.
- Publish and disseminate manuals, codes or guidelines relating to environmental management and prevention or abatement of environmental degradation.
- Render advice and technical support, where possible to entities engaged in natural resources management and environmental protection so as to enable them to carry out their responsibilities satisfactorily.
- Prepare and issue an annual report on the state of the environment in Kenya and in this regard may direct any lead agency to prepare and submit to it a report on the state of the sector of the environment under the administration of that lead agency and,
- Perform such other functions as government may assign to the Authority or as are incidental or conducive to the exercise by the authority of any or all of the functions provided under EMCA.

However, NEMA mandate is designated to the following committees:

4.6.2 Public Complaints Committee

The Committee performs the following functions:

- Investigate any allegations or complaints against any person or against the authority in relation to the condition of the environment in Kenya and on its own motion, any suspected case of environmental degradation and to make a report of its findings together with its recommendations thereon to the Council.
- Prepare and submit to the Council periodic reports of its activities which shall form part of the annual report on the state of the environment under section 9 (3) and

- To perform such other functions and excise such powers as may be assigned to it by the council.

4.6.3 National Environment Action Plan Committee

This Committee is responsible for the development of a 5-year Environment Action plan among other things. The National Environment Action Plan shall:

- Contain analysis of the Natural Resources of Kenya with an indication as to any pattern of change in their distribution and quantity over time.
- Contain analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity.
- Recommend appropriate legal and fiscal incentives that may be used to encourage the business community to incorporate environmental requirements into their planning and operational processes.
- Recommend methods for building national awareness through environmental education on the importance of sustainable use of the environment and natural resources for national development.
- Set out operational guidelines for the planning and management of the environment and natural resources.
- Identify actual or likely problems as may affect the natural resources and the broader environment context in which they exist.
- Identify and appraise trends in the development of urban and rural settlements, their impact on the environment, and strategies for the amelioration of their negative impacts.
- Propose guidelines for the integration of standards of environmental protection into development planning and management.
- Identify and recommend policy and legislative approaches for preventing, controlling or mitigating specific as well as general diverse impacts on the environment.
- Prioritise areas of environmental research and outline methods of using such research findings.
- Without prejudice to the foregoing, be reviewed and modified from time to time to incorporate emerging knowledge and realities and;
- Be binding on all persons and all government departments, agencies, States Corporation or other organ of government upon adoption by the national assembly.

4.6.4 Standards and Enforcement Review Committee

This is a technical Committee responsible for environmental standards formulation methods of analysis, inspection, monitoring and technical advice on necessary mitigation measures.

Standards and Enforcement Review Committee consists of the members set out in the third schedule to the Environmental Management and Co-ordination Act. The Permanent Secretary under the Minister is the Chairman of the Standard and Enforcement Review Committee. The Director General appoints a Director of the Authority to be a member of the Standards and Enforcement Review Committee who is the Secretary to the committee and who provides secretarial services to the Committee. The Committee also regulates its own procedure. The Standard and Enforcement Review Committee may co-opt any person to attend its meetings and a person so co-opted shall participate at the liberations of the committee but shall have no vote. Finally, the Committee shall meet at least once every three months for the transactions of its business.

4.6.5 National Environmental Tribunal (NET)

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

4.6.6 National Environmental Council (NEC)

EMCA 1999 No. 8 Part III section 4 outlines the establishment of the National Environment Council (NEC). NEC is responsible for policy formulation and directions for purposes of EMCA; set national goals and objectives and determines policies and priorities for the protection of the environment and promote co-operation among public departments, local authorities, private sector, non-governmental organisations and such other organisations engaged in environmental protection programmes. It also performs such other functions as assigned under EMCA.

4.6.7 National Environmental Action Plan (NEAP)

The NEAP for Kenya was prepared in mid 1990s. It was a deliberate policy effort to integrate environmental considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and the conservation of natural resources are an integral part of societal decision-making.

4.6 Legal Framework

There are several legal provisions on environmental protection, which touch on and regulate the development of infrastructure like the one under this proposal. A summary of the various legislations relevant to the development is given hereunder. The following pieces of legislation and regulations are applicable to the proposed of development.

4.6.1 The Environmental Management and Coordination Act, 1999

The Act defines the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment. This Act is guided Policy wise by

the national environmental council, while the day-to-day enforcement falls under the Director General of the National Environmental Management Authority. Thus (NEMA) enforces the Act on behalf of the Minister responsible for Environment. Its functions include:-

- The coordination of various environmental management activities;
- Initiation of legislative proposals;
- Research, investigations, and surveys on the field of environment.
- Creation of environmental education and awareness programmes;
- Advise the government on regional and international agreements to which Kenya is party to;
- Executing the Environmental Impact Assessment (EIA) under the Environmental Impact (Assessment and Auditing) regulations, 2003, among other duties.

4.6.6.1 The Environmental Impact (Assessment and Auditing) Regulations, 2003

Environmental Impact Assessment under the Act is guided by the Environmental Impact Assessment (Assessment and Auditing) Regulations of the year 2003, which is given under legal notice no. 101. The regulations stipulate the ways in which environment impact assessment and audits should be conducted. The project falls under the second schedule of EMCA, 1999 section 58 (1), (4) that require an Environmental Impact Assessment project report. As stipulated by the legal notice No. 101, 2003, PART V, Section 31 (3((a) (i) and (ii) it is required that an environmental assessment be undertaken to provide baseline information upon which subsequent environmental control audit shall be based.

4.6.6.2 Environmental Management and Coordination (Water Quality Regulations),2006

Water Quality Regulations apply to water used for domestic, industrial, agricultural, and recreational purposes; water used for fisheries and wildlife purposes, and water used for any other purposes. Different standards apply to different modes of usage. These regulations provide for the protection of lakes, rivers, streams, springs, wells and other water sources. The objective of the regulations is to protect human health and the environment. The effective enforcement of the water quality regulations will lead to a marked reduction of water-borne diseases and hence a reduction in the health budget.

The regulations also provide guidelines and standards for the discharge of poisons, toxins, noxious, radioactive waste or other pollutants into the aquatic environment in line with the Third Schedule of the regulations. The regulations have standards for discharge of effluent into the sewer and aquatic environment. While it is the responsibility of the sewerage service providers to regulate discharges into sewer lines based on the given specifications, NEMA regulates discharge of all effluent into the aquatic environment. The regulations provide for the creation of a buffer zone for irrigation schemes of at least fifty (50) metres in width between the irrigation scheme and the natural water body. Standards for irrigation water are given in schedule nine of the regulations.

Everyone is required to refrain from any actions, which directly or indirectly cause water pollution, whether or not the water resource was polluted before the enactment of the Environmental

Management and Coordination Act (EMCA) Gazetted in 1999. It is an offence to contravene the provisions of these regulations with a fine not exceeding five hundred thousand shillings.

4.6.6.3 Environmental Management and Coordination (Waste Management Regulations),2006

The Minister for Environment and Natural Resources gazetted these regulations in 2006. These Regulations may be cited as the Environmental Management and Co-ordination (Waste Management) Regulations, 2006. Waste Management Regulations are meant to streamline the handling, transportation and disposal of various types of waste. The aim of the Waste Management Regulations is to protect human health and the environment. Currently, different types of waste are dumped haphazardly posing serious environmental and health concerns. The regulations place emphasis on waste minimization, cleaner production and segregation of waste at source.

4.6.6.4 Environmental Management and Coordination Controlled Substances Regulations, 2007 (Legal Notice No.73 of 2007)

The Controlled Substances Regulations defines controlled substances and provides guidance on how to handle them. This regulation mandates NEMA to monitor the activities of persons handling controlled substances, in consultation with relevant line ministries and departments, to ensure compliance with the set requirements. Under these regulations, NEMA will be publishing a list of controlled substances and the quantities of all controlled substances imported or exported within a particular. The list will also indicate all persons holding licenses to import or export controlled substances, with their annual permitted allocations.

The regulations stipulate that controlled substances must be clearly labelled with among other words, "Controlled Substance-Not ozone friendly'') to indicate that the substance or product is harmful to the ozone layer. Advertisement of such substances must carry the words, "Warning: Contains chemical materials or substances that deplete or have the potential to deplete the ozone layer."

Producers and/or importers of controlled substances are required to include a material safety data sheet. Persons are prohibited from storing, distributing, transporting or otherwise handling a controlled substance unless the controlled substance is accompanied by a material safety data sheet. Manufacturers, exporters or importers of controlled substances must be licensed by NEMA. Further, any person wishing to dispose of a controlled substance must be authorized by NEMA. The licensee should ensure that the controlled substance is disposed of in an environmentally sound manner. These regulations also apply to any person transporting such controlled substances through Kenya. Such a person is required to obtain a Prior Informed Consent (PIC) permit from NEMA.

4.6.6.5 Environmental Management and Coordination (Conservation of Biodiversity regulations),2006

Kenya has a large diversity of ecological zones and habitats including lowland and mountain forests, wooded and open grasslands, semi-arid scrubland, dry woodlands, and inland aquatic, and coastal and

marine ecosystems. In addition, a total of 467 lake and wetland habitats are estimated to cover 2.5% of the territory. In order to preserve the country's wildlife, about 8% of Kenya's land area is currently under protection.

The country has established numerous goals, as well as general and specific objectives that relate to these issues, among others: environmental policies and legislations; involvement of communities; documentation of national biological resources; sustainable management and conservation of biodiversity; fair and equitable sharing of benefits; technical and scientific cooperation; biodiversity assessment; dissemination of information; institutional and community capacity building; and integration of biodiversity concerns into development planning.

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

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

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

These regulations also relate noise to its vibration effects and seek to ensure no harmful vibrations are caused by controlling the level of noise. Any person(s) intending to undertake activities in which noise is suspected to be injurious or endangers the comfort, repose, health or safety of others and the environment, must make an application to NEMA and acquire a license subject to payment of requisite fees and meeting the license conditions. Failure to comply with these regulations attracts a fine of KES 350,000 or 18 months jail term or both.

4.6.6.7 Air Quality Regulations, 2008

This regulation is referred to as "The Environmental Management and Coordination (Air Quality) Regulations, 2008". The objective is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources, including as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act, 1999. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the

procedure for designating controlled areas, and the objectives of air quality management plans for these areas. The following operations (provided they are not used for disposal of refuse), are exempt from these regulations:

- Back-burning to control or suppress wildfires;
- Firefighting rehearsals or drills conducted by the Fire Service Agencies
- Traditional and cultural burning of savannah grasslands;
- Burning for purposes of public health protection;

4.6.7 The Traffic Act, 2012

The Traffic Act of gives provisions and guidelines that govern the Kenya roads transport sector. These guidelines are essential to private, public and commercial service vehicles in ensuring safety and sanity on the roads hence ensuring the environment; the human being a component is safeguarded. In section 41 The Act demands for installation and certification of speed governors for the commercial vehicles ferrying goods adjusted to the loading condition of such vehicles to a limit of 80 KPH, registration and competence of drivers.

Moreover, the owner of commercial vehicles or trailer shall ensure clear markings on their vehicles in English language on the right side of the vehicle showing ownership details, tare weight of vehicle and maximum authorized weight.
Section 26 and 27 of the same discourages engines that emit exhaust gases to the atmosphere without passing via a silencer or expansion chamber
In ensuring safety of all the persons in transit section 56 encourages that every public and commercial vehicle be fitted with inspected and first class first aid box and fire extinguisher.

4.6.8 Public Health Act (Cap. 242)

Part IX, section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 as waste pipes, sewers, drainers or refuse pits in such state, situated or constructed as in the opinion of the medical officer of health to be offensive or injurious to health.

4.6.9 Urban and Cities Act No 13 of 2011

The Act came into function with regard to Article 184 of the Constitution providing regulations on the classification, governance and management of urban areas and cities and further providing the criteria of establishing urban areas.
Part III of the Act gives the regulations and functions of every city or municipality with regard to integrated development plans, which shall include but not limited to environmental plans and disaster

preparedness, within the area of jurisdiction in achieving objects of devolved governments under section 174 of the constitution while maintaining the socio-economic rights of the people.
Moreover, in the first schedule, the Act enlists the services the services that the any municipality shall provide to its residents which include but not limited to traffic control and parking, water and sanitation, refuse collection, solid waste management, pollution abatement services among others.

4.6.10 The Land Act, 2012

This is an ACT of Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land based resources, and for connected purposes.The Land Act of 2012 subsection (1) states that 'any land may be converted from one category to another in accordance with the provisions of this Act or any other written law.' it continues to state in subsection (2) that Without prejudice to the generality of subsection (1)

a) Public land may be converted to private land by alienation
b) Subject to public needs or in the interest of defence, public safety, public order, public morality, public health, or land use planning, public land may be converted to community land
c) private land may be converted to public land by
    i. Compulsory acquisition;
    ii. Reversion of leasehold interest to Government after the expiry of a lease; and
    iii. Transfers; or
    iv. Surrender.

(d) Community land may be converted to either private or public land in accordance with the law relating to community land enacted pursuant to Article 63(5) of the Constitution.
It is important to note that any substantial transaction involving the conversion of public land to private land shall require approval by the National Assembly or county assembly
as the case may be.
Part I of the same Act states that title to land may be acquired through—
(a) allocation;
(b) land adjudication process;
(c) compulsory acquisition;
(d) prescription;
(e) settlement programs;
(f) transmissions;
(g) transfers;
(h) long term leases exceeding twenty-one years created out of private
land; or

(i) any other manner prescribed in an Act of Parliament.

Part viii of this ACT provides procedures for compulsory acquisition of interests in land. Section 111 (1) States that if land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. The Act also provides

for settlement programmes. Any dispute arising out of any matter provided for under this Act may be referred to the Land and Environment Court for determination.

4.6.11 The Land Registration Act, 2012

The Land Registration Act is place to revise, consolidate and rationalize the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. This Act applies to Subject to section 4, this Act shall apply to:

- Registration of interests in all public land as declared by Article 62 of the Constitution;
- Registration of interests in all private land as declared by Article 64 of the Constitution; and
- Registration and recording of community interests in land.

Section 24 states that: (a) the registration of a person as the proprietor of land shall vest in that person the absolute ownership of that land together with all rights and privileges belonging or appurtenant thereto; and (b) the registration of a person as the proprietor of a lease shall vest in that person the leasehold interest described in the lease, together with all implied and expressed rights and privileges belonging or appurtenant thereto and subject to all implied or expressed agreements, liabilities or incidents of the lease.

4.6.12 The Environment and Land Court Act, 2011

This Act is in place to give effect to Article 162(2) (*b*) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes.

4.6.13 The National Land Commission Act, 2012 (No. 5 of 2012)

Section 5 of the Act outlines the Functions of the Commission, pursuant to Article 67(2) of the Constitution as follows 5(1):-

- to manage public land on behalf of the national and county governments;
- to recommend a national land policy to the national government;
- to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya;
- to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;
- to initiate investigations, on its own initiative .or on a complaint, into present or historical land injustices, and recommend appropriate redress;
- to encourage the application of traditional dispute resolution mechanisms in land conflicts;
- to assess tax on land and premiums on immovable property in any area designated by law; and
- To monitor and have oversight responsibilities over land use planning throughout the country.

4.6.14 Water Act, 2002

The Water Act, 2002 provides the legal framework for the management, conservation, use and control of water resources and for the acquisition and regulation of right to use water in Kenya. It also provides for the regulation and management of water supply and sewerage services. In general, the Act gives provisions regarding ownership of water, institutional framework, national water resources, management strategy, and requirement for permits, state schemes and community projects. Part IV of the Act addresses the issues of water supply and sewerage. Specifically, section 59 (4) of the Act states that the national water services strategy shall contain details of:

- Existing water services
- The number and location of persons who are not being provided with basic water supply and basic sewerage
- Plans for the extension of water services to underserved areas
- The time frame for the plan; and
- An investment programme

Part II, section 18, of the Water Act 2002 provides for national monitoring and information system on water resources. Following on this, sub-section 3 allows the Water Resources Management Authority (WRMA) 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 the Authority.

4.6.15 The Energy Act of 2006

The Energy Act 2006 was enacted on 2nd January 2007 hence becoming. The Act establishes an Energy Regulatory Commission mandated to perform all function that pertains to energy production, transmission, setting and enforcing of energy policies, Public education and enforcing energy conservation strategies, prescribing the energy licensing process and issuing of licenses that pertain to energy sector in Kenya. Section 30 of the Act provides the factors that shall be taken into consideration prior to issuance of license. It states the need and expression of an entity to conserve and protect the environment and natural resources in accordance to the Environmental and Coordination Act of 1999 (No. 8 of 1999), moreover, the Act gives provisions for the need to protect health and safety of users of energy by providing an enabling environment of operation that protects the health and safety of users of the service for which the license or permit is required and other members of the public affected by the undertaking.

4.6.16 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 must be discharged into sewers.

4.6.17 The Occupational Safety and Health Act (OSHA),2007

Before any premises are occupied, or used a certificate of registration must be obtained from the chief inspector. The occupier must keep a general register. The Act covers provisions for health, safety and welfare. This 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. Some of the areas addressed here are machinery safety, chemical safety and health, safety and welfare special provisions are also provided in the ILO conventions on safety and health in construction recommendation, 1988 R175. Failure to comply with the OSHA, 2007 attracts penalties of up to KES 300,000 or 3 months jail term or both or penalties of KES 1,000,000 or 12 months jail term or both for cases where death occurs and is in consequence of the employer.

4.6.18 The Standards Act Cap. 496

The Act is meant to promote the standardization of the specification of commodities, and to provide for the standardization of commodities and codes of practice; to establish a Kenya Bureau of Standards, to define its functions and provide for its management and control. Code of practice is interpreted in the Act as a set of rules relating to the methods to be applied or the procedure to be adopted in connection with the construction, installation, testing, sampling, operation or use of any article, apparatus, instrument, device or process.

4.6.19 Public Roads and Roads of Access Act (Cap. 399)

Sections 8 and 9 of the Act provides for the dedication, conversion or alignment of public travel lines including construction of access roads adjacent lands from the nearest part of a public road. Section 10 and 11 allows for notices to be served on the adjacent land owners seeking permission to construct the respective roads.

4.6.20 Physical Planning Act (Cap 286)

An Act of Parliament to provide for the preparation and implementation of physical development plans and for connected purposes enacted by the Parliament of Kenya Under this Act, no person shall carry out development within the area of a local authority without a development permission granted by the local authority under section 33. The local authority concerned shall require the developer to restore the land on which such development has taken place to its original condition within a period of not more than ninety days. If on the expiry of the ninety days' notice given to the developer such restoration has not been effected the concerned local authority shall restore the site to its original condition and recover the cost incurred thereto from the developer.

4.6.21 Employment Act No 11 of 2007

The Act is enacted to consolidate the law relating to trade unions and trade disputes, to provide for the registration, regulation, management and democratization of trade unions and employers organizations and federations. Its purpose is to promote sound labour relations through freedom of

association, the encouragement of effective collective bargaining and promotion of orderly and expeditious dispute the protection and promotion of settlement conducive to social justice and economic development for connected purposes. This Act is important since it provides for employer – employee relationship that is important for the activities that would promote management of the environment within the energy sector.

4.6.22 Penal Code Cap 63

Section 191 of the penal code states that if any person or institution that voluntarily corrupts or foils water from public springs or reservoirs, rendering it less fit for its ordinary use is guilty of an offence. Section 192 of the same Act says a person who makes or vitiates the atmosphere in any place to make it noxious to health of persons /institution, dwelling or business premises in the neighbourhood or those passing along public way, commit an offence.

4.7 World Bank Safeguard Policies

The World Bank's environmental and social safeguard policies are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for Bank and borrower staffs in the identification, preparation, and implementation of programs and projects. In essence, the safeguards ensure that environmental and social issues are evaluated in decision making, help reduce and manage the risks associated with a project or program, and provide a mechanism for consultation and disclosure of information.

4.7.6 Environmental Assessment (OP/BP 4.01*)*

The objective of this policy is to ensure that World Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans-boundary and global environment concerns. A range of instruments can be used to conduct Environmental Assessments i.e. EIA, Environmental Audit, hazard or risk assessment and Environmental Management Plan (EMP). The Borrower is responsible for carrying out the EIA.

4.7.7 Natural Habitats (OP/BP 4.04)

This policy prohibits Bank support for projects that would lead to the significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats that are: legally protected; officially proposed for protection; or unprotected but of known high conservation value.
The policy is "triggered" if a project could result in any one or more of the following four events: A loss of natural habitats; Construction of "linear features" (e.g., roads, transmission lines, pipelines) that might cut through natural habitats; An effect on the water supply to or drainage from natural habitats; A direct or indirect result in resettlement or migration of people in a way that would adversely affect natural habitats.

4.7.8 Forests: (OP/BP 4.36)

This policy applies to the following types of Bank-financed investment projects:

- Projects that have or may have impacts on the health and quality of forests
- Projects that affect the rights and welfare of people and their level of dependence on or interaction with forests
- Projects that aim to bring about changes in the management, protection, or utilization of natural forests or plantations, whether publicly, privately, or communally owned.

The Bank does not finance projects that in its opinion would involve significant conversion or degradation of critical forest areas or related Critical Natural Habitats. If a project involves the significant conversion or degradation of natural forests or related natural habitats that the Bank determines are not critical, and the Bank determines that there are no feasible alternatives to the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs, the Bank may finance the project, provided that it incorporates appropriate mitigation measures.

The policy is "triggered" if any one of the following criteria is applicable.

- The project could result in direct or indirect loss of forests of high ecological value (e.g., through improving access for logging).
- The project would finance commercial logging operations or purchase of logging equipment.
- The host country is committed to sustainable management of forests.

A project that is likely to have significant adverse environmental impacts with potential for conversion or degradation of natural forests or other natural habitats that are sensitive, diverse, or unprecedented is classified as Category A; projects otherwise involving forests or other natural habitats are classified as Category B, C, or FI, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its environmental impacts.

4.7.9 Indigenous people (OP/BP 4, 20)

This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of indigenous peoples. For all projects that are proposed for Bank financing and affect indigenous peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation.

A project proposed for Bank financing that affects indigenous peoples requires:

- Screening by the Bank to identify whether indigenous peoples are present in, or have collective attachment to, the project area (see paragraph 8 of the policy);
- A social assessment by the borrower (see paragraph 9 and Annex A of the policy);
- A process of free, prior, and informed consultation with the affected indigenous peoples' communities at each stage of the project, and particularly during project preparation, to fully identify their views and ascertain their broad community support for the project

- The preparation of an indigenous peoples planning framework; and
- Disclosure of the draft indigenous peoples planning framework.

4.7.10 Physical Cultural Resources: OP/BP 4.1

The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international community.

This policy applies to all projects requiring a Category A or B Environmental Assessment under OP 4.01, project located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources.

5 PUBLIC PARTICIPATION

5.1 Introduction

This chapter describes the process of the public consultation/participation followed to identify the key issues and impacts of the proposed project. Views from the general public, local leaders, surrounding institutions and development partners who in one way or the other would be affected by the proposed project were sought. Door to door public consultations were conducted for the stakeholders neighbouring the project site. A public meeting (baraza) was also held in order to solicit the opinion of the neighbouring community and ensure comprehensiveness in the EIA study as stipulated in the Environment Management and Coordination Act, 1999. Public consultation was conducted by a team of qualified EIA experts between 6th August 2014 and 22 nd August 2014 while the public meeting was held on 26th August 2014 at Crowne Plaza Ballroom and the findings were comprehensively analysed. The proposed mitigation measures suggested by the public, neighbours and other stakeholders have been integrated in the report.

5.2 Objectives of the consultation and public participation

The objective of the Consultation and Public Participation (CPP) as required in EMCA, 1999 was to:-

1. Disseminate and inform the public and other stakeholders about the proposed office tower for Jabavu Village Limited project with special reference to its key components, location and expected impacts.
2. Create awareness among the public on the need for the EIA for the proposed project.
3. Gather comments, concerns and suggestions of the interested and, would be affected/interested parties.
4. Ensure that the concerns of the interested and, would be affected/interested parties were known to the decision-making bodies and the proponent at an early phase of project development planning.
5. Establish a communication channel between the interested, would be affected/interested parties, the team of consultants and the Government.
6. Incorporate the information collected in the study by EIA Experts.

The purpose for such a process was to identify the positive and negative impacts of the project and subsequently suggest mitigation measures. It also helped in identifying other miscellaneous issues which may bring conflicts during project implementation phase.

5.3 Interested and affected stakeholders consulted

About 50 Interested stakeholders and affected parties consulted during the EIA process. (see full list of the people/Stakeholders consulted in the table below). A comprehensive list of the people/stakeholders who participated in the interviews and public meeting is attached at appendix of this report:-

Table 5: List of Public participants

S/N	NAME	CONTACTS	DESIGNATION
1.	LEAH NJUGUNA	0722 203 032/0202724848	PROPERTY MANAGER, AXIS REAL ESTATE-RAHIMTULLA TOWERS
2.	A.E COLLIS	0722200566	MANAGING TRUSTEE,RAHIMTULLA TOWERS
3.	JOHN.M.KITALA	0722 889 901	ADMINISTRATOR-AIC HEAD OFFICE
4.	ARCH. ABDI ISMAIL	0720150988	PROJECT ARCHITECT
5.	REUBEN KIPROTICH	0700108444	CARETAKER,ZEP RE BUILDING
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7.	JOHN K.RIKA	0202202352	ASSISTANT MANAGER,KENYA RE TOWERS
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12	MOSES G.MUCHEMI	0720987622	PROPERTY ADMNISTRATOR KENYA NATIONAL LIBRARY SERVICES
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22	R.N MWANGI	0722275693	AC/E ,KMA CENTRE
23	MR. OTIS	0722 287 367	ADMNISTRATOR-HIGHRISE FLATS
24	KAMAU IRUNGU	0721 324 337	BUSINESS MAN
25	VINCENT OOKO	0727 054 275	LABORER
26	JUSTINA KAVINDYO	0728 363 336	RESIDENT WHITE HOUSE
27	DAN MUGAMBI	0707 088 301	NEIGHBOR-HIGH RISE FLATS
28	BONFACE WAMBUGU	0717 744 247	FOOD VENDOR-WHITE HOUSE
29	OIGO OSEKO	0714 021 826	SHOP KEEPER HIGH -RISE FLATS
30	R.W KASILY	0721 126 669	MANAGER (GENESIS SHOP) HIGH - RISE FLATS
31	ABDUL RAZAK	0707 271 568	GUARD-WHITE HOUSE
32	MUSYOKI JOHN	0721 319 558/271 168 61	OFFICE ASSISTANT AIC HEAD OFFICE
33	JOSEPH MUSUYU	0718 032 521	SECURITY –RAHIMTULLA TOWERS
34	SIMEON RICHARD	0721 501 814	WORKER
35	WILLIAM OMBATI	0727 495 683	GUARD-AIC HEAD OFFICE
36	BERNARD KERICH	0723 270 859	GUARD-HIGH RISE FLATS
37	MERCY GACHANJA	0724 157 895	GUARDETTE-RAHIMTULLA TOWER
38	KENNETH KUKALO	0726 581 658	DRIVER
39	JAMES KISANYA	0711 730 877	WORKER
40	JOHN KIMANI	0727 263 241	FOREMAN
41	ZACHARIA KINYANJUI	0725 555 548	WORKER
42	JAMES MWANGI	0727 877 848	TRANSPORT MANAGER
43	SIMON WAINAINA	0724 969 503	WORKER
44	SAMSON KARIUKI	N/A	WORKER
45	EDITH MUSANYI	0724 311 263	RESIDENT-HIGH RISE FLATS
46	JUSTINA KAVINDU	0720831362	RESIDENT
47	PIUS KYALO	0723724771	NEIGHBOUR
48	CALVINCE ONYANGO	0725941567	RESIDENT
49	DENNIS WAFULA	0710238974	RESIDENT
50	ALICE AWILO	0723594836	RESIDENT

5.4 Methodology used in the CPP

The Consultation and Public Participation (CPP) Process is a policy requirement by the Government of Kenya and a mandatory procedure as stipulated by EMCA 1999 section 58, on Environmental Impact Assessment for the purpose of achieving the fundamental principles of sustainable development. The exercise was conducted by a team of experienced registered environmental experts in three ways, namely, (i) Key informant interviews and discussion, (ii) field surveys and observations and (iii) Public meetings.

Plate 9: Public Meeting attendees at Crowne Plaza Ballroom

Plate10: Members air their views at the public meeting

Plate 11: Presentations by Project Architect, traffic engineer and environmental consultant

5.5 Background

From the field work, it was apparent that the majority of the stakeholders were aware of the proposed project construction and the direct impacts. The proposed construction of the residential commercial office development units was nevertheless received with mixed reactions by the community as they anticipated numerous impacts both negative and positive alike. The local communities and major stakeholders independently gave their views, opinions, and suggestions as in the best of their interest and in the interest of the factors that affected the circumstances, influences, and conditions under which their organizations exist.

5.6 Issues raised

This Sub-Section covers the views and opinions of the key stake holders (local leaders, surrounding, institutions/organizations, interested persons or groups). It highlights both positive and negative socio-economic and environmental impacts anticipated during the construction and operational phases of the project. This is followed by suggested mitigation measures that the developer should incorporate to minimize environmental degradation and promote sustainable development. This section ends by highlighting the opinions and expectations of the stakeholders.

5.6.1 Positive Issues

5.6.1.1 Improving Growth of the Economy

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

5.6.1.2 Increased Revenue

The public and the various stakeholders interviewed expressed their optimism that there will be an increase in revenue collection due to the fact that there will be an increase in office space.

5.6.1.3 Affordable housing and the increase in housing stock

The Interviews revealed that the commercial building tower in the area will increase the housing stock hence they welcomed the possibility that the project in the area will be more affordable and accessible.

5.6.1.4 Creation of Employment

The local community was optimistic that the construction of the proposed project will open up new fields of employment. Despite the fact that most of the project will need skilled labour force, the people expressed hope that they will be able to access employment once the project commences mostly as casual workers. However, they wanted assurance that the locals will be given the first priority for employment once the construction of the project begins. This will be a source of income for several

individuals and households and hence is expected to boost the GDP and improve the living standards of the local people.

5.6.1.5 Improved Security of the area

The local residents and businesses were optimistic that the establishment of the project will lead to improved security situation in the neighbourhood due to the numbers that will work in the areas and the possible synergistic effects that populated neighbourhoods bring along with them.

5.6.1.6 Optimal land use

The public interviewed were optimistic that the construction of commercial office tower project will lead to opening up the area by adding more office space that ensures optimal land use as compared to the current use or any perceived future use of the said plot.

5.6.1.7 Increased Business Opportunities

Those with businesses along and around the area were optimistic that the increased number of businesses in the area will result in an increased business volume and the quality of this business will be increased by way of this project coming up in the area.

5.6.1.8 Increased Land Value

The public expressed confidence that once the project will be completely constructed; many investors will opt to buy land near the project site. This they say is bound to push high the demand for land along and near the site, which in turn will increase the value of land in the areas surrounding.

5.6.2 Negative Issues

5.6.2.1 Dust emissions

The people expressed concern over possibility of generation of large amount of dust and fumes within the project site and surrounding areas as a result of excavation works and transportation of construction materials. The proponent shall ensure that dust levels at the site are minimized through sprinkling water in areas being excavated and along the trucks used by the transport trucks and diversions within the site. Additional mitigation measures presented within the EMP will be fully implemented to minimize the impacts of dust generation.

5.6.2.2 Noise Pollution

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

5.6.2.3 Vibrations

The residents expressed fear over vibration produced by the construction machines and other moving machines in the construction site and this has likely effects on the strength of the buildings nearby.

5.6.2.4 Waste Generation

Large amounts of solid waste will be generated during construction of the project. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paints and solvent containers, broken glass among others. Solid wastes if not well managed have a potential of causing accidents and disease outbreaks due to suitable breeding conditions for vectors of cholera and typhoid. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes.

Some of the excavation material will be rendered unusable and thus will have to be disposed off. This also applies to some of the soil/rocks which may not be reusable after excavation processes are complete. All these materials needs to be collected, transported and disposed off appropriately in approved designated areas. It is encouraged that other alternative uses of these materials should be found e.g. filling excavated areas at the site.

5.6.2.5 Increased water and Electricity demand

It is expected that both the workers and the construction works will create an increased demand for water and electricity in addition to the existing demand. Water will be mostly used in the creation of aggregates for construction works and for wetting surfaces for softening or hardening after creating the formworks, watering dusty diversions and active construction sites. The contractor should obtain enough water for construction in an otherwise water unreliable water supply.

5.6.2.6 Accidents and hazards during construction and Operation Phase

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

5.6.2.7 Noise and Vibration

There was concern over the possibility of high noise and vibration levels at the project site as a result of construction works. The business owners especially at nearby businesses expressed fears of noise and vibrations from the project activities. The sources of noise pollution will include transport vehicles, construction machinery, metal grinding and cutting equipment. However, the proponent will take appropriate steps to minimize noise impacts including provision of appropriate protective equipment to construction workers, planning and minimizing the frequency of materials transportation, and ensuring that the neighbors are well informed through a notice as required by law. The contractor and/or the proponent should ensure that works are carried out during daytime i.e. from 8 a.m to 5 p.m.

5.6.2.8 Air pollution

Area residents and the neighbours raised concerns that air pollution is likely to occur during the construction phase in form of dust particulate matter emissions and greenhouse gases from the construction machines. They suggested that dust covers to be used during the transportation of materials like cement and sand. The proponent will take all the appropriate measures to curb all forms of air pollution as much as possible.

5.6.2.9 Relocation

The proposed development area provides accommodation to a few squatters residents. They requested to be given notice to vacate in good time so as to make necessary arrangements. Those squatting within the premises requested to be allowed to vacate during school holidays in August so as not to disrupt learning of their children.

5.6.2.10 Routing of transportation trucks

One of the neighbouring development managers requested for the planned for transportation trucks movement from the site during construction so that they can plan their own management plans before construction starts.

5.6.2.11 Surveys and subdivision of development plot.

One of those present asked if there was proper subdivision and surveys done for the development plot. He also asked if the area has been changed from residential to commercial zone.

5.6.2.12 Possible cracking of buildings from blasting activities

Most of the nearby residents were worried about the blasting activities that may cause buildings and structures develop cracks. Through experience they stated that they had should not de done during the day when people are in offices. As a mitigation measure, the lead environmental consultant said that this proposed activity is guided by the Environmental laws and regulations which did not exist in the time of earlier quarrying activities and hence they were now protected from unnnecessary harm from these activities. He indicated that the contractor will employ the latest technology, which produces less noise, dust, and vibrations as the requisite licenses may require. The Environmental Consultant indicated that the project will employ an Environment Health and Safety Officer to advice the contractor and monitor the activities of the quarry to ensure compliance. He also advised the local liaison and monitoring committee to work closely with the contractor officials to resolve such cases.

5.6.2.13 Road and plot alignement along Upper Hill Road

One of the participants in the meeting from neighbouring AIC headquarters indicated that fencing and perimeter walls put on site could not be indictive of any surveys had been done because the road reserve had been getting smaller with new developments. She stated that the area had been residential for a long time hence the new developments should consider ceding some way leave for road widening

e.g. near Rahimtulla towers to Haile Sellassie junction. She also decried lack of pedestrian walkways and drainage issues that affect residents' of lower areas of these new developments along Upper Hill Road.

5.6.2.14 Sewerage issues of tall towers in Upper Hill

One of the neighbouring businesses is constructing a twin 8 and 4 floor building at Kenya National Library Services (KNLS). He stated that with all these developments the sewerage system has not been upgraded he also decried the slow pace of the ring road around Kenyatta Hospital as requisite to traffic snarl ups and stated that the projected population increase of these developments has caused destruction of roads due to heavy trucks and machinery. The number of security checks around Upper Hill area was noted to be a major issue affecting traffic. He also intimated that bursting of sewers is evident especially on the road behind Rahimtulla towers joining the British council .He therefore suggested that a Biobox or Biodigester can be put up to reduce the strain on sewer line. He sated that noise and dust issues may persist due to rocky working foundations and increase project time.

5.6.2.15 Upper Hill road rehabilitation

One of the Upper Hill development association attendant stated that Upper hill road Rehabilitation is planned in Phase two of rehabilitation programme and therefore asked the developer to leave enough wayleave for the expansion of such an important road link

5.6.2.16 Increased security

A participant from Upperhill Business Asocciation indicated that traffic snarl-ups were too many in the area and needed to be addressed by the contractors. She also indicated that increased security surveillance be put up in the recreational facility.

5.6.2.17 City planning and environment issues

An officer from the Nairobi City County Environment Department stated that several issues have to be taken care of such as waste management and decommissioning of some facilities. He indicated that transport vehicles to disposal sites have to be licensed and dump waste at designated areas .He suggested that a temporary waste storage facility be put up on site and engage licensed waste collector. He also was of the opinion that environmentally friendly technologies be incorporated in project designs. Noise management plans should also be put up to reduce conflicts with neighbours while occupational health and safety issues should be adhered to strictly for safe and harmonious working environments.

5 POTENTIAL ENVIRONMENTAL IMPACTS

This Section identifies both negative and positive impacts associated with the proposed development. These are identified according to the proposed project phases namely: Construction Phase, Operational Phase and the Decommissioning Phase.

6.1 *CONSTRUCTION PHASE*

6.1.1 *Positive Impacts*

6.1.1.1 New commercial/shopping mall, hotel, office space and residential areas

With the coming up of the proposed project, cases of insecurity will reduce given that the project will attract more people hence scaring away ill minded people. The project will come along with security details, which will be a benefit to the society as well. The proponent intends to construct a business complex comprising; a commercial component of about 30,000 square meters of total floor area, a residential component of about 10,000 square meters of total floor area, a hotel of about 15, 000 square meters of total floor area and a retail component of maximum 15,000 square meters of total floor area amounting to 70,000 square metres and therefore this will result in better access to these facilities.

6.1.1.2 Immediate Impacts during construction

During construction period the informal sector will benefit from the operations. This will involve kiosk operators who will be selling food to the workers on site. This will promote Jua Kali entrepreneurs in the local areas.

6.1.1.3 Employment Opportunities

There will be job opportunities especially to casual workers. Employment opportunities are a benefit both in economic and social sense. In the economic sense it means abundant unskilled labour will be used in economic production. In the social sense these young and energetic otherwise poor people will be engaged in productive employment other than remaining idle. Remaining idle may attract them into social ills like drug abuse and other criminal activities like robberies. Several workers including casual labourers, masons, carpenters, joiners, electricians and plumbers are expected to work on the site for a period that the project will start to the end. Apart from casual labour, semi-skilled and unskilled labour and formal employees are also expected to obtain gainful employment during the period of construction.

6.1.1.4 Gains in the Local and National Economy

There will be gains in the local and national economy. Through consumption of locally available materials including: concrete tiles, timber and cement. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government. The cost of the materials will be payable directly to the producers.

6.1.1.5 Provision of Market for Supply of Building Materials

The project will require supply of large quantities of building materials most of which will be sourced locally within Upper Hill area and the surrounding areas. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

6.1.2 *Negative Impacts*

6.1.2.1 Soil erosion

The site slopes gently and possibilities of soil erosion occurring during construction are high specifically during rainy and windy seasons. Soil erosion is an important problem both at its source and downstream of the development site. Lost soil will be deposited somewhere, and the location of the deposition could alter downstream hydrology and increase flooding. It may also pose a water quality issue directly as a result of siltation and indirectly from contaminants carried with or attached to soil particles.

6.1.2.2 Storm water

There is a likelihood of interference of the construction operation from the storm water runoff either from the site or from the neighbouring compounds. The situation is made worse due to the site gradient with respect to the neighbouring plots as pointed out in 6.1.2.1 above.

6.1.2.3 Noise pollution

The construction works will most likely be a noisy operation due to the moving machines (mixers, tippers, communicating workers) and incoming vehicles to deliver construction materials and workers to site. To be affected mostly are the site workers since noise beyond some level is itself a nuisance if not maintained within acceptable limits.

6.1.2.4 Disposal of excavated soil

Site excavations shall be done to the satisfaction of the Principal Consultant's specification hence some materials shall be rejected as waste for disposal. In-judicial disposal of this category of waste may have adverse impacts on the receiving environment.

6.1.2.5 Oil spills

The machines on site may be containing moving parts which will require continuous oiling to minimise the usual corrosion or wear and tear. Possibilities of such oils spilling and contaminating the soil and water on site are real. Likewise, moving vehicles on site may require oil change. But these dangers are contained by maintaining the machinery in specific areas designed for this purpose.

6.1.2.6 Increased water demand

Both the workers and the construction works will create additional demand for water in addition to the existing demand. Water will be mostly used in the preparation of concrete for construction works and for wetting surfaces, curing or even cleaning completed structures.

6.1.2.7 Dust emissions

Particulate matter pollution is likely to occur during the site clearance, excavation and spreading of the topsoil. There is a possibility of PMB_{10} suspended and settle able particles affecting the site workers and even neighbours health.

6.1.2.8 Faecal waste management

The construction workers will generate faecal waste during their day-to-day operations. The generated waste needs proper handling to prevent disease, for example diarrhoea, outbreak on the site.

6.1.2.9 Food kiosks and mushrooming of informal settlement

There is a likelihood of food kiosks starting to appear more so close to the project site due to the meal demands from the construction workers. Most of the foods sold at such places are cheap. The food kiosk owners will be looking for shortcut means to get easy money.

The proposed commercial office development project may involve mushrooming of informal settlements in the surrounding area owing to workers preference to stay near their places of work. The long- term negative impact again will be the mushrooming of informal settlements in the neighbourhood owing to the job opportunities that would be available in the domestic sector. It is common to see people camping outside the entrance of estates in different places in Kenya waiting to be contracted for a day's work in the domestic sector. Such people would be attracted to settle in the neighbourhood for that purpose. Such settlements often compromise security in the neighbourhood. However, workers accommodation has been included in the development plan so that this issue is dealt with as far as is directly possible within the development.

6.1.2.10 Destruction of existing vegetation

The construction process will involve clearing of the existing vegetation cover. The developer intends to replace this with planting of many indigenous and other useful firewood and fodder trees and grass in all the gardens and strategic green areas as proposed in the landscape plan.

6.1.2.11 Generation of exhaust emissions

Exhaust emissions are likely to be generated by the construction equipment during the construction phase. Motor vehicles used to mobilise the work force and materials for construction would cause a potentially significant air quality impact by emitting pollutants through exhaust emissions. Because large quantities of building materials are required, some of which will be sourced outside Upper Hill area, such emissions can be enormous and may affect a wider geographical area. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent gunning of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas.

6.1.2.12 Increased runoff from new impervious areas

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

6.1.2.13 Surface and ground water hydrology and water quality degradation

Changes in surface hydrology alter the flow of water through the landscape. Construction of impervious surfaces such as parking lots, roads and buildings increase the volume and rate of runoff, resulting in habitat destruction, increased pollutant loads, and flooding. Built or paved areas and changes in the shape of the land also influence groundwater hydrology (i.e. recharge rates, flow, conditions).

Project related excavation could lead to surface and ground water quality degradation. Contaminated soil or ground water in the path of the project could be disturbed by excavation resulting in a potential transfer of the contamination to surface waters. The excavated area, if linear could act as a conduit to extend groundwater contamination to new areas. Spills of hazardous materials in excavated areas during construction could introduce contaminants to ground water. Development activities such as office construction as well as the spill over effects of development such as increased demand for drinking water and increased water use can impact water quality by contributing sediment, nutrients, and other pollutants to limit water supplies, increasing the temperature of the water, and increasing the rate and volume of runoff.

6.1.2.14 Workers accidents and hazards during construction

During construction of the proposed commercial office developmentproject, it is expected that construction workers are likely to have accidental injuries and hazards as a result of handling hazardous waste. Because of the intensive engineering and construction activities including erection and fastening of roofing materials, metal grinding and cutting, concrete work, steel erection and welding among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets and collapse of building sections among others.

6.1.2.15 Vector borne and water borne disease incidence

When solid wastes are not well managed there is potential of disease outbreak due to suitable breeding conditions for vectors of cholera and typhoid. If the wastes find their way to water body its quality may be lowered. Malaria outbreak could also be exacerbated by the presence of open water ditches for breeding of anopheles mosquitoes. The major vulnerable groups are children who could be exposed to these conditions.

6.1.2.16 Possible exposure to workers to diseases

During construction phase, workers are likely to be exposed to diseases from building materials. It is therefore recommended that before the construction commences, there is need for the materials to be well inspected according to the occupational health and safety standards.

6.1.2.17 Solid waste generation

During construction solid waste will be generated. These include papers used for packing cement, plastics and timber remains among others. Dumping around the site will interfere with the aesthetic status of the area. This has a direct effect to the surrounding community. Disposal of the same solid wastes off-site could also be a social inconvenience if done in the wrong places. The off-site effects could be aesthetic, pest breeding, pollution of physical environment, invasion of scavengers and informal recycling communities.

6.1.2.18 Loss of plant species and communities

Direct impact results from disturbances that cause changes in temperature, light, moisture and nutrient levels; removal activities (e.g. clear-cutting, bulldozing); impacts resulting from air and water pollution (e.g. turbidity, eutrophication). Indirect impacts result from changes in natural community processes or invasion of non-native plant species. Loss of plant communities also results in decreased water quality, increased erosion as a result of unstable soil, nutrient imbalances in the soil, and/or compaction of soil.

6.1.2.19 Extraction and use of building materials

Building materials such as hard core, ballast, cement, rough stone and sand required for construction of the project will be obtained from quarries, hardware shops and sand harvesters who extract such materials from natural resource banks such as rivers and land. Since substantial quantities of these materials will be required for construction of the buildings, the availability and sustainability of such resources at the extraction sites will be negatively affected as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of animals and vegetation, poor visual quality and opening of depressions on the surface leading to several human and animal health impacts.

6.1.2.20 Energy consumption

The project will consume fossil fuels (mainly diesel) to run transport vehicles and construction machinery. Fossil energy is non-renewable and its excessive use may have serious environmental implications on its availability, price and sustainability. The project will also use electricity supplied by Kenya Power (KP) Ltd. Electricity in Kenya is generated mainly through natural resources, namely, water and geothermal resources. In this regard, there will be need to use electricity sparingly since high consumption of electricity negatively impacts on these natural resources and their sustainability.

6.2 *OPERATION PHASE*

6.2.1 *Positive Impacts*

6.2.1.1 Employment creation

Employment opportunities are one of the long-term major impacts of the development project that will be realised after construction and during the operation and maintenance of the office tower. These will involve security personnel, solid waste management staff, businesses that will be located within the project. Other sources of employment will involve direct service provision to the office services e.g. caretakers and cleaning services etc.

6.2.1.2 Increase in national housing stock

In Kenya the housing/office space demand by far outstrips the unit supply. This has eventually led to slums in some parts of the country. The greatest positive thing with the project is that it will contribute to the housing stock. A total of 70,000 square metres of office space is expected to be put in place. These will add to the supply of housing/office space which is currently a major socio economic problem for Kenya and especially in Nairobi's Metropolis and its vicinity.

6.2.1.3 Improvement in the housing/office quality

The project would also improve the housing quality for the neighbourhood residents where office space is in high demand.

6.2.1.4 Individual investments

Economically commercial office building is an investment good to the individual investor. Through buying the offices and then renting or reselling, or self-occupation, the owner is able to earn some income or save on wasted capital from renting office space. Property is also used as collateral as they are an assets to the investor mainly in this case first time buyers who are young professionals.

6.2.1.5 Optimal use of land

Being a state of the art office and commercial tower project there is a potential of greatly reducing urban sprawl through densification by constructing high quality buildings. Land is a scarce resource in Kenya and through construction of the proposed project will ensure optimal use of land to the great benefit of the country and its people.

6.2.1.6 Establishment of shopping facilities

A retail-shopping complex will be put up as a component of the proposed project. The local residents and members of the community will spend less in terms of fuel or transport to reach shopping facilities. They will also save time and energy to reach the shopping facilities.

6.2.1.7 Increased Recreational facilities

Recreational facilities including a modern hotel will also be established in the area as part of the proposed project. This will attract local and international tourists and thus generating revenue and foreign exchange. The local residents will also access affordable recreational facilities without going too far.

6.2.1.8 Increased Security in the area

The proponent will put up several streetlights and employ several security guards during the operational phase of the project. This is expected to boost the general security of the area especially at night. The rather 'bushy area' will be opened up and made secure during the operational phase.

6.2.1.9 Increased Social Amenities

The proposed mix of residential, institutional, and recreational and facility support infrastructure developments in the project will result in affordable amenity institutions established in the area. This will benefit the entire community, as some of nearby residents will visit such areas to shop and relax.

6.2.1.10 Incorporation of proper Solid and Liquid Waste Management System

The project is designed such that there will be provision of a well planned strategic waste management system. The wastes will thus be collected from the site in bulk and as one unit such that the careless disposal leading to proliferation of wastes within the surrounding areas will be curbed.

6.2.2 Negative Impacts

6.2.2.1 Increased population without commensurate services and facilities

With development of 70,000 square metres of office and related developments such as communal facilities clearly means that many people are expected to visit and reside on the proposed site. This will increase the density of resident population in the area and if this population is not provided with the appropriate services and facilities then pressure on existing facilities is bound to increase.

6.2.2.2 Increased pressure on infrastructure

Development projects of this magnitude have a potential of increasing pressure on existing infrastructure such as roads, water supply system, waste handling facilities, electricity etc. This would be due to increased volumes on human and vehicle traffic along the access road.

6.2.2.3 Air pollution

Poor solid waste management could lead to blocking of drains especially when the project is in existence and this can lead to flooding and unsanitary conditions within the offices, hotel and related facilities. Blocked drains produce bad odour hence are environmentally unfriendly. The project management proposes to have good controlled and well managed waste management to avoid this from occurring.

6.2.2.4 Water pollution

If the sites for dumping solid wastes are not well taken care of, they may cause contamination to ground water sources and also form breeding areas for mosquitoes; this may cause human diseases like malaria and cholera. The proponent will put in place an efficient waste management scheme that will prevent the accumulation of uncontrolled waste, as well as an efficient collection system and off-site disposal.

6.2.2.5 Electricity consumption

The project shall consume large amount of electricity due to the number of the commercial office tower development being proposed and the activities that will take place once the project is complete. Since electric energy in Kenya is generated mainly through natural resources, namely water and geothermal resources, increased use of electricity have adverse impacts on these natural resources base and their sustainability.

6.2.2.6 Insecurity/social crime

The project will introduce permanent and temporary residents on the proposed site. This implies increased operations that may make it more difficult to monitor and control. As mentioned earlier, the project may encourage development of informal settlements in the vicinity. However, measures have already been taken to deal with insecurity in the area. The developer will put measures to ensure there is security by engaging a reputable security firm to guard the area, undertake street lighting and install security lights that will benefit the surrounding areas.

6.2.2.7 Solid waste generation

The project is expected to generate enormous amounts of solid waste during its operation phase. The bulk of the solid waste generated during the operation of the project will consist of paper, plastic, glass, metal, textile and organic wastes. Such wastes can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on animal health. Some of these waste materials especially the plastic/polythene are not biodegradable hence may cause long-term injurious effects to the environment. Even the biodegradable ones such as organic wastes may be injurious to the environment because as they decompose, they produce methane gas, a powerful greenhouse gas known to contribute to global warming.

6.2.2.8 Increased storm water flow

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

6.2.2.9 *Water use*

Activities during the operation phase of the project will involve the use of large quantities of water as a result of activities that will take place and the large number of people that stay there.

6.3 *DECOMMISSIONING PHASE*

6.3.1 *Positive Impacts*

6.3.1.1 Rehabilitation

Upon decommissioning of the project, rehabilitation of the project site will be carried out to restore the site to its original status. This will include replacement of topsoil and re-vegetation which will lead to improved visual quality of the area.

6.3.1.2 Employment opportunities

Several employment opportunities will be created for the demolition staff.

6.3.2 *Negative Impacts*

6.3.2.1 Solid waste

Demolition of the project buildings and related infrastructure will result in large quantities of solid waste. The waste will contain the materials used in construction including concrete, metal, drywall, wood, glass, paints, adhesives, sealants and fasteners. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. In addition, even the generally non-toxic chemicals such as chloride, sodium, sulphate and ammonia, which may be released because of leaching of demolition waste, are known to lead to degradation of groundwater quality.

6.3.2.2 Dust

Large quantities of dust will be generated during demolition works. This will affect demolition staff as well as the neighbouring residents.

6.3.2.3 Noise and Vibration

The demolition works will lead to significant deterioration of the acoustic environment within the project site and the surrounding areas.

7 MITIGATION MEASURES AND MONITORING PROGRAMMES

This section highlights the mitigation measures for the expected negative impacts of the proposed project. The potential impacts and the possible mitigation measures have herein been analyzed under two categories: Construction and Operational.

7.1 *MITIGATION OF CONSTRUCTION RELATED IMPACTS*

7.1.1 *Air quality*

Controlling dust during construction is useful in minimizing nuisance conditions. It is recommended that a standard set of feasible dust control measures be implemented for all construction activities. Emissions of other contaminants (NOx, CO_2, SOx, and diesel related PMB_{10B}) that would occur in the exhaust from heavy equipment are also included. The proponent is committed to implementing measures that shall reduce air quality impacts associated with construction. All personnel working on the project will be trained prior to starting construction on methods for minimizing air quality impacts during construction. This means that construction workers will be trained regarding the minimization of emissions during construction. Specific training will be focused on minimizing dust and exhaust gas emissions from heavy construction vehicles. Construction vehicles drivers will be under strict instructions to minimize unnecessary trips, refill petrol fuel tanks in the afternoon, and minimize idling of engines.

Dust emissions will be controlled by the following measures:

- Watering all active construction areas as and when necessary to lay dust.
- Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water when necessary, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with physical sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Fast growing trees will be planted around the project area to act as a wind breaks to reduce the uplift of particulate matter that lead to respiratory diseases.
- Project will be undertaken in phases to cushion the cumulative effects of dust which would be great in case the project is done at once.

7.1.2 *Minimize the effects of noise and vibrations emitted from the site*

Significance of noise impacts depends on whether the project would increase noise levels above the existing ambient levels by introducing new sources of noise. Noise impacts would be considered significant if the project would result in the following:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels (more than five dBA) in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The proponents shall put in place several measures that will mitigate noise pollution arising during the construction phase. The following noise-suppression techniques will be employed to minimise the impact of temporary construction noise at the project site.

- Install portable barriers to shield compressors and other small stationary equipment where necessary.
- Use quiet equipment (i.e. equipment designed with noise control elements).
- Co-ordinate with relevant agencies regarding all substation construction activities in the nearby residential areas.
- Install sound barriers for pile driving activity.
- Limit pick up trucks and other small equipment to a minimum idling time and observe a common-sense approach to vehicle use, and encourage workers to shut off vehicle engines whenever possible.
- Construction/Demolition works should be done during the day when people are away and also the outside environment is also noisy.
- Adhere to the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 regarding noise limits at the workplace.

7.1.3 *Minimise the effects of exhaust emission*

In order to control exhaust emissions the following measures shall be implemented during construction:

- Vehicle idling time shall be minimized.
- Alternatively fuelled construction equipment shall be used where feasible.
- Equipment shall be properly tuned and maintained.

7.1.4 *Minimize traffic related impacts*

This will also be achieved through proper planning of transportation of materials to ensure that vehicle fills are increased in order to reduce the number of trips done or the number of vehicles on the road. By implementing the Traffic Management Plan, most of these impacts will be reduced significantly.

- *Warning signs*, aimed at both drivers and other road users, to highlight hazards will be erected along the route between the proposed project site and the junctions joining both Upper Hill Road and the Haile Selassie Avenue.

- *Demarcated pedestrian crossings* will be established at appropriate points along the route between the proposed project site and the junctions joining Upper Hill Road and the Haile Selassie Avenue.
- *Barriers* to separate vulnerable road users (pedestrians and cyclists) from vehicle traffic in high-risk areas will be considered in the project area.

a) Trip Reduction Measures

Reducing the amount of time spent travelling and the number of trips undertaken is an effective means of reducing exposure to risk. The proponent will implement systems aimed at achieving this, these will include:

- Greater use of electronic means of communication as a substitute for delivering communication by road.
- Scheduled trips for regular business (including banking, purchasing, postage collection, etc.) to Nairobi City to avoid unnecessary additional trips.
- Co-ordination of all trips to the City so as to ensure they are kept to a minimum.
- Management of commuter transport for employees to and from work to optimize the number of trips required.

b) Encouraging Use of Safer Modes of Transport

Encouraging employees to utilize safer modes of transport will minimize their exposure to risk. Although cycling and walking can bear relatively high risks, cyclists and pedestrians pose less risk to other road users when compared to drivers. The proponent will encourage safer modes of transport by:-

- Encouraging use of the contractor commuter transport in preference to public transport or private transport.
- Providing a secure and covered shelter for bicycles at the construction site.
- Assisting cyclists in acquiring reflective vests and suitable safety reflectors and lighting for their bicycles.
- Discouraging the use of bicycles and motorcycles on public roads where the proponent's commuter transport is available.

c) Minimizing Disruption to Non-Project Road Users

The proponent is committed to minimizing the disruption caused to surroundings community members and non-project road users by its activities. To achieve this the proponent will implement the following measures:-

- All project vehicles will be required to adhere to speed limits determined by the proponent or the legal speed limit, whichever is lower, and these will be enforced and subject to monitoring.
- Reduced speed limits will be set for night driving
- Project vehicles will have electronic data recorders / transponders fitted which will, in addition to other data, be able to record vehicle speed. These will be analyzed regularly to determine adherence to Project speed limits and driving regulations.

- Dust suppression mechanisms, such as water spraying, will be in operation along the dirt access road from main roads to the site to reduce the amount of dust created by Project vehicles using the road
- All project-related vehicles will have proponent's signage affixed on them.
- All project-related vehicles will be fitted with enhanced vehicle visibility aids.

d) Safety Impact Assessments

The safety impact of the project's transport should give consideration to its effect on the road system in which it is operating. This can include strategies aimed at improving mobility, reducing congestion and improvements that are compatible with road safety. During operation of the project, periodic safety impact assessments should be carried out along the transport route. The purpose of the Safety Impact Assessments will be to collect data on the use of the road and the effectiveness of traffic management measures along the route.

With strict adherence to the proposed Traffic Management mitigation measures above, in close collaboration with the relevant Government Ministries and the Nairobi Traffic Department, the proponent will be able to handle all the traffic management issues related to the proposed project. However, regular monitoring and evaluation exercise should be carried out to check the effectiveness of the proposed plan.

7.1.5 *Hydrology and water quality degradation*

Several measures shall be put in place to mitigate the impacts that are likely to lead to hydrology and water quality degradation. The proponent will prepare a hazardous substance control and emergency response plan that will include preparations for quick and safe clean-up of accidental spills. It will prescribe hazardous-materials handling procedures to reduce the potential for a spill during construction, and will include an emergency response programme to ensure quick and safe clean-up of accidental spills. The plan will identify areas where refuelling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted.

Soil sampling and trial holes digging will be conducted before construction begins and soil information will be provided to construction crews to inform them about soil conditions and potential hazards. If hazardous substances are unexpectedly encountered during trenching, work will be stopped until the material is properly characterised and appropriate measures are taken to protect human health and the environment. If excavation of hazardous materials is required, they will be handled in accordance with applicable regulations. If suspected contaminated groundwater is encountered in the depths of the proposed construction areas, samples will be collected and submitted for laboratory analysis of petroleum hydrocarbons, metals, volatile organic compounds and semi-volatile organic compounds. If necessary, ground water will be collected during construction contained and disposed of in accordance with all applicable regulations. Appropriate personal protective equipment will be used and waste management will be performed in accordance with applicable regulations. Oil absorbent material,

tarps and storage drums will be used to contain and control any minor releases of engine and other equipment oil.

7.1.6 *Worker accidents and hazards when handling hazardous wastes*

Adequate collection and storage of waste on site and safe transportation to the disposal sites and disposal methods at designated area shall be provided. In addition the proponent is committed to adherence to the occupational health and safety rules and regulations stipulated in Occupational Health and Safety Act, 2007. In this regard, the proponent is committed to provision of appropriate personal protective equipment, as well as ensuring a safe and healthy environment for construction workers as outlined in the EMP.

7.1.7 *Populations of disease vectors*

Disease vectors such as rats, flies, and cockroaches increase where refuse is exposed or uncollected and can be a hazard. Complete refuse collection and handling service will be provided by the proponent so that this is not a hazard in compliance with the Public Health Act and as also required in the Occupational Safety and Health Act, 2007 regarding hygiene at the workplace.

7.1.8 *Increased runoff*

Increased run off from paved grounds and expansive roofs causing extreme flooding and overflows of drainage systems shall be mitigated. Surface runoff and roof water shall be harvested and stored in underground reservoir for reuse. A Storm Water Management Plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structures will be designed.

7.1.9 *Possible exposure of workers to diseases*

Possible exposure of workers to diseases from building materials at construction site shall be mitigated by occupational health and safety standards enforcement as required in the OSHA, 2007.

7.1.10 *Worker accidents during construction and operation*

Workers accidents especially in deep trenching operations and from gas accumulation in sewers and other confined spaces shall be mitigated by enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.

7.1.11 *Reduction of impacts at extraction sites and efficient use of raw materials*

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

To reduce the negative impacts on availability and sustainability of the materials, the proponent will only order for what will be required through accurate budgeting and estimation of actual construction

requirements. This will ensure that materials are not extracted or purchased in excessive quantities. Moreover, the proponent will ensure that wastage, damage or loss (through run-off, wind, etc) of materials at the construction site is kept minimal, as these would lead to additional demand for and extraction or purchase materials.

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

7.1.12 *Minimization of vegetation disturbance*

Clearance of part of the vegetation at the project site to pave way for construction will be inevitable. However, the proponent will ensure proper demarcation of the project area to be affected by the construction works. This will be aimed at ensuring that any disturbance to flora and fauna is restricted to the actual project area and avoid spill over effects on the neighbouring areas. In the same vein, there will be strict control of construction vehicles to ensure that they operate only within the area to be disturbed by access routes and other works.

Another important measure aimed at reducing disturbance of vegetation in the project area will be preservation of individual trees within the site. In addition, the proponent has committed itself to re-vegetation of some of the disturbed areas through implementation of a well designed landscaping programme. It is recommended that part of the topsoil excavated from the construction site be re-spread in areas to be landscaped to enhance plant health. The Proponent shall undertake the project in phases with areas completed re-vegetated as required in the site landscaping programme.

7.1.13 *Minimization of run-off and soil erosion*

The Proponent will put in place some measures aimed at minimizing soil erosion and associated sediment release from the project site during construction. These measures will include terracing and levelling the project site to reduce run-off velocity and increase infiltration of rain water into the soil. In addition, construction vehicles will be restricted to designated areas to avoid soil compaction within the project site, while any compacted areas will be ripped to reduce run-off.

7.1.14 *Minimization of construction waste*

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

The proponent shall put in place measures to ensure that construction materials requirements are carefully budgeted and to ensure that the amount of construction materials left on site after construction is kept minimal.

It is further recommended that the proponent should consider the use of recycled or refurbished construction materials. Purchasing and using once-used or recovered construction materials will lead to financial savings and reduction of the amount of construction debris disposed of as waste.

Additional recommendations for minimization of solid waste during construction of the project include:-

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

7.1.15 *Reduction of energy consumption*

The proponent shall ensure responsible electricity use at the construction site through sensitization of staff to conserve electricity by switching off electrical equipment or appliances when they are not being used. In addition, proper planning of transportation of materials will ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts. Complementary to these measures, the proponent shall monitor energy use during construction and set targets for reduction of energy use.

7.1.16 *Minimization of water use*

The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use. The proponent will install water-conserving automatic taps and toilets. Moreover, any water leaks through damaged pipes and faulty taps will be fixed promptly by qualified staff.

7.1.17 *Controlling oil spills during construction phase*

The proponent will control the dangers of oil, grease and fuel spills during construction by maintaining the machinery in specific areas designed for this purpose. Machinery site repair will be discouraged and repair work restricted to only approve garages to avoid pollution from oil, grease and fuel.

7.1.18 *Public Health safety and Awareness*

i. The contractor should provide a small section of the construction site with a shed and a water stand where the food can be served to the construction workers to promote hygiene and health of the employees.
ii. A fully equipped first aid kit should be provided at the site.
iii. The contractor must have workmen's compensation cover as required by law (The Workmen's Compensation Act), as well as relevant ordinances, regulation and union's agreements.
iv. The workers, immediate neighbour and other stakeholders should be sensitized on the dangers and risk associated with the construction works for enhanced self responsibility on personal safety.
v. The proponent should ensure that the completed buildings are fitted with safety facilities including fire detectors, fire fighting equipment, fire exits, adequate access and buffer between the residential premises.
vi. Disabled access features and safety signage should be placed strategically around and within the buildings.
vii. Appropriate sanitation conveniences should be provided at the site as required in the OSHA, 2007 and echoed in the Public Health Act.

7.2 *MITIGATION OF OPERATION PHASE IMPACTS*

7.2.1 *Ensuring efficient solid waste management*

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

A lot of solid wastes will be generated from the proposed commercial office tower project. An integrated solid waste management system is recommendable. First, the proponent will give priority to Reduction at Source of the materials. This option will demand a solid waste management awareness programme in the management and the residents. Secondly, Recycling, Reuse and compositing of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place. The recyclables will be sold to authorized waste buyers. The third priority in the hierarchy of options is combustion of the waste that is not recyclable in order to produce energy. Finally, sanitary landfilling will be the last option for the proponent to consider. The proponent will adhere to the Environmental Management and Coordination (Waste Management), Regulations 2006.

7.2.2 *Wastewater management*

The proponent will ensure that there are adequate means for handling the large quantities of sewage generated at the offices. It will also be important to ensure that sewage pipes are not blocked or damaged so that the waste can be delivered to the recommended Bio Box Treatment System or

biodigester since such vices can lead to release of the effluent, resulting in land and water contamination. Such blockages or damages will be fixed expeditiously. Wastewater shall be disposed in compliance with the provisions of the Environmental Management and Coordination (Water Quality), Regulations 2006.

7.2.3 *Ensure efficient energy consumption*

The proponent plans to install an energy-efficient lighting system at the commercial office tower.This will contribute immensely to energy saving during the operational phase of the project. In addition, occupants of the commercial office development units will be sensitised to ensure energy efficiency in their domestic operations. To complement these measures, it will be important to monitor energy use during the operation of the proposed estate and set targets for efficient energy use.

7.2.4 *Ensure general safety within the premises*

A perimeter fence (Boundary Wall with Green Hedge) will be erected round the plot, street lighting done and a security lighting system installed. A competent security firm may be engaged to ensure the general safety and security at all times within and around the premises.

7.2.5 *Ensure efficient water use*

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

7.2.6 *Increased pressure on the existing infrastructure*

It is recommended that the proponent should liaise closely with other development partners and Government/Council Departments to upgrade the existing shared facilities including roads, water distribution systems etc. The proponent should as well explore alternative means which are environmentally sound like employing the Green Energy Technologies when and where applicable like the proposed use of Solar Panels in water heating among others. This will rather reduce the over dependence on fossils based energy sources which are arguably presently threatened with the idea of having a private borehole in itself being a way of relieving an existing water supply system..

7.3 *MITIGATION OF DECOMMISSIONING PHASE IMPACTS*

7.3.1 *Efficient solid waste management*

Solid waste resulting from demolition or dismantling works will be managed as described in Section 7.2.1.

7.3.2 *Reduction of Dust Concentration*

High levels of dust concentration resulting from demolition or dismantling works will be minimized as described in Section 7.1.1.

7.3.3 *Minimization of Noise and Vibration*

Significant impacts on the acoustic environment will be mitigated as described in Section 7.1.2.

8 ANALYSIS OF PROJECT ALTERNATIVES

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

8.1 *Relocation* Option

Relocation option to a different site is an option available for the project implementation. At present the landowner/developer does not have an alternative site. This means that he has to look for the land. Looking for the land to accommodate the scale and size of the project and completing official transaction on it may take up to three (3) years although there is no guarantee that the land would be available. The developer will spend another two years on design and approvals since design and planning has to be according to site conditions. Project design and planning before the stage of implementation will cost the developer millions of Kenya Shillings. Whatever has been done and paid to date will be counted as a loss to the developer. Assuming the project will be given a positive response by the relevant authorities including NEMA, this project would have been delayed for about two (2) years period before implementation. This is a delay that our economy can ill afford. This would also lead to a situation like No Project Alternative option. The other consequence of this is that it would be a discouragement for private/local investors especially in the business sector that has been shunned by many public and private investors already aggravating critical business shortages in terms of office space. In consideration of the above concerns and assessment of the current proposed site, relocation of the project is not a viable option.

8.2 No Project Alternative

The No Project option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. This option will however, involve several losses both to the landowner and the community as a whole. The landowner will continue to pay rent for the plot while the plot remains idle hence no income to the owner. The No Project Option is the least preferred from the socio-economic and partly environmental perspective due to the following factors:

- The economic status of the Kenyans and the local people would remain unchanged.
- The local skills would remain underutilized.
- Reduced investing due to lack of office space in the Upper Hill area where the project is proposed.
- Reduced interaction both at local, national and international levels.
- No employment opportunities will be created for thousands of Kenyans who will work in the proposed commercial building tower development area and Nairobi at large.
- Increased urban poverty and crime in Kenya.
- Discouragement for investors thus leading to reduced office space in the Upper hill area

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

8.3 The proposed development alternative

Under the proposed development alternative, the developer of the proposed commercial building tower development project would be issued with an EIA License. In issuing the license, NEMA would approve the proponent's proposed development of the office tower, provided all environmental measures are complied with during the construction period and operational phases. This alternative consists of the applicant's final proposal with the inclusion of the NEMA regulations and procedures as stipulated in the environmental impacts to the maximum extent practicable.

8.4 Analysis of Alternative Construction Materials and Technology

The proposed project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given first priority without compromising on cost or availability factors. The concrete pillars and walls will be made using locally sourced stones, cement, sand (washed and clean), metal bars and fittings that meet the Kenya Bureau of Standards requirements.

Beautiful and durable re-inforced concrete roofs because they are good in heat insulation with minimal iron sheet roofs. This will ensure that the rainwater harvested will be utilized in other areas such as watering the flower gardens. Heavy use of timber during construction is discouraged because of destruction of forests. The exotic species would be preferred to indigenous species in the construction where need will arise. However, this construction methods and technologies to be used will require very little timber.

8.5 *Domestic waste water management alternatives*

There applicable locally available technologies are discussed below-

8.5.1 *Alternative Four - Use of septic tanks*

This involves the construction of underground concrete-made tanks to store the sludge with soak pits. It is expensive to construct and regular empting in large discharge points like the large scale commercial building tower development project proposed. Given the kind of liquid waste emanating from the proposed project this option is not preferred since it will be uneconomical.

8.5.2 *Alternative Five - Waste water treatment plant*

This involves the construction of a plant and use of chemicals to treat the effluents to locally/internationally accepted environmental standards before it is discharged into the river nearby. It is usually expensive to construct and maintain, but it is the most reliable, efficient and cost-effective in the long term.

8.5.3 *Alternative Three - Connection to the sewer line system*

Connection to the sewer line option is a viable option since Upper Hill area is served by existing sewer line.

8.5.4 *Alternative three: Use of Biodigester*

Bio digester is an on-site sanitation unit that utilizes anaerobic technology for the disposal of toilet (black) wastewater as well as of kitchen and bathroom (grey) water, in a closed system. This is an incredibly ethical sanitation technology, which treats wastewater in an environmentally friendly manner, facilitating its use for irrigation or its return to water bodies without polluting them. The process also generates organic fertilizer and biogas (a form of fuel) by allowing naturally occurring bacteria to break down solid waste. From the analysis and economic as well as environmental; considerations use of bio digester system is a viable option for the proponent to adopt in order to supplement connection to the sewer system.

8.6 *Solid waste management alternatives*

A lot of solid wastes will be generated from the proposed development. An integrated solid waste management system is recommendable. First, the proponent will give priority to Reduction at Source of the waste materials. This option will demand a solid waste management awareness programme in the management and the workers. Notices for proper waste management/handling may be posted at strategic places for the sake of visitors. Secondly, Recycling, Reuse and compositing of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place especially in the kitchen section. The recyclables will be sold to waste buyers within Nairobi City. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. Finally, sanitary land filling will be the last option for the proponent to consider.

8.7 *EIA WITH/WITHOUT EMP*

8.7.1 *Without*

This scenario was based upon the assumption that the proposed development would go ahead without any environmental management plan/options being implemented. The total project impact for the scenario is on the appreciably adverse side. This shows that if the project goes ahead without EMP, the adverse impact on the existing environment would be several times that of the impact without the project. Thus, this assumption is disqualified and not applicable since the greatest challenge worldwide presently is geared towards sustainable developments and sustainable use of natural resources.

8.7.2 *With*

If the environmental management strategies discussed in Chapter 9 is fully implemented, the adverse impact of the project would be reduced, and there will be an overall improvement in physical, chemical, biological and socioeconomic environment of the region. Therefore, the proposed activity will be beneficial for the environment of the area, provided the EMP is in place. It is clear from the above, that the proposed office tower project would have negative effect without implementing certain environmental management strategies. If EMP, as discussed in Chapter 9, is adopted and implemented, the adverse impacts will be reduced and

the overall environmental quality of the area would improve hence this remains a preferred option.

9 ENVIRONMENTAL MANAGEMENT/MONITORING PLAN

9.1 Introduction

The proponent of the proposed project acknowledges the fact that the proposed project activities will have some impacts on the biophysical environment, health and safety of its employees, stakeholders, interested parties and socio economic well-being of other members of the public. Thus, the main focus will be on reducing the negative impacts and maximizing the positive impacts associated with the project activities through a programme of continuous improvement.

An environmental management/monitoring plan has been developed to assist the proponent in mitigating and managing environmental impacts associated with the life cycle of the project. The EMP has been developed to provide a basis for an Environmental Management System (EMS; ISO 14001 principles) for the project. It is noteworthy that key factors and processes may change through the life of the project and considerable provisions have been made for dynamism and flexibility of the EMP. As such, the EMP will be subject to a regular regime of periodic review.

Tables 6, 7 and 8 form the core of this EMP for the construction, operational and decommissioning phases of the proposed project respectively. In general, the Tables outline the potential safety, health and environmental risks associated with the project and detail all the necessary mitigation measures, their financial costs, as well as the persons responsible for their implementation and monitoring. The EMP will be used as checklist in future environmental audits.

9.2 Construction Phase Environmental Management Plan

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the construction phase the proposed project are outlined in **Table 6 below**.

Table 6: Construction Phase Environmental Management Plan for the Proposed Commercial Building Tower Development

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
1. Curb project associated conflicts and Lost Time Injuries (LTI) e.g. land ownership disputes.				
Project implementation disputes	Sufficient planning for adequate resources required i.e. financial, personnel and equipment	Proponent & Contractor	Project planning phase	-
	Land transfer agreements should be formalized before the project start as per the laws of the land	Proponent/Government of Kenya and City County Government	Project planning phase	Done
	Community support mobilization and sensitization through consultative forums or questionnaire methods	Proponent & EIA Experts	Project planning phase	Done
2. Minimize extraction site impacts and ensure efficient use of raw materials in construction				
High Demand of Raw material	Source building materials from local suppliers who use environmentally friendly processes in their operations	Project Manager & Contractor	Throughout construction period	
	Ensure accurate budgeting and estimation of actual construction material requirements to ensure that the least amount of material necessary is ordered	Project Manager & Contractor	Throughout construction period	100,000
	Ensure that damage or loss of materials at the construction site is kept minimal through proper storage.	Project Manager & Contractor	Throughout construction period	80,000
	Use at least 5%-10% recycled, refurbished or salvaged materials to reduce the use of raw materials and divert material from landfills	Project Manager & Contractor	Throughout construction period	0

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
3. Minimize vegetation disturbance at and or around construction site				
Vegetation disturbance	Ensure proper demarcation and delineation of the project area to be affected by construction works.	Contractor, Civil engineer & Project Manager	1 month	50,000
	Specify locations for trailers and equipment, and areas of the site which should be kept free of traffic, equipment, and storage	Civil Engineer, Architect and Project Manager	1 month	50,000
	Designate access routes and parking within the site	Civil Engineer, Architect and Project Manager	1 month	500,000
	Introduction of vegetation (trees, shrubs and grass) on open spaces and their maintenance	Architect & Landscape specialist	Monthly to Annually	800,000
	Design and implement an appropriate landscaping programme to help in re-vegetation of part of the project area after construction	Architect & Landscape specialist	2 months	700,000
4. Reduce storm-water, runoff and soil erosion				
Increased storm water, runoff and soil erosion	A storm water management plan that minimizes impervious area infiltration by use of recharge areas and use of detention and/or retention with graduated outlet control structure will be designed	The Civil Engineer, Mechanical Engineer and Project Manager	1 month	100,000
	Apply soil erosion control measures such as levelling of the project site to reduce run-off velocity and increase infiltration of storm water into the soil.	The Civil Engineer, Mechanical Engineer and Project Manager	1 months	

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	Ensure that construction vehicles are restricted to existing graded roads to avoid soil compaction within the project site	The Civil Engineer, Mechanical Engineer and Project Manager	Throughout construction period	
	Ensure that any compacted areas are ripped to reduce run-off.	The Civil Engineer, Mechanical Engineer and Project Manager	2 months	
	Open drains all interconnected will be provided on site	Civil Engineer	Throughout construction period	50,000 per unit
5. Minimize solid waste generation and ensure efficient solid waste management during construction				
Increased solid waste generation	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling	Project Manager & Contractor	Throughout construction period	100,000
	Through accurate estimation of the sizes and quantities of materials required, order materials in the sizes and quantities they will be needed rather than cutting them to size, or having large quantities of residual materials	Project Manager & Contractor	One-off	0
	Ensure that construction materials left over at the end of construction will be used in other projects rather than being disposed off.	Project Manager & Contractor	One-off	0

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	Ensure that damaged or waste construction materials including cabinets, doors, plumbing and lighting fixtures, marbles and glass will be recovered for refurbishing and use in other projects	Project Manager & Contractor	One-off	0
	Donate recyclable/reusable or residual materials to local community groups, institutions and individual local residents or homeowners.	Project Manager & Contractor	One-off	0
	Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time	Project Manager & Contractor	Throughout construction period	–
	Provide facilities for proper handling and storage of construction materials to reduce the amount of waste caused by damage or exposure to the elements	Project Manager & Contractor	One-off	200,000
	Purchase of perishable construction materials such as paints should be done incrementally to ensure reduced spoilage of unused materials.	Project Manager & Contractor	Throughout construction period	0
	Use building materials that have minimal or no packaging to avoid the generation of excessive waste	Project Manager & Contractor	Throughout construction period	0
	Use construction materials containing recycled content when possible and in accordance with accepted standards.	Project Manager & Contractor	Throughout construction period	0

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	Reuse packaging materials such as cartons, cement bags, empty metal and plastic containers to reduce waste at the site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	0
	Dispose waste more responsibly by dumping at designated dumping sites or landfills only.	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	20,000/ month
	Waste collection bins to be provided at designated points on the site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	20,000/ month
	Private waste disposal company to be contracted to transport and dispose the solid waste from site	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	
	Running an educational campaigns amongst employees, e.g. through use of posters, to encourage reuse or recycling of the solid waste	Project Manager, Mechanical Engineer & Contractor	Throughout construction period	
6. Reduce dust emissions				
Dust emission	Ensure strict enforcement of on-site speed limit regulations	Project Manager & Contractor	Throughout construction period	10,000/ month
	Avoid excavation works in extremely dry weathers	Project Manager & Contractor	Throughout construction period	
	Sprinkle water on graded access routes when necessary to reduce dust generation by construction vehicles	Project Manager & Contractor	Throughout construction period	
	Personal Protective equipment to be worn always when at work place	Project Manager	Throughout construction period	

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
7. Minimization of exhaust emissions				
Exhaust emission	Vehicle idling time shall be minimized	Project Manager & Contractor	Throughout construction period	0
	Alternatively fuelled construction equipment shall be used where feasible equipment shall be properly tuned and maintained	Project Manager & Contractor	Throughout construction period	0
	Sensitise truck drivers to avoid unnecessary racing of vehicle engines at loading/offloading points and parking areas, and to switch off vehicle engines at these points	Project Manager & Contractor	Throughout construction period	0
8. Minimization of noise and vibration				
Noise and vibration	Sensitise construction vehicle drivers and machinery operators to switch off engines of vehicles or machinery not being used.	Project Manager & Contractor	Throughout construction period	0
	Sensitise construction drivers to avoid gunning of vehicle engines or hooting especially when passing through sensitive areas such as churches, residential areas and hospitals	Project Manager & Contractor	Throughout construction period	0
	Ensure that construction machinery are kept in good condition to reduce noise generation	Project Manager & Contractor	Throughout construction period	25,000/ month
	Ensure that all generators and heavy-duty equipment are insulated or placed in enclosures to minimize ambient noise levels	Project Manager & Contractor	Throughout construction period	200,000

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	The noisy construction works will entirely be planned to be during daytime when most of the neighbours will be at work.	Project Manager & all site foremen	Throughout construction period	0
	Comply with the provisions of Noise Prevention and Control Rules 2005, Legal notice no. 24 regarding noise limits at the workplace	Project Manager & all site foremen	Throughout construction period	0
9. Minimization of energy consumption				
Increased energy consumption	Ensure electrical equipment, appliances and lights are switched off when not being used	Project Manager & Contractor	Throughout construction period	0
	Install energy saving fluorescent tubes at all lighting points instead of bulbs which consume higher electric energy	Project Manager & Contractor	Throughout construction period	50,000
	Ensure planning of transportation of materials to ensure that fossil fuels (diesel, petrol) are not consumed in excessive amounts	Project Manager & Contractor	Throughout construction period	50,000
	Monitor energy use during construction and set targets for reduction of energy use.	Project Manager & Contractor	Throughout construction period	5,000
10. Minimize water consumption and ensure more efficient and safe water use				
High water demand	Install water conserving taps that turn-off automatically when water is not being used	Project Manager & Contractor	One-off	10-40 % higher
	Promote recycling and reuse of water as much as possible	Project Manager & Contractor	Throughout construction period	2,000
	Install a discharge meter at water outlets to determine and monitor total water usage	Project Manager & Contractor	One-off	2,000

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	Promptly detect and repair water pipe and tank leaks	Project Manager & Contractor	Throughout construction period	5000 per month
	Sensitise staff to conserve water by avoiding unnecessary water use	Project Manager & Contractor	Throughout construction period	0
	Ensure taps are not running when not in use	Project Manager & Contractor	Throughout construction period	1,500
11. Minimize release of liquid effluent				
Generation of wastewater	Ensure that liquid effluent generated by construction workers is directed to the existing sewerage treatment plant.	Mechanical Engineer & Project Manager	One-off	15,000
	Conduct regular checks for pipe blockages or damages since such vices can lead to release of the effluent into the land and water bodies	Mechanical Engineer & Project Manager	Throughout construction period	3,000/ month
	Monitor effluent quality regularly to ensure that the stipulated discharge rules and standards are not violated	Mechanical Engineer & Project Manager	Throughout construction period	3,000/ Month
12. Minimize occupational health and safety risks				
Approval of building plans	Ensure that all building plans are approved by the Local Authority and the local Occupational Health and Safety Office	Developer	One-off	5,000
Registration of the premises	Registration of the premises under the Occupational Safety and Health Act, 2007 Laws of Kenya is mandatory	Developer	One-off	5,000

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
General register	A general register should be kept within the facility as stipulated in Sec 122&123 of the Occupational Safety and Health Act, 2007.	Project Manager & Contractor	One-off	0
Posting of abstract of Act, rules and notices	There shall be displayed at prominent places within the site the prescribed abstract of the OSHA and the relevant notices as stipulated in section 121 of the OSHA, 2007.	Project Manager & Contractor	One-off	2,500
Incidents, accidents and dangerous occurrences.	Ensure that provisions for reporting incidents, accidents and dangerous occurrences during construction using prescribed forms obtainable from the local Occupational Health and Safety Office (OHSO) are in place.	Project Manager, Developer & Contractor	Continuous	5,000/ month
	Enforcing adherence to safety procedures and preparing contingency plan for accident response in addition safety education and training shall be emphasized.	The Contractor, Project Manager& Site Safety Officer	Continuous	11,600
Insurance	Ensure that the premises are insured as per statutory requirements (third party and workman's compensation)	Developer	Annually	_
Safety, health and environment (SHE) policy	Develop, document and display prominently an appropriate SHE policy for construction works	Project Manager, Developer & Contractor	One-off	2,300
Health and safety committee	Provisions must be put in place for the formation of a Health and Safety Committee, in which the employer and the workers are represented	Project Manager	One-off	5,500

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
Sanitary conveniences	Suitable, efficient, clean, well-lit and adequate sanitary conveniences should be provided for construction workers	Project Manager	One-off	9,000
Medical examination	Arrangements must be in place for the medical examination of all construction employees before, during and after termination of employment	Project Manager, Developer & Contractor	Continuous	500 per examination
Machinery/equipment safety	Ensure that machinery, equipment, personal protective equipment, appliances and hand tools used in construction do comply with the prescribed safety and health standards and be appropriately installed maintained and safeguarded	Project Manager, Developer & Contractor	One-off	_
	Ensure that equipment and work tasks are adapted to fit workers and their ability including protection against mental strain	Project Manager, Developer & Contractor	Continuous	_
	All machines and other moving parts of equipment must be enclosed or guarded to protect all workers from injury	Project Manager	One-off	_
	Arrangements must be in place to train and supervise inexperienced workers regarding construction machinery use and other procedures/operations	Project Manager	Continuous	5,000 per training
	Equipment such as fire extinguishers must be examined by a government authorized person. The equipment may only be used if a certificate of examination has been issued	Project Manager	Continuous	5,000 per examination

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	Reports of such examinations must be presented in prescribed forms, signed by the examiner and attached to the general register	Project Manager	Continuous	3,000 per examination
Storage of materials	Ensure that materials are stored or stacked in such manner as to ensure their stability and prevent any fall or collapse	Project Manager	Continuous	5,000
	Ensure that items are not stored/stacked against weak walls and partitions	Project Manager	Continuous	_
Safe means of access and safe place of employment	All floors, steps, stairs and passages of the premises must be of sound construction and properly maintained	Project Manager & Contractor	Continuous	_
	Securely fence or cover all openings in floors	Project Manager & Contractor	One-off	_
	Provide all staircases within the premises with suitable handrails on both sides	Project Manager & Contractor	One-off	
	Ensure that construction workers are not locked up such that they would not escape in case of an emergency	Project Manager & Contractor	Continuous	_
	All ladders used in construction works must be of good construction and sound material of adequate strength and be properly maintained	Project Manager & Contractor	One-off	_
Emergency preparedness and evacuation procedures	Design suitable documented emergency preparedness and evacuation procedures to be used during any emergency	Project Manager & Contractor	One-off	4,000

EXPECTED NEGATIVE IMPACTS	RECOMMENDED MITIGATION MEASURES	RESPONSIBLE PARTY	TIME FRAME	COST (KSHS)
	Such procedures must be tested at regular intervals	Project Manager & Contractor	Every 3 months	4,000
	Ensure that adequate provisions are in place to immediately stop any operations where there in an imminent and serious danger to health and safety and to evacuate workers	Project Manager & Contractor	One-off	6,000
	Ensure that the most current emergency telephone numbers posters are prominently and strategically displayed within the construction site	Project Manager & Contractor	One-off	2,000
	Provide measures to deal with emergencies and accidents including adequate first aid arrangements	Project Manager & Contractor	Continuous	5,000
First Aid	Well stocked first aid box which is easily available and accessible, should be provided within the premises	Project Manager & Contractor	One-off	5,000
	Provision must be made for persons to be trained in first aid, with a certificate issued by a recognized body.	Project Manager & Contractor	One-off	5,000
13. Ensure the general safety and security of the site and surrounding areas				
Increased Pressure on Infrastructure	Coordinate with other planning goals and objectives for the region	Architect, Project Manager, Contactor and the Developer	Continuous	18,000
	Upgrade existing infrastructure and services, where feasible.	Architect, Project Manager, Contactor and the Developer	Continuous	

Insecurity	Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the construction site.	Security Officer, Project Manager & Police	Continuous	15,000
	Body-search the workers on entry, to avoid getting weapons on site, and leaving site to ensure nothing is stolen.	Security Officer	Continuous	
	Ensure only authorised personnel get to the site	Security Officer	Continuous	
	Security alarms will be installed	Security Officer	Continuous	
14. Environmental monitoring of the project				
Environmental concern during the construction phase	**Due to the magnitude of the project the proponent will liaise with the environmental consultants throughout the construction phase and ensure that the conditions of approval are adhered to.**	Proponent, Contractor and AWEMAC	Throughout construction phase	

6.1 Operational Phase EMP

The necessary objectives, activities, mitigation measures, and allocation of costs and responsibilities pertaining to prevention, minimization and monitoring of significant negative impacts and maximization of positive impacts associated with the operational phase of the office tower project are outlined in **Table 7.**

Table 7: Operation Phase Environmental Management Plan for the Proposed Commercial Building Tower Development

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	COST (KSHS)
1 Minimization of solid waste generation and ensuring more efficient solid waste management				
Solid waste generation	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary landfilling.	Proponent/Property Managers	One-off	5,000/Month
	Provide solid waste handling facilities such as waste bins and skips	Proponent/Property Managers	One-off	10,000
	Ensure that solid waste generated is regularly disposed off appropriately at authorised dumping sites	Proponent/Property Managers	Continuous	10,000/month
	Donate redundant but serviceable equipment to charities and institutions	Proponent/Property Managers	Continuous	0
	Comply with the provisions of Environmental Management and Co-ordination (Solid Waste) Regulations 2006	Proponent/Property Managers	Continuous	0
2 Minimise risks of liquid waste release into environment				
Liquid waste release into the environment	Provide adequate and safe means of handling liquid waste at the premises	Proponent/Property Managers	One-off	

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	COST (KSHS)
	Conduct regular inspections for pipe blockages or damages and fix them appropriately	Proponent/Property Managers	Continuous	500 per inspection
	Ensure regular monitoring of the sewage discharged from the project to ensure that the stipulated sewage/effluent discharge rules and standards are not violated	Proponent/Property Managers	Continuous	500/parameter
	Comply with the provisions of Environmental Management and Co-ordination (Water Quality) Regulations 2006	Proponent/Property Managers	Continuous	0
3 Minimize energy consumption				
Energy Use	Switch off electrical equipment, appliances and lights when not in use	Proponent/Property Managers	Continuous	–
	Install occupation sensing lighting at various locations such as the parking areas which are not in use all the time	Proponent/Property Managers	One-off	10-40 % higher than ordinary lighting
	Install energy saving fluorescent tubes at all lighting points within the building instead of bulbs which consume higher electric energy	Proponent/Property Managers	One-off	10-40 % higher than ordinary lighting
	Monitor energy use during the operation of the project and set targets for efficient energy use	Proponent/Property Managers	Continuous	5,000/month

Expected Negative impact	Recommended Mitigation Measures	Responsible Party	Time Frame	COST (KSHS)
	Sensitise workers on how to use energy efficiently	Proponent/Property Managers	Continuous	500/month
4 Minimize water consumption and ensure more efficient and safe water use				
Water management	Promptly detect and repair water pipe and tank leakages	Proponent/Property Managers	Continuous	5,000/month
	Workers/visitors to conserve water e.g. by avoiding unnecessary toilet flushing	Proponent/Property Managers	Continuous	500/month
	Ensure taps are not running when not in use	Proponent/Property Managers	Continuous	500/month
	Install water conserving taps that turn-off automatically when water is not being used	Proponent/Property Managers	One-off	10-40 % higher than ordinary taps
	Install a discharge meter at water outlets to determine and monitor total water usage	Proponent/Property Managers	One-off	5,000
5 Minimization of health and safety impacts				
Implement all necessary measures to ensure health and safety of workers and the general public during operation of the offices as stipulated in the Occupational Safety and Health Act,2007		Proponent/Property Managers	Continuous	–
6 Ensure the general safety and security of the premises and surrounding areas				
Ensure the general safety and security at all times by providing day and night security guards and adequate lighting within and around the premises		Proponent/Property Managers	Continuous	10,000/month
7 Control of informal activities around the project site				

Mushrooming of Informal Settlement	Local Administration; Local Authority	Continuous	0
8 Ensure environmental compliance			
Undertake an environmental audit within 12 months after operation commences as required by law	Africa Waste and Environment Management Centre Firm of Experts	12 months after operation commences	40,000

6.2 Decommissioning Phase

In addition to the mitigation measures provided in **Tables 6** and **7**, it is necessary to outline some basic mitigation measures that will be required to be undertaken once all operational activities of the project have ceased. The necessary objectives, mitigation measures, allocation of responsibilities, time frames and costs pertaining to prevention, minimization and monitoring of all potential impacts associated with the decommissioning and closure phase of the project are outlined in **Table 8** below.

Table 8: Decommissioning Phase EMP for the Proposed Commercial Building Tower Development

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (KShs)
1. Demolition waste management				
Demolition waste	Use of an integrated solid waste management system i.e. through a hierarchy of options: 1. Source reduction 2. Recycling 3.Composting and reuse 4. Combustion 5. Sanitary land filling.	Project Manager & Contractor	Once-off	5,000
	All buildings, machinery, equipment, structures and partitions that will not be used for other purposes must be removed and recycled/reused as far as possible	Project Manager & Contractor	Once-off	15,000
	All foundations must be removed and recycled, reused or disposed of at a licensed disposal site	Project Manager & Contractor	Once-off	7,000
	Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site	Project Manager & Contractor	Once-off	0
	Donate reusable demolition waste to charitable organizations, individuals and institutions	Project Manager & Contractor	Once-off	0
2. Rehabilitation of project site				

Expected Negative Impacts	Recommended Mitigation Measures	Responsible Party	Time Frame	Cost (KShs)
Site degradation	Implement an appropriate re-vegetation programme to restore the site to its original status	Project Manager & Contractor	Once-off	0
	Consider use of indigenous plant species in re-vegetation	Project Manager & Contractor	Once-off	0
	Trees should be planted at suitable locations so as to interrupt slight lines (screen planting), between the adjacent area and the development.	Project Manager & Contractor	Once-off	0

10 CONCLUSION AND RECOMMENDATION

The EIA study has established that the proposed development project by Jabavu Village Limited is a worthy investment by the proponent and broadly with no doubt, will contribute significantly to the improvement of living standards among the investors and by extension spur economic development. This will be achieved through the prior discussed positive impacts namely; growth of the economy, boosting of the informal sector during the construction phase, provision of market for supply of building materials, employment generation, increase in government revenue and optimal use of land.

However, the EIA study has established that the proposed project will also come along with some negative impacts. The negative environmental impacts that will result from establishment of the proposed project which include pressure on the existing traffic and parking facilities, hydrology and water quality degradation, noise pollution, dust emissions, solid waste generation, increased water demand, increased energy consumption, generation of exhaust emissions, workers accidents and hazards during construction, possible exposure of workers to diseases, increased storm water among others can however be sufficiently mitigated.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the life cycle of the project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the EMP as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects. It is expected that the positive impacts that emanate from such activities shall be maximised as much as possible as exhaustively outlined within the report. These measures will go a long way in ensuring the best possible environmental compliance and performance standards.

It is our recommendation that the project be allowed to go on provided the mitigation measures outlined in the report are adhered to, Environmental Management Plan (EMP) is implemented and the developer adhere to the conditions of approval of the project.

11 REFERENCES

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World Bank (1991), Environmental Assessment sourcebook volume I: Policies, procedures and cross-sectoral issues. World Bank, Washington.

12 APPENDICES

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