

ENVIRONMENTAL IMPACT ASSESSMENT-STUDY REPORT



**PROPOSED CONSTRUCTION
OF
MODERN MIXED USE COMMERCIAL OFFICE/HOTEL
COMPLEX ON
L.R. NO. 209/64/11
MUTHITHI ROAD- WESTLANDS, NAIROBI COUNTY
BY
WESTLANDS SKYE DEVELOPMENT LIMITED**

DECLARATION

We, the undersigned, hereby declare that this EIA Study Report represents the facts pertaining to the proposed construction of commercial Office Block Project on Muthithi Road- Westlands; Nairobi by Westlands Skye Development Limited

ON BEHALF OF WESTLAND SKYE DEVELOPMENT LIMITED

Signed: _____

Dated: _____

DETAILS OF EXPERTS WHO CONDUCTED THE EIA

MR. PHILLIP OGUBA WANDERA LEAD EXPERT/ TEAM LEADER NEMA REG. No. 0080

Signed: _____

Dated: _____

List of assessment Experts

Kenn Esau	Environmentalist
W. Agutu	Project Manager
Eng. Muriithi Kuria	Civil Works Engineer
Space Form Studio	Architects
Irene Keino	Public Participation

ACRONYMS, ABBREVIATIONS & UNITS**ABBREVIATIONS & ACRONYMS**

AADT	Average Annual Daily Traffic
CBD	Convention on Biological Diversity
CBD	Central Business District
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
ESIA	Environmental and Social Impact Assessment
GDP	Gross Domestic Product
GFA	Gross Floor Area
HazMat	Hazardous Material
HGV	Heavy Good Vehicle
HMSP	Hazardous Material Safety Plan
HSE	Health, Safety and Environment
HSEMP	Health, Safety and Environment Management Plan
ITE	Institute for Transport Engineering
KENHA	Kenya National High Way Authority
LGV	Light Good Vehicle
MoL	Ministry of Labour
MoNMD	Ministry of Nairobi Metropolitan Development
MoPHS	Ministry of Public Health and Sanitation
MoSPND	& Ministry of State for Planning, National Development and Vision 2030
Vision 2030	
MoW	Ministry of Works
MSDS	Material Safety Data Sheet
NCC	Nairobi City Council
NCWSC	Nairobi Water and Sewerage Company
NEAP	National Environmental Action Plan
NEMA	National Environmental Management Authority
NHIF	National Hospital Insurance Fund
Nv	Number of Vehicles
O/D	Origin/Destination
OSH	Occupational and Safety Act
OSHA	Occupation Safety and Health Act
OSHMP	Occupational Safety and Health Management Plan
PCB	Polychlorinated Biphenyls
PCU	Passenger Car Unit
POP	Persistent Organic Pollutant
PPE	Personal Protective Equipment
STI	Science, Technology and Innovation
TAZ	Traffic Analysis Zones
UNEP	United Nations Environmental Programme
V/H	Vehicles per hour
VEH	Vehicles
VEH/H	Vehicles per hour
WMP	Waste Management Plan

UNITS & SYMBOLS

°C	Degrees Celsius
°F	Degrees Fahrenheit
C	Carbon
Cm	Centimeter
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO _x	Carbon Oxides
Cr	Chromium
Ft	Feet
Kg	Kilogram = 1000 grams
Km	Kilometer = 1000 meter
KSHS	Kenya Shillings
Kwh	Kilowatt Hours
M	Meter = 100 cm
m ²	Square Meters = m x m
N	Nitrogen
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxide
O ₃	Ozone
Ppm	Parts per million

EXECUTIVE SUMMARY

In the recent decade Nairobi has experienced a boom in urban development curtailed by the construction of numerous infrastructure projects encompassing: residential and housing projects; commercial and industrial establishments; recreational facilities, and other amenities. These have all been in support or service to the growing population in the city and also economic development in both macro and micro scales. Most of these projects tend to have generic impacts with baselines withholding but having a cumulative impact on the natural resources that the greater population depends on. Thus as required by the EMCA of 1999 it is prudent for all these projects to comply with regulations and where possible surpass legal stipulations/obligations in order to minimize or avoid negative impacts on these resources.

The proposed project for which this EIA Study report has been prepared is a construction project that will involve a mixed use development on Muthithi Road Westlands. The development comprises the development of a modern mixed use Office/Hotel complex anchored by a Business Hotel on plot No L.R.No. 209/64/11 on Muthithi Road, Westlands, Nairobi County. The project shares impacts similar to most construction ditto urban development projects, and are thus manageable through the proposed EMP that was developed commensurate to the assessment of its impact in this report.

The project will be implemented on a plot relatively flat measuring approximately 0.5 acres with two old residential buildings that will be removed to pave way for the proposed office block. The development once completed, will offer state of the art premium offices and an internationally styled business hotel housed in an 18 storied office block consisting of two towers-wing A and B. The building will have at least three (3) basements that will serve as the parking area for tenant cars having a total of 40 vehicle parking spaces each. The building will also be serviced with four (4) lifts, have fibre cable serving all the floors. As part of the building services; Electricity and water are readily available. The project wants to achieve a work and play character making it appealing to potential tenants. The construction will have the following but not limited to:

- Ground floor; a restaurant the will house a coffee house , lettable commercial space that will be converted to shops, general storage space, service yard for vehicles, building lobby, docking areas for delivery and a transformer room.
- First floor; having several meeting rooms, lobby, restaurant and accompanying office space.
- Subsequent floors will have typical floor plans that will comprise; office spaces that will be partitioned according to need, office lobby areas and storage areas complete with WC, kitchenette facilities. Each floor will have a balcony area with fire escape, served with both staircases and lifts for each tower.
- Top floor of the building will have an artic/ service floor that will consist of the following; Gym space, adult and baby swimming pool, sauna, steam, treatment and changing rooms. This floor will have a bridge between the towers that will characterize it, being the only floor that links tower A and B. this floor will have an executive lounge, luxury bar-roof top bar, kitchenette, infinity pool and external sitting space on wing B.

The project will be implemented in two phases i.e. construction of tower A followed by that of Tower B. This is due to the limitation of financial resources.

This Environmental Impact Assessment (EIA) assessment is undertaken under requirements of Environmental Management Coordination Act of 1999 schedule II as stipulated by National Environment Management Authority that requires all development projects to do so in order to elucidate the potential adverse impacts of a project and thereby devising appropriate mitigation measures.

The major objective of the EIA assessment was to evaluate the effects/impacts of proposed development in relation to the general environmental aspects i.e. physical, biological, and social-economic environments. It aims at influencing the protection and co-existence of the development with the surroundings as well as the compatibility of the proposed development to the area; to ensure and enhance sustainable environmental management during implementation and operational phases.

This project report is broken down the proposed project's activities into five (5) phases of:

- Decommissioning of existing old buildings
- Design phase
- Construction phase
- Operational phase, and
- Decommissioning phase.

Specific assessment objectives pinned to these activities were to:

- Identify and analyze the impacts of the proposed project on the natural environmental
- Evaluate impacts of the project on the socio-cultural environment
- Assess impacts on infrastructure and social amenities (sewerage, water supply, road network, electricity)
- Assess and predict any effects on any sensitive ecosystems
- Identify and predict impacts on and changes in development policy with respect to the area
- Formulate an Environmental and Social Management Plan (ESMP)

To achieve these objectives the assessment collected baseline data firstly through desktop studies on a: national level; regional, and then finally scoping down to the assessment area and its immediate environs. These were combined with a public participation, a checklist and matrix to identify and analyse impacts in order to fully prioritize them and develop efficient and appropriate mitigation measures.

The project will access electricity from the national grid on top of having a backup power generator whereas water access will be from a borehole to be drilled in the site that can supply approximately 40% of the total daily demand for the development as well as NCWSC supply.

The proposed project which its proponents are the Westlands Skye Development Limited is estimated to cost about **Ksh. 0.7 Billion**. The project will take approximately **36 Months** from its design to operational phase. The construction will be conducted using a phased approach with construction of tower 1 being completed before the developer moves to tower 2 based the the availability of adequate financing. The total cost for development of phase 1 will be **Ksh. 375,397,698**.

The significant potential adverse impacts of the proposed project, which were identified through this EIA's methodology, were found to be:

- Generation of solid and liquid wastes
- Air pollution: gaseous, dusts and particulates
- Increased pressure on utilities/services
- Traffic
- Public safety risks
- Noise generation

The above mentioned impacts will be effectively managed and where possible eliminated through the following mitigation measures:

- Landscaping with indigenous species on completion of construction.

- Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens.
- Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.
- Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dusts.
- Enclosing the structures under construction with dust proof nets.
- Using efficient machines with low emission technologies for the ones that burn fossil fuels.
- Controlling the speed and operation of construction vehicles.
- Regular maintenance and services of machines and engines.
- Use of clean fuels e.g. unleaded and de-sulphurized fuels.
- Educate and raise awareness of construction workers on emission reduction techniques.
- Using equipment with noise suppressing technologies.
- Providing workers with PPEs against noise e.g. ear plugs.
- Placing signs around the site to notify people about the noisy conditions.
- Regular maintenance of equipment to ensure they remain efficient and effective.
- Complying with the EMCA noise regulation Legal Notice 61.
- Construction works will be carried out only during the specified time which is usually as from 0800 hrs to 1700 hrs.
- There should not be unnecessary honking of the involved machinery.
- Provision of bill boards at the construction site gates notifying of the construction activity and timings
- Employing water conservation techniques and only using the required amounts of water to prevent wastage.
- Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible.
- Using machines with power saving technologies i.e. high efficiency equipment.
- Providing proper sanitary facilities for construction workers.
- Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.
- Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site.
- Ensuring all drivers for the project comply to speed regulations.
- Making sure the construction doesn't occupy the road reserves and complying with traffic and land demarcation obligations.
- Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.
- Following EMCA regulations on Waste Management, Legal Notice 121.
- Employing a waste management plan. (See Appendix 6)
- Using waste minimization techniques such as buying in bulk.
- Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so.
- Making available suitable facilities for the collection, segregation and safe disposal of the wastes.
- Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, timber, metals etc.
- Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected.

- Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation.
- Creating adequate facilities for the storage of building materials and chemicals and controlling access to these facilities.
- Ensuring bins are protected from rain and animals.
- Employing an OSH plan that will outline all OSH risks and provide a strategy for their management. (See Appendices 7 & 8)
- Ensuring all potential hazards such as movable machine parts are labelled.
- Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment.
- Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out.
- Placing visible and readable signs around where there are risks.
- Ensuring there is security in and around the site to control the movement of people.
- Providing safe and secure storage for equipment and materials in the site and maintaining MSDSs.
- Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.
- Providing fire fighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly.
- Labeling chemicals and material according to the risks they possess.
- Creating safe and adequate fire and emergency assembly points and making sure they are well labeled.
- Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.
- Implementing water conservation techniques such as having faucets with dead man tap openers.

The proposed project will also have many positive impacts due its objectives, scope, details, the site and other baseline conditions. These can be summarized by the following which are the most significant positive impacts:

- Creation of employment throughout all of its phases and indirect employment creation from industries that may either service the people working at the warehouses.
- Economic benefits that include the capital investment of **Ksh. 0.7 Billion** that will be injected into the economy.
- Stimulation of development through revenue and taxes that will be levied by the government
- Creation of market for goods and services that will be utilized in the entire project such as raw materials, plumbing services, electrical fittings, transport and landscaping
- Creation of business opportunities for various companies and individuals which is in line with the vision 2030

The project will play an important role in increasing the number and quality of hotel accommodation and offices in the area, country and regionally, however to greatly work in synchrony with the environment and stakeholders in order to ensure its sustainability Westlands Skye development Limited should proceed with the project with the prescribed mitigation measures. Constant monitoring of the said aspects (impacts and mitigation) through close follow-up and implementation of the recommended Environmental Management and Monitoring Plans will also ensure its longevity and avoid conflicts between the project and stakeholders or between it and the natural world. In relation to the proposed mitigation and environmental management and planning measures that will be incorporated during construction and operation phases; and the developments' input to the proponent and the general society, the proposed project is considered beneficial and important. Major concerns should

nevertheless be focused towards minimizing the occurrence of impacts that would degrade the general environment.

On the strength of the aforesaid, it is hereby recommended that the project be granted the required approval and an EIA license as appropriate.

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1 INTRODUCTION

Mixed use developments impact the environment and societies in several ways during the different phases of their project life cycles. This involves construction which would require building material (quarrying, mining and processing of metals, cement production), land clearing erection of the buildings (noise, dust, hazardous materials) and during operation generation of both solid and liquid waste etc. following the approval of the Terms of Reference (ToR) as per EMCA regulations, this Environmental Impact Assessment report (EIA) seeks to examine both the positive and negative effects that the proposed mixed use development project is likely to have on both the physical and socio-economic environment in order for sound decision making to promote human activities that align synergistically with the natural world within a sustainable development framework. Thus this study conducted wide stakeholder participation and is being used as an important planning tool for the project proponent as it will outline any significant project impacts and clearly define mitigation measures to avoid or curb any adversities. The proposed mitigations have taken into consideration the concerns of various stakeholders and residents. As espoused in the project report, the proponent of the project is **Westland Skye Development Limited**, which is a registered company by the registrar of companies and under the Companies Act of Kenya, Cap 486.

1.1 OBJECTIVES AND SCOPE OF THE EIA

The overall objective of the EIA is to carry out an assessment of constructing and operating an 18 storeyed building to determine whether or not the construction and operation and associated activities will have any adverse impacts on the environment, taking into account biophysical, social, cultural, legal and economic considerations.

The specific objectives of the EIA are to:

- describe the nature of construction to be undertaken;
- verify compliance with environmental laws, policies and regulations as well as industry best practice and standards;
- identify and analyze alternatives to the envisaged project;
- Identify, analyse and propose mitigation measures for positive and negative impacts and enhancement measures for positive impacts to be undertaken during and after the implementation of the project including; recommending cost effective measures to be used to mitigate against the anticipated negative impacts;
- seek the views of affected persons in consultation with NEMA;
- Prepare an Environmental and Social Management Plan (ESMP) report compliant with the Environmental Management and Coordination Act (1999).

The assessment was undertaken in full compliance with the Environmental Management and Coordination Act 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003.

1.2 THE APPROACH

The EIA approach was structured so as to cover the requirements under the EMCA, 1999 as well as the Environmental Management and Coordination (Environmental Impact Assessment and Audit) Regulations, 2003 and amended 2009 regulations. The approach mainly involved an understanding of the project background, technology and processes, implementation plan, operation activities. In addition, baseline information was obtained through detailed physical and biological investigation of the proposed road project and its surrounding areas, stakeholder consultations (which included discussions with local communities, traders, local administration, private sector, Government and private organizations), photography and, continuous discussions with the proponent. The key activities undertaken during the various stages of the EIA were as follows:

- describing the project and establishing environmental baseline conditions;

- scoping the issues and establishing the boundaries of the assessment;
- assessing the potential environmental effects of the project, including residual and cumulative effects;
- identifying potential mitigation measures to eliminate or minimize potential adverse effects; and
- Developing environmental management and monitoring plan.

This approach emphasized key elements of the EIA i.e.: scoping; stakeholder engagement; baseline data collection; project description; assessment of impacts and identification of mitigation measures; integrated.

TERMS OF REFERENCE

The EIA study was conducted as per the approved ToR were pursuant to Section 58 of EMCA 1999 and regulation 10 of Environmental (Impact Assessment and Audit) regulations, 2003 legal notice No. 101. The study conducted an indepth evaluation of potential impacts in order to materialize harmony with the affected and interested stakeholders. It also aimed at ensuring that the proposed project/building would be constructed based on applicable building standards of Kenya and other international building codes i.e. British standards (BS 8110, BS 5950, etc). The construction should, in addition, incorporate environmental guidelines, and health and safety measures.

Responsibilities

While the environmental expert provided the technical understanding on the baseline environmental status, potential impacts, management options and legal framework, the client was expected to provide the following:

Site map(s) showing roads, service lines, buildings layout and the actual size of the site,

- Full details of proposed operations and activities, input materials, site operational outline, products and by-products and any wastes to be generated,
- Measures to be put in place for handling wastes and hazardous materials on the site,
- Land ownership documents and site history.

The output from the assessor was an EIA project report comprising of an executive summary, study approach, baseline conditions, existing and anticipated impacts and potential mitigation measures for anticipated negative impacts and a comprehensive Environmental Management Plan (EMP).

1.3 METHODOLOGY

Various data collection and analyses techniques were used in the assessment:

1.3.1 Desk Review

Deskwork provided a detailed description of the project with respect to spatial coverage, preliminary design layout, magnitude, implementation schedules and costs as well as human resources. Relevant documents were reviewed to obtain information on the baseline information in general but specifically at the project site. This documentary review provided further understanding the project design (site plan and architectural drawings), land use, local micro-environmental conditions, data on demographic trends, land use practices, development strategies and plans (local and national) as well as the policy and legal documents among others. Others included area maps, Development Plans of the Nairobi City, National Development and Economic Surveys, relevant legislations, regulations and guidelines and standards.

1.3.2 Field Assessment

Physical evaluation of the project area was carried out with specific focus on landform trends, land use patterns, biodiversity, natural resources, hydrology and climatic variations. This was also an evaluation of the current environmental status with respect to physical, biological and socio-cultural perspectives. It was a systematic field inspection backed with available documentation and direct interviews. Field evaluation was planned to enable determination of the exact physical environmental features to be

affected within the proximity of the project site. In addition to identifying the potential positive and negative impacts, field assessments contributed understanding the proposed works to be undertaken.

The field survey adopted various techniques of baseline data collection on the existing environmental conditions, namely:

- Field observations and recordings including photography the project site and its vicinity.
- Use of checklists for determining potential environmental impacts of the proposed project.
- Consultations and public participation within the neighbourhood of the project site.

1.3.3 Observations

Detailed field observation assessment was undertaken to enable determination of the exact socio-economic activities within the proximity of the project site. Among the broad focal areas for which observation was done included settlement patterns, land use, commerce, trade and industry among others. Checklists were used along with observations to check on possible environmental impacts of the project would have on the environment during both construction and operational phases. In this assessment, checklists were utilized to: facilitate identification of potential environmental impacts; provide a means of comparing the predicted environmental impacts; indicate the magnitude of both positive and negative environmental impacts; indicate possible adverse environmental impacts that are potentially significant but about which sufficient information can be obtained to make a reliable prediction; and Indicate negative potential environmental impacts in the project area, which merit mitigation measures and monitoring during project implementation.

1.3.4 Public and Stakeholders Engagement

Structured stakeholder engagement was undertaken in the neighbourhood of the proposed project site to capture the views and concerns of interested and affected parties. The engagement process entailed face to face meetings / interviews.

1.3.5 Data Collection, Analysis

The process of data collection was undertaken as follows:

- **Preliminary assessment of the site:** where the experts visited the site to know the location.
- **Screening:** This is the initial phase of any EIA process. It involves the determination of whether or not an EIA assessment is required for a particular development activity.

Determination in the proposed project depended on the following aspects but not limited to:

- The sensitivity of the area likely to be affected;
- Public health and safety;
- The possibility of uncertain, unique or unknown risks;
- The possibility of having individually insignificant but cumulatively significant impacts;
- Whether the proposed activity affects protected areas, endangered or threatened species and habitats;

From the above, the proposed project was seen to require an Environmental Impact Assessment assessment since construction activities of such magnitude are expected to give forth both negative and positive effects to the environment and ultimately contribute to an increased waste generation both in the construction and occupational phases. This stage also involved activities such as:

- a) Getting a comprehensive site description that includes: Location of the proposed project, the soils and geology of the proposed site, water resources available on site, drainage system evident on site, climatic conditions of the proposed location and its vicinity, vegetation on site, land use systems on site and its vicinity, population characteristics of the region holding the proposed site, infrastructure at the site and justification for selection of the site

- b) Getting detailed information on: The nature of the proposed construction activities, the materials to be used in the construction activities on site and the expected project outputs including waste generation
- **Collection of Baseline Data:** Data collection involved activities such as desktop assessment and discussion with the proponent, observation, detailed physical inspection of the proposed site and the surrounding areas to determine the present and anticipated impacts of the proposed project, assessment of the approved structural and technical drawings for the proposed project development (housing units) and development of a photo log. The data obtained was used to assess potential impacts on health, safety, environment and the community surrounding the proposed site location. From the obtained data, environmental, health, safety and social concerns were identified in relation to the proposed project location and mitigation measures proposed for the negative impacts, while enhancement measures proposed for the positive impact. Photography was used to capture salient features and baseline conditions in the project site and its neighbourhood. The photos were used to define existing features in the project area and identify soils and floral species in the area.
 - **Data Analysis and Evaluation of Alternatives:** use of checklists and the threshold limits were used in data analysis; while the proposed site location, technologies to be employed, product mix, scale of construction, potential environmental impacts, capital and operating costs, suitability under local conditions, and institutional, training, and monitoring requirements were considered in the evaluation of alternatives. The proposed project's impacts were identified using a developed checklist, public consultation information, literature and professional knowledge. Impacts were first distinguished as either positive or negative. The proposed project's negative impacts were analysed to denote their significance based on their characteristics and this was also impacts per project phase. Significance was judged based on their capacity to change baseline conditions beyond acceptable standards or legislative provisions. A qualitative scoring matrix was used to give a value/score of each impact on the environment
 - **Consultation and Public Participation:** here, stakeholders, that include the neighbors to the proposed site were interviewed and asked to fill in questionnaires, in order to get their views, expectations, projected economic and social effects regarding the proposed project activities and location. It was done through a BID (Appendix 3) and a preconceived comment registration sheet (Appendix 4). These findings were then analyzed and incorporated in this project report.
 - **Preparation of the Project Report:** this Environmental Impact Assessment project report was then prepared by approved and registered (by NEMA) EIA experts, who are familiar with the provisions of the Environmental Management and Coordination Act (EMCA), 1999 and other relevant regulations and laws of Kenya as indicated in the Legal framework.

1.4 PROJECT DESCRIPTION

This E.I.A project report is based on information and consultations with the project proponent, the Architects, Quantity Surveyors, Engineers, valuers and financial analysts and details contained in the Drawings of the proposed project (attached at the Annex). The above aim to provide a new focal point for offices and improve tourism sector and it is anticipated that the cosmopolitan development will boost Nairobi County.

1.4.1 Project Location

The Proposed Project is a Mixed Use Development on L.R.No. 209/64/11 which falls on the North of Muthithi road, Westlands area of Nairobi's CBD.

Table 1-1: Proposed Project Site Coordinates

Point ID	Latitude	Longitude
1	S1° 16' 2.2779"	E 36° 48' 30.8371"
2	S 10 16'037965'	E 360 48. 513951'
Projection		Datum

UTM Zone37S

Arc 1960

The proposed development comprises of offices for commercial use and hotel, linked around a landscape heart incorporating a cultural event space on what is very interesting site that varies in character from the noise of the busy main road to the quieter, more peaceful landscape areas to the south.

1.4.2 Land Tenure, Use, Ownership and Management

The property under reference is under residential single dwelling and the proponent has acquired a change of use to multi-dwelling structure and is Leasehold from the Government of Kenya for term of 99 years from 1.11.1998. The conveyance is registered in the name of Westlands Skye Development Limited as per the last title transfer.

1.4.3 Project Design

The proposed project will curtail the development of mixed use establishment that will include: retail and commercial establishments in the form of offices and a hotel establishment. The retail development will help to shield the offices and other components from traffic pollution and road noise, and will therefore allow the option of natural ventilation in the buildings, as well as creating pleasant public spaces

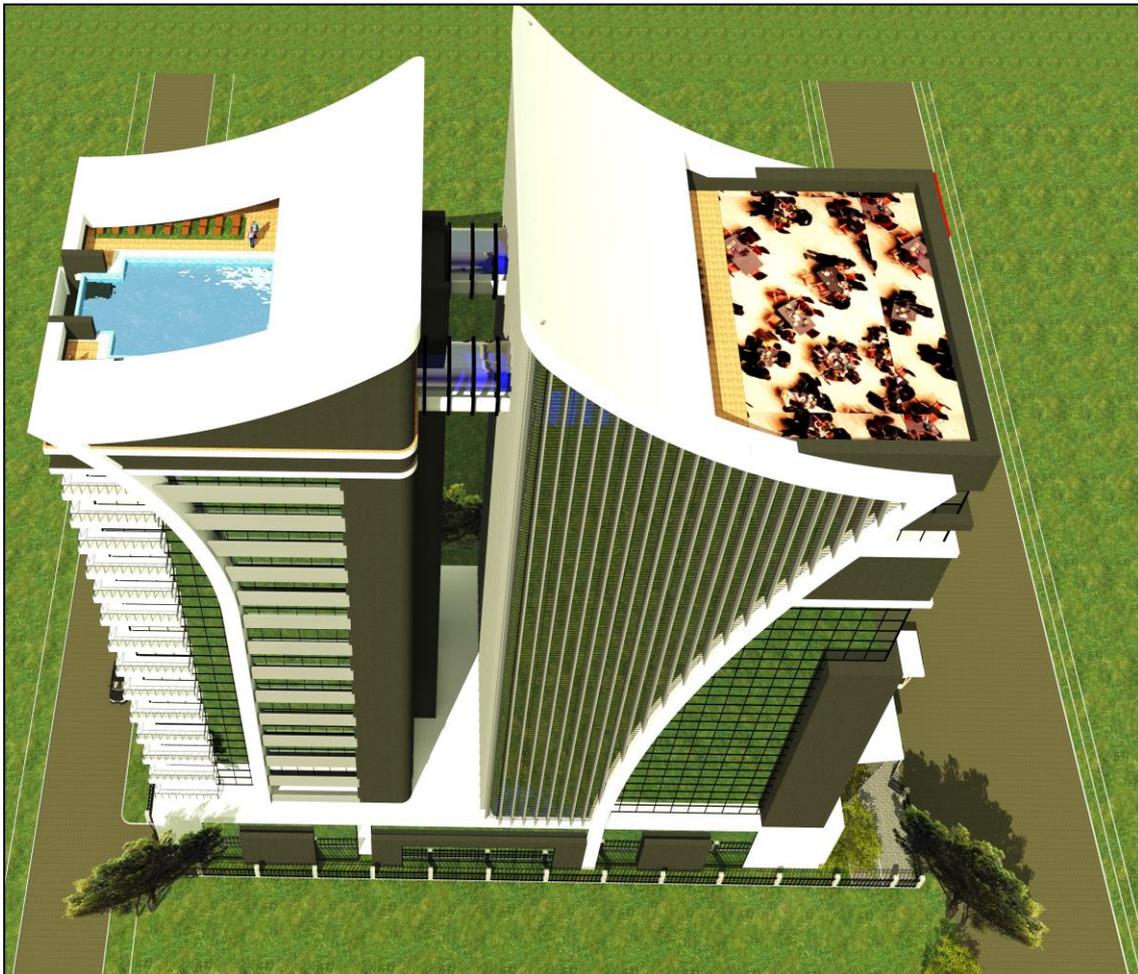


Plate 1-1: Architectural Impression of proposed project

- Ground floor; a restaurant the will house a coffee house , lettable commercial space that will be converted to shops, general storage space, service yard for vehicles, building lobby, docking areas for delivery and a transformer room.
- First floor; having several meeting rooms, lobby, restaurant and accompanying office space.
- Subsequent floors will have typical floor plans that will comprise; office spaces that will be partitioned according to need, office lobby areas and storage areas complete with WC, kitchenette facilities. Each floor will have a balcony area with fire escape, served with both staircases and lifts for each tower.
- Top floor of the building will have an artic/ service floor that will consist of the following; Gym space, adult and baby swimming pool, sauna, steam, treatment and changing rooms. This floor will have a bridge between the towers that will characterize it, being the only floor that links tower A and B. this floor will have an executive lounge, luxury bar-roof top bar, kitchenette, infinity pool and external sitting space on wing B.

Table 1-2: Sectional Areas

Project Component	Descriptive Objective
Modern offices	To enable more companies to have a base of operations. To allow established companies to expand and increase their revenue from an increased capacity to do business
Retail section	Occupies approximately 10% of the building and it will be implemented predominantly in the ground floor of the project. To create an enabling environment of facilities for business, individuals and tourists. To provide business opportunities. Shops and amenities in the retail area will include: <ul style="list-style-type: none"> ○ Specialist Stores ○ Medium Sized Shops ○ Line Shops ○ Home Zone ○ Small Shops ○ Restaurants/Cafes ○ Fast Food/Food Court ○ A Leisure area.
Hotel Section	To create additional infrastructure for people to be accommodated. The hotel area will contain rooms for accommodation.
Creation of common area	To give it and the project a distinct character, brand and address, and respond to attributes to the site. All visitors and residents will have an access to the common recreation area. It will include the main attic area of the main recreational facilities in the project.
Perimeter wall and access gate	Perimeter wall will be for security purposes. One main commercial entrance and a secondary retail access gate. Two residential access gates to ease congestion at the retail gates. A bridge on the top floor will also be constructed to enable connection/link between tower A & B
Parking Spaces	Parking spaces will include: 3 level basements and grade parking. At least 1 parking space per 30 m ² with total about 120 cars

1.4.3.1 Retail Area

The retail area occupies approx. 1, 629m² of the ground and 1st floor sections of the project leaving 94.5% for other commercial uses to maximize the site’s Westland skye Development address. The commercial site will be able to be accessed and secured independently to the office and hotel area. The premium food/beverage/seating and leisure/entertainment uses are clustered on 2-3 levels to maximize the benefits of the view. The shops and amenities in the retail area will include:

- Large Specialist Stores
- Medium Sized Shops
- Line Shops
- Home Zone
- Restaurants/Cafes
- Fast food/Food court

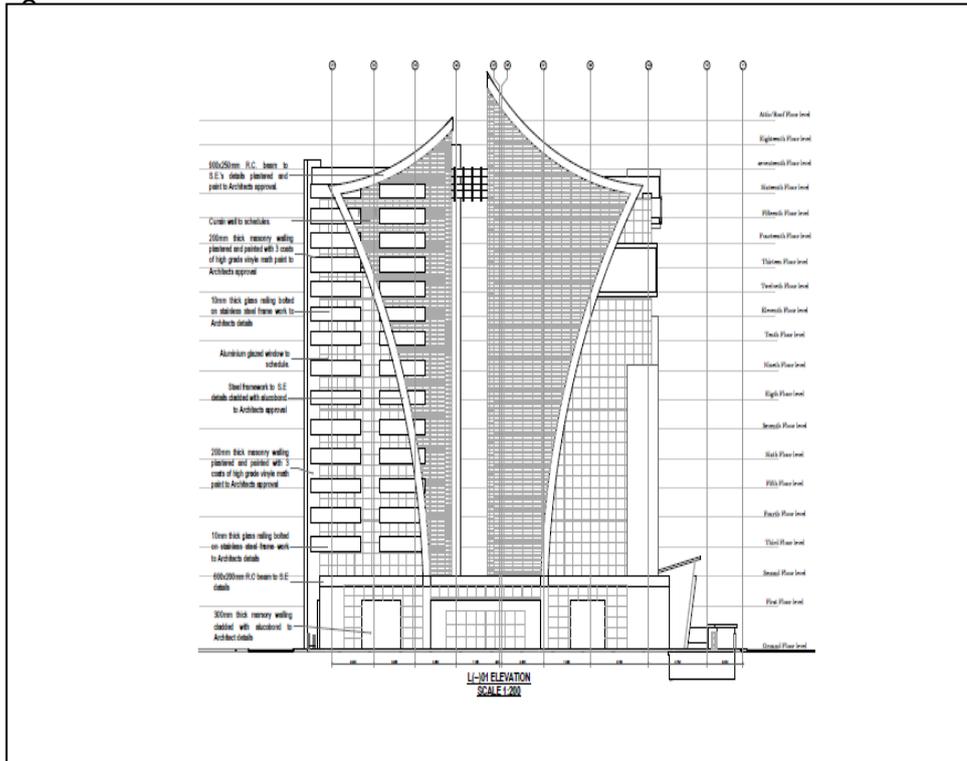


Plate 1-2 Cross section of the Proposed Project

Plate 1-2 shows a cross section of the retail area and these amenities in space according to the project’s master plan, respectively (See Appendix 2 for Project Designs and Plans).

1.4.3.2 Office block Area

The office block area will meet the rising demand for grade “A” offices in Nairobi with many multinational and established local companies setting up their offices in Westlands. It is to be a neighborhood with a secure and safe environment. The office block area will contain units in the twin towers areas that cover 9, 464m² of the project site. The offices will occupy floor 2-17 of the building and will each have their own parking spaces.

1.4.3.3 Hotel Block

There exists an untapped market for affordable high standard business hotel accommodation for business travelers in Nairobi, where the upscale hotels dominate the market, while the affordable ones do not meet the expected standards. Many hotel operators prefer to buy an already constructed structure to fit out their hotels as per their needs. Further, there are various commercial developments established and coming up in the area and this translates to more corporate people in the area creating a client base for the hotel and restaurant. The hotel area will offer flexible residential facilities for both short and long stay visitors. It will be equipped with enough check in and check out counters measuring about xm² in the lobby of the development. There will be a highly flexible conference facility to accompany the hotel accomodtaion measuring about 9,737m². The facility will also have a roof top bar with a swimming pool, mini gym and state of the art restaurant to provide for the visitors and clientele visiting the offices and the hotel.

1.4.3.4 Common Area

The project will have a common area; lobby, ground floor, restuarants both at the ground level and the top floor of the establishment. Its main aim is to increase the ambience of the project through nature and to promote the retention of the hydrological regime of the site.

1.4.3.5 Perimeter Wall and Access Gate

The project will also include a perimeter wall for security purposes and have one main commercial entrance on the Westerly boundary (to and fro Muthithi road) and a secondary retail access gate (to and fro an exit from westlands road). On top of these there will be access points in the lobby to ease congestion at the retail gates. A foot bridge will also be constructed on the top floor to link Towers A & B.

1.4.3.6 Parking Spaces

The project will have several parking spaces that will be in the three underground basement areas to provide in building parking. The parking, whose specification will be 1 parking space per 30 m², will total approx. 120 spaces including spaces for the disabled and for shopping trolleys (See Appendix 2 for Project Designs).

The project will also include internal roads for vehicles that will be for the residents, customers, services and ancillary operations which will also include access for fire brigade services. There will also be paved paths for human movement within the facilities.

1.4.4 Processes, Equipment, Materials, Output and Expected Wastes

For the purposes of better understanding the proposed project and the identification and analysis of impact, the proposed project is broken down in Table 2-2 in terms of its processes, equipment, materials, outputs and expected wastes. These have been pigeonholed in terms of the project phase (design, construction, operation and decommissioning) in which they will occur.

1.4.4.1 Utilities

In order for the project to achieve its objectives varying quantities of utilities will be necessary as ancillary and primary inputs. These utilities and facilities, whose sources are described in this sub-

section, include: Water, Electricity, Sewerage, Storm Water Drainage, Transport and Traffic, Fire Reticulation.

1.4.4.2 Water

The total demand for potable water for the development is estimated to be approximately 200 cubic metres per day with a peak demand of 30 litres per second. An existing 300mm diameter NCWSC main currently passes through the site and will have to be relocated prior to the development taking place. NCWSC confirmed that they would allow the development to connect to the 300mm main feeding the current establishment along Muthithi road. Therefore a 200mm diameter feed from this to the project will be maintained and the residual volume and pressure will be available for the development from this main will be determined in liaison with NCWSC. However the project will also consider other sources of water due to the known high demand on water infrastructure in Nairobi. Thus the following are some of the sources of water that the project will use.

1.4.4.3 NCWSC Mains Supply

The most direct source of potable water will be from the 300mm diameter main which passes adjacent to the site along Muthithi Road. Storage would then be mostly within the individual building, with very little requirement for additional water storage on the site and little need for onsite water treatment. However, because of the frequent rationing, storage will be done in the individual building (perhaps 3 or 4 days consumption). However since storing water for an extended period is not advisable due to health risks, UV disinfection (treatment) will be done before distribution to the buildings. If water is supplied purely from the NCWSC main site water, the on-site reticulation will be adopted by NCWSC after construction and proponent billed directly by the authority. This would mean the site management team will be involved in the activity including allowing access for the utilities to repair the pipework etc. as required. Typically NCWSC water is not of the highest quality standards or is of variable standard. Many Nairobi residents do not drink the mains water without carrying out their own form of treatment / filtration at a domestic level. However for other sources of water, which will be combined with the NCWSC supply, treatment will be done prior to distribution

1.4.4.4 Borehole Supply

The proponent will drill a borehole prior to the development to supply approximately 40% of the total daily demand for the development. However there are reports of declining groundwater levels in the Nairobi area, due in part to the large number of boreholes in operation. The project will have to acquire an abstraction permit or transfer the abstraction permit if allowable, in order to operate the borehole. Water quality tests done on the borehole water indicated good quality water except for high levels of fluoride. The water will be treated through methods such as reverse osmosis in order for it to be used for potable purposes. The water will be pressurised prior to reticulation, either through an elevated tank or a pump system. Ground storage will be required of approximately 2000 m³ (2 days demand). The project management team will take the responsibility of water treatment when borehole water is pumped to tenants. This will involve testing the water regularly to ensure it is fit for human consumption as per the EMCA Water Regulations of 2006 (Legal Notice No 120). Alternatively the borehole supply could be used for non-potable uses such as irrigation, in which case treatment will not be required.

1.4.4.5 Rainwater Harvesting

The average annual rainfall on the proposed development area is between 800 and 1200mm, this can supply approximately 58 days/year potable water demand. This water could be used to reduce the volume of water extracted from the borehole during times of rainfall, thus conserving the underground aquifer supply. Harvested rainwater will be used for potable uses, thus will be stored and treated. This will be combined with the borehole water in the storage and treatment system. Alternatively, harvested rainwater could be used for irrigation of soft landscape areas only and to maintain a satisfactory level in the ponds.

1.4.4.6 Re-use of Sewerage

The potential volume of sewerage from the development is such that it could be treated for potable use and supply up to 85% of the water demand for the development. This would clearly be a significant reduction in the reliance on mains water supply and (with the addition of the borehole water) make the development close to self-sufficient for water. However this will have a significant capital cost and increase management responsibilities and resources. The type of sewage treatment will depend on the intended use or uses of the treated water; the project site has limited space for a new development of sewerage ponds or other space-consuming forms of treatment. It is therefore proposed that a packaged treatment plant would be used, which will require a carefully adhered to on-going operation and maintenance regime to manage risks. The NCWSC would not be prepared to adopt such a treatment plant, so it would fall under the scope of the proponent's onsite management team. Treated outflow from a packaged treatment plant could be used solely for irrigation or toilet flushing within the buildings (as for harvested rainwater), but this would involve separate storage and reticulation. There are three potential sources of water for the site including mains supply from NCWSC. If the three sources of water are used, the development could be self-sufficient for water, although a connection to the mains supply would still be recommended for resilience.

If alternative sources of water are to be used, other than purely mains supply, it is likely that there will be two storage and reticulation systems within the site as they are unlikely to be able to be consumed. This will increase the capital cost of the initial construction (compared with a mains only reticulation) but is significantly beneficial in terms of reliance on external water sources which are known to be in short supply. The project will therefore use the NCWSC supply combined with the other sources of water to ensure a consistent supply and place minimal pressure on the NCWSC supply. The different units will have their individual storage and treatment facilities built in them.

1.4.4.7 Electricity

The existing 11kV overhead line from Muthithi Road to site, which currently lies adjacent to the site Discussions between the proponent and KPLC yielded that the lead time for. Calculations on the initial master plan indicated a total electrical demand of approximately 10MVA. The load is classified as an 'industrial' demand and therefore KPLC requires it to be supplied by at least two sources via two independent 11kV lines. The preliminary estimates of total demand based on the revised areas and uses are given in the Tables below:

1.4.4.8 Offsite Power Supply

There is adequate power infrastructure within the vicinity of the proposed site that can be reinforced by KPLC for the provision of the power requirements of the proposed project. Two diverse incoming 11kV overhead lines to a new 11kV Switch room will be erected for the proposed development. The two 11kV overhead lines will emanate from KPLC's 66/11kV substations located at Westlands (approx. 3 km). This is the preferred option for electricity as compared to others which will involve negotiating re-use of the existing poles and routing.

1.4.4.9 On-site Power Supply Options

The preferred option is for KPLC to be responsible for the supply, installation, testing, commissioning, maintenance and ownership of the 11kV infrastructure, substations within the various buildings and the metering at low voltage. The alternative would be for the development (or parts of the development) to have a bulk meter at 11kV in which case the management team would be responsible for the supply, installation, testing, commissioning, maintenance and ownership of the HV and LV infrastructure downstream of KPLC's bulk metering point. In this case it would be recommended that all users are fitted with sub meters, and the management team would then have to read the meters and charge the

occupants accordingly. Charging a flat rate/m² is an alternative option but means there is no incentive for the users to reduce consumption and therefore often leads to wasteful energy usage. The bulk metering and private distribution option does potentially simplify providing a more centralised backup supply. The management and metering strategy will be discussed further with both KPLC and the proponent.

1.4.4.10 Back-up Power

The preferred design is to provide separate back-up generators for the development. The proponent plans to install an onsite 800KVA to managed by the site management team. In this case sub meters will be required, to allow the management team to bill tenants appropriately. As an initial recommendation the following back-up power capacities will be provided:

1. 100% back up power for offices and retail
2. 100% back up power for hotel and conference facilities.

An alternative approach would be to have one of more “Energy Centres” within the scheme containing large scale generators distributing at HV. This would only be an option if the substations and LV distribution is privately owned (i.e. the bulk supply option described above).

1.4.4.11 Renewable Electricity Supply Options

Alternative sources of on-site energy generation (e.g. photovoltaics) have been in the project considered if sufficient supporting funding can be sourced. However the project will be mostly reliant on KPLC’s supply since the contribution from these other sources is likely to be relatively small. On-site generation will be provided and it will be designed to be service particular, specific energy demands which can be isolated from the main distribution system. If a centralised back up power system were used (i.e. a central “Energy Centre”), then alternative supplies could potentially be fed into the network. The preferred project option does not include any renewable electricity generation. See Appendix illustrations of the proposed Electricity Infrastructure for the project

1.4.4.12 Green Star Certification

The project will also seek to be Green Star certified in terms of its energy use and place minimum demand on KPLC’s supply and reduce impacts from energy/fuel use by:

- **Making a commitment:** Establishing an Energy policy for the project
- **Assessing Performance:** Documenting the project’s energy use baseline.
- **Setting goals:** Establishing goals and targets for the project’s energy use.
- **Creating an action plan:** Developing an action plan based on these goals and targets;
- **Implementing the action plan:** undertaking the action items of the action plan such as,
 - Using natural sources of energy such as sunlight for daytime lighting, using designs that allow for natural air conditioning;
 - Constructing using weather efficient materials – reducing the demand for additional/consumptive heating during the cold season (April – July), while reducing the demand for cooling during the hot season (January – March);
 - Using energy efficient equipment (Green Star Certified equipment);
 - Using efficient and clean fuels such as de-sulphurized diesel, unleaded fuels, and
 - Employing energy conservation strategies and plans (e.g. wise consumption campaigns, regular maintenance of equipment, phasing out inefficient equipment where feasible etc.)
 - Complying with all legal obligations for energy use and fuel storage;

- **Evaluating Progress:** Reviewing and monitoring the effectiveness of the action plan toward the achievement of the pre-set goals and targets.
- **Recognizing achievements:** Documenting achievements and continuous improvement of the entire energy management plan.

1.4.4.13 Sewerage

There is an existing 900mm diameter trunk sewer line which runs along the line of Muthithi road the south of the site. The small buildings on the development site currently discharge through small diameter pipes to a 450mm diameter main which passes through the site to the trunk main. The 450mm diameter main is owned by NCWSC and the development will have the right to discharge into this, subject to the necessary design reviews by NCWSC. Preliminary calculations contained within the engineering report indicated that spare capacity may exist. Preliminary calculations by the proponent also indicate that the 450mm outfall would have a capacity of approximately 40 litres/sec, compared with a peak discharge of approx. 54 litres/sec. Due to the topography of the site several gravity fed sewer lines are feasible to be gravity fed (rather than pumped) whilst maintaining the north south fall. Roads (and therefore sewer lines) are designed where possible to follow existing falls. This is in conjunction with the storm water management (see section below) as the site development might result in some undulation in the typical north south fall to maintain a wetland water feature in the landscape design.

Therefore the sewerage discharge from the development will be taken off site, although this will be confirmed with the relevant authorities. Thus there is no need, from a sewerage point of view, to carry out on site retention or treatment. The introduction of a packaged treatment plant would be purely to reduce the demand for potable water from other sources (as described above) and not because there is a need to carry out on-site sewerage treatment. The cost / benefit analysis of providing on-site sewerage treatment has been undertaken as part of the design. It may be possible to allocate space for a future packaged treatment plant, and arrange the reticulation in such a way that the plant can be introduced at a later stage, either in later phases of the current proposed development, or even in the future depending on scarcity of water resources in the city. Plate 1-3 shows the proposed sewerage works for the project.

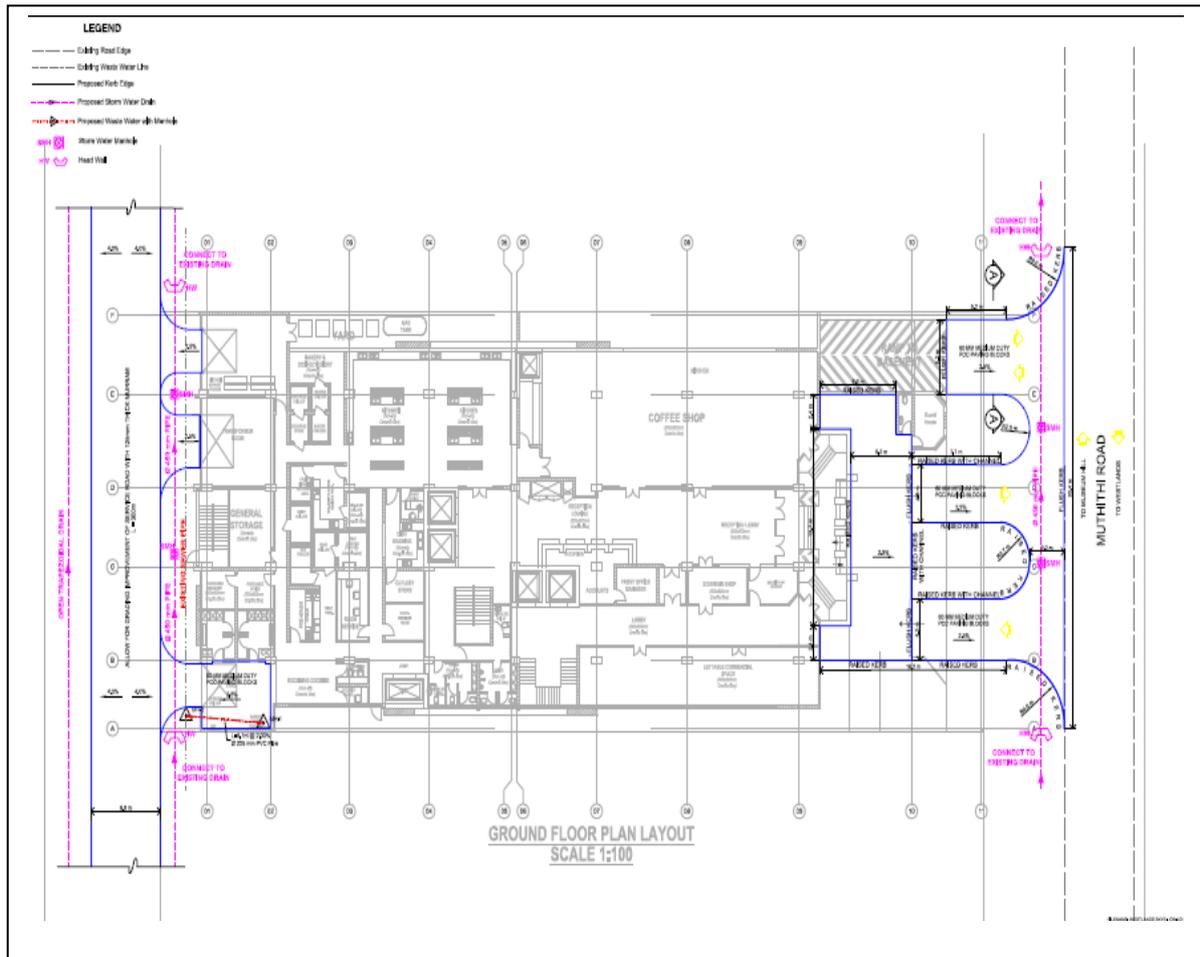


Plate 1-3: Layout of Sewerage

1.4.4.14 Storm Water Drainage

The topography of the development site is a general fall from the Thika Highway in the south towards the north. Within the development site the general south North Slope is broken by a ridge that runs north-west, south-east across the site, creating a low point, towards the centre east of the site.

Preliminary calculations have been carried out to determine the quantity of runoff from the site but will need to be checked with verified climatic details for the vicinity (as rainfall can be quite localised). For the preliminary calculations it has been assumed that the entire development site will be impermeable, whether through building development or hard landscape areas and roads. The extent of future soft landscaping will reduce the runoff volumes but it is anticipated that these areas will be small (10-15% maximum) of the development areas and therefore not significant in the initial calculations.

The choice of storm water drains will include having open storm water drains alongside the roads, although cheaper to construct than buried pipes; they affect the aestheticism of the site.

1.4.4.15 Off-site Drainage

There are existing storm water drains to the west of the site which are owned by Nairobi City Council but their spare capacity is unknown.

The nearest storm water drain is 600mm diameter located near the site. There is a limitation on the peak discharge to this drain since it leads to an existing culvert. Most of the off-site existing storm water

infrastructure is either silted over or has been damaged/removed over time. If any are to be used in the development storm water design surveys will be required to calculate their capacity and condition.

The simplest solution may be to discharge all of the site runoff into an off-site storm water system. From preliminary calculations, which assumed an increase from 25% run-off now to 100% run off in the future, the 10 year runoff increases from 1.1m³/s to 5.3 m³/s. This additional flow, if the existing drains are currently at capacity, will need to be supplemented with an additional 300 mm diameter pipe based on an assumed 1 in 100 gradient or equivalent open channel. For a 1 in 100 year design, the runoff increases from 1.1 cubic metres per second to 5.3m³/s. The existing drains will need to be supplemented with an additional 600 mm diameter pipe based on a 1 in 100 gradient or equivalent open channel.

Alternatively, and perhaps preferably, the off-site flows can be reduced by providing and capturing rainwater run-off for other uses (see section 1.4.4.5 above). This will reduce the peak flows and hence the size of connection pipes required.

1.4.4.16 On-site Drainage

The current topography on site generates two low points, one at the centre / east, and the other at the southern boundary. The on-site drainage can be dealt with by reshape the site with bulk earthworks. The cost of this in terms of earthworks and environmental aspects would be considered if this option was to be pursued.

1.4.4.17 Transport and Traffic

The traffic loads and peaks have been modelled to show that the primary access to the development will be through the access gate fed from Muthithi Road junction instead of Thika Road. However this option will include the development of this access road and it will increase the capital costs of the project. Pedestrians will also have access from this area and on Thika Road on top having public transport services that are currently found in the area.

1.4.4.18 Fire Reticulation

The proponent and his insurers' standards for fire protection are likely to be higher than the statutory minimum as required by Nairobi City Council and the fire brigade. Therefore this will be adopted informed by GIIP and approval of this approach will be sought from the relevant authorities.

Access for fire brigade vehicles will be provided around the site, with fire hydrants spaced to give adequate coverage to the perimeter of all buildings. If the hydrants are served from a NCWSC water main, the pressure within the main is usually adequate as the fire engines have an in-built booster pump. In this case NCWSC would take over the fire reticulation system and hydrants at the end of the defects liability period, having already approved the design of the entire water reticulation system before construction.

However, as with the potable water, there is an issue regarding the reliability of the mains supply and the current problems with rationing in Nairobi. If on site fire storage capacity is required for example to meet insurance or particular tenant requirements, this will mean that pumps are required, and it is then unlikely that the NCWSC will adopt such a system.

1.4.5 Project Cost and Schedule

The proposed project is estimated to cost **Ksh. 0.7 Billion** and this amount is broken down in Table 1-1 below. The construction will be conducted using a phased approach with construction of tower 1 being completed before the developer moves to tower 2 based the the availability of adequate financing. The total cost

for development of phase 1 will be **Ksh. 375,397,698**. The project is also expected to take duration of **36 Months** from its design to operational phase (Table 1-2 outlines the project's schedule). In terms of phases in this report the project has separated into four phases of design, construction, operation and decommissioning.

Table 1-3: Proposed Total Project Cost Breakdown

ITEM	COST (Ksh)
Construction cost	703,040,848
Contractor Preliminaries	46,592,850
Sub Total Construction cost	749,633,698*
Professional fees	89,956,043
Sub Total	839,589,742
Land cost	250,000,000
Preliminaries @5%	41,979,487
Sub Total	1,131,569,229
Design Reserve/Contingency @5%	56,587,461
Sub Total	1,188,147,690
VAT @16%	190,103,630
TOTAL ESTIMATED CONSTRUCTION COST	1,378,251,321

*To be implemented in phases with Phase 1 scheduled to cost a sum of Ksh. 375,397,698

Table 1-4: Proposed Project Schedule

ACTIVITY	START DATE	END DATE
Business Case, Feasibility	6/1/15	10/7/15
Concept and Master-Plan (Whole project)	8/1/15	3/22/15
Planning Approvals	1/04/15	03/08/15
NEMA (All Phases)	1/07/15	15/08/15
Leasing/Marketing	2015	2018
Funding	2015	2015
Construction	11/2015	11/2018
Total Duration for Phase 1 (Months)		36 Months



Figure 0-1: Front Entrance to Proposed Project Site

Table 0-1: Construction Phases Process, Equipment, Materials, Wastes & Output

Processes
Site Preparation, land clearing and decommissioning the existing structures Relocating the 11kv Power Lines Digging trenches for the perimeter wall Erecting the perimeter wall, access gates and constructing a security office/post Installing construction fire fighting equipment Soil compaction for the parking, loading areas and Paths Building the site foreman's office Digging the internal sewerage network trenches and laying the network pipes Building a materials' storage Soil Excavation for the foundations Digging trenches for the sewerage network and installing it to connect Filling the foundations Lining the foundation with PVC Erecting Construction pillars Erecting the walls for the buildings Constructing the roofs and water tanks Fitting and plumbing the water network around the buildings Electrical fittings in the buildings and around the site with switchboard, transformers etc. Plumbing and piping the office and storage units Installing Emergency Generators and Water pumps Installing elevators and escalators Establishing Sewerage Facilities and connections Tarmacking the parking area and paving the paths Erecting a fence around the site Landscaping the site and facilities Installing in house amenities such as lights, doors, windows floors, carpets etc. and interior decoration Placing fire fighting equipment Installing Facility waste management equipment e.g. bins Installing Perimeter and internal site lights i.e. streetlights Painting the internal roads and placing signs around the site
Equipment
Chainsaw Earth mover Compactor Spades Wheelbarrow Hammers and bolt and nut fasteners Handsaw Bolts, nut, screws and nails Ropes Ladders Electric and Gas Welders Electric saws and grinders Gas cutters Spirit Level Road Roller Trucks Hand drills and drill bits Glass cutters Wire cutters Shears Cranes Mobile Electric Power Generators Concrete mixer trucks Wheel loader Fork lift & Telescopic Fork lift Tractor Excavator Asphalt Paver Dump truck
Materials & Energy
Sand Fuel and Oil Electricity Water Cement and ceramic Tiles Concrete Polythene Bricks and Gravel Water Steel Concrete pipes Steel pipes PVC pipes Polyfilla, Adhesives and paints Ceramics tiles Copper wires Plastic Electricity Gas (acetylene & oxygen) Cardboard PVC Glass Bricks Asphalt Bitumen
Expected Wastes
Construction waste: (paper, polythene, metal shavings, cement, concrete, welding particles, plastics, sand, grey water, adhesives, paints, soil, plants, cloth, rubber). Air emissions from vehicles engines and burning and friction operations (COx and SOx). Oil and fuel spills from vehicles and storage of oil and fuel. Dust from movement of vehicles and excavation activities. Sewerage and Domestic/Municipal Waste.
Outputs
Primary and Ancillary Project Facilities (Commercial Units, Residential Units, Retail Area, Common Area, Perimeter Wall, Security Posts and Access gates, Storage facilities etc.

Table 0-2: Operational Phase Processes, Equipment, Materials, Wastes and Outputs

Processes
Start-up: Pumping the project with water from the borehole and mains; Connecting the project to electricity main and turning on the power; Acquiring in house amenities, Office and commercial operations Ancillary project operations (deliveries, loading and unloading materials, storage, transport to and fro project of staff and customers) Logistic Operations and storage of equipment and materials Procurement Operation and Maintenance Occupying and Dwelling in the residential area Commercial operations in the retail and commercial areas (shops, businesses, restaurants, cinemas etc.)
Equipment
Water Pump; Office Furniture, Stationery and Machinery; Domestic Furniture, amenities and machinery; Trucks, Vehicles and motorbikes; Fork lifts; Diesel Power Generator; Packaging and wrapping; Electronics (Computers, Phones, Tablets etc.)
Materials & Energy
Water; Electrical Energy; Fuel and Oil; Foodstuffs and beverages; Plastics, Paper, Metals
Expected Wastes
Water vapour; Office and Domestic waste (paper, garbage, cloth, rubber, paper clips, plastics such as pens and plastic bags etc.); Electronic Waste ; Air emissions from trucks and vehicles (COx, NOx, SOx etc); Oil spills from vehicles and storage; Dusts from movement of vehicles and operation and maintenance; Sewerage and sludge
Outputs
Commercial activities of the project from its facilities (Residence, Business, Entertainment and Recreation); Goods and Services traded in the retail areas.

Table 0-3: Decommissioning Phase Processes, Equipment, Materials, Wastes and Outputs

Processes
Shut down: Stopping the flow of water and Switching off power Clearing the Commercial and Residential, Storage Buildings Sealing the borehole Draining the ponds Pulling down the Structures Clearing the Tarmacked parking area Transportation of the debris and gravel Re-vegetation of the site to restore it to its initial state.
Equipment
Chainsaw Earth mover Compactor Spades Wheelbarrow Hammers and bolt and nut fasteners Handsaw Ropes Ladders Electric and Gas Welders Electric saws and grinders Gas cutters Trucks Glass cutters Wire cutters Shears Cranes Mobile Electric Power Generators Wheel loader Fork lift & Telescopic Fork lift Tractor Excavator Dump truck
Materials & Energy
Electricity Fuel and Oil Gas (Acetylene, Oxygen) Water Plants (Trees, Grasses) Soil
Expected Wastes

Demolition waste (paper, polythene, metal shavings, cement, concrete, welding particles, plastics, sand, grey water, adhesives, paints, soil, cloth, rubber). **Air emissions** from burning fossil fuels (COx and SOx). **Particulate emissions** (dusts, metal, wood and cardboard shavings); **Sewerage, Office and Domestic wastes.**

Outputs

Recyclable building, Office and Domestic materials. Environmental Restoration of the project site

The project will not use timber since there isn't a sustainable source of the resource locally available. This is because deforestation is a growing problem in the Kenya and hardwoods are mostly from the Democratic Republic of Congo where forestry is largely unregulated.

2 LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK

2.1 GENERAL OVERVIEW

Kenya has a policy, legal and administrative framework for environmental management. Under the framework, the National Environment Management Authority (NEMA) is responsible for ensuring that environmental impact assessments (EIAs) are carried out for new projects and environmental audits on existing facilities as per the environmental management and coordination Act 1999.

EIAs are carried out in order to identify potential positive and negative impacts associated with the proposed project with a view to taking advantage of the positive impacts and developing mitigation measures for the negative ones. The guidelines on EIAs are contained in Sections 58 to 67 of the Act.

According to Section 68 of the Environmental Management and Coordination Act (EMCA) 1999, The Authority will be responsible for carrying out environmental audits on all activities that are likely to have a significant effect on the environment.

Environmental auditing (EA) is a tool for environmental conservation and has been identified as a key requirement for existing facilities to ensure sustainable operations with respect to environmental resources and socio-economic activities in the neighbourhood of the facilities.

The government has established regulations to facilitate the process on EIAs and environmental audits. The regulations are contained in the Kenya Gazette Supplement No. 56, Legislative Supplement No. 31, and Legal Notice No. 101 of 13th June 2003.

In the past, the government has established a number of National policies and legal statutes to enhance environmental conservation and sustainable development. *The proponent will need to observe the provisions of the various statutes that are aimed at maintaining a clean, healthy and sustainable environment.* Some of the policy and legal provisions are briefly presented in the following sub-Sections

2.2 KENYA LEGAL FRAMEWORK

2.2.1 The Constitution of Kenya

Promulgated on the 27th of August 2010, the constitution of Kenya in its preamble declares that the people of Kenya are respectful to the environment, which is their heritage and they are determined to sustain it for the benefit of future generations.

The constitution which is based on the bill of rights as its backbone, states in article 42 that every person has a right to a clean and healthy environment and subsection 1 adds that this includes the right to protect environment for the benefit of present and future generations through legislative and other measures. Article 43 follows declaring economic and social rights of every Kenyan and they include in subsections: (a) the right to the highest attainable standard of health, which includes the right to health care services, including reproductive health care and (d) the right to clean and safe water in adequate quantities. Section 2 of article 43 adds that no one shall be denied emergency medical care.

The constitution also endorses the national land policy and chapter 5 which deals with land and environment states principally in article 60 that land in Kenya will be held, used and managed in a manner that is equitable, efficient, productive and sustainable. The principles are outlined in subsections of article 60 and article 61 declares that all land in Kenya belongs to the people of Kenya collectively and subsection 2 classifies land to be as either public, community or private and thus it's

important to establish in which of these the project lies. The national land commission is established in article 67 and its main function is to manage land on behalf of national and county governments.

Part 2 of chapter 5 deals with the environment and natural resources and article 69 section (1) subsection (a) states that the state will ensure sustainable exploitation, utilization, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits. The following subsections give regulations in terms of forest cover, biodiversity, cultural resources, indigenous knowledge, systems for environmental impact assessment and prevention of activities that may harm the environment. Section 2 states that every person has a duty to cooperate with state organs and other persons, to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Article 70 deals with enforcement of environmental rights and everyone who feels their right to a clean and healthy environment has been denied has the obligation to go to court to seek redress. Article 71 and 72 deal with agreements relating to natural resources and legislation relating to the environment respectively, where parliament is given this authority.

2.2.2 The Environmental Management and Coordination Act of 1999 (EMCA)

The EMCA of 1999 entitles every Kenyan to a clean and healthy environment in part II of the act and sets out the principles in the context of sustainable development such as the principle of public participation in the development of policies, plans and processes for the management of the environment; the cultural and social principle traditionally applied by any community in Kenya for the management of the environment or natural resources in so far as the same are relevant and are not repugnant to justice and morality or inconsistent with any written law; the principle of international co-operation in the management of environmental resources shared by two or more states; the principles of intergenerational and intra-generational equity; the polluter-pays principle, and the pre-cautionary principle.

In terms of administration in part III the act declares the national environmental council whose main functions include being responsible for policy formulation and directions for purposes of the act; setting national goals and objectives and determine policies and priorities for the protection of the environment; promoting co-operation among public departments, local authorities, private sector, Non- Governmental Organizations and other organizations engaged in environmental protection programs. The Council powers are decentralized to the district level and project activities should be in liaison with them. The National Environmental Management Authority (NEMA) is also established under this part and its main duty can be seen as to co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programs and projects with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.

Part V of the act that deals with protection and conservation provided the regulations by which environmental or natural resources may be protected and conserved. In declaring a protected area community interests must be taken into account and prior notice must also be given such as through the Kenya gazette and the media. Environmental impact assessments which guide the proposed project activities are mandatory under part VI and the EIA reports should be submitted to NEMA for approval and the EIA should be conducted in accordance to EIA guidelines, principles and regulations. This broadly involve identifying the impacts of the proposed project on the ecology of the area as well as social systems in place and strategically establishing ways to mitigate negative impacts which can include project alternatives. This also provides for the development of an environmental management plan from inception of the project to its decommissioning with the necessary mitigation in place.

The EIA process starts after the completion and submission of 12 copies of the EIA project report and a submission of 0.05% of the total project cost to NEMA. The authority then reviews the report and distributes copies of the same to relevant government ministries. If the project meets the requirements then it's approved and license is granted. If otherwise, then the client through the consultant is advised to revise the project according to the reviewed comments. This is done within 42 days after submission of the ESIA report for the said assessment.

Under the EMCA of 1999, NEMA has gazetted several regulations and they are follows:

- i. Environmental (Impact Assessment and Audit) Regulations, 2003, Legal Notice No. 101
- ii. Environmental Management and Co-ordination (water quality) Regulations, 2006 Legal notice No. 120
- iii. Environmental Management and Coordination (Waste management) Regulations, 2006 Legal Notice No. 121
- iv. The Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) regulations, 2006 Legal Notice 160
- v. The Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 Legal Notice No. 61
- vi. The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2009 Legal Notice No. 30

Also NEMA and the Ministry of Environmental and Natural Resources developed the National Environmental Action Plan 2009-2013 that recognizes the importance and sets the strategic actions to conservation and wise use of Kenya's natural resources which include land, water, forests, wildlife, biodiversity, wetlands, agriculture, livestock and fisheries. The threats to these resources and human health include pollution and it would be important for this to be prevented in the proposed project.

The Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009, Legal Notice No. 61, identifies natural resources, land uses or activities which may be affected by noise or excessive vibration and provides abatement measures to mitigate them. It also makes provisions for licenses of projects that emit noise or vibrations in excess of permissible levels. The limit for construction activities is given as 70dB and thus the proposed project should mitigate noise levels higher than this.

The Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006 Legal Notice 160, states that no persons will engage in any activities that have adverse impacts to ecosystems, that lead to the introduction of exotic species and that lead to unsustainable use of natural resources without an environmental impact assessment license issued by NEMA.

The Environmental Management and Co-ordination (Water Quality) Regulations, 2006 Legal Notice 120, refrains any actions that directly or indirectly causes or may cause immediate or subsequent water quality pollution. This regulation prohibits any discharge of any effluent from sewerage treatment works, industry or other point sources without a valid effluent discharge license in accordance with the provision of this act.

The Environmental (Impact Assessment and Audit) (Amendment) Regulations, 2009 Legal Notice No. 30, provides for the provision of cost of an ESIA license of 0.05% of the total project cost, to the minimum of KSHS 10,000 and maximum of KSHS 1,000,000. The ESIA approval process starts after the completion and submission of 12 copies of the ESIA project report and the prescribed fee to NEMA.

2.2.3 Environmental Vibration Pollution (Control) Regulations, 2009

These regulations were published as legal Notice No. 61 being a subsidiary legislation to the Environmental Management and Co-ordination Act, 1999. The regulations provide information on the following:

- i. Prohibition of excessive noise and vibration
- ii. Provisions relating to noise from certain sources
- iii. Provisions relating to licensing procedures for certain activities with a potential of emitting excessive noise and/or vibrations and
- iv. Noise and excessive vibrations mapping.

According to regulation 3 (1), no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Regulation 4 prohibits any person to (a) make or cause to be made excessive vibrations which annoy, disturb, injure or endanger the comfort, repose, health or safety of others and the environment; or (b) cause to be made excessive vibrations which exceed 0.5 centimeters per second beyond any source property boundary or 30 metres from any moving source.

Regulation 5 further makes it an offence for any person to make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

Regulation 12 (1) makes it an offence for any person to operate a motor vehicle which- (a) produces any loud and unusual sound; and (b) exceeds 84 dB(A) when accelerating. According to sub regulation 2 of this regulation, No person shall at any time sound the horn

or other warning device of a vehicle except when necessary to prevent an accident or an incident.

Regulation 13 (1) provides that except for the purposes specified in sub-Regulation (2) there under, no person shall operate construction equipment (including but not limited to any pile driver, steam shovel, pneumatic hammer, derrick or steam or electric hoist) or perform any outside construction or repair work so as to emit noise in excess of the permissible levels as set out in the Second Schedule to these Regulations.

Regulation 16 (1) stipulates that where a sound source is planned, installed or intended to be installed or modified by any person in such a manner that such source shall create or is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, such person shall apply for a License to the Authority. According to regulation 18 (6) the license shall be valid for a period not exceeding seven (7) days. Regulation 19 (1) prohibits any person to carry out activities relating to fireworks, demolitions, firing ranges or specific heavy industry without a valid permit issued by the Authority. According to sub regulation 4, such permit shall be valid for a period not exceeding three months. The project proponent will be required to comply with the above mentioned regulations in order to promote a healthy and safe working environment.

2.2.4 The Environmental Management and Co-ordination (Waste Management Regulations 2006)

2.2.4.1 Legal Notice No. 121: Section 4-6

Part II of the Environmental Management and Co-ordination (Waste Management) Regulations, 2006 states that: - 4. (1) No person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle.

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

(3) Without prejudice to the foregoing, any person whose activities generates waste has an obligation to ensure that such waste is transferred to a person who is licensed to transport and dispose off such waste in a designated waste disposal facility. In addition, the Regulations state that:

5. (1) *a waste generator shall minimize the waste generated by adopting the following cleaner production methods*

- a). *Improvement of production process through:-*
 - i. *Conserving raw materials and energy;*
 - ii. *Eliminating the use of toxic raw materials; and*
 - iii. *Reducing toxic emissions and wastes*
- b). *monitoring the production cycle from beginning to end by:-*
 - i. *Identifying and eliminating potential negative impacts of the product;*
 - ii. *Enabling the recovery and re-use of the product where possible;*
 - iii. *Reclamation and recycling*
- c). *Incorporating environmental concerns in the design and disposal of a product.*

6. A waste generator shall segregate waste by separating hazardous wastes from non hazardous waste and shall dispose of such wastes in such facility as shall be provided by the relevant local authority.

(23) No person shall engage in any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by Authority under the provisions of the Act.

The proponent shall ensure that the main contractor adopts and implements all possible cleaner production methods during the construction phase of the project. During the construction phase of the project, the proponent shall ensure that the main contractor implements the above mentioned measures as necessary to enhance sound Environmental Management and Coordination (Noise management of waste).

2.2.5 Waste Water Management;

2.2.5.1 Legal Notice No. 120; Part II – Protection of Sources of Water for Domestic Use.

4. (1) every person shall refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution, and it shall be immaterial whether or not the water resource was polluted before the enactment of these Regulations

(2) No person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution

5. All sources of water for domestic uses shall comply with the standards set out in the First Schedule of these Regulations.

The proponent and project Architect as well as engineer are urged to ensure that drainage channels are well designed during the construction phase of the project, and upon completion the entire project is supposed to be connected to the NCC sewer line for proper management of liquid waste.

2.2.6 The Kenya Water Act of 2002

The Kenya Water Act of 2002 was enacted to ensure equitable and sustainable use of water resources in the country. It establishes the Water Resource Management Authority to manage water resources in the country that are vested in the state.

The Minister also formulates, and publishes in the Gazette, the national water resources management strategy in accordance with which the water resources of Kenya are being managed, protected, used, developed, conserved and controlled, the Water Resources Management Authority (WRMA) in turn formulate a catchment management strategy through which water catchment areas are managed.

WRMA may also with approval from the Minister declare an area to be a protected area where it is satisfied that special measures are necessary for the protection of a catchment area or part thereof and the Authority may impose such requirements, and regulate or prohibit such conduct or activities, in or in relation to a protected area as the Authority may think necessary to impose, regulate or prohibit for the protection of the area and its water resources.

Schemes are categorized hierarchically with state schemes taking precedence over community schemes and by notice in the Kenya gazette land may be acquired for purposes of a state scheme under means prescribed in the law as to how land may be acquired. Community water resources projects are only allowed if the proposed project is approved by the persons owning or occupying at least two-thirds of the particular area concerned in the project; and provision is made by the project for an adequate alternative supply of water to be supplied to permit holders likely to be adversely affected and unable to benefit from the scheme.

In term of water work permits will be required for the following purposes except in state schemes; any use of water from a water resource (except as provided in section 26); drainage of any swamp or other land; the discharge of a pollutant into any water resource; any purpose, to be carried out in or in relation to a water resource, which is prescribed by rules made under the Act to be a purpose for which a permit is required. Further exceptions for permit requirement are for;

1. the abstraction or use of water, without the employment of works, from or in any water resource for domestic purposes by any person having lawful access thereto;
2. any development of ground water, where none of the works necessary for the development are situated within one hundred meters of any body of surface water (other than inclosed spring water); or within a ground water conservation area; or
3. The storage of water in, or the abstraction of water from, a dam constructed in any channel or depression which the Authority has declared, by notice published in the Gazette, not to constitute a watercourse for the purposes of the Act.

Permits may be applied for from WRMA and in may be subject to EIA in accordance with the requirements of the EMCA of 1999, payment of a prescribed fee and completion of an application form. The WRMA determines an application for a permit as soon as practicable after its lodgement but where an application duly made in accordance with the procedure is not determined by the Authority within six months after lodgement, any fee paid by the applicant will be refunded to the applicant. Every permit will be subject to subsequent variation by the Authority after hydro graphic survey of the relevant body of water has been made, and after reasonable notice has been given to all parties affected.

Licenses for provision of water are also a requirement and application for which is made to the water regulatory board and within the limits of supply of a licensee provide water services to more than twenty households; or supply more than twenty-five thousand litres of water a day for domestic purposes; or more than one hundred thousand litres of water a day for any purpose, except under the authority of a license. A licensee may, on any land belonging to him, or over or in which he has acquired any necessary casement or right, construct and maintain drains, sewers and other works for intercepting, treating or disposing of any foul water arising or flowing upon such land or otherwise for preventing water belonging to the licensee, or which he is for time being authorized to take, from being polluted. This is Provided that before constructing any works the licensee, if the proposed works will affect or be likely to affect any body of water in the catchment in which the works are situated, will obtain the consent of the Authority.

The Authority may also where it finds it necessary, for public interest, to take special measures in area for the conservation of groundwater. The Act also establishes the national water services authority and the minister formulates who formulate the national water services strategy and publishes it in the Kenya gazette. The strategy seeks to institute arrangements to ensure that all times there is in every area of Kenya a person capable of providing water supply and to design a program to bring about progressive extension of sewerage to every center of population in Kenya.

Also in terms of acquisition of land A licensee, or an applicant for a license, who requires the compulsory acquisition of land for any of its purposes may apply to the Minister, who may, on the advice of the Regulatory Board, and upon being satisfied that such compulsory acquisition is desirable, take any steps necessary to secure the compulsory acquisition of the land in accordance with the Land Acquisition Act.

Thus the Kenya Water Act of 2002 will also provide guidelines and framework for the project's activities and through compliance the project will align its objectives with those of this act.

The main contractor will be required to implement necessary measures to ensure water conservation and also to prevent potential for water contamination during the construction phase to comply with this the developer will use a channel to direct water to the main channel just like the houses in the surrounding neighbourhood.

2.2.7 The Water Resources Management Rules, 2007

These rules guide all activities that are bound by the Kenya Water Act of 2002 and section 22 of the rules set categories for water use and those that require permits and they include water treatment works. Section 24 states that permit applications will be made by filling Form WRMA 001 and maps projected UTM based on the 1960 datum section 25 (1) & (2) and a site assessment and technical report is also a requisition under section 27.

Part IV of the rules apply to groundwater and section 72 (1) states that a permit is required by any person seeking to abstract groundwater. Part V also deals with water quality monitoring and effluent discharge and section 81 (1) states that no person will discharge or apply any poisonous, toxic, noxious or obstructing matter, radioactive waste or other pollutants or permit any person to dump or discharge such matter into any water resource unless the discharge of such poisonous, toxic, noxious or obstructing matter, radioactive waste or pollutant has been treated to permissible standards authorized by the Authority. Section 82 deals with affluent discharge to any water resource and sub-sections (a) – (d) stipulate that no person will: discharge effluent into a water resource without a valid discharge permit issued by the Authority; discharge wastewater or effluent, which does not meet the water quality requirements stipulated in the effluent discharge permit; generate and discharge effluent onto land or into any water resource without compliance with an approved Effluent Discharge Control Plan; or discharge into any water resource effluent from a sewage treatment plant, trade or industrial facility without a calibrated flow measuring device approved by the Authority.

Conditions for water quality permits that guide the authority on the discharge/effluent are stated in section 83 and they include sub-section 1 the capacity of the receiving water resource to assimilate the effluent without violating the water resource quality objectives for that water resource, and sub-section 2 the toxicity and persistence of the pollutant(s).

Part IX of the regulations deal with conservation of riparian and catchment areas and riparian land on each side of watercourse is defined by section 116 as a minimum of six meters or equal to the full width of the watercourse up to a maximum of thirty meters on either side of the bank. Sub-section 4 adds that the riparian land will be measured from the top edge of the bank of the watercourse and this will also apply to seasonal and perennial watercourses. Section 118 (1) outlines activities that are not permitted on riparian land unless authorized by the Authority in consultation with other relevant stakeholders and the activities set out in the sixth schedule include:

- (a) Tillage or cultivation
- (b) Clearing of indigenous trees or vegetation
- (c) Building of permanent structures

- (d) Disposal of any form of waste within the riparian land
- (e) Excavation of soil or development of quarries
- (f) Planting of exotic species that may have adverse effect to the water resource
- (g) or any other activity that in the opinion of the Authority and other relevant stakeholders may degrade the water resource;

2.2.8 The Public Health Act (Cap 242)

The Public Health Act (Cap 242) aims at protecting and promotes human health and the prevention, limitation or suppression of infectious, communicable or preventable diseases within Kenya. It also aims to advise and direct local authorities in regard to matters affecting public health and to promote or carry out researches and investigations in connection with the prevention and treatment of human diseases. This Act provides the impetus for a healthy environment and gives regulations to waste management, pollution and human health.

Section 119 states that a medical officer may require the owner of dwelling causing nuisance to remove the nuisance in the dwelling failure to which legal proceedings may be taken against the owner of the dwelling and penalties.

Under section 126 the act includes The Public Health (Drainage and Latrine) Rules which in section 63 deals with sewerage and prohibits the disposal of solid or liquid sewage or sewage effluent in such a manner or in such a position as to cause or be likely to cause dampness in any building or part thereof, or to endanger the purity of any water supply, or to create any nuisance.

2.2.9 Physical Planning Act Cap 1999

This Act provides for the preparation and implementation of physical development plans for connected purposes. It establishes the responsibility for the physical planning at various levels of Government in order to remove uncertainty regarding the responsibility for regional planning.

It provides for a hierarchy of plans in which guidelines are laid down for the future physical development of areas referred to in specific plan. The ostensible intention is that the three-tier order plans, the national development plan, regional development plan, and the local physical development plan should concentrate on broad policy issues.

The Act also promotes public participation in the preparation of plans and requires that in preparation of plans, proper consideration be given to the potential for economic development, socio-economic development needs of the population, the existing planning and future transport needs, the physical factors which may influence orderly development in general and urbanization in particular, and the possible influence of future development upon natural environment. The innovation in the Act is the requirement for Environmental Impact Assessment (EIA). Any change of use of the actual development without authority constitutes an offence.

2.2.10 The Electricity Power Act, 1997

Section 55 (1) in the execution of works in connection with the construction, modification, maintenance or operation of an electric supply line or apparatus or conductor connected thereto, every licensee shall:-

In no way injure the works, conveniences or property belonging to any such other such authority, company or person, nor obstruct or interfere with public traffic, except with the previous consent of the board. Take adequate precautions to protect from danger any person engaged upon such works by the provision and maintenance in safe and efficient conditions of the necessary safety appliances for the use of such persons and by ensuring their proper use, or by other means approved by the board.

2.2.11 Land Control Act (Cap 406)

This law provides for the control of transactions in land, especially under the responsibility of the Land Control Boards. However, it is of environmental interest that one of the points to consider in granting or refusal of consent by the Board is what impact the transaction is likely to have on the maintenance or improvement of standards of good husbandry within the specific agricultural area.

Government land is land owned by the Government of Kenya under the Government Lands Act (Cap 280). Trust land is land held and administered by various local government authorities as trustees in the Constitution of Kenya and Trust Land Act (Cap 288). Individuals may acquire leasehold interest for a specific number of years in trust land and can (in theory) be repossessed by the local authorities should the need arise. Local authorities retain regulatory powers over trust land.

2.2.12 Land planning act cap 303

Section 9 of the subsidiary legislation (the development and use of land Regulations 1961) under which it requires that before the local authority to submit any plans to then minister for 23 approval, steps should be taken as may be necessary to acquire the owners of any land affected by such plans. Particulars of comments and objections made by the landowners should be submitted, which intends to reduce conflict of interest with other socio economic activities.

A change of user has been approved by the NCC.

2.2.13 The Local Government Act Cap 265

This act provides for the establishment of authorities for local government and defines their functions. The act establishes county councils and Section 163 allows the County Councils to prohibit all business, which may be or become a source of danger, discomfort, or annoyance due to their noxious nature through smoke, fumes, dust, noise, or vibrations. Section 165 allows the local authority to refuse to grant or renew any license which is empowered in this act or any other written law on the grounds that the activity does not conform to the requirements of any by-laws in force in the area of such local authority the granting of the license would be contrary to the public interest.

2.2.14 Municipal by-law

The Local Government Act, Cap. 265, sections 160 (a) and 201 gives the Local Authorities powers to formulate by-laws in order to manage wastes (mainly sewage and solid waste). The following analysis is a typical by-law outlining the general features appearing in the City by-laws.

2.2.15 Solid Waste/Refuse Management

The municipal refuse receptacles and collection by-laws states that the removal of the contents of all the refuse receptacles within market and urban centers shall be carried out by the council or any other authorized person. The provision and maintenance of refuse receptacles within council is the responsibility of the occupiers of the premises under is also required to deposit the refuse into the refuse receptacle and properly cover it until such a time that it is removed by the municipal council staff. The by-laws further prohibits the burning of materials which are likely to cause fire, any liquid or solid matter likely to cause injury to any person, deposition of refuse on public or private property and accumulation of refuse on premises. The removal of refuse from light industrial, "Jua Kali" etc...are carried out by the municipal council at the request of the owner or occupier of the premises and upon payment of the prescribed fee.

2.2.16 Sanitation

Drainage and sewerage by-laws requires the owners of every building, and place where workers are employed to provide a sufficient number of latrines for use by the inhabitants and workers in the building or place, and such accommodation shall be conveniently sited contiguous to the premises in

connection with which they are or will be installed and shall be conveniently screened. A provision of separate sanitary accommodation for each sex may be ordered by the council where appropriate and must conform to the site requirements.

2.2.17 Sewage and Sewerage Management

The by-laws require all new buildings to be provided with effective sewer connections within the recommended distance. If no such public sewer exists within the recommended distance or if it is not practical to connect with such sewers, then the drain should empty into septic tanks or soakage ways or as the council may direct. Section 8 of the by-laws prohibits the emptying of sewage into a cesspool, septic tanks or elsewhere other than a sewer whereby a public sewer exists and it is practical to connect to such a sewer. The by-laws further prohibits any person from causing or permitting any subsoil, surface, storm or rain water any drain for conveyance of such water to discharge into foul sewer or vice versa.

2.2.18 Waste Water

The by-laws requires that where any building is without adequate provision for conveying waste water there from to surface water or where such provision has fallen into disrepair, the owner of such building shall on receipt of notice from the Town Clerk requiring him to do so, and within such reasonable time shall be specified therein, provide guttering or down pipes or execute such other works as may be necessary to any distance water sewer which is within the recommended distance of 1 meter or if there is no surface water sewer within that distance or if it is not practical to connect to such sewer may otherwise dispose off such water to the satisfaction of the council.

2.2.19 Drainage

The by-laws on drainage and sewerage states that, every new building shall be provided with an effective drain to be constructed in accordance with the council requirements. The maintenance of all drains and all drainage works is the responsibility of the owner of the building and must always be in an efficient condition. The council may construct the drainage works in agreement with the owner with the owner such owner pay the construction cost of the works. Other charges include supervision charges among others. The role of the council includes supervision of excavation for the laying of the drains, testing of drainage works and examination of drains.

2.2.20 The Building Code 2000

This legislation was developed to ensure the safety of buildings and ensure sound construction practices. Section 194 of the building codes requires that where a sewer exists, the occupants of the nearby premises will apply to the local authority for a permit to connect to the sewer line and that all wastewater must be discharged into the sewers. The code also prohibits construction of structures or buildings on sewer lines. For this development designed effluent treatment plant will be used for effluent disposal awaiting the construction of sewer system in the area soon.

2.2.21 Occupational Health and Safety Act, 2007

The first law introducing an official factory inspectorate was passed in Great Britain in 1878 as The Factories and Workshops Act. In Kenya, Factories Act was enacted in 1951 and amended in 1990 to include "other places of work". It imposes a minimum standard of conduct or care that is an absolute duty upon employers, employees and sellers/importers of machinery/equipment for use in factories and other places of work. This Act together with the Traffic Act Cap 403 addresses the problem of air pollution. The amendment introduced in 1990 prohibits any factories from emitting dust; fumes or impurities into the atmosphere without undergoing appropriate treatment to prevent air pollution or any ill effect on life or property. This provision is similar to that of nuisance under the Public Health Act. The Factories Occupation Health and safety Act 2007 however dwells immensely on the working condition

within the factories and work places. The requirement under the Act is that the factories and other work places must observe high standards of cleanliness for respective operations, avoid overcrowding, construct and maintain adequate ventilation, provide and maintain suitable lighting (artificial or natural), ensure drainage of floors within the working environment and maintain sanitary conditions. This legislation concerns the protection of persons working in factories and other places of work and aims at creating a good working environment, free from the risk of accidents or occupational diseases.

It issues the following general guidelines on working conditions and environment:

a) Health

Cleanliness: No accumulation of dirt, kept painted

Overcrowding: Minimum air space 10 cubic metres and Height of workroom: Minimum 3 metres.

Ventilation -By circulation of fresh air

Lighting - Suitable and Adequate

Drainage of floors - For wet processes

Sanitary conveniences - Suitable and well maintained

Medical examination of workers.

b) Safety

Fencing and guarding of machinery

Training and supervision of inexperienced workers

Periodic examination of plants, precautions against fire, Safe means of access and safe place of employment

c) Welfare

Safe drinking water

Washing facilities

Accommodation for clothing

Facilities for sitting

First Aid Facilities

Protective clothing and appliances

d) Other Provisions

Registration Approval of plans

Reporting of accidents, dangerous occurrences and occupational diseases

Health and Safety committees

Duty of employed person

General register

Abstract of the Act and Subsidiary Legislation

e) Subsidiary legislation Factories (woodworking machinery) Rules

Factories (First Aid) rules Factories (protection of Eye) Rules Factories (building operations and works of engineering construction) Rules

Factories and Other Places of Work Act

Factories (Noise prevention and control) rules

f) Enforcement

On discovery of a contravention of a provision of the Act, the Occupational Health and Safety Officer (OHSO) is empowered to do any of the following:

- Issue improvement notice
- Issue prohibition notice
- Seize, render harmless or destroy any substance or article that is considered a cause of imminent danger or serious personal injury.

g) Prosecution.

The Act provides access to inspection of such facilities with special conditions by OHS officers and other appropriately appointed inspectors. Such inspections may lead to prosecution. The OSH Act 2007

further requires that accident and incidents like fires and explosions at the work place be reported to the inspectors in writing.

2.2.22 The Factory and Other Places of Work Act Cap 514 of 2005

This act governs noise prevention and control and in section 4 (1) it sets limits of how much noise a worker may be exposed to (a) as the continuous equivalent of ninety dB (A) in eight hours within any twenty four hours duration; and (b) one hundred and forty dB (A) peak sound level at any given time. Section (3) adds that where noise is intermittent, noise exposure shall not exceed the sum of the partial noise exposure equivalent continuous sound level of ninety dB (A) in eight hour duration within any twenty four hours duration. It also places the duty of ensuring an effective noise control and hearing conservation programme on occupiers in section 5, which the act states in subsection 5 (2) to include:

- a) Noise measurement;
- b) Education and training;
- c) Engineering noise control;
- d) Hearing protection.
- e) Posting of notices in noisy areas;
- f) Hearing tests; and
- g) Annual programme review.

The act places responsibility of recording noise levels at workplaces and reporting to the Director of Occupational Safety and Health on occupiers and in Section 10 (1) it states that machinery or plant in the workplace should be installed in such a way that the lowest possible noise is emitted when the machine is in operation. In section 12 it states that where measures to segregate noisy areas (beyond 90 dB(A)) are not feasible then occupiers should provide workers with adequate PPEs.

2.2.23 Employment Act 2007

2.2.23.1 General Principal

The Act constitutes minimum terms and conditions of employment of an employee and any agreement to relinquish vary or amend the terms set will be null and void. The act stipulates that no person will use or assist any other person, in using forced labour. Clause 5 of the act states that its will be the duty of the Minister, Labour officer, the National Labour Court and the subordinate labour courts to; Promote equality of opportunity in employment in order to eliminate discrimination in employment; Promote and guarantee equality of opportunity for a person who, is a migrant worker or a member of the family of the migrant worker lawfully within Kenya. No employer will discriminate directly or indirectly, against an employee or prospective employee or harass an employee or prospective employee on the following grounds; race, colour, sex, language, religion, political or other opinion, nationality, ethnic or social origin, disability, pregnancy, mental status or HIV status. An employer will pay his employees equal remuneration for work of equal value.

2.2.23.2 Part IV Rights and duties of employment

The provisions of this part and part VI constitute basic minimum and conditions of contract of service. The employer will regulate the hours of work of each employee in accordance with provisions of this Act and any other written law. Subsection (2) of section 27 states that an employee will be entitles to at least one rest day in every period of seven days. An employee will be entitles to not less that twenty one working days of leave after every twelve consecutive months.

2.2.23.3 Maternity Leave

Section twenty nine of the Act stipulates that a female employee will be entitled to three months maternity leave with full pay. Subsection 8 of section 29 further states that no female employee will forfeit her annual leave entitlement on account of having taken her maternity leave.

2.2.23.4 The Penal Code (Cap. 63)

The penal code of Kenya cap 63 prohibits common nuisances in section 175 as any activity that may cause any common injury, or danger or annoyance, or obstructs or causes inconvenience to the public in the exercise of common rights and section 193 extends these nuisance to include loud noises or offensive or unwholesome smells. Section 191 and voluntarily corrupt or foul the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used, whereas section 192 does the same for vitiating the atmosphere in any place, so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighborhood or passing along a public way.

In terms of Health, Safety and Responsibility Chapter XX section 219 states that it is the duty of every person who has in his charge or under his control anything, whether living or inanimate, and whether moving or stationary, of such a nature that, in the absence of care or precaution in its use or management, the life, safety or health of any person may be endangered, to use reasonable care and take reasonable precautions to avoid the danger; and he shall be deemed to have caused any consequences which adversely affect the life or health of any person by reason of any omission to perform that duty.

2.2.23.5 Labour Institutions Act 2007

Section 34 of the act stipulates that an authorized officer may either alone or in the presence of another person, enter any premises or place where persons are, or may be employed for the purpose of performing his duties as specified under the Act. The labour officer may, for the purpose of monitoring or enforcing compliance with any law require the production of wages sheets or other employment records kept by an employer, enter inspect and examine all latrines and other sanitary arrangements or water supply, inspect and examine all food provided or appearing to be provided for employees, and take samples thereof in duplicate, in the presence of the employer or the employers representative which samples will be sealed and one sample so sealed will be left with the employer, order that all buildings and premises where employees are housed or employed be kept in a clean and sanitary condition.

2.2.23.6 Trade Licensing Act (Cap 497)

Section 5 of the Act makes it mandatory for all businesses to obtain trading licenses.

2.2.24 National Policies And Plans

The various key polices and plans by various state organs which are relevant to the project and its activities are examined in the following subsections and they include:

2.2.24.1 National Poverty Reduction Strategy Paper

The Economic Recovery Strategy (National Poverty Reduction Strategy) presents a multifaceted strategy to meet economic growth, equity and poverty reduction, and governance objectives. To spur economic growth, the ERS commits to strengthening the macroeconomic framework, assuming a responsible fiscal stance, and providing a conducive environment for private sector investment in the productive sectors and, specifically, in infrastructure development and maintenance. One of its main focal points is the improvement of access to basic health and upgrading the living conditions for the urban poor.

The paper also states the policies relevant to natural resource management and it states that adequate management of environmental resources is key to long-term sustainable economic growth in rural areas. The relevant policies include the national environmental action plan and environmental management and coordination act (1999). Activities in forestry include implementation of the Forestry

Development Policy, enforcement of the Forestry Act, and promotion of private sector participation in afforestation and management of forest plantations.

2.2.24.2 National Biodiversity Strategy and Action Plan

This action plan sensitizes the importance of biological resources which are fundamental to her national economic prosperity as sources of food, fuel, wood, shelter, employment, and foreign exchange earnings, especially through tourism. Kenya's plans to industrialize the 21st century depend to a large extent on national biodiversity resources. Other important benefits of biodiversity include the maintenance of water cycles, regulation of climate, photosynthetic fixation, protection of soil, storage and cycling of essential nutrients, as well as absorption and breakdown of pollutants.

This strategy and action plans advocates for sensitization and empowerment of communities through participatory management practices and use of environmentally friendly techniques and technologies to achieve Kenya's vision to maintaining a clean and healthy environment with abundant biodiversity resources.

Issues identified encompass conservation within protected areas, arid and semi-arid areas, forests, degraded ecosystems, threatened and alien species, genetically modified organisms, indigenous systems and knowledge. Fundamental concerns that the action plan addresses to the management of biodiversity in Kenya are outlined below as;

1. Agricultural biodiversity
2. Incentive measures
3. Research and training
4. Public education and awareness
5. Impact assessment,
6. Access to genetic resources,
7. Institutional capacities and linkages,
8. Gender concerns,
9. Policy and legislation,
10. Poverty,
11. Biotechnology and other technologies,
12. Information exchange,
13. Technical and scientific co-operation,
14. Financial resources.

The Strategy and Action plan gives its broad objectives of biodiversity management in Kenya to be;

1. To conserve Kenya's biodiversity
2. To sustainably use its components
3. To fairly and equitably share the benefits arising from utilization of biodiversity among all stakeholders
4. To enhance technical and scientific corporation nationally and internationally, including the exchange of information, in support of biodiversity convention.

2.2.24.3 Kenya's Vision 2030

Kenya Vision 2030 is the country's new development blueprint covering the period 2008 to 2030. It aims to transform Kenya into a newly industrializing, middle-income country providing a high quality life to all its citizens by the year 2030. The vision has three pillars to achieving its goal and they are economic, social and political and their foundations are anchored by macroeconomic stability; continuity

in governance reforms; enhanced equity and wealth creation opportunities for the poor; infrastructure; energy; science, technology and innovation (STI); land reform; human resources development; security; and public sector reforms. The vision also aligns Kenya with achieving the millennium development goals.

The economic pillar identifies the sectors that can drive Kenya towards the 10% annual economic growth and the social pillar drives Kenya towards prosperity and also involves the building of a just and cohesive society that enjoys equitable social development in a clean and secure environment. Some of the specific sectors that are vital to achieving this are identified to be: education and training; the health sector; water and sanitation; the environment; housing and urbanization; gender youth and vulnerable groups.

2.2.24.4 National Environmental Action Plan 2009-2013 (NEAP)

The NEAP 2009-2013 is an instrument whose purpose is to integrate environmental concerns into development planning. It identifies the capacities and responsibilities to do this and it can be seen as a broad-based strategy that will help the country attain sustainable development as envisaged in Kenya Vision 2030.

It also identifies environmental problems facing the country and they include deforestation, soil erosion, desertification, water shortage and degraded water quality, poaching, and domestic and industrial pollution. Poverty and population growth are also described as some driving factors towards these problems and the challenges facing the following natural resources are given as well as the strategy for their sustainable use: land, water, forests, wildlife, biodiversity, wetlands, agriculture, livestock and fisheries.

Chapter 3 of the NEAP deals with human settlement and infrastructure and it covers human settlements and planning, pollution, waste, infrastructure, water supplies and energy supply, which over the years have continued exerting pressure on the environment. The areas of concern include not only human settlements but human and environmental health; human settlements and environmental pollution; infrastructure; and energy supply. The challenges in these themes are given and proposed interventions outlined.

Chapter 4 of the NEAP 2009-2013 is associated with challenges and interventions in the trade and services sector which is an integral part of Kenya's economy. In terms of health services it states that preventive, promotive and curative health services chain includes hospitals, (public and private) health centers, clinics, pharmaceutical industries and their possible impacts on environmental quality. Impacts associated with this sector include; use and handling impacts, waste pre- treatment, transportation and disposal of hazardous materials. Specific challenges include: management of hazardous and toxic materials; effective management of medical and biological waste; compliance to radiation regulations; management of emissions from incinerators; and control of water pollution.

The plan also recognizes the impacts of natural disasters to development it states that people and environment face threats to their life and livelihood from natural and human related hazards. Natural hazards include drought, floods earthquakes, volcanic eruptions, landslides cyclones, and storms among others. Disasters occur when these natural hazards interact with vulnerable people, property, and livelihoods causing varying damage depending on the level of vulnerability of the individual, group, property or livelihoods. In Kenya disaster impacts have become an impediment to sustainable development and a number of regions have suffered devastating effects of disasters. Therefore taking disaster risk assessment of the project would help to ensure not only its preparedness but also its sustainability to disaster risk which may be present in the area.

Thus by complying with regulations and the relevant legislation the project will work within the framework the NEAP 2009-2013 and prevent adverse human, social and environmental impacts from its activities.

2.3 INSTITUTIONAL FRAMEWORK

By law there are several state institutions whose mandates govern the project and its activities, and these are listed in **Error! Reference source not found.** below:-

Table 2-1: Institution Framework

Institution	Mandate/ESIA Relevance
NEMA	<p>The National Environment Management Authority (NEMA) is established under the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, as the principal instrument of government in the implementation of all policies relating to the environment.</p> <p>The Authority became operational on 1st July 2002 following the merger of three government departments, namely: the National Environment Secretariat (NES), the Permanent Presidential Commission on Soil Conservation and Afforestation (PPCSCA), and the Department of Resource Surveys and Remote Sensing (DRSRS). However, following government restructuring in March 2003, DRSRS reverted to its departmental status under the then Ministry of Environment and Natural Resources (MENR). There was a transition period characterized by the integration of previous departmental activities and appointment of the first Board of Management,</p> <p><i>(Source: GoK. (2012). National Environmental Management Authority. Retrieved 30th January 2012 from http://www.nema.go.ke).</i></p>
Nairobi City Council	<p>The Council was created by then Local Government Act, Cap 265 of the Laws of Kenya and its mandate is to provide services to residents of the city. Among other functions, the City Council is responsible for the provision of essential services like water, sewer and public safety.</p> <p>Some of the city councils departments whose functions are pertinent to the project include the following:</p> <ul style="list-style-type: none"> ○ City Planning Department ○ Public Health Department ○ Social Services and Housing Department ○ Housing Development Department ○ City Inspectorate Department ○ City Engineer's Department ○ Department of Environment
NCWSC	<p>The Nairobi Water Company is a water service provider charged with the provision of the water and sewerage services in Nairobi. Those services were previously offered by the Water and Sewage Department of the Nairobi City Council.</p> <p>Nairobi Water Company's formation arose from the enactment of the Water Act 2002, which created new institution to manage water resources in the country.</p>

Institution	Mandate/ESIA Relevance
	Under the new Act, water service providers will be licensed by water service boards to retail water in their jurisdictions. Nairobi Water Company is one such water service provider, which has been appointed by the Athi Water Service Board to provide water and sewerage services to the residents of Nairobi and its environs.
Ministry of Energy - KPC	<p>The Ministry of Energy derives its mandate from Cap.112 and 435 of the Laws of Kenya. In addition, a Sessional Paper (No.4 of 2004) provides the policy framework and direction on Energy Development in Kenya for the next 20 years. The Minister of Energy oversees policy formulation while the Permanent Secretary oversees efficiency and effectiveness in the implementation of formulated policies. The Ministry has three technical departments namely; Geo-Exploration, Electric Power and Renewable Energy.</p> <p>The Ministry of Energy's mission is to facilitate provision of clean, sustainable, affordable, reliable and secure energy sources for national development while protecting the environment, (Source: GoK, MoE, http://www.energy.go.ke/, Retrieved 30th January, 2012).</p>
Ministry of Labour	<p>This ministry's mandate is to: enforce labour laws, maintain industrial peace, industrial training and promote safety and health of employees. We also develop and coordinate implementation of policies and strategies for human resource development, micro and small enterprise sector and productivity improvement. Our mandate is derived from Presidential Circular No 1/2006 of March 2006 and also from the following Acts of Parliament and other policy documents:</p> <ul style="list-style-type: none"> ○ Employment Act, Cap. 226; ○ The Regulation of Wages and Conditions of Employment Act, Cap. 229; ○ The Trade Disputes Act, Cap. 234; ○ The Workmen's Compensation Act, Cap. 236; ○ The Trade Unions Act, Cap. 233; ○ The Industrial Training Act Cap 237; ○ The Factories and Other Places of Work Act, Cap. 514; ○ National Social Security Fund (NSSF) Act, Cap 258; ○ ILO Conventions and Recommendations; ○ The Industrial Relations Charter of 1984; ○ Economic Recovery Strategy for Wealth and Employment Creation; ○ The 9th National Development Plan; ○ Session Paper No.2/2005 on MSE development; and ○ The Legal Notice 7354 of September 2002 on the establishment of the ○ Productivity Centre of Kenya (PCK). <p>(Source: GoK, Ministry of Labour, Mandate (2012). Retrieved on January 30, 2012 from http://www.labour.go.ke/index.php?option=com_content&view=article&id=119&Itemid=212)</p>
Ministry of Devolution Planning, National Development	<p>The Ministry of Devolution, Planning and National Development is mandated to facilitate and coordinate the national development planning process and to provide leadership in national economic policy management. Its core functions include:</p> <ul style="list-style-type: none"> ○ The coordination of government economic policies, including regional and

Institution	Mandate/ESIA Relevance
	<p>international cooperation policies;</p> <ul style="list-style-type: none"> ○ The coordination and preparation of the planning components of the Medium Term Expenditure Framework (MTEF); the Fiscal Strategy Paper and the requisite budget documents; ○ The provision of leadership and coordination in the preparation of the main National Development Plan documents, including the District Development Plans (DDP); National Development Plans, and specific socio-economic programmes and plans; ○ The coordination and management of population, economic and national statistical services within government; and ○ The Coordination and provision of leadership in the national Monitoring and Evaluation (M&E) framework. <p>(Source: GoK. (2012) MoSPND and Vision 2030. Retrieved January 30, 2012 from http://www.planning.go.ke)</p>
Ministry of Health	<p>This ministry is charged with the functions of:</p> <ul style="list-style-type: none"> ○ Public health and sanitation policy ○ Preventive and promotive health services ○ Community health services ○ Health education ○ Reproductive health ○ Food quality and hygiene ○ Health inspection and other public health services ○ Quarantine administration ○ Oversight of all sanitation services ○ Preventive health programme including vector control ○ National public health laboratories ○ Government chemist ○ Dispensaries and health centres (i.e., levels 2 & 3) ○ Kenya Medical Research Institute (KEMRI) ○ Radiation Protection Board ○ Member of KEMSA Board ○ Member of Kenya Medical Training College (KEMTC) Board <p>(Source: GoK, (2012) Ministry of Public Health and Sanitation, Functions of the Ministry. Retrieved January 31, 2012 from http://www.publichealth.go.ke/index.php/about-the-ministry/functions)</p>
Ministry of Transport	<p>The development of integrated Nairobi metropolitan areas growth and development strategy covering among other things:</p> <ul style="list-style-type: none"> ○ Integrated roads, bus and rail infrastructure for metropolitan area ○ Efficient mass transport system for Nairobi metropolitan area ○ Replacement of slums with affordable low cost/rental housing provision of adequate housing ○ Development and enforcement of planning and zoning regulations ○ Preparation of spatial planning for metropolitan area ○ Efficient water supply and waste management infrastructure

Institution	Mandate/ESIA Relevance
	<ul style="list-style-type: none"> ○ Promotion, development and investment in sufficient public utilities, public services and world class infrastructure for transforming Nairobi into a global competitive city for investment and tourism ○ Identification and implementation of strategic projects and programmes requiring support by government ○ Promotion of Nairobi metropolitan area as a regional and global services centre for financial, information and communication technology, health, education, business, tourism and other services ○ The development of a sustainable funding framework for the development of identified urban and metropolitan areas <p>(Source: GoK. (2012). Ministry of Nairobi Metropolitan Development, Mandate. Retrieved January 31, 2012 from http://www.nairobimetro.go.ke/index.php?option=com_content&view=article&id=3&Itemid=45)</p>
Kenya National Highways Authority (KeNHA)	<p>KeNHA An autonomous road agency, responsible for the management, development, rehabilitation and maintenance of international trunk roads linking centres of international importance and crossing international boundaries or terminating at international ports (Class A road), national trunk roads linking internationally important centres (Class B roads), and primarily roads linking provincially important centres to each other or two higher-class roads (Class C roads).</p> <p>KeNHA's core functions include:</p> <ul style="list-style-type: none"> ○ Constructing, upgrading, rehabilitating and maintaining roads Class A, B, C roads ○ Implementing road policies in relation to national roads ○ Ensuring adherence to the rules and guidelines on axle load control prescribed under the traffic act and any regulations under this act ○ Ensuring that the quality of roads works is in accordance with such standards as may be defined by the minister ○ Collecting and collating all such data related to the use of national roads as may be necessary for efficient forward planning under the traffic act <p>(Source: GoK, (2012). Kenya National Highways Authority, Mandate. Retrieved July, 04, 2012 from www.kenha.co.ke)</p>
Kenya Urban Roads Authority	<p>The mandate of KURA as defined in the Kenya Roads Act, 2007 is the Management, Development, Rehabilitation and Maintenance of all public roads in the cities and municipalities in Kenya except where those roads are national roads.</p> <p>KURA's core functions include:</p> <ul style="list-style-type: none"> ○ Constructing, upgrading, rehabilitating and maintaining roads under its control. ○ Controlling urban road reserves and access to roadside developments. ○ Implementing roads policies in relation to urban roads. ○ Ensuring adherence by motorists to the rules and guidelines on axle load

Institution	Mandate/ESIA Relevance
	<p>control prescribed under the Traffic Act and under any regulations under this Act.</p> <ul style="list-style-type: none"> ○ Ensuring that the quality of road networks is in accordance with such standards as may be defined by the Minister. ○ In collaboration with the Ministry responsible for transport and the police department, overseeing the management of traffic and road safety on urban roads. ○ Monitoring and evaluating the use of urban roads. ○ Planning the development and maintenance of urban roads. ○ Collecting and collating all such data related to the use of urban roads as may be necessary for efficient forward planning under the Roads Act. ○ Preparing the road works programs for all urban roads. ○ Liaising and coordinating with other road authorities in planning and on operations in respect of roads. ○ Advising the Minister on all issues relating to urban roads. ○ Performing such other functions related to the implementation of the Roads Act as may be directed by the Minister <p>(Source: GoK (2012) Kenya Urban Roads Authority. Retrieved July 4, 2012 from www.kura.go.ke)</p>
County Environment Committees.	<p>According to EMCA, 1999, the Minister by notice in the gazette appoints County Environment Committees of the Authority in respect of every province and district respectively. The Environment Committees are responsible for the proper management of the environment within the county in respect of which they are appointed to. They are also to perform such additional functions as are prescribed by the Act or as may, from time to time be assigned by the Minister by gazette notice. The decisions of these committees are legal and it is an offence not to implement them.</p>
Public Complaints Committee.	<p>The Committee is charged with the following functions: Investigating allegations/complaints against any person or against the Authority (NEMA) in relation to the condition of the environment and its management, 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, and to perform such other functions and exercise such powers as may be assigned to it by the Council.</p>
National Environment Action Plan Committee.	<p>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, and Analytical profile of the various uses and value of the natural resources incorporating considerations of intergenerational and intra-generational equity among other duties as the EMCA specifies.</p>
Standards & Enforcement Review Committee.	<p>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.</p>
National	<p>This tribunal guides the handling of cases related to environmental offences in the</p>

Institution	Mandate/ESIA Relevance
Environmental Tribunal.	Republic of Kenya. The Tribunal hears appeals against the decisions of the Authority. Any person who feels aggrieved may challenge the tribunal in the High Court.

3 BASELINE ENVIRONMENTAL AND SOCIOECONOMIC CONDITIONS

Westlands Skye Development Limited is proposing to build a modern 18 storied building on its plot No L.R.No. 209/64/11 on Muthithi Road, Westlands, Nairobi County. Westlands is a commercial and residential suburb northwest of Nairobi's CBD. Its proximity to the City Centre makes it a hot property area, typically inhabited by a significant number of the city's expat population and home to several multinational companies and agencies. The area is home to several new office blocks and old residential houses with many turned to business offices. The site is vegetated with the existing buildings and their ancillary structures creating the built up infrastructure in it.

The regional area of the project site lies is composed of residential and commercial urban establishments with several key neighborhoods such as Westlands, Riverside, Parklands, Pangani, and Nairobi CBD amongst others. Over the past years Nairobi has grown rapidly. However, the growth rate of new apartment's construction as well as infrastructure growth to cater for the ever growing population falls far below demand. There is need for rapid development of new housing blocks as well as infrastructure to accommodate the demands and influx of the working class and community into emerging new industries.

The population of Nairobi grew from 8,000 in 1901 to 118,579 in 1948 (Rakodi 1997). By 1962; the city had a population of 343,500 people, although some of this could be attributed to extension of the city's boundaries. Between the 1948 and 1962 censuses, the population grew at an average rate of 5 .9 per cent per annum, compared with 7 .6 per cent in the previous 12-year period. Taking the 1999 census figures as a baseline, it is projected that the city's population by the next census in 2009 will be about 3 .1 million, and 3 .8 million by 2015 (CBS 2001).

This chapter presents the baseline environmental, socioeconomic and cultural conditions of the project site and its environs. The scope of this chapter covers the project's area influence, the immediate neighbourhood around the project and then Nairobi County, across the subjects of:

- Physical Environment,
- Ecological Environment, and
- Socio-cultural and Economic Environment.

Plate 3-1:Photo of the Current Project Site



3.1 PHYSICAL ENVIRONMENT

3.1.1 Atmospheric Conditions

3.1.1.1 Climate and Meteorology

The project lies in Westlands, Nairobi District in Nairobi County which has a temperate tropical climate with two rainy seasons. The highest rainfall is received between March and April and the short rainy season is between November and December. The average annual rainfall in Nairobi is about 900mm, but the actual amount in any one year may vary from less than 500 mm to more than 1900 mm and the seasons of rainfall coincide approximately with the time of changeover of the monsoon currents which affect Eastern Africa, the South-West Monsoon becoming established in April, and north-east monsoon in November.

The average daily temperatures in Nairobi varies only from about 17°C during July and August to 20°C in March, the daily range of temperature is quite large, averaging about 10°C in May and 15°C in February. These leads to Nairobi having an annual average temperature maximum of 24.9°C and an average minimum of 13.3°C and average mean relative humidity value is 78.3% in the morning and 50.5% in the afternoons.

3.1.1.2 Winds

The wind near the ground is very predominantly easterly throughout the year, generally between north-east and east from October to April, and between east and south-east from May to September. The strongest winds occur during the dry season just prior to the "Long Rains" when speeds of 20 to 25 mph are common from mid-morning to early afternoon; at other times of the year winds speeds are usually 10 to 15 mph. During the night the wind is usually light. In the squalls sometimes associated with thunderstorms, short-lived of up to 70 mph. have been known to occur.

3.1.1.3 Precipitation

Nairobi has a bimodal rainfall pattern, in which the maxima occur in March-April (long rains) and November-December (short rains). This simple rainfall regime is complicated by the uncertainty of rainfall from year to year. Thunderstorms may occur, nearly always during the afternoon or evening, during most months of the year but they are rare during the period June/August. Hail is comparatively rare in Nairobi, being reported on average less than once a year unlike other areas such as the western part of Kenya.

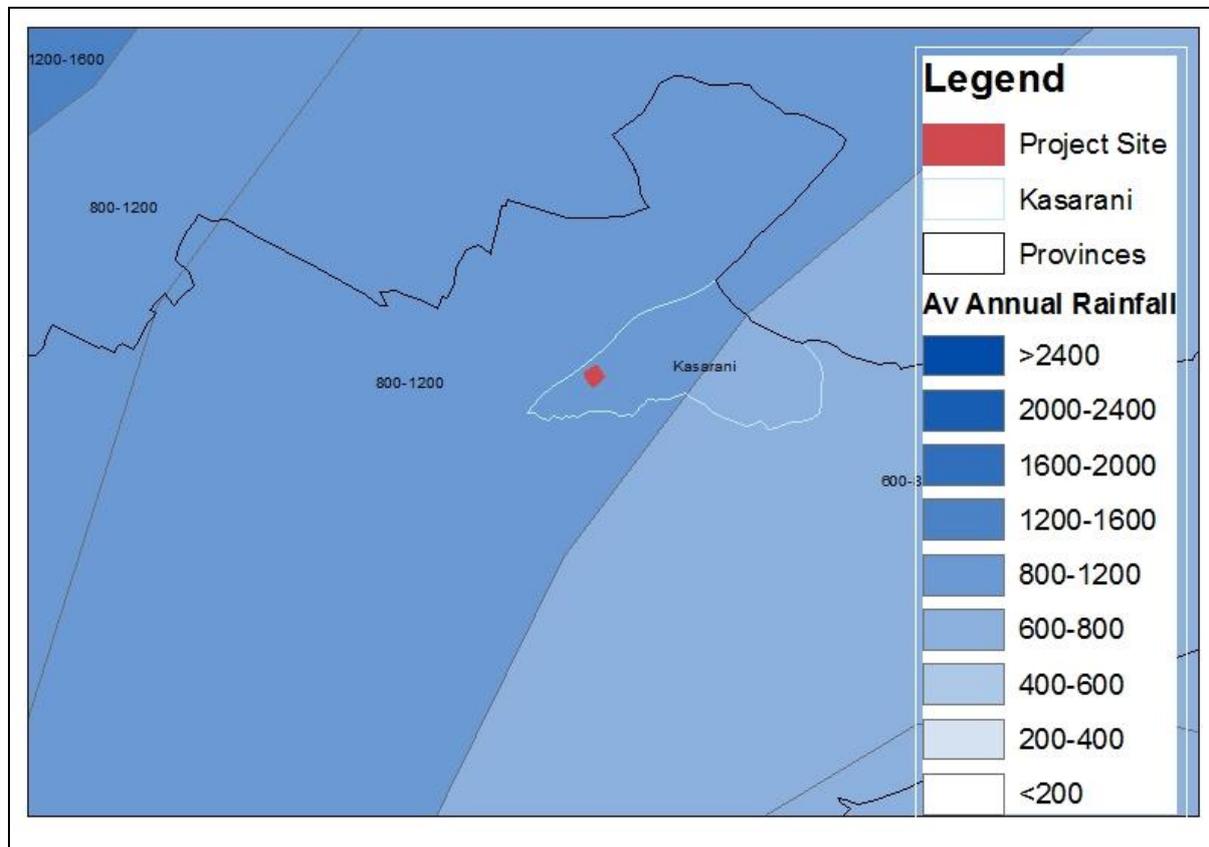


Plate 3-2: Average Annual Precipitation of the Project Site

3.1.1.4 Sunshine and Solar Radiation

Nairobi experiences a total of about 2,500 hours of bright sunshine per annum, which is equivalent to an annual mean of approximately 6.8 hours of sunshine per day. July and August are characterized by cloudiness and during these months the average daily sunshine in Nairobi is 4 hours. Often there are several days in succession when the sun fails to penetrate the thick stratocumulus cover, although on other days the cloud cover does break for a short period. There is about 30% more sunshine in the afternoon than in the morning, and it follows that westerly exposures receive more insolation than easterly ones.

3.1.1.5 Evaporation

Given temperature and sunshine factors, the annual variation of evaporation is as expected. The mean annual evaporation as measured by the pan is seen slightly to exceed the mean rainfall at the altitude of Nairobi, but it would be expected that at higher altitudes this position would be reversed.

3.1.1.6 Smog

Smog is common during the rainy season. Most common hazards to flying occur during this period. This is mostly associated with the development of towering cumulus and cumulonimbus clouds. A further hazard common in Nairobi is the formation of low stratus clouds during the early morning¹.

3.1.1.7 Ambience and Air Quality

The project area lies in Nairobi, an urban area, where the major sources of air pollution are as a result of industrial, construction, increased development activities and their related amenities (majorly cars). The situation is further compounded by the fact that air quality regulations are still being drafted leaving no regulations in place. These can be seen as the reason behind Nairobi having low air quality especially in the central business district and highly populated areas. A assessment by Maina D. (2004) found that Nairobi has higher levels of suspended particulate matter than WHO standards, with NO and NO₂ levels found being high during rush hour to show that vehicles are the main sources. Maina D. (2004) also found out that for fine particles there was a high correlation between the vehicles density and the fine particles. The high correlation between fine particles with Pb, Br, Zn and Cu is also associated with vehicular emissions as well as engine wear.

The situation with air pollutants could get worse with regulations taking long to come into place and the risks these pollutants (heavy metals and other waste gases) pose are to human health, flora, agro & wild faunal health and to soil quality as well as to water bodies. UNEP and WHO sampled air quality management capacities in 20 developing countries in 1996 and Nairobi was found to be the worst (as cited by Kariuki W. & Mulaku C., 2001) due to the lack of air quality regulations. Kariuki W. & Mulaku C. stipulate that although the air quality does not present an environmental or critical health problem the situation could get worse with the increasing population, growing industrial area, deforestation on the city's fringes, increased construction works and increased vehicular traffic.

However the project area falls out of the central business and industrial districts thus enjoys better air quality and this forms part of the reason as to why the area is majorly residential. During the field survey the main sources of pollution (dusts and noise) that can be of concern was dust generated by trucks and cars moving in the area on the loose soil murrum roads (mobile sources), construction of the northern bypass that uses explosives and the quarrying, which also uses light explosives. Other minor point sources are domestic activities.

Error! Reference source not found. presents a summary of these weather and atmospheric parameters of Nairobi and the project site.

Table 3-1: Nairobi Weather Parameters

Parameter	Observations
Average Annual Rainfall	Average Annual Rainfall: 900mm but can vary between 500mm and 1900mm. Influenced by SW monsoon in April and NE monsoon in November.
Average Annual Temperature	Annual Average Max Temp. 24.9°C Annual Average Min Temp. 13.3°C
Average Mean Relative Humidity	Morning: 78.3% Afternoon: 50.5%
Wind speeds (Easterly)	During long rains: 36 to 40kph Normal speeds: 16 to 24kph Highest observed: 112kph (thunderstorms)
Sunshine	7 hours daily average

¹ Kenya Meteorological Department, 2010, Smog Characteristics of Nairobi.

3.1.1.8 Geology, Soils and Topography

The project and its surrounding area lie in Nairobi which is covered mainly by Tertiary volcanic material overlying folded Precambrian Basement System rocks of the Mozambique Belt. The youngest Tertiary rocks are the Limuru Trachytes, which are subsequently underlain by Kerichwa Valley Tuffs, Nairobi Trachytes, the Athi Series and the Kapiti Phonolites. In Nairobi lava sheets from subsequent lava flows are superimposed on top of each other and on outcrop they form extensive and remarkably flat volcanic terraces, such as the Embakasi Plains (Nairobi Phonolites), Athi Plains (Mbagathi Phonolitic Trachytes), the Karen-Langata and Kilimani-Lavington Areas (Nairobi Trachytes) and Kapiti Plains (Kapiti Phonolites).

Weathering from this Tertiary period resulted in Old Land Surfaces which have the characteristic reddish-brown color inherent of the soil in the project area. Aquifers were formed when the lava flows produced voids in permeable and semi-permeable lava series due to joints and fractures.

The project falls into Seismicity Zone VII according to the Kenyan building code and the buildings within this project are not anticipated to be particularly unconventional in geometry or layout (e.g. exceedingly tall, long cantilevers etc.), but nevertheless it would be prudent to take into account in the design, data on seismicity that has been gathered in the past 40 years. Zone VII structures are, according to the Kenyan code, to be limited to 3 storeys for offices, hotels etc. and 4 storeys for flats.

The topography of the development site is a general fall from the Thika Highway in the south towards the Westlands in the north. Within the development site the general north south slope is broken by a ridge that runs north-west, south-east across the site, creating a low point.

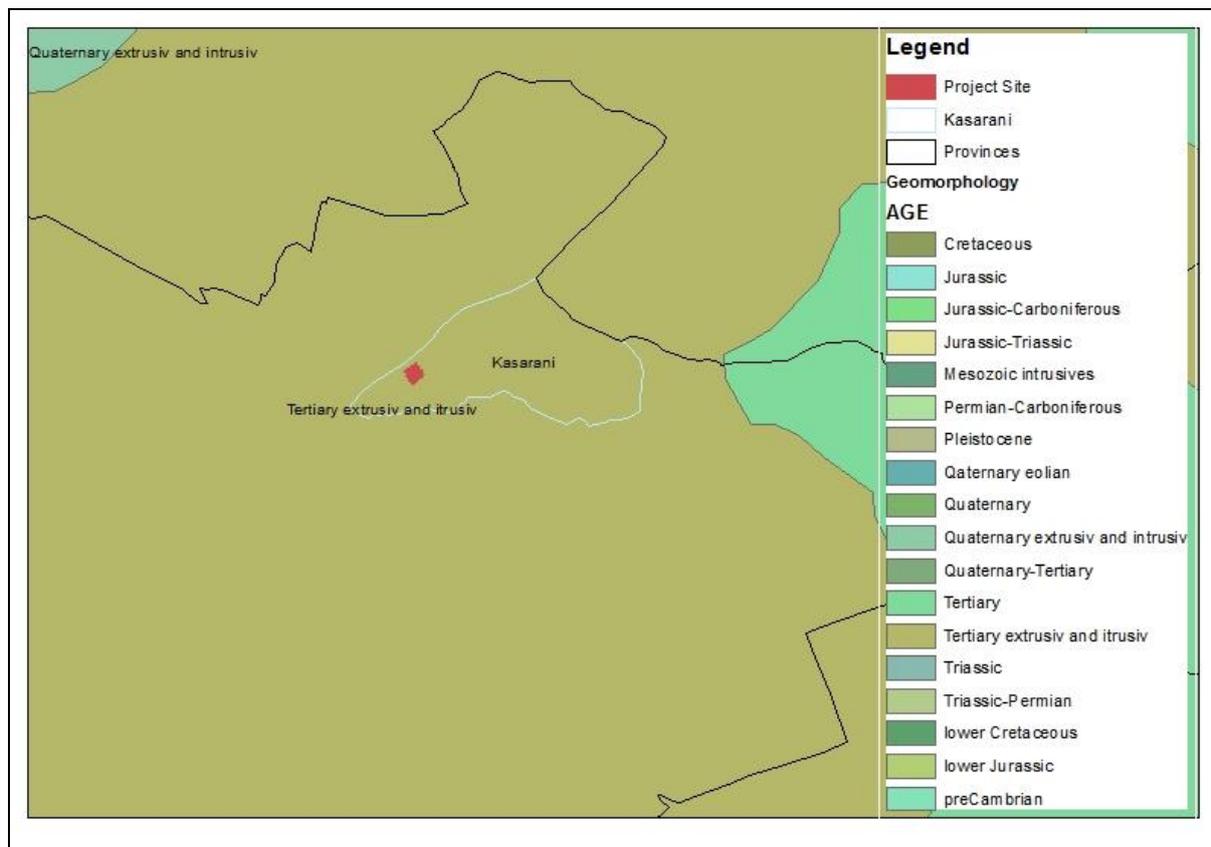


Plate 3-3: Geomorphology of the Project Site

Geotechnical investigations were carried out in the project site as part of its design phase and from trial pits red soil was the predominant top soil discovered an average depth of **Xm** from the surface then Murram which is found between an average depth gap of 10m to 20m (this also includes mixtures of murram and water that were observed in two pits). Clays were observed in three pits with an average depth gap of between 12m and 15m, whereas rock was encountered at an average depth of 17m onwards.



Photo of the Soil in the Project Site



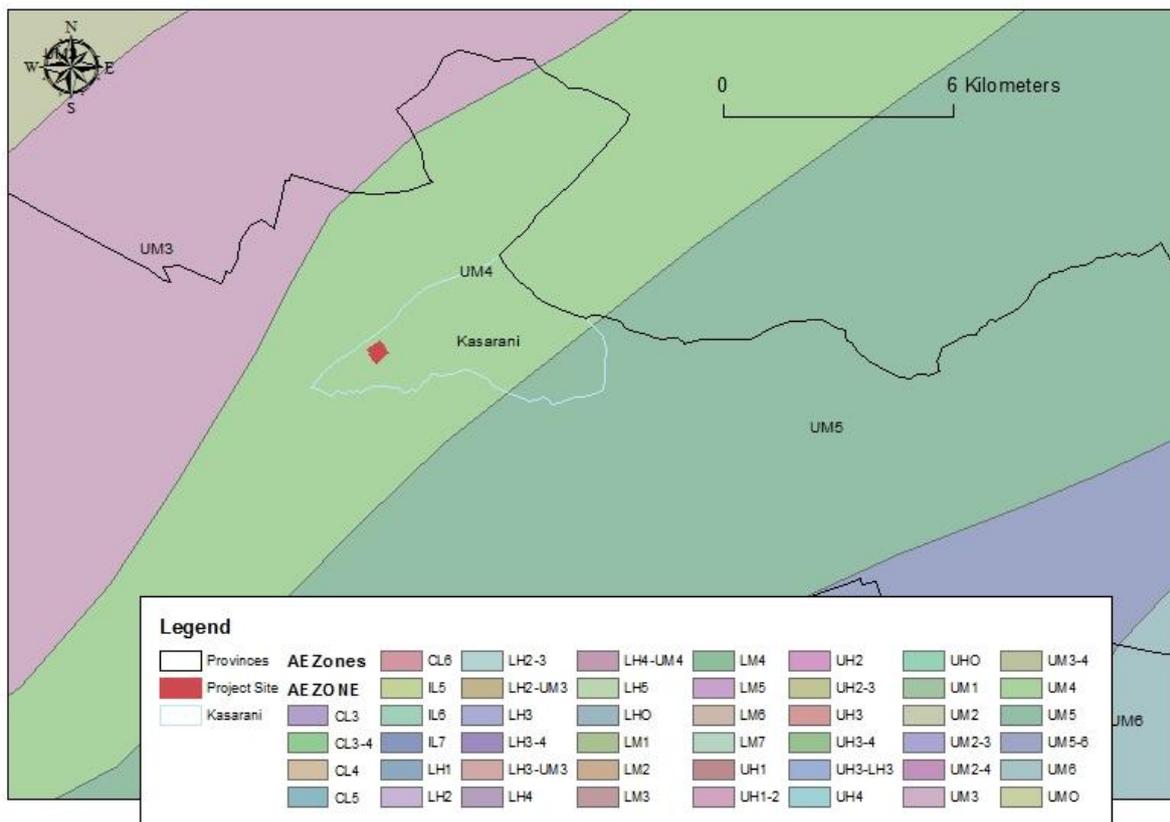
3.1.2 Ecological Environment

3.1.3 Flora

The project area lies in Nairobi which falls under several ecological zones which have biologically diverse floral species and the ecological zones confined within the boundary of the province include the zones II, III, IV and Mwaura (2005) adds that there is another ecological zone that occurs in Nairobi and this is the downtown flora which is the flora of urban areas.

Zone II is essentially a dry montane forest which is less vibrant and spectacular than the montane and tropical rain forest. This zone was previously covered by an evergreen hardwood forest composed of the East African pencil cedar (*Juniperus procera*), wild olive (*Olea europaea*), East African olive (*O. hochstetteri*), figs (*Ficus thonningii*, *F. sur*, *F. natalensis*), Muthaiga tree (*Warbugia ugandensis*) and Muhugu (*Brachylaena huillensis*) amongst others. Other trees include the Podo (*Podocarpus milanjanus*) and Camphor (*Ocotea usambarensis*). The most common grass in this zone is the couch grass (*Cynodon dactylon*), Kikuyu grass (*Pennisetum clandestinum*) and Napier grass (*Pennisetum purpureum*), (Otieno V.J, 2006).

Agro Ecological Zones Based on Temperature and Crop Suitability



Other trees found in this zone include cypresses, pines and wattle. These include various species such as the Himalayan or Bhutan cypress (*Cupressus torulosa*), Monterey cypress (*Cupressus macrocarpa*) and Mexican cypress (*Cupressus lusitanica*). The most successful pines include the Mexican weeping pine (*Pinus patula*) and Monterey pine (*Pinus radiata*) from America. Various wattles including the Black wattle (*Acacia mearnsii*), Australian Blackwood (*A. melanoxylon*) and the Golden wattle (*A. podalyriifolia*) from Australia. The Silky oak (*Grevillea robusta*) from Australia is grown as a shade tree. Kei-apple (*Dovyalis caffra*) from South Africa is common around the high-income residential estates and the Avocado (*Persea americana*) from South America is a prominent fruit tree, (Otieno V.J, 2006).

Vegetation in Zone III as indicated by Mwaura (2005) is the dry semi-deciduous type that varies from dry lowland forest and bush land. Other dominant trees in Zone III include *Euphorbia obavalifolia*, *Cordia Africana*, *Strychnos henningsii*, *Diospyros abyssinica*, *Albizia schimperiana*, *Ochna holstii*; *Chionanthus battiscombe*, *Teclea* spp. as well as *Calodendrum capense* and *Zanthoxylum usambarensis*.

Zone IV as described by Mwaura (2005) has vegetation that includes dry woodland, bush land and grassland commonly referred to as savannah. The larger *Acacia gerrardii* is also found in few places. Other *Acacias* include *Acacia Senegal* and *Acacia seyal*. In areas where the soils are predominantly vertisols the grass community is dominated by *Cynodon*, *Sporobolus*, *Andropogon* and *Setaria* while the star grass (*Themeda triandra*) and Zebra grass (*Hyparrhenia* spp.) are common in areas of latosolic soils.

Mwaura (2005) identifies the downtown flora as the flora of urban centres which includes a relatively high proportion of alien plant species. Some of the few indigenous trees in the city center include *Acokanthera oppositifolia*, *Acacia xanthophlea*, *Combretum molle*, *Cordia africana* and *Encephalartos hildebrandtii* although many of these have originated from up-country sources. The common shade and ornamental trees within the City of Nairobi include *Jacaranda mimosifolia* from Brazil, *Chorisia speciosa* (Brazil), *Aloe bainesii* (South Africa), *Bauhinia variegata* (Asia), *Brachychiton populneum*, *Grevillea robusta* (Australia), *Schinus molle* (Peru) and a wide range of local and foreign *Acacias* and *Terminalias*. Others include a wide range of ornamental palms like the *Caryota urens* (Asia) and the Arizona desert palm (*Washingtonia filifera*).

Urban farming also promotes the cultivation of certain food crops in Nairobi and as observed by Foeken D. and Mwangi A. (1998) some of the crops cultivated in Nairobi include sukuma wiki (kale), tomatoes, beans, cowpeas, maize, Irish potatoes, sweet potatoes, arrowroot and bananas.

3.1.4 Fauna

Urban farming contributes to most of the faunal species in residential areas of Nairobi in terms of animals reared as livestock. Some of the animals reared in Nairobi include poultry, goats, sheep, cattle, pigs and rabbits (Lee Smith et al, 1994). Most of the faunal species noted from the scoping survey were mainly as a result of urban farming and they included goats, chicken and cattle. There were some stray dogs spotted in the environs of the proposed project's site and some of the trees in the site also had bird nests as well as several bird species were spotted. The site also had some small invertebrates (lizards) and insects.

Bird's Nest in the Project Site

3.1.5 Ecological Sensitize Areas and Threatened/Rare/Endangered Species

The project site doesn't lie in any protected areas or ecologically sensitive areas and its not a habitat or spawning ground for any threatened, rare or endangered species. Plate 5-7 shows the location of the project in relation to protected areas in its vicinity, the urban extent of Nairobi.

3.2 SOCIO-ECONOMIC ENVIRONMENT

Kenya's real gross domestic product (GDP) grew by 5.8 per cent in 2005 against a revised growth of 4.9 per cent in 2004 (CBS 2006). The major growth sectors were agriculture and forestry; transport and communications; manufacturing; and wholesale and retail trade. Economic growth is expected to be sustained in 2006. Nairobi is a major contributor to Kenya's economy: it generates over 45 per cent of GDP; employs 25 per cent of Kenyans and 43 per cent of the country's urban workers (UN-Habitat 2006). The paradox is that the financial capacity of the Nairobi City County is extremely limited, largely because of poor resource management and a weak revenue collection system. As a result, there is a 200 per cent shortfall between the revenue collected per capita (\$7 on average) and per capita expenditure (\$21) (UN Habitat 2006).

3.2.1 Population and Demography

The population of Nairobi according to the 2009 census results stood at 3,138,369 people in 985,016 households (Ministry of planning, 2009 Housing and Population Census Results) bringing about an approximate gross average of 3 people per household. Data from the 1999 census indicated Nairobi to having a population 2,143,254 (Kenya National Bureau of Statistics, 2010) people and thus over the ten year period in between the two tallies Nairobi had an annual growth rate of 99,511.5 people/year or 4.64% per year. Table 5-1 below presents a summary of population growth in the city between 1969, when the first census was conducted, and 2009.

Population Trends for the City of Nairobi from 1969-2009²

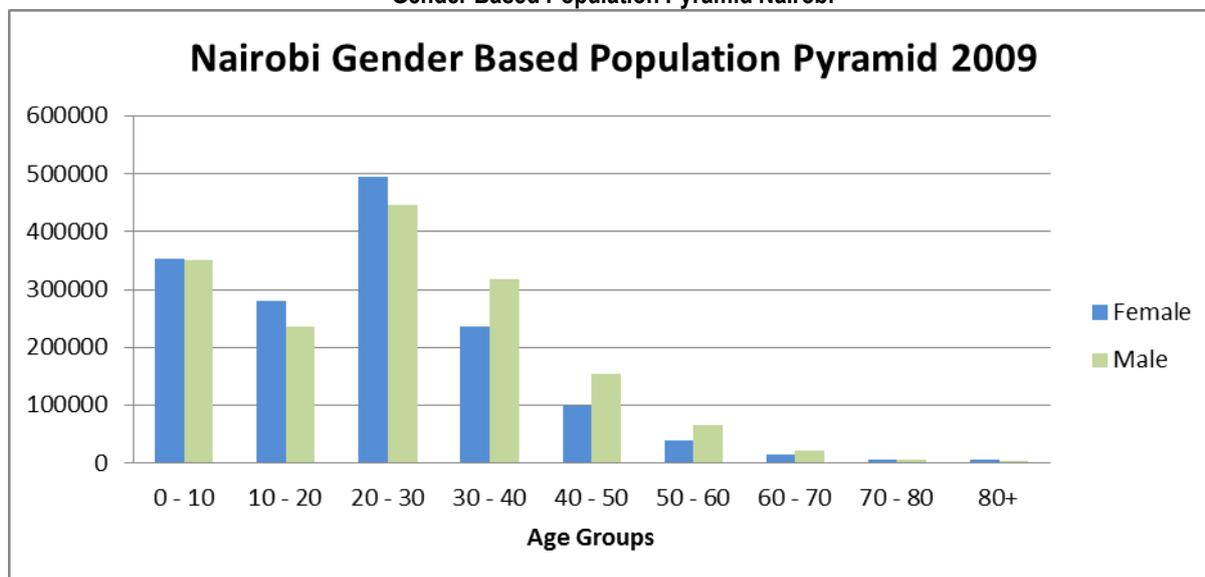
Year	Total population	No. of households	Population density	Area (km ²)
1969	509,286	*	*	*
1979	827,775	206,474	12,120	684
1989	1,324,570	382,863	19,113	693
1999	2,143,254	649,426	30,779	696.1
2009	3,138,369	985,016	4,509	696

*Represents data that was not available during the census survey

Population is a major driver of environmental change in Nairobi and current trends point to the continued growth of Nairobi. This suggests a higher number of inhabitants with lifestyles that demand high energy, more land for the built environment, and increasing natural resources consumption. This has implications for the natural ecosystems that are crucial for maintaining ecological and ultimately economic stability. According to the 2009 Housing and Population Census, the average population density of Nairobi County is 4,509 people/km² but this figure varies significantly across the different divisions and constituencies.

In terms of gender the census outlined that Nairobi North district where the project lies had 516,385 females and 545,701 male, thus a female to male ratio of 1:1.057, Table below illustrates the population pyramid of Nairobi in 2009 across the two genders. Culturally the area surrounding the project area is mixed but the most dominant ethnic group are the Indians and Kikuyu and mainly because the division and location borders central province through Kiambu district.

Gender Based Population Pyramid Nairobi



Source: Ministry of Planning, 2009

3.2.2 Livelihoods and Poverty

During the field and socio-economic survey it was noted that the residents of the area make their livelihoods in a variety of ways in both in the formal and informal sector. Some people work as far as in the central business district where as others work in these sectors locally, through shops in the commercial and market centers, others work in the local institutions fulfilling diverse roles.

² Kenya National Bureau of Statistics, 2011. Population and Housing Census Surveys - 1969, 1979, 1989 and 2009.

Some of the businesses in the area included; Malls, banks, restaurants, apartments and letting businesses (real estate) just to mention a few. Others included the vast number of schools and educational institutions in the area that have employed locals. Some locals are also employed in the construction teams in the myriad sites and developments occurring in the area that were under construction during the field survey.

According to the Human Development Report 2005, 42%³ of the Kenyan population lives below the national income poverty line, while Nairobi was reported to have a poverty rate of 22%**Error! Bookmark not defined.**. The average income in Kenya is around Ksh100 (\$1.32) a day.⁴ Table below shows the percentage distribution of the de jure population by wealth quintiles of Nairobi which is Kenya’s capital 2008-09.

Table 3-2: Wealth Quintiles of Nairobi Province

Lowest	Second	Middle	Fourth	Highest	Total
0.0	0.0	0.2	4.2	95.5	100.00

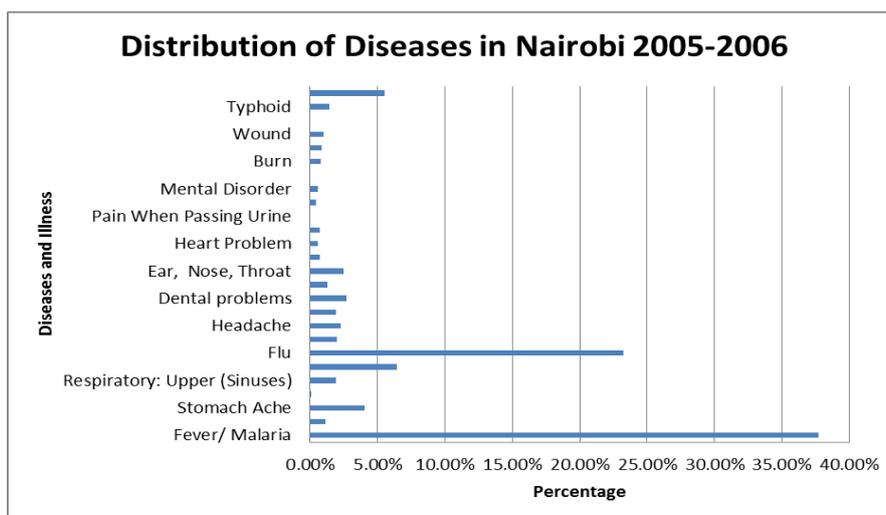
Source: Kenya National Bureau of Statistics and ICF Macro, 2005

Nairobi West is predominantly urban as compared to other districts outside of Nairobi and most households have access to modern lifestyle amenities for communication and transport.

3.2.3 Health

The socioeconomic diversities in the province greatly influence the quality of life of the people, and poverty reduces the access to resources that the people may use to improve their livelihoods. Poverty is one the main factors that influences the quality of health of people in Nairobi and Kenya in general since restricts the quality and access to health care that an individual can get. This therefore leaves the people vulnerable to endemic diseases that occur as a result of coupling factors linked to quality/hygiene and state of their surroundings. Linked to their socioeconomic wellbeing and quality of housing it can be seen that fever, malaria and respiratory diseases are the most prevalent causes of morbidity in Nairobi, while most health facilities are concentrated around the urban areas of Nairobi in general.

Prevalent Diseases in Nairobi 2005 -2006



Source: Kenya Bureau of Statistics, 2006

³ United Nations Development Programme, 2005. *Human Development Report 2005*.

⁴ Global Village Energy Partnership International, Sept 2010. Retrieved] from www.gvepinternational.org

3.2.4 Education

The 2009 census results revealed that enrollment into primary education in Nairobi is highest and this stands at 490,314. This is followed by secondary at 176,837 then pre-primary at 155,936. University enrollment is at 69,345. According to the Central Bureau of Statistics (2003) Illiteracy rates in Nairobi for the 15–54 age groups are 7.8 per cent for women and 5.8 per cent for men. Illiteracy levels are lowest in Nairobi, compared to the rest of the country: 21 per cent for women and 12 per cent for males. 56.4 per cent of women and 67.3 of men have attended secondary school and above, compared with 48.2 and 57.7 per center respectively for urban areas in general in Kenya⁵. **Error! Reference source not found.** below shows the percentage gender education attainment rates in Nairobi Province in 2010 from which we can deduce that more men than women attained higher levels of education.

Percentage Gender Education Rates Nairobi Province

	No education	Some primary	Completed primary	Some secondary	Completed secondary	More than secondary	Total
Women	2.5	7.9	21.5	12.2	24.8	31.1	100.00
Men	1.5	5.2	15.2	8.2	37.7	32.2	100.00

Source: Kenya National Bureau of Statistics and ICF Macro, 2010

However in Nairobi West District in the 2009 census the trend is reversed with a higher percentage of women having attained the higher levels of education. A similar trend as **Error! Reference source not found.** below across the two genders although in the province in general an average of the 89.6% of the population is literate.

Literacy Rates in Coast Province 2008-2009

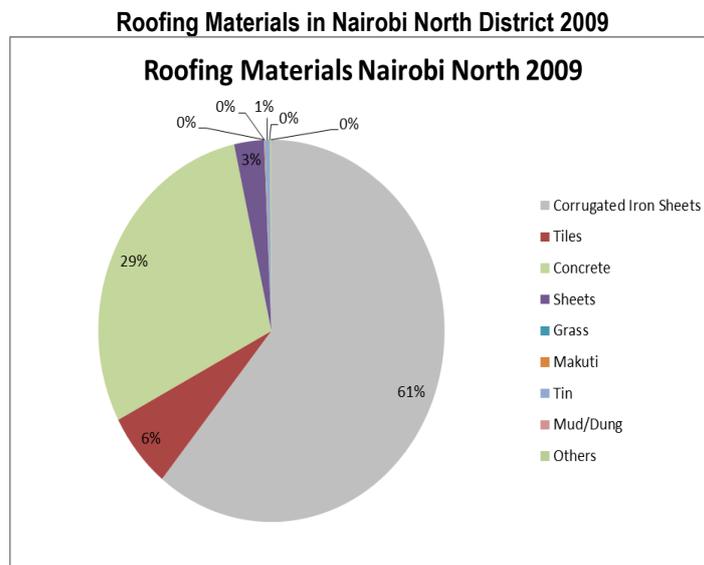
	Secondary school or higher	Can read a whole sentence	Can read part of a sentence	Can't read at all	No card with required language	Blind/visually impaired	Missing	Total
Women	68.1	20.5	7.3	3.6	0.0	0.1	0.5	100.00
Men	78.1	12.5	7.0	2.2	0.0	0.0	0.2	100.00

Source: Kenya National Bureau of Statistics and ICF Macro, 2010

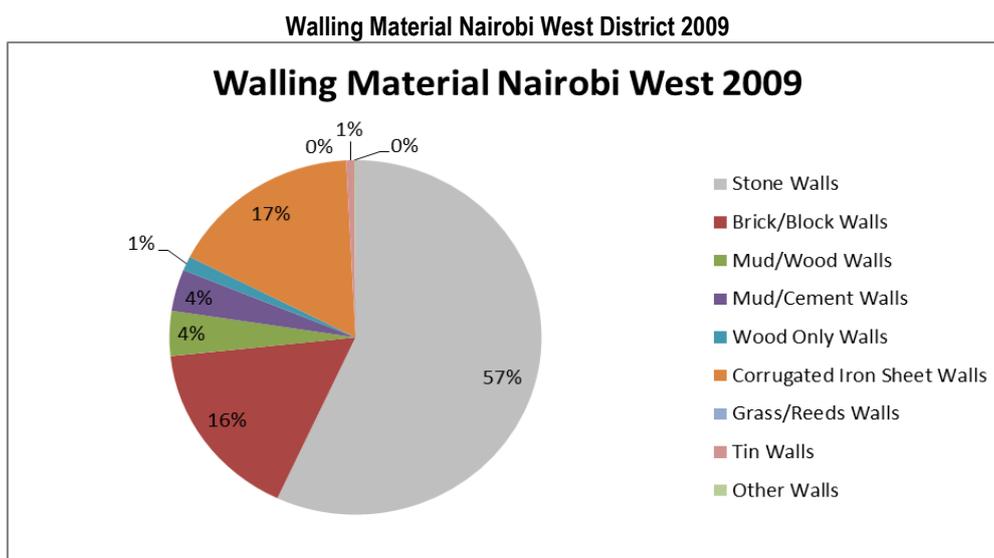
3.2.5 Housing

Nairobi West District had the most households from the 2009 census with 326,398, and the quality of housing in the district is presented in the **Error! Reference source not found.** below in terms of the ratio of roofing, walling and floor materials respectively, which depict the quality of Housing. Typical of an urban area most building materials are of a processed nature however sections of the population still use naturally raw materials to construct their houses such as mud, wood, thatch etc. The quality of housing is also linked to the prevalent diseases in the district especially those that affect the respiratory system.

⁵ As cited by UNEP/NCC, City of Nairobi Environmental Outlook, 2007



Source: Ministry of Planning, 2009



3.2.6 Sanitation and Water

Only 48 per cent of Nairobi’s population is served by the existing waterborne sewerage system. The poor state of sanitation and the inadequacy of sewerage management pose a health hazard to residents. Studies have shown that 50 per cent of all preventable illnesses in Kenya are water, sanitation and hygiene related (Practical Action 2005, as cited by UNEP/NCC, City of Nairobi Environmental outlook report, 2007).

Within informal settlements, pit latrines are the main methods used to dispose of human waste. However, the number of latrines is inadequate and lack of sewage exhauster services often causes them to overflow. Moreover, pit latrines built along riverbanks empty directly into the rivers.

Water is a crucial basic need for survival and whose availability enhances economic growth. The population supplied by water supply system in Nairobi has risen from about 65,000 people in 1940 to 3.1 million people today. Nairobi currently gets its water from six sources; Ruiru and Kikuyu springs,

which are on the Athi River drainage basins; Sasumua, Chania, Thika dam and Ndakaine dam on the Tana River catchments. The water from these sources is treated at three plants, Sasumua, Kabete and Ngethu, all operated by the Nairobi City Council.

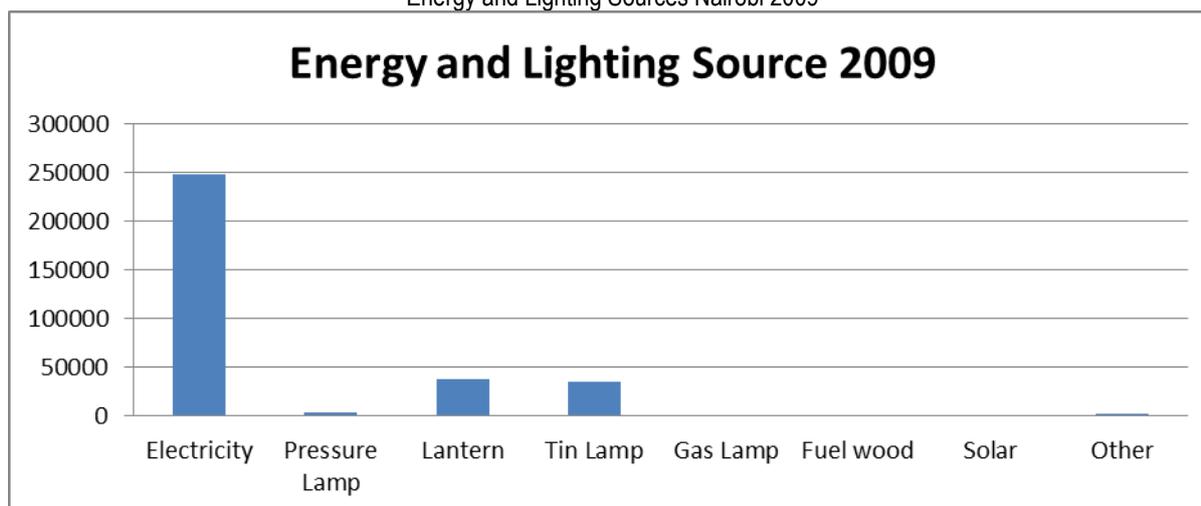
According to the Water and Sanitation Program (WSP) of the World Bank (2005) the main problems facing the water and sanitation sector include access to water, water quality, access to sanitation and poor solid waste management. Only about 42 per cent of households in Nairobi have proper water connections (as cited by UNEP/NCC, City of Nairobi Environmental Outlook, 2007). The urban poor and slum dwellers are the ones who suffer most from the lack of piped water supply with many forced to spend a large proportion of their income on water leading to household poverty. For instance during periods of water shortage in Kibera slum, a 20-litre jerry-can goes for up to Ksh20 shillings, and yet the majority of residents live below the poverty line and spend less than one dollar a day (Integrated Regional Information Network 2006, as cited by UNEP/NCC, City of Nairobi Environmental Outlook, 2007). Since the area around the project (Nairobi West) is mainly urban and most of the population depend on piped water (62%) as their main source of water then piped into their residential units (26%), while water vendors also provided 6% of the population.

As for sanitation modes majority of the population of Nairobi West (86%) have households connected to a main sewer, however 3% of the population use pit latrines and 11% use septic tanks.

3.2.7 Energy

Energy is an important livelihood aspect and the quality and quantity of energy that a household has accesses is evidence of their socioeconomic wellbeing as well as ingenuity. Energy is also a primary driver of environmental change since all fuels are from natural environment and they involve conversions and extraction of resources which in some cases are unsustainable. Additionally several fuels also have health impacts due to the emissions/wastes they give when consumed. **Error! Reference source not found.** shows that 76% of the Nairobi population depended on electricity as their primary source of energy for domestic purposes while 12% and 11% used lanterns and tin lamps for lighting.

Energy and Lighting Sources Nairobi 2009



3.2.8 Land use:

Urban land use refers to spatial distribution of social and economic activities. Accordingly, an up-to-date land use inventory is frequently required to facilitate urban planning and growth patterns as well as monitoring of urban expansion. A assessment by the Department of Resource Surveys and Remote Sensing (DRSRS 1994) identified eight major land-use classes in Nairobi. These include Residential

use Industrial, commercial and service centres, Infrastructure land use, Recreational areas, urban agriculture as well as Water bodies and riverine areas.

3.2.9 Economic Activity:

The economy and the environment are closely linked, as natural resources are the basis of production, manufacturing and waste disposal. Environmental resources such as forests, water and land have a vital role to play in boosting economic growth and reducing poverty. While it may be argued that economic growth brings many benefits to people, the attendant pollution loading and resource depletion poses great risks to human health and the environment. If not managed properly this may even jeopardize the viability of the economic activities being supported. Nairobi is a major contributor to Kenya's economy: it generates over 45 per cent of GDP; employs 25 per cent of Kenyans and 43 per cent of the country's urban workers (UN-Habitat 2006). The paradox is that the financial capacity of the Nairobi City County is extremely limited, largely because of poor resource management and a weak revenue collection system. As a result, there is a 200 per cent shortfall between the revenue collected per capita (\$7 on average) and per capita expenditure (\$21) (UN Habitat 2006).

3.2.10 Socio-economic Importance of the proposed project

The proposed project is in line with the governments' housing policy that aims to facilitate the attainment of adequate shelter and healthy living environment to all socioeconomic groups in Kenya. The project will therefore help to increase settlement in the region by investing in the construction industry; the proponent will also contribute towards the economic growth of our nation through revenue collection. In particular, the proposed project will generate the following positive socio-economic impacts:

1. The proponent will rent the residential development to the public. The proposed project will therefore serve as a source of income to the proponent thereby improving their living standards
2. During the operation phase of the project, the proponent will be required to pay tax to the government hence contributing to the economic growth of our nation
3. The proposed project will indirectly contribute towards enhancement of security in the neighbourhood of the area
4. The proposed project will generate revenue to the County through payment of connection and service fee.

Apart from the direct employment of construction workers, the proposed project will also benefit the following categories of individuals:

- Transporters. Investors on lorry and trailer transport will benefit greatly from the project. This benefit will extend to vehicle dealers and manufacturers, lorry drivers and turn boys.
- Cement Manufacturers. The local cement manufacturers and their employees and shareholders are direct beneficiaries of the development.
- The government will also get some impressive increase in V.A.T. and other taxes levied on cement.
- Manufacturers and dealers of other building materials. Most of the building materials to be used are locally manufactured. Relevant companies, their workers and shareholders will be direct beneficiaries of the development.
- Sand Harvesters. Locals involved in sand harvesting in sand harvesting are to be major beneficiaries' of the project. The benefit will extend to the local authority entitled to levy taxes on sand transporters.
- Ballast Quarries. There will be massive use of ballast. These will ensure that the Quarry owners and workers benefits greatly.

3.2.11 Water Resources

Although Nairobi relies mainly on surface water supplies, the sources of these supplies lie outside the city. The surface streams, though numerous, are heavily contaminated by domestic and industrial effluents and solid wastes. Naturally rivers are expected to cleanse themselves as they move downwards, but this is not the case with the Nairobi River and its tributaries, because there are many sources of organic pollution along the river. Even when water is available, it is often unsuitable for human consumption, and boiling it is expensive. Poor water quality and its high cost may contribute to malnutrition, child mortality and exposure to water-borne diseases and also impede efforts to reduce hunger and poverty. The natural groundwater quality is generally good and reaches the drinking water standards for most constituents, except for fluoride, which often exceeds 1 mg/l (Foster and Tuinh of 2005).

3.2.12 Waste Management

Waste management is a growing problem in Nairobi. Increasing urbanization, rural-urban migration, rising standards of living and rapid development associated with population growth have resulted in increased solid waste generation by industrial, domestic and other activities. The increase in solid waste generation has not been accompanied by an equivalent increase in the capacity of the relevant urban authorities to deal with this problem. Only about 40 per cent of the waste generated in Nairobi is collected by the City Council of Nairobi, the private sector collects about 20 per cent and the balance is left uncollected, or is disposed of through other means, including by burning, dumping in pits and other unauthorised places, or is collected by the numerous nongovernmental organizations, community-based groups and other ad hoc or voluntary groups (Ikiara 2006). It is estimated that there are at least 60 private companies engaged in solid waste collection services in the city (JICA 1998 in UNEP/NEMA 2005). The existing waste management practices in the neighbourhood of the proposed project site and within the Nairobi City County in general include; NEMA, in line with the Environmental Management and Coordination (Waste Management) Regulations, 2006 requires all solid waste (unless the generator opts to recycle) to be dumped at approved sites.

The neighborhood of the proposed site relies on private garbage collectors to dispose of solid waste. The Proponent will be required to contract a licensed solid waste transporter to collect and transport solid waste from the site for dumping at approved sites.

4 PROJECT ALTERNATIVES

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

From an environmental perspective, not carrying out this development may be the best option. Without the development, the area would remain a relatively undisturbed area providing a habitat for the varied flora and fauna presently observed. This area will continue to be impacted, although minimally, by anthropogenic and natural factors. From a socio-economic perspective the “no action” alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realised and the resources in the area would continue to be underutilized.

In order to enable the proposed project to seek different ways of minimizing its impacts on the environment and at the same time achieve its objectives several alternatives were assessed through its architectural and engineering designs and environmental planning through this EIA. This not only justifies the course of action (base case) but also enables the risk management to follow a hierarchy of:

1. Avoidance: Temporal and spatial;
2. Elimination and minimization: non-structural *ex-ante* mitigation
3. Elimination and minimization: structural *ex-ante* mitigation
4. Elimination and Response: structural *ex-post* mitigation
5. Elimination, Recovery and Development: non-structural *ex-post* mitigation

The proceeding subsections review these alternatives in the subjects of: location, time, design, inputs, existence and the base case with mitigation.

4.1 ALTERNATIVE SITE

This option involves pursuing the proposal but on a different site meaning its impacts that are relevant to the proposed site or occur due it will be avoided. The avoidance of these *in-situ* and *ex-situ* regional impacts would be the main benefit of this option but there will also be other impacts specific to the alternative site and due to specifications of the proposed project, a different site away from Plot L.R.No. 209/64/11 would also increase logistic costs. Alternative sites are also not readily available since availability of land in urban areas is low.

4.2 ALTERNATIVE SCHEDULE

This option entails carrying out the proposal at a later time thereby offsetting its impacts to that time. Only benefit is if there improvements in baseline conditions and technologies that may be involved with the proposal. However these are not guaranteed and it may only lead delays in development, therefore carrying out the proposed project with mitigation would be a preferred option due to this uncertainty. In addition carrying out the proposed project at later time may lead to more operational and logistic costs due to increasing inflation and standards of living.

4.3 ALTERNATIVE DESIGNS

This option curtails undertaking the project but with different infrastructural designs that encompass: buildings, roads, power, water and sewerage. The presented project design was however achieved by

considering the options available that would ensure cost-effectiveness and avoid or reduce environmental and social impacts as much as possible.

For the buildings and their layout several options were explored as where they can be located and it was preferred to locate the residential area further away from the road to shield the occupants from noise and air pollution from Thika road. Additionally several of the other proposed designs would result in higher building densities and less internal transport/path optimization. This would mean the project would use more energy and resources as compared to the preferred project option. Additionally the alternative possible designs would also reduce the project's commercial viability as well as its targeted balance with nature that will create ambience.

In line with the project's master plan the preferred design takes into account electric power options (See Sections 1.4.4.7 and 4.5.1) and uses the preferred option 3 that would require: less disruptions to other users; more space for the development, and less costs.

4.4 ALTERNATIVE INPUTS

Alternatively the project may use different combinations of inputs such as: transport systems; water; electric power, and sewerage. This may reduce the project's impacts in several cases but as compared to the project's preferred options for these services they may result in extensive costs and bottlenecks since several of these options/inputs are at a techno-commercial infancy stage and have a varying set of impacts.

4.5 UTILITIES

4.5.1 Electricity

The proposed project had various options for its sources of the electricity and these are reviewed in contrast to the preferred option.

4.5.2 Water

The two main options that exist for water use is to either use a variety of sources that curtail: the NCWSC mains, borehole, sewerage recycling and rainwater harvesting, whilst the second option curtails using the NCWSC mains only.

The former option which is the base case has the advantages of ensuring consistent supply while placing as minimal pressure as possible on the regional water demand and infrastructure. It also promotes wise use, water recycling and capture strategies that ensure effective usage and conservation of water. The disadvantages of this option are that it will involve the construction of extra facilities and management resources for the treatment plant and therefore extra costs. The latter option has the main disadvantage of placing the at least maximum possible pressure on the regional water demand although water recycling and conservation strategies will also be employed.

4.5.3 Transport

Apart from the proposed access modes of having one access from Muthithi Road and another from Westlands Road the project has the alternative of only using one road access. This alternative has the disadvantage of increasing the traffic load around the project site, whereas the preferred option has the advantage of minimizing this load and increasing access to the site by decentralization. However the preferred alternative has a disadvantage of increasing traffic loads in the inter neighbourhood roads in the region adjacent to the project, which will be adequately managed by constructing quality roads; following traffic laws and erecting the appropriate signage.

4.5.4 Materials

Alternative for the materials that will be used in the project involve using locally procured materials (base case) with the exception of not using timber and the second option involves primarily importing materials and using timber. The former alternative is preferred option since it will ensure the project contributes to the national economy by creating business opportunities for the suppliers of these materials while conserving the environment by ensuring the most environmentally friendly suppliers are contracted. This option will also not use timber since most of the hardwoods available in Kenya come from the DRC where forestry is largely unregulated while local timber sources are in most cases not sustainable.

4.6 NO PROJECT OPTION

This alternative means forfeiting the proposed development avoiding all its impact both positive and negative. The only benefit of this option would be negative impacts would be avoided such as losses in flora & faunal habitats, waste generation and pressure on infrastructure. However positive gains from the project on the economy would also be lost such as employment creation, revenue generation, tourism development, capital injection into the economy and infrastructure developments that may result from the project.



Figure 4-1: Project Site Neighbourhood

5 IMPACT IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES

This option is the preferred option and it entails carrying out the proposal with mitigation measures to prevent, offset or avoid its negative impacts thereby maximizing its gains. This option would therefore lead to achieving the proposal’s objectives sustainably and contribute to the achievement of other sectoral and policy goals and objectives. As compared to the other options this option uses the strengths of the other options such as using different water and energy sources thereby creating synergy and increasing the project’s cost-effectiveness. This option also involves using the best available building materials and process to minimize risks to environmental and social systems in the area and globally.

5.1 IMPACT IDENTIFICATION, ANALYSIS AND MITIGATION MEASURES

In order to assess the significance of the proposed project’s impacts, the impacts were first identified from their source which are the project’s activities/equipment/processes/materials and then the impact receptor which are the baseline environmental and social conditions. This was carried out through the use of the Impact Checklist Table 5-1, which only identifies an impact. This process was also informed by the public participation exercise.

The impacts were then classified as either positive or negative and the project phase whence which they will occur and then they were discussed individually in the later subsections of this chapter. The impacts were lastly analysed in terms of their characteristics on the aforementioned baselines to define their significance by using a matrix and this was also informed by the public participation exercise to identify the acceptable risks.

Lastly through literature reviews, professional knowledge, engagements with the proponent and engagements with stakeholders, mitigation measures were developed commensurate to the significance of impacts. This facilitated the development of the Environmental and Social Management Plan in this report. This entire process is illustrated through Figure 5-1.

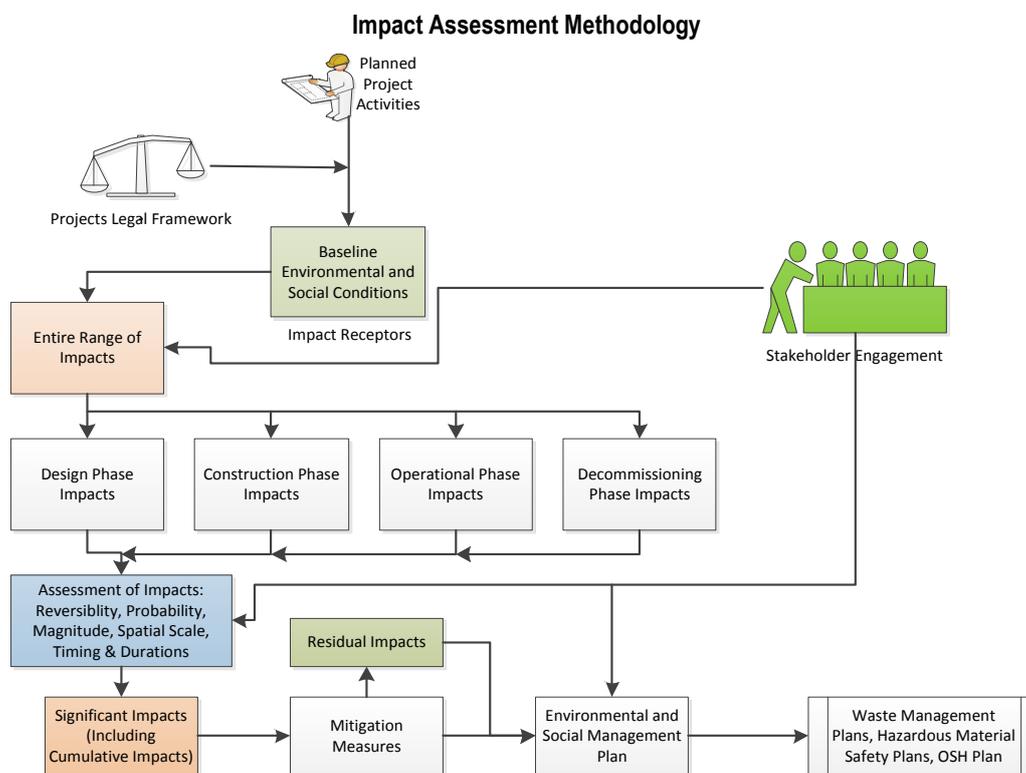


Table 5-1: Checklist of Project's Likely Impacts

Environmental aspect	Design Phase	Construction Phase	Operational Phase	Decommissioning Phase
<i>Water</i>				
Pollution		✓	✓	✓
Surface flow		✓	✓	✓
Water Balance		✓		✓
<i>Air</i>				
Pollution		✓	✓	✓
Noise		✓	✓	✓
<i>Soil</i>				
Soil loss		✓		✓
Contamination		✓	✓	✓
Compaction		✓		
<i>Bio-Diversity</i>				
Loss of Flora		✓		
Loss of Fauna		✓		
Extinction of species				
Habitat Alteration		✓		✓
<i>Population and Social Dynamics</i>				
Population size		✓	✓	
Diseases		✓	✓	✓
Quality of Life		✓	✓	
Employment		✓	✓	✓
Utilities		✓	✓	✓
Land uses		✓	✓	✓
<i>Others</i>				
Environmental Opportunities	✓	✓	✓	✓
Economy	✓	✓	✓	✓
Landscape Design		✓		✓
KEY				
	✓	Denotes an Impact		

5.2 POSITIVE IMPACTS

The development of this project will have a number of significant positive impacts both locally and nationally.

5.2.1 Design phase

5.2.1.1 Creation of Employment and Business opportunities

The design phase of the project will create employment and business opportunities for various professionals/consultants who will be involved in the planning stages of the project. They will include: project managers, engineers, architects, building economists, land surveyors, environmentalists, economists, urban planners among others. These professionals may be employed directly in the project or be consultants whose services will be procured.

5.2.1.2 Generation of Income and Source for Government Revenue

Income generated from the consultancies and services undertaken will provide income which will be taxed and generate revenue for the state. In addition, fees levied for the submission of plans to the local authorities and state agencies for approval and application for services will generate revenue that is used to meet the various governmental goals and objectives. These include NEMA, NCC, KPLC and NCWSC amongst others.

Additionally in order to operationalize the proposed project financial resources will have to be mobilized and these will be injected into the economy. These resources will amount to the total project costs of **Ksh. 0.7 billion** and it will be used for the services involved in the design and planning of the project and also acquiring the raw materials of the project.

5.2.1.3 Environmental opportunities

The design phase of the project will also present opportunities for green/sustainable designing of the project, which support the minimization of environmental impacts whilst fortifying the project to achieve its intended objectives. It's at this stage that the opportunities which will enable the project achieve a sustainable development are discovered, explored and integrated into the project.

5.2.2 Construction phase

5.2.2.1 Creation of Employment

The activities involved in the erection, maintenance and management of the proposed houses will generate employment i.e. employees involved in the production, sale and transportation of the buildings materials, construction of the building, maintenance of the building and management (caretaker, domestic staff etc.). Security services, cleaning and waste collection are also some of the services that will benefit indirectly. Other employment opportunities that will be created will include for workers involved in the civil and interior works of construction such as engineers, masons, foremen, bricklayers, machine operators, interior designers, electricians, masons etc.

5.2.2.2 Market for goods and services

To facilitate the construction activities goods and services including raw materials, plumbing services, electrical fittings, transport landscaping and finishing. It therefore offers a market for these goods and services promoting the primary and secondary sectors involved in their procurement such as: quarrying and brick production; furniture and carpentry; glass production; plant and gardening; tarmac, asphalt and bitumen; chemicals; building contractors; electric fittings; plumbing fittings and water infrastructure etc.

5.2.2.3 Increased population

The influx of labour into the area and subsequent people/workers to service them or provide them with goods such as food will be another positive impact of the proposed project. This is taken as positive since the population increase if sustainable will create additional market for goods and services offered in the area, increase the amount of mobilized capital and also increase the social capital in the area.

5.2.2.4 Increased Economic Activities and Revenue

The construction phase of the project will also increase the economic activities in the region, and revenue for the central government through taxes, through businesses that will be formed to service the increased population. These services include health, food and nutrition, transport and recreation that the workers taking part in the construction will require from time to time.

5.2.3 Operational phase

5.2.3.1 Increased Commercial Viability

The establishment of the project in the area, the goods and services it will offer will increase the commercial viability of the area and will consequently increase the land values in the surrounding area due to the potential high returns after development. This will attract more high income investors into the region as well as more middle income groups as settlers.

5.2.3.2 Creation of Employment Opportunities

The proposed project will create employment in three tiers, with the first being the staff that will be primarily involved in its implementation, supervision and maintenance. The second tier will be staff for the businesses that will be formed in the commercial and retail area and those involved in these businesses supply and value chains. The third tier of employment creation will be for the people who will take the opportunities presented to service the increased population and the population's amenities.

Through these three tiers the project will create employment for high level staff, middle level staff and low level staff in line with all development policies in the country and county. Also through the third tier and low level staff, the project will inadvertently create jobs for locals since this has always been the case with projects of similar nature due to the fact that the locals are readily available and have the shortest access time to the site.

It is also important to note that all these employees will be taxed and generate revenue for the taxman thereby contributing to more state implemented development projects.

5.2.3.3 Increased Accommodation/Housing

The project will also increase the amount and quality of housing available in the country through the residential area with 724 units. Housing is a challenge in the county mainly due to the high population growth rate therefore the project will contribute to solving this problem and in line with development policies such as Vision 2030.

5.2.3.4 Increased Access to Goods, Services and Social Amenities

The commercial area of the project will increase access to quality goods and services that encompass those that will be provided by the shops, supermarket and businesses. Also the recreational facilities created by the project will increase both the social facilities and health of the region, which is psychologically linked to human wellbeing and productivity. This will stimulate other economic activities linked to these services and goods on top of improving the quality of life that is linked to this access of goods and services.

5.2.3.5 Increased Economic Activities and Government Revenue

The project will also increase the economic activities that will be carried in the area through those that will be primarily as a result of: the project's internal and ancillary activities; its supply chain; its value chain, and those that will be formed as a result of the project to support its occupants. The latter includes businesses that may form around the project site such as shops, kiosks and transport.

All these businesses activities will be taxed and generate revenue for the central government in addition to providing a market for their supply and value chains.

5.2.3.6 Stimulation to Urban Development

Cumulatively with other developments in the area (Kasarani) the project will lead to turning the area from a lower tier urban area to at least a middle tier urban area. This has benefits of increasing the quality of life and revenue generation from increased activities. It is predicted that the project will increase the viability of the area to develop more residential areas and commercial establishments

since it will increase the market and labour available, and the socioeconomic status of the region. This is together with other projects being carried out in the area such as: The expansion of Thika Road; The Gatharaini Trunk Sewer etc.

5.2.3.7 Aesthetic Enhancements

The proposed project will result in beautification of the locality. This will include establishment and maintenance of flower beds and greenery belt. The design concept has been inspired by modern lifestyle expectation of space interacting with nature to produce lifestyle targets which uphold current quality of living.

5.2.3.8 Improved Roads

The improvement and development of the project's access road from the Outer Ring Road round about as part of the project will increase the amount and quality of roads in the area. This will improve access to the neighbourhoods and commercial establishments lying in the western region of the project and therefore increase their business activities. This will also be in line with local and national development policies that recognize the importance of roads and infrastructure towards development.

5.2.3.9 Population Increase

From the influx of labour and economic opportunities resultant of the project, the population of the region will be increased. This will be positive if the increase is sustainable on the basis of the opportunities and services available leading to the population being an increase in human and social capital as well as market for the various goods and services sold in the area.

5.2.3.10 Impetus to Improve Amenities and Services

An increase in population to the area will provide an impetus for the County Council to improve the much needed amenities and infrastructure to the area. It will provide a stronger lobbying group. The influx will also provide an impetus to develop shared facilities i.e. schools, hospitals, shops. This will have the indirect effect of creating job opportunities in the area. Companies also in the business of providing services such as telecommunication will also be encouraged to extend their networks to the region since it will be a ready and capable market for their services.

5.2.4 Decommissioning phase

5.2.4.1 Creation of Employment and Business Opportunities

The decommissioning phase and its activities will create business for the contracting company that will be charged with pulling down the structure and transporting the resultant materials/debris. Additionally on shut down moving companies will also benefit from being contracted to move equipment and materials from the different businesses and residential units in the project. All these income streams will be taxed and generate income for the central government.

Additionally the decommissioning activities will create employment and job opportunities for the different professionals involved in them. These include: engineers, demolition experts, landscaper and gardeners, foremen, supervisors, masons, truck drivers and crane operators amongst others.

5.2.4.2 Income Generation

Decommissioning the project will create recyclable materials and equipment such as: stones, bricks, metals, furniture, switchboards, pumps etc. may be sold for income albeit cheaper than new ones they will generate taxable income for the proponent.

5.2.4.3 Provision of Cheaper Building Materials

The decommission phase of the project will create recyclable building materials such as bricks, stones, metals, glass, wiring, furniture, electronics and water pumps, plumbing etc. which at present market

trends will be cheaper than new materials. This will thus provide cheaper building material for future projects strategically increasing the productivity of the purposes the establishments in which they are used.

It is also possible that the materials may be donated and used for development projects (schools, hospitals etc.) in much needed areas. This will assist in promoting development where its mostly needed and generally improve the quality of life in those areas and cumulatively in the country.

5.2.4.4 Environmental Conservation and Restoration

The recycling of the waste to be used as raw materials in other construction process reduces the demand for raw materials. This in turn reduces the potential impact to the environment that would have been felt if the demand of the raw materials hadn't reduced. For instance leaving the land derelict and destroying the habitat as a result of mining activities.

5.3 NEGATIVE IMPACTS

5.3.1 Construction phase

5.3.1.1 Loss of Flora and Faunal Habitats

Vegetation has a great effect on the general and localized environment and normally can modify microclimate. Usually, the flora creates a good environment for habitats thus the two may go together more often than not. In consequence, de-vegetation during construction may result to negative effects on the fauna by creating a disturbance.

The vegetation is important in as food and habitat for various animals. It also assists in maintaining the structure of the soil by holding the particles together. This enables the soil microorganisms to flourish as their habitat; the soil is stable. This in turn allows the organisms easily convert the dead leaves and plants to humus which helps enrich the soil as well as preventing soil erosion. Converting the land area into a mostly built environment will minimize the natural process of the existing vegetation.

5.3.1.2 Changes in Surface and Sub-Surface Hydrology

Together with the loss of flora, changing the characteristics of the project site from its present state to a more built state (85-90% built) and changing the soil's characteristics, the proposed project will lead to a change in the water regime at the project site. This is because the built areas will increase run-off while reducing percolation of water into the ground and thereby also changing the sub-surface hydrology.

The wastes from the construction activities also pose a threat to the quality of water that will be drained from the site through run-off and this may pollute aquifers and River Ruaraka.

5.3.1.3 Changes in soil characteristics

Several changes in the characteristics of the soil may result due to the excavation and compaction of soil for the foundation. The excavation may lead to losses in the accumulated soil carbon and this is known source of GHGs i.e. CO₂. Additively this excavation can also alter the soil's structural stability and reducing its structural integrity.

Compacting the soil to lay the foundation, erecting temporary structures, and also from the heavy vehicles (trucks, tractors etc.) can reduce the soil's percolative ability and thereby **increasing run-off** either on the specific routes or large area. Together with the laying of foundation and erecting of ancillary structures, this will further lead to **changes in surface and sub-surface hydrology** by changing the flow and recharge rates at the project site.

5.3.1.4 Emission of Air pollutants

The works involved in this phase of this project will also emit various air pollutants which can have both negative effects on both human and environmental health. One of these is dusts from the soil excavation, decommissioning of existing structures, carving of bricks and movement of trucks on loose top soil after the land has been cleared. Excavations and the use of cement and sand among other like-materials are bound to increase the dust and particle levels in the air around the development area. Such effects should be avoided through the use of dust screens. Workers at the site should also be provided with protective clothing to avoid negative health effects

Also engines burning fossil fuels (vehicular and generators) will emit oxides of Carbon, Sulphur and Nitrogen, and these also pose risks to human and environmental health on top some of them being GHGs such as (CO₂).

Welding operations will also emit gases and fumes such as ozone, chromium particularly in its hexavalent state (Cr⁶⁺), nickel (potential carcinogens), cadmium and lead¹⁰, whilst others include: NO_x, NO₂, CO, CO₂, O₃ from mild and stainless steel welding⁶. The health effects of exposure to these fumes can include irritation of the upper respiratory tract (nose and throat), tightness in the chest, wheezing, metal fume fever, lung damage, bronchitis, pneumonia or emphysema. While particulate welding fume is usually fairly easy to see, gaseous fumes are invisible

5.3.1.5 Generation of Noise

The construction activities and processes will also generate noise above the ambient levels of the area. One of the sources of this noise would be from the trucks' and tractor's engines moving in the area either undertaking the civil works or ferrying materials, wastes and equipment to and fro the project site and these will form the mobile sources of noise during this phase. Some point sources of noise will include civil works which will be operation specific or localized at the site due to the scope of the activities. This category of noise will include activities such as excavation, hammering, sawing, grinding; moving of material to and fro storage and also the use of generators.

One of the risks of the noise would be to the surrounding areas where they may create a nuisance or disturbance. Whereas at the site the loud noises pose a risk to the workers and site personnel since loud noises increase the risk of ear damage and deafness. Table 6- 2below shows some of the levels of noise that can emitted from the project's activities during this phase.

Table 5-2: Noise Levels of Some Construction Equipment⁷

Equipment	Noise Levels
Back Hoe	85-95 dB
Chain Saw	110 dB
Front-end Loader	90-95 dB
Jackhammer	112 dB
Lawn Mower	90 dB
Tractor	95-105 dB

⁶ Matczak W. & Gromiec J. (2000). *Occupational exposure to gases emitted in mild and stainless steel welding*. US National Library of Medicine National Institutes of Health. Med Pr. 2001;52(6):423-36.

⁷ Washington State Department of Labor and Industries. (n.d). Noise Basics. Retrieved January 20, 2012 from <http://www.lni.wa.gov/wisha/noisebank/noisebasics.pdf>

There will be an increase in the levels of noise in the construction site owing to the nature of machinery in use and the activities such as drilling and excavation. The normal levels of 55 decibels recommended by World Health Organization (WHO) will be surpassed in the duration of the construction process. However this is a minor negative impact since the site area is largely an agricultural area with sparse residential settlement.

5.3.1.6 Increased Pressure on Utilities

The processes and activities involved in the construction of the project would place added pressure on infrastructure services and utilities such as roads, water, drainage and energy. This may contribute to service disruptions since the utility and service requirements of this stage are intensive. This impact is made more probable due to the challenges faced in the county to provide these services and compounded by the growth of the population.

5.3.1.7 Increased Heavy Traffic

In this phase, the main roads leading to the site area will serve the additional vehicles used for the transportation of materials, equipment and staff to the site. Thika Road is currently being upgraded to become a 4 lane super highway and this will steer other developments in the area⁸. Thus together with other developments the project will contribute to increasing the amount of heavy traffic plying the roads around it. Heavy trucks not have the risk of causing accidents due to their limited manoeuvrability but also place added pressure on the roads and can lead to failure (cracks and potholes). This is failure is however a combination of factors including:

- The total of trips of heavy trucks
- The strength of the roads in context of carrying the heavy loads, and
- The resilience of the roads towards weathering.

Although Thika Road is being upgraded the roads in the neighbourhoods and other access roads in the wider region remain in a poor state or are not up to the standards that Thika Road is being upgraded to. Therefore they will be most at risk of failure or dilapidation from the cumulative pressure placed on them by the construction projects targeting the area.

5.3.1.8 Population Influx

During the construction phase there will be an influx of people mainly working in the development. There will also be an increase of population due to the opportunities presented in providing goods and services to primary population increment for the construction activities and employees. This secondary increase will mainly entail retailers of foodstuffs and other commodities. Waste from such commodities might pollute the area if a designated dumping place is not allocated. The population will increase since the opportunities will be open to both local and people from other areas and thereby increasing the population.

This increase in population will create pressure on utilities as well as present social risks through the interaction of people. Also it may present a security risk since people with ill intentions may see an opportunity in the belongings of those attracted by the project for economic reasons.

5.3.1.9 Generation of Construction Waste

Millions of tonnes of solid waste is generated annually by human beings and may therefore pose great hazard if there are no proper disposal and handling systems. The construction phase will also lead to generation of construction wastes from the civil works and operations on the materials involved in the

⁸ At the time of this assessment Thika Road was being upgraded to become a four lane super highway as part one of the Vision 2030 Flagship Projects.

processes. These wastes include: plastics, metal shavings, wood shavings, food wastes, plants, gases (Carbon, Nitrous and Sulphurous Oxides), fumes (from glues and other hydrocarbons), stone shavings, ceramics, bricks, glass, cardboard, soil, cement, asphalt, sand, concrete, paper, paints, sealants, adhesives, fasteners, construction effluent (grey water).⁹

This phase will also lead to generation of waste heat through its run-off (water used for cooling) and the electric and diesel machines used in the construction activities. The waste heat can contribute cumulatively with other projects/activities in the area to change the microclimate, while waste heat in run-off can lead thermal pollution if it eventually drains into River Ruaraka.

This type of waste poses risks to both human and environmental health and thus the proposed project would require an adequate waste management strategy, occupational health and safety strategy, and hazardous material safety plan. Some environmental impacts would include soil contamination, water and air pollution, whereas health risks include: breathing complications and respiratory diseases, cancer, skin disorders, poisoning etc.

5.3.1.10 OHS Risks

Several OSH risks will occur from the activities, processes, materials and equipment involved in the construction phase of the project. These risks are listed in Table 6-3 alongside their source.

Table 5-3: Construction Phase OSH Risks

OSH Risk	Source
Injuries or Injurious substances, materials and equipment	<ul style="list-style-type: none"> ○ Moving parts of equipment e.g. saws, tractors, grinders etc. ○ Moving heavy materials ○ Open foundation pits ○ Raised building materials and equipment e.g. bricks, saws, hammers, steel pipes & fittings etc. ○ Sharp edges of nails, knives, saws, glass ○ Open flames, heat generating or using processes. ○ Working at heights ○ Emission of radiation i.e. EMFs from electrical equipment and bright lights from welding operations ○ Corrosive chemicals
Fire	<ul style="list-style-type: none"> ○ Flammable liquids & gases, chemicals, electricity, welding, open flames, heated materials and heat producing processes such as grinding, burning fuels etc.
Intoxication	<ul style="list-style-type: none"> ○ Toxic substances, corrosive chemicals, adhesives, waste gases, smoke, dusts and emitted particulate matter.

5.3.2 Operational phase

5.3.2.1 Increased Pressure on Available Utilities

The expected increase in population and the needs of this population would place more pressure on infrastructure, utilities and social amenities in the area during the operational phase of the project. This may mainly be at the early stages of the project since they may not be capable to handle the extra demand created especially during rush hours. These services also encompass security as the project may attract people with different motives to the area.

The increased demand has been estimated to be 8.0 MVA for electricity and 1,200 m³/day for water although not all of this will be placed on existing systems, since the project will use other on-site

⁹ Salar El-Haggar (2007). *Sustainable Industrial Design and Waste Management*. Elsevier Science and Technology Books. ISBN 0123736234.

options, a considerable amount of demand will be placed on KPLC's and NCWSC's network. Additionally the roads in the area will experience more traffic due this increased in population and this can cause more or increase the duration of traffic jams as well as increase the probability of traffic hazards,

5.3.2.2 Increased Land Values and Land Use Changes

It is predicted that as a result of the project and other projects being carried out in the area the values of land in the area may increase at rates significantly more than normal. This is because the increase in population will increase demand for land and since its supply can't be increased, the value of land will increase. Also these projects will cumulatively turn the area into a more commercial and middle income region therefore pushing the value per acre in the region since more and more commercial establishments and higher value residential areas will be created out of opportunity.

This increase of land values and attraction of businesses to the area will cause land use changes in the region both in terms of uses of land (residential to commercial) and changing its character (vegetated areas to built-up areas). This will have impacts of loss of vegetation and emissions of GHGs on top of increasing the cost of living in the region, which may socially push the residents of the region further away if their econometric capacities are not improved in commensurate.

It is important to note that the project in its self can't lead to this impact since it will only involve land use change at the site but its combination with other projects in the area can possibly cause this impact.

5.3.2.3 Micro-Climate Modification

Though the project area is quite small to cause any considerable microclimate change it bears the potential of adding to cumulative effects of other infrastructural development that together emit GHGs. Change in land surface from natural vegetation to manmade built landscape will have an effect on the area microclimate by reducing the amount of evapotranspiration from the vegetation in the area which are also a GHG sink.

The microclimate will also be modified by the project activities that produce waste heat (emitted heat) and this will result in the area producing more heat than originally emitted without the project. Waste heat will be produced from vehicles, electronics, generators, water pump, air conditioning etc.

5.3.2.4 Security Threats

The proposed project will attract a variety of people to the region either as residents, business people, suppliers, visitors and customers. Their variety of economic and social activities will also generate income and increase both the economic and social capital in the area. These may attract thieves to the area since they may target either the businesses or the people themselves and their belongings. Also the diversity of people in the project during its operational phase and the creation of a hub by the project may also be a target for terrorists as has been experienced in the past where malls have been put on high alert towards terror threats¹⁰.

5.3.2.5 Sociocultural Impacts

The proposed project will involve a mixed use development that will attract different Kenyans and foreigners to the site. Social cohesion and blending with the existing communities may pose a conflict of interests in the short term since the influx population will come with their differing cultural and social

¹⁰ In December 2011 while Kenya invaded Somalia to combat the Al Shabaab militants, terror threats and subsequent reprisal attacks were made by the Al Shabaab targeting cinemas, malls and other social places. This placed establishments such as Sarit Centre, Yaya Centre, Village Market, Nakumatt Nyali, Nakumatt Ngong and others on high alert and extra measures were taken to secure the facilities. These measures have been carried out from the time the alert was issued by the Kenya Police to the time of writing of this report in July 2012. In some reported cases either the high alert or terror threat combined with other factors and reduced business for these establishments or the businesses who were their tenants.

practices. The locals may also be forced to move from the area if the land values increase and they end being bought out to pave way for more commercial developments that are predicted to occur in the region. Thus they would face a loss of social control and ownership to the region if this happens and economic segregation may occur on the basis of richer middle and upper class moving into the area and displacing the local lower class.

However this may be treated as a *minor impact* since most communities in Kenya are welcoming and easy to interact with. Also since Nairobi is a predominantly urban and developed area that has a higher level of social permissiveness than most other urban areas in the country.

Social interactions and increased population may also present public health risks from communicable diseases such as respiratory diseases, HIV/AIDS, typhoid and cholera amongst others. The latter two diseases can be caused as result of increased population without commensurate services in sanitation, whilst the increase in population alone will place pressure on available medical and health care.

5.3.2.6 Increased Air Pollution

Cumulatively with other projects and activities carried out in the area the proposed project will emit pollutants to the air that present risks to human and ecosystem health. Table 6-4 below delineates some of the air pollutants expected from the project and the environmental and social aspects that they present a risk on.

Table 5-4: Operational Phase Air Pollutants, their Sources and Risks¹¹

Pollutant	Sources	Risks
CO ₂	Fossil fuel engines (vehicles, generators, water pumps etc.) Cooking Any burning activities e.g. welding.	GHG and micro-climate modification Acid run-off Suffocation – Poisonous in large quantities
CO	Fossil fuel engines (vehicles, generators, water pumps etc.) Cooking Any burning activities e.g. welding.	Acid run-off Suffocation – Poisonous gas
SO ₂	Fossil fuel engines (vehicles, generators, water pumps etc.) Welding	Acidified run-off GHG Poisonous gas Respiratory diseases and complications
NO _x , NX _(g)	Fossil fuel engines (vehicles, generators, water pumps etc.) Welding	Some forms are poisonous GHG – NO ₂ Smog Respiratory illnesses and complications
Dusts and Particulates (PM-10) Heavy metals (Pb)	Fossil fuel engines (vehicles, generators, water pumps etc.) Construction activities undertaken for O&M	Heavy metals are poisonous when ingested Respiratory diseases Pollute rivers and underground water Environmental Haze

¹¹ Lisa Benton Short and John Rennie Short. 2008. Cities and Nature. Routledge Taylor Francis Group, London and Newyour. Routledge 2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

It is also important to note that there are no air pollution laws in the country and this creates a problem in terms of regulating this impact and it is thus proposed for the project to use international guidelines such as those provided by the WHO.

5.3.2.7 Increased Surface run-off

The paved surfaces and the project structures created from the construction phase of the project can lead to increased run-off by preventing the natural percolation of water through the soil. This will also aggregate to the changes in the surface and subsurface hydrology as a result of the project.

Additionally the increased run-off may lead to soil erosion in the areas where the water drains off to or drainage blockages by overloading the present drainage systems in the area. The increased run-off from the project and other construction projects may also cumulatively cause urban flooding and inundation of low lying areas during the rainy season.

5.3.2.8 Increased Traffic

From the increased population; demand for goods and services, and ancillary project operations more vehicles will be plying the roads in the region around the project. This may lead to increased traffic jams and hazards in the area especially if the roads in the region are not upgraded to cater for this demand. This situation will be remedied by the completion of the upgrading of Thika Road into a super highway since it will be able to carry part of the excess traffic since this is the intention of upgrading the road.

However as a result of the project and other projects targeting the area, the area will experience an increase in traffic albeit intermittent, and this will increase the risk of traffic hazards since the probability of occurrence of the hazards will be increased by having more cars on the roads.

5.3.2.9 Generation of waste

Several waste streams will be generated from the operational phase of the project and these have are delineated in Table 6-5 below alongside their sources and risks they present if not properly managed.

Table 5-5: Operational Phase Wastes

Waste	Source	Risks
Municipal Waste Solid Waste Garbage, Kitchen & Office Wastes	Kitchen, restaurants, shops, supermarkets, residential area, offices, repair works, plants, plastics (tubes, binders, , wrappings, metals (from clips, pins, lids), paper, cloth etc.	Water pollution, nuisances, air pollution on decomposition, soil contamination, water borne diseases, respiratory illnesses
Municipal Waste Liquid Waste Grey water, Sewerage	Kitchen, , shops, offices, recreational areas, residential area, washings, cooking oils, adhesives, fuel, chemicals, toilets, soaps and detergents	Water pollution (surface & subsurface), air pollution, soil contamination, water borne diseases
Waste Heat	Electronics, Vehicles, Air Conditioning, Power Generators, Water Pumps, Cooking and Heating activities (in house), Cooling water for machines	Thermal Pollution of Rivers from run-off Microclimate modification

5.3.2.10 OSH Risks

Several OSH risks will also be created by either the activities, equipment and materials of the operational phase of the project, and these have been listed in Table 6-5 below alongside their sources:

Table 5-6: Operational Phase OSH Risks

OSH Risk	Source
Injuries or Injurious substances and equipment	<ul style="list-style-type: none"> ○ Slippery floors from washing with soaps and detergents, oil spills (both fuel and kitchen oil). ○ Parking barriers – can hit people passing below them. ○ Corrosive chemicals ○ Working at heights ○ Moving parts ○ Vehicles and trucks ○ Corrosive chemicals
Fire	Fuel, electricity and electrical equipment that cause heat such as kettles, cookers both electric and or gas, and other electronics and machinery in the project
Intoxication	Chemicals, soaps & detergents, adhesives, inks, fuel

Thus a plan to manage the OSH risks during this stage will also enable the proposed project will also be important and necessary. This plan may simply be an extension of the one developed for the construction phase and can be further extended to the decommissioning phase.

5.3.2.11 Generation of Noise

The activities of this phase of the project will also generate noise and these will be from various point sources such as if diesel generators without silencers are used and also any repair works that may be carried as necessitated by the project's operations. Mobile sources of noise will mainly include cars and the trucks that will be ferrying goods to the project. Although the noise levels emitted during this stage will be less than during the construction the impact will have more receptors since there will be more people in the area as a direct result of the project being operational.

5.3.3 Decommissioning phase

5.3.3.1 Generation of Noise

There will be a considerable increase in noise owing to the demolition process. This will be a short term impact and will be felt throughout the demolition process. The main sources of noise will include: cars and trucks; the civil works of pulling down the project's built structures (especially of explosives are used), and mechanized equipment that will be used in the processes involved in this project phase.

5.3.3.2 Generation of Demolition Waste

The decommissioning phase of the project will create demolition wastes which share similar characteristic with construction wastes and therefore similar risks. The only two main differences are that: (1) demolition waste can easily be accounted for before the empty building shell is pulled down, and (2) if explosives are used they will form part of the waste

Waste in form of debris and pieces of metal and wood will arise. Thus creating a need of disposing off of the waste and all the disadvantages associated with waste mismanagement will arise such as spread of diseases. It is hoped that this phase will be implemented only under unavoidable circumstances for instance aging of the building and/or pertinent rights arising.

5.3.3.3 Increased Heavy Traffic

For the processes of these phase materials from the buildings and equipment will have to be ferried to and fro the site through the use of trucks and tractors/bulldozers and these will increase the amount of heavy traffic in the area. Although it is expected that at the time when the project will be decommissioned there will be substantial developments in infrastructure (transport), the trucks with

limited manoeuvrability will pose a risk to the general public and other vehicles/drivers on top of placing extra pressure on the roads.

5.3.4 OSH Risks

The decommissioning phase will have several OSH risks from the civil works involved, equipment, materials and processes. This may be added to if explosives are used and although their use is not known for now, an assessment has been made assuming or incorporating their use since they present a cost-effective way of demolition, which is safe when controlled. Table 6-7 that follows outlines the major OSH risks from this phase and their sources.

Table 5-7: Decommissioning Phase OSH Risks

OSH Risk	Source
Injuries or Injurious substances and equipment	<ul style="list-style-type: none"> ○ Explosives (if used) ○ Falling debris ○ Moving parts of equipment such as mechanized saws and other cutting equipment
Fire	Heat from gas cutters, friction from abrasive processes, fuel, electricity and electrical equipment
Intoxication	Particulates, dusts from debris; fumes and gases emitted from friction & cutting processes, engines burning fossil fuels

5.3.5 Emission of Air Pollutants

The processes, material and equipment involved in this stage of the project and their wastes will also emit air pollutants either: as gases such as oxides of C, N and S from the burning of fossil fuels in engines, or particulate matter from cuttings and breakages of steel, glass, shavings, bricks and movement of soil. These will pollutants will pose risks to both human and environmental health such as air pollution, water pollution, soil contamination, respiratory diseases, skin disorders and irritations.

5.4 SUMMARY & ANALYSIS OF IMPACTS

The identified impacts of the proposed project are presented in Table 5-6 that follows in that follows in terms of their orientation and the project phase whence which they occur, and then they are further analysed in terms of their characteristics to define their significance in Table 5-7.

Table 5-8: Summary of Impacts

Positive Impacts	Negative Impacts
<i>Design Phase</i>	
5.1.1.1 Creation of Employment and Business opportunities 5.1.1.2 Generation of Income and Source for Government Revenue 5.1.1.3 Environmental opportunities	
<i>Construction Phase</i>	
5.1.2.1 Creation of Employment 5.1.2.2 Market for goods and services 5.1.2.3 Increased population 5.1.2.4 Increased Economic Activities and Revenue	5.2.1.1 Loss of Flora and Faunal Habitats 5.2.1.2 Changes in Surface and Sub-Surface Hydrology 5.2.1.3 Changes in soil characteristics 5.2.1.4 Emission of Air pollutants 5.2.1.5 Generation of Noise 5.2.1.6 Increased Pressure on Utilities 5.2.1.7 Increased Heavy Traffic 5.2.1.8 Population Influx 5.2.1.9 Generation of Construction Waste 5.2.1.10 OHS Risks
<i>Operational Phase</i>	
5.1.3.1 Increased Commercial Viability 5.1.3.2 Creation of Employment Opportunities 5.1.3.3 Increased Accommodation/Housing 5.1.3.4 Increased Access to Goods, Services and Social Amenities 5.1.3.5 Increased Economic Activities and Government Revenue 5.1.3.6 Stimulation to Urban Development 5.1.3.7 Aesthetic Enhancements 5.1.3.8 Improved Roads 5.1.3.9 Population Increase 6.1.3.10 Impetus to Improve Amenities and Services	5.2.2.1 Increased Pressure on Available Utilities 5.2.2.2 Increased Land Values and Land Use Changes 5.2.2.3 Micro-Climate Modification 5.2.2.4 Security Threats 5.2.2.5 Sociocultural Impacts 5.2.2.6 Increased Air Pollution 5.2.2.7 Increased Surface run-off 5.2.2.8 Increased Traffic 5.2.2.9 Generation of waste 5.2.2.10 OSH Risks 5.2.2.11 Generation of Noise
<i>Decommissioning Phase</i>	
5.1.4.1 Creation of Employment and Business Opportunities 5.1.4.2 Income Generation 5.1.4.3 Provision of Cheaper Building Materials 5.1.4.4 Environmental Conservation and Restoration	5.2.3.1 Generation of Noise 5.2.3.2 Generation of Demolition Waste 5.2.3.3 Increased Heavy Traffic 5.2.3.4 OSH Risks 5.2.3.5 Emission of Air Pollutants

Table 5-9: Analysis of the Proposed Project's Impacts¹²

REF	SIGNIFICANCE	Reversibility	Probability	Magnitude/Intensity	Spatial Scale	Timing	Duration	Public Concern
<i>Construction Phase</i>								
5.2.1.1	M	I	H	L	SS	FO	ST	L
5.2.1.2	M	R	M	L	L	MO	MT	L
5.2.1.3	L	R	L	L	SS	FO	LT	L
5.2.1.4	M	I	H	M	L	FO	LT	M
5.2.1.5	L	I	H	L	L	FO	ST	H
5.2.1.6	M	R	M	L	L	MO	ST	L
5.2.1.7	M	R	M	L	R	FO	ST	H
5.2.1.8	L	R	H	L	L	MO	MT	M
5.2.1.9	H	I	H	M	SS	FO	ST	M
5.2.1.10	H	R	H	M	SS	FO	ST	L
<i>Operational Phase</i>								
5.2.2.1	M	R	H	L	L	MO	MT	L
5.2.2.2	L	R	M	L	L	SO	LT	M
5.2.2.3	L	R	L	L	L	SO	LT	M
5.2.2.4	M	R	M	M	L	MO	LT	M
5.2.2.5	M	R	M	L	L	SO	LT	M
5.2.2.6	M	R	M	L	L	MO	LT	M
5.2.2.7	L	R	M	L	SS	FO	LT	L
5.2.2.8	M	R	M	L	R	FO	LT	H
5.2.2.9	H	I	H	L	SS	FO	LT	M
5.2.2.10	H	I	H	M	SS	FO	LT	L
5.2.2.11	L	I	M	L	SS	FO	LT	H

¹² The impact reference is the section of this report where the impact is discussed in Chapter 6. The significance an impact is ranked and color coded as **HIGH**, **MODERATE** or **LOW** from the characteristics of the impact and its overall effect on the social and environmental baseline conditions as well as the acceptability from the public participation exercise and the legal framework. (See Table 1-3)

REF	SIGNIFICANCE	Reversibility	Probability	Magnitude/Intensity	Spatial Scale	Timing	Duration	Public Concern
<i>Decommissioning Phase</i>								
5.2.3.1	L	I	M	L	SS	FO	ST	H
5.2.3.2	H	I	H	L	SS	FO	ST	M
5.2.3.3	L	R	M	L	L	FO	ST	H
5.2.3.4	H	I	H	M	SS	FO	ST	L
5.2.3.5	H	R	M	M	L	FO	ST	M

5.5 MITIGATION MEASURES

The project's significant (HIGH, MODERATE and some LOW) impacts are analysed, reviewed further and mitigation measures are proposed in Table 6-4 below, that will enable the impacts to be managed, reduced or avoided where possible.

Table 5-10: Proposed Mitigation Measures

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
<i>Construction Phase</i>		
5.2.1.1 Loss of Flora and Faunal Habitats	Landscaping with indigenous species on completion of construction. Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens. Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.	Low
5.2.1.2 Changes in surface and sub-surface hydrology	During construction, the design (of the drainage system) should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site. Drainage channels should be installed in all areas that generate or receive surface water such as car parking, driveways and along the building block-edges of the roofs. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and entry dirt that would compromise flow of run-off. The channels should be designed with regards to the peak volumes such as periods or seasons when there is high intensity of rainfall which is also not common in the project area but just in case such an event occurs. They should never at any time be full due to the resulting heavy downpours. The drainage channels should ensure the safe final disposal of run-off /surface water and should be self-cleaning which means it should have a suitable gradient. Storm water generated from roof catchments should be harvested, stored and made use in various household activities such as general cleaning. This will reduce run-off reaching the drainage channels. Paving of the side walkways, driveways and other open areas should be done using pervious materials such as cabro to encourage water recharge and reduce run-off volume	Low
5.2.1.3 Changes in soil characteristics	Sprinkling water on the soil to prevent dust from rising. Creating specific paths for the trucks Ensuring there is enough space for normal percolation of water. Preventing pollution from construction wastes by having specific sites for collection, sorting and transport of wastes. Proper installation and configuration of drainage structures to ensure their efficiency. Installing cascades to break the impact of water flowing into the drains. Controlling the earthworks and ensuring the management of excavation activities. Compacting areas with loose soil. Landscaping. Providing soil erosion control structures on the steeper areas of the site & controlling activities during the rainy season.	Low

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
5.2.1.4 Emissions of Air pollutants	<p>Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dusts.</p> <p>Enclosing the structures under construction with dust proof nets.</p> <p>Using efficient machines with low emission technologies for the ones that burn fossil fuels.</p> <p>Controlling the speed and operation of construction vehicles.</p> <p>Regular maintenance and services of machines and engines.</p> <p>Use of clean fuels e.g. unleaded and de-sulphurized fuels.</p> <p>Educate and raise awareness of construction workers on emission reduction techniques.</p>	Low
5.2.1.5 Generation of Noise	<p>Using equipment with noise suppressing technologies.</p> <p>Providing workers with PPEs against noise e.g. ear plugs.</p> <p>Placing signs around the site to notify people about the noisy conditions.</p> <p>Regular maintenance of equipment to ensure they remain efficient and effective.</p> <p>Complying with the EMCA noise regulation Legal Notice 61.</p> <p>Construction works should be carried out only during the specified time which is usually as from 0800 hrs to 1700 hrs.</p> <p>There should not be unnecessary honking of the involved machinery.</p> <p>Provision of bill boards at the construction site gates notifying of the construction activity and timings</p>	Low
5.2.1.6 Increased Pressure on Utilities	<p>Employing water conservation techniques and only using the required amounts of water to prevent wastage.</p> <p>Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible.</p> <p>Using machines with power saving technologies i.e. high efficiency equipment.</p> <p>Providing proper sanitary facilities for construction workers.</p> <p>Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.</p>	Low
5.2.1.7 Increased Heavy Traffic	<p>Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site.</p> <p>Ensuring all drivers for the project comply to speed regulations.</p> <p>Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations.</p> <p>Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.</p>	Low
5.2.1.8 Population Influx	<p>Workers to be issued with jobs cards to monitor their movements in the site area</p> <p>Only authorised personnel should be allowed entrance to the site</p> <p>Presence of a work registry book where workers sign in and out</p> <p>Educating the workers on proper sanitation methods</p> <p>Sensitizing the worker on HIV/AIDS</p> <p>Making available suitable facilities for the collection, segregation and safe disposal of the wastes.</p> <p>Ensuring all waste is dumped in their designated areas and legally acceptable methods</p>	Low
5.2.1.9 Generation of Construction	Following EMCA regulations on Waste Management, Legal Notice 121.	Low

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
waste	Employing a waste management plan. (See Appendix 6) Using waste minimization techniques such as buying in bulk. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, timber, metals etc. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected. Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Creating adequate facilities for the storage of building materials and chemicals and controlling access to these facilities. Ensuring bins are protected from rain and animals.	
5.2.1.10 OSH Risks	Employing an OSH plan that will outline all OSH risks and provide a strategy for their management. (See Appendices 7 & 8) Ensuring all potential hazards such as movable machine parts are labelled. Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. Placing visible and readable signs around where there are risks. Ensuring there is security in and around the site to control the movement of people. Providing safe and secure storage for equipment and materials in the site and maintaining MSDSs. Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site. Providing fire fighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly. Labelling chemicals and material according to the risks they possess. Creating safe and adequate fire and emergency assembly points and making sure they are well labelled. Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.	Low
<i>Operational Phase</i>		
5.2.2.1 Increased Pressure on available utilities	Implementing water conservation techniques such as having faucets with dead man tap openers. Using only the required amounts of water during normal operations. Creating awareness through signs of conservation of water and electricity. Using natural light during the day for lighting purposes.	Low

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
	Using machines and equipment with a high level of power efficiency in the offices and residential houses and servicing them as often as required to maintain their efficiency. Using gas in the kitchens/restaurants for cooking purposes.	
5.2.2.2 Increase Land Values and Land Use Changes	Complying to zoning bylaws Collaborating with public and planning officials on the development and future developments Aligning the project's objectives with those of national, county and district development policies	Low
5.2.2.3 Micro-climate modification	Advocating for the use of other renewable sources of energy such as wind and solar energy Use of clean fuels e.g. unleaded and de-sulphurized fuels in vehicles Paving should only be carried out where necessary to reduce the reflection of the solar radiations. Landscaping the site with indigenous species of plants Using sustainable drainage systems that mimic the natural percolation of water into the soil, and green roofs where possible Using efficient equipment that emit little or no waste heat	Low
5.2.2.4 Security Threats	Employing of security guards/competent security firm at the site and searching all vehicles and people entering the project Use of CCTV cameras to monitor security within the site Collaborating with the national police on security matters Placing alarms around the project and establishing emergency preparedness and response procedures (EPRP – See Appendix 8)	Low
5.2.2.5 Sociocultural Impacts	Integrating and implementing Equal Opportunity Principles in Procurement and human resource policies. Promoting social cohesion and integration among people in the area. Creating awareness towards the diversity of cultures and different economic background of the people in the project staff and residents through sensitization. Allowing the residents and businesses to form social groups and networks that build social capital. Targeting social investment programs towards the local communities and region.	Low
5.2.2.6 Increased Air pollution	Install scrubbers in the exhausts of motor vehicles to filter the toxic fumes Use of clean fuels such as solar and wind energy sources Use of de -sulphurized and unleaded fuels in vehicles Banning the burning of wastes and other materials at the site. Using efficient equipment, machines and engines that emit less pollutants	Low

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
5.2.2.7 Increased surface runoff	Using materials that mimic natural percolation of water. Landscaping to ensure there are areas where water will percolate underground. Constructing proper drains and monitoring them to ensure there are no blockages. This also includes ensuring the size of the drains can accommodate storm flows during the rainy season.	Low
5.2.2.8 Increased traffic	Erecting visible and clear signs to control the movement of vehicles in and out of the site. Having alternative entrances and exits for emergency operations. Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to traffic regulations Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations. Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.	Low
5.2.2.9 Generation of waste	Developing and implementing a waste management plan. (See Appendix 6) Following EMCA regulations on Waste Management, Legal Notice 121. Using waste minimization techniques such as buying in bulk, buying pre-processed foods in the restaurants etc. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, paper, electrical equipment etc. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected. Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. Creating adequate facilities for the storage of materials and chemicals and controlling access to these facilities. Ensuring bins are protected from rain and animals.	Low
5.2.2.10 OSH Risks	Employing and EHS/OSH plan. (See Appendices 7 & 8) Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear. Placing readable signs alerting people of hazardous such as for slippery floors. Servicing equipment and machine to ensure efficiency. Providing fire fighting equipment and maintaining them to ensure they are fully functional. Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them,	Low

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
	<p>e.g. through the use maps on elevators, staircases etc. Putting in place and ERP and ensuring all people in the project are aware of it and the procedures to follow commensurate to the level of emergency. Providing adequate storage for hazardous and flammable substances and controlling access to them. Monitoring the movement, handling and management of wastes to ensure they safely managed and don't present any EHS risks. Working state agencies in the management of emergencies and disasters to ensure multilateral and inter-sectoral approaches to this management. Performing emergency drills on a frequent basis, setting benchmarks for response and evaluating performance to ensure continuous improvement of response and preparedness.</p>	
5.2.2.11 Generation of Noise	<p>Erecting signs and notifying other users of noisy activities. Conducting all noisy activities during the day when permissible levels are higher. Provision of PPEs such as ear plugs for employees working in noisy conditions or with noisy equipment. Using equipment with low noise ratings or noise reduction technologies such as for the generators</p>	Low
<i>Decommissioning Phase</i>		
5.2.3.1 Generation Of Noise	<p>Carrying out the decommissioning works only during the specified time from 0800hrs to 1700hrs where permissible levels of noise are high and acceptable. Machineries should be maintained regularly to reduce noise resulting from friction. Providing workers with Personal Protective Equipment such as earmuffs when operating noisy machinery and when in a noisy environment. Provision of bill boards at the construction site gates notifying people of the activities and timings. Shielding the area to reduce noise propagation</p>	Low
5.2.3.2 Generation of demolition waste	<p>Following EMCA regulations on Waste Management, Legal Notice 121. Employing a waste management plan, which will involve assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. (See Appendix 6) Removing reusable and recyclable material from the building before demolition to minimize the amount of waste. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods</p>	Low
5.2.3.3 Increased Heavy Traffic	<p>Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to speed regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations</p>	Low

Likely Impact & Reference	Proposed Mitigation Measures	Residual Impact
5.2.3.4 OSH Risks	<p>Employing an OSH plan that will outline all OSH risks and provide a strategy for their management. (See Appendices 7 & 8)</p> <p>Ensuring all hazards such as movable parts are labelled.</p> <p>Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment.</p> <p>Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out.</p> <p>Placing visible and readable signs around where there are risks and undertaking the riskier demolition activities first and in isolation.</p> <p>Ensuring there is security in and around the site to control the movement of people.</p> <p>Providing safe and secure storage for the waste and materials in the site.</p> <p>Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.</p> <p>Providing fire fighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly.</p> <p>Labelling chemicals and materials according to the risks they possess.</p> <p>Creating safe and adequate fire and emergency assembly points and making sure they are well labelled.</p> <p>Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.</p>	Low
5.2.3.5 Emission of Air Pollutants	<p>Using efficient equipment and machines with efficient engines meaning low emission.</p> <p>Using clean fuels such de-sulphurized diesel and unleaded fuels.</p> <p>Using Dust screens.</p> <p>Removing components with potential of emitting hazardous gases or particulates separately and under caution to prevent emissions.</p>	Low

6 HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT PLAN

This EMP is developed with an aim to outline actions necessary to prevent, mitigate and control possible negative impacts or disadvantages during the different phases of the project onto the environment and to analyse steps that could be taken in respect to this. This section sets out a HSE Management Plan through which the proposed project will manage its HSE risks commensurate to the significance and magnitude of these risks. The purpose of this management plan is not only to ensure that the project complies with the relevant HSE legislation and guidelines but also that it avoids (where possible), reduces or minimizes its risks. Together with the actions proposed in the ESAP and ESMP of this report this management plan will synergistically enable the project to set environmental performance objectives, goals and targets and achieve them. This HSE Management Plan (HSEMP) is guided by both national HSE/OSH legislation and GIIP, which should always be made available in the project, these include:

National Legislation

- EMCA of 1999, and its subsidiary legislations
- OSHA of 2007
- The Public Health Act of 2005
- The Physical Planning Act, Cap 286
- The Energy Act of 2005
- The Kenya Water Act of 2002

GIIP

- The World Bank General EHS Guidelines, April 30, 2007
- The IFC Performance Standards of Environmental and Social Sustainability of January 1, 2012: Performance Standards 1, 2, 3, 4 & 6.
- The WHO Guidelines on indoor and outdoor Air Pollution

6.1 HSEMP SCOPE

This HSEMP covers all aspects that the project proponent has an influence over and all activities in the project's area of influence. This area of influence includes:

- The project's main and ancillary activities in the project site;
- Any works financed as part of the project that will be carried out outside the project's site;
- Any works carried out by third parties or employees of the project, and
- The areas where the project's direct impacts will be felt and will cause a HSE risk.

This area of influence delineates the proponent scope of liability as legally defined and the measures proposed will assign adequate management control over these aspects and activities in order to manage risks.

6.2 HSEMP PURPOSE

The primary purpose of this HSEMP is to ensure the proponent has an established benchmark for HSE legislative compliance and to ensure the project is carried out safely environmentally and ergonomically. This can be broken down in the following objectives:

- To ensure the project is undertaken without any incidents or accidents to its primary employees.
- To ensure the project is undertaken without any incidents or accidents to its secondary employees and members of the public.
- To ensure adequate facilities are put in place to carry out the project's principal and ancillary activities.

- To ensure that all of the project's employees are adequately trained, aware of and committed to of all HSE procedures.
- To ensure adequate resources are assigned towards HSE management.
- To ensure that period monitoring of HSE performance is undertaken so as to improve this performance.
- To ensure the project's compliance to HSE legislation is continuously and continually evaluated.

The proponent should also develop a HSE policy creating an umbrella of guidance for all its HSE functions and practices. This policy should be converted into sectoral goals (water, energy, OSH etc.) using the above objectives and targets developed for HSE performance. The proponent's top management should lead the commitment to the policy and it should be made available to all employees, contractors, sub-contractors and members of the public. This policy should also be integrated into the project's human resource and labour policies, which would delineate what the proponent would be liable to and what contractual obligations the project would have on the second and third parties involved in its supply and value chain.

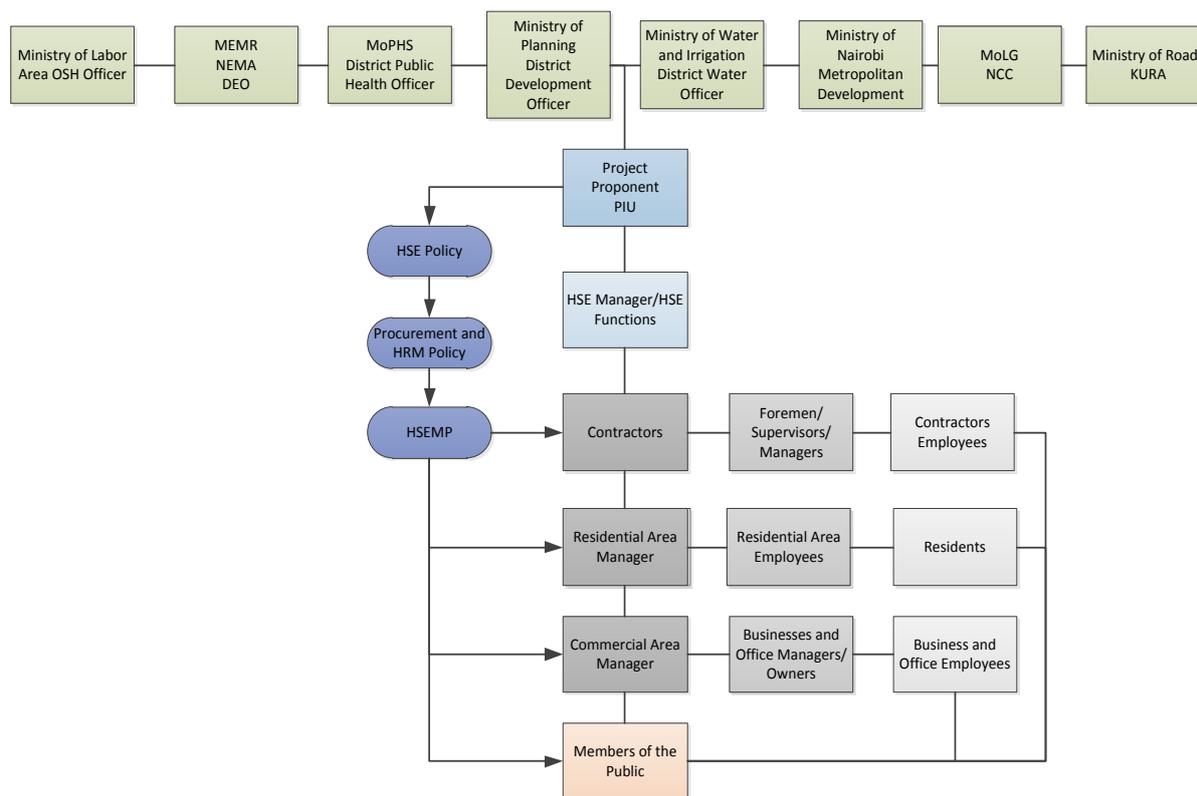
6.3 HSEMP MANAGEMENT FRAMEWORK

In order for the project to successfully carry out all HSE procedures and achieve the goals of this HSEMP adequate human resources will be required on the part of the client to take a leading role of HSE. As a preliminary dependent on the resources available, the leading HSE responsibilities may be integrated into the roles of either primary or secondary staff charged with site and employee management. However if adequate resources are available it is suggested that the proponent creates a responsibility for an overall HSE manager who will oversee and direct all HSE functions of the project. Under the HSE manager's docket will be the managers of the commercial and retail area, and the manager of the residential area, whom the HSE manager will ensure they carry out HSE functions in the jurisdictions. The HSE manager or person charged with HSE management duties will be responsible for monitoring, evaluation, reporting and developing internal HSE guidelines in line with national legislation and GIIP.

Additionally HSE should be integrated into the procurement and human resources policies of the project, and thus roles should be defined for contractors working on behalf of the proponent. Each contractor should have a role in their company for HSE management if their activities fall within the scope of this HSEMP. They will report to the overall HSE manager and assist in the achievement of the project's HSE goals.

On an administrative scale the effectiveness of the HSEMP will depend upon the collaboration of other key institutional players who are mandated with HSE responsibilities legally and on national and local scales. These include state agencies and offices who are charged with HSE responsibilities and they should be involved early in the project when developing the final HSE Management Plan and during its implementation. Figure 6-1 depicts an institutional HSE Management Framework.

HSEMP Institutional Framework



6.4 OBJECTIVES

1. To promote environmental ethics within concerned parties and users
2. To ensure environmental conservation and sustenance whilst enabling a balance between the proposed project and the ecosystem
3. To ensure safety within the project both within the construction and operational phases
4. To provide monitoring indicators for the project's environmental performance through its phases

6.5 ENVIRONMENTAL POLICY

The management policy of the proposed development is ensuring a clean and safe environment within the site and support of environmental health and safety both within and outside the project through proactive and responsible activities. The measures that are to be enforced would be implemented under the following framework

6.5.1 Land

- Ensuring the presence of floral cover on unpaved surfaces so as to maintain the soil's structure within the project area and where flora has been lost landscaping should be undertaken
- Ensuring proper waste management of both solid and liquid wastes is implemented to prevent soil contamination and creation of an unsightly environment

6.5.2 Biodiversity

- Maintain where possible trees and larger flora by planting more trees at or near the site during and after construction phase of the development
- Buffer creation and maintenance between the project and other land uses to mitigate micro climate changes

6.5.3 Air

- Maintenance of low levels of dust generation during construction through either surfacing the bare areas of any roads as well as by watering areas that are not paved.
- Installation of scrubbers on all the machinery used during construction that has a certain level of emission
- Setting up screens and buffer fences to reduce the amount of fugitive dust and noise generated during construction
- Use of noise absorbent padding in fixed installations
- Use of silencers in heavy earth moving machines, DG sets and pumps
- Use of ear-muffs by staff to reduce any exposure to increased noise
- Retention and consistent planting of green-belts barriers between source and receiver, although a long term strategy trees are effective noise barriers and flower bushes or shrubs can be grown around noise emitting utilities

6.5.4 Water

- Ensure conservation of water in the construction phase through wise and only necessary use and recycling where possible
- Maintenance of floral cover within the non-paved areas in order to reduce direct evaporation and maintain the micro-climate of the area
- Management of any liquid and solid wastes to ensure that they don't lead to pollution of surface and sub-surface waters
- Using water catchment techniques such as roof catchment where water harvested can be used for cleaning or lawn maintenance purposes
- Employing sustainable drainage measures that mimic the normal drainage of water to prevent increasing run-off to high levels as result of the development. These methods include using materials that allow water percolation in making paved surfaces such as the parking lot; using green roofs where possible or water catchment.

6.5.5 Hazards

- Hazards especially from moving vehicles and trucks in and out of the site could be handled properly
- Erecting hazards warning signs
- Using smaller trucks that make narrow turnings
- Construct storm water drains to channel flood waters
- Keep the percentage of the area of impervious surface as low as possible to reduce runoff during storm periods and in respect to the slope of the project area.
- Developing an OSHMP and HSMP

6.6 TRAINING PROGRAM

The successful implementation of the risk management plans presented through this ESMP, the ESAP and HSE management plan will enable the project to co-exist with its ecosystem and the social systems in which falls. However to ensure the staff charged with implementing them have the capacity to do so, training will be a fundamental aspect through which the staff will be made aware of the project's aspects, risks and the know-how of reducing these risks. Thus training is a key recommendation of this ESMP whereby the proponent is recommended to develop a training program on HSE and all the aspects of the ESMP and ESAP, thereby ensuring the project's employees are up to date with new HSE procedures and they can also respond or be proactive towards risks.

HSE training can be integrated into other career development training or be held as standalone training courses with certifiable curricula. The choice of this will depend on the level of engagement in HSE for the particular training target group. Also all training should be recorded and reported as well as its effectiveness, productivity and efficiency towards HSE management in the project.

6.7 MONITORING, EVALUATION AND REPORTING

All aspects of the HSEMP should be recorded as required by its guiding principles, legislation and GIIP. Records should be kept onsite and backed up in case of any eventualities that may damage them. A monitoring plan should be developed as part of the HSEMP through which its different aspects will be monitored and documented based on aspect specific frequencies. The monitoring and records will include: training, training content, incidents, accidents, complaints, internal and external communications, levels of emissions, MSDS etc. In this light the proponent should also develop adequate and efficient communication channels and procedures for the project through which all HSE will be communicated.

The records should allow for the HSEMS to be audited or its performance evaluated periodically so that it may be improved continuously through a Plan-Do-Check-Act (PDCA) framework. Additionally audits should be undertaken as required by legislation such EMCA of 1999 and OSHA of 2007 and reported to the relevant authorities. Incident and accidents should also be reported both internally and externally as required by legislations. A reporting schedule should also be developed as part of the HSEMP, which will guide the required reporting procedures based on their frequencies and format. Reporting and documentation should also cover corrective actions taken to close out non-conformities.

6.8 HSE RISK MANAGEMENT MEASURES

Several risk management measures are proposed in this subsection through which the project will adopt safe and self-improving measures in line with national legislation and GIIP, as part of its HSEMP.. However it is proposed that risks are best avoided early in the design and planning phases of the project following the hierarchy in Table that follows;

1. ENGINEERING CONTROLS	
DESIGNING	a way that will ensure that hazards are 'designed out' when new materials, equipment and work systems are being planned for the workplace.
REMOVING	the hazard or substitute less hazardous materials, equipment or substances.
ADOPTING A SAFER PROCESS	through alteration tools, equipment or work systems that can often make them much safer.
ENCLOSING OR ISOLATING THE HAZARD	through the use of guards or remote handling techniques.
PROVIDING EFFECTIVE VENTILATION	through local or general exhaust ventilation systems.
2. ADMINISTRATIVE CONTROLS	
ESTABLISHING appropriate ADMINISTRATIVE PROCEDURES such as:	
<ul style="list-style-type: none"> ○ Job rotation to reduce exposure or boredom; or timing the ○ Job so that fewer workers are exposed; ○ Routine maintenance and housekeeping procedures, and ○ Training on hazards and correct work procedures. 	
3. PERSONAL PROTECTIVE EQUIPMENT	
PROVIDING suitable and properly maintained PERSONAL PROTECTIVE EQUIPMENT and training in its use.	

6.8.1 Risk Register

During all phases of the project, the proponent and their third parties where applicable such as contractors, should develop a risk register of all HSE risks in the project. This identification of risks can be done through an aspects-impacts register or log, which links the project's aspects to impacts and ranks the level of risk by analysing its probability and likely consequences. Importantly also the risk register should take into perspective the level of public concern over the risks involved and identified, as a matter of good practice.

The duty of developing this register may vary depending on the project phase since during the construction and decommissioning phase the contractor will undertake most if not all activities that either are inherently risky or create risks to other stakeholders. However as a matter of policy and good practice the proponent should ensure third parties have adequate skills in risk management and systems are put in place to manage all risks.

Importantly linked to the risks register are the remedial actions which reduce or avoid the risk where possible. The proponent through either the HSE manager and/or engineers should always seek to avoid risks early enough through design and planning but this is not possible they should develop the requisite remedial actions or plans to legally acceptable standards (such as EMCA of 1999 and OSHA of 2007) and GIIP standards. The information of the risk register and these remedial actions should be documented, readily available and regularly updated to ensure it stays relevant and actual.

Some of the HSE risks from the project will come from the following aspects:

Construction Phase HSE Aspects

- Air emissions
- Water emissions
- Moving parts
- Heavy equipment and trucks
- Inflammable materials
- Hazardous/Poisonous chemicals and substances
- Storage areas
- Ladders
- Working at heights
- Electricity
- Open pits
- Heated surfaces, solids and fluids
- Wastes
- Raised materials and equipment, etc.

Operational Phase HSE Aspects

- Slippery floors
- Moving parts and barriers
- Storage areas
- Heated surfaces, solids and fluids
- Cold surfaces, solids and fluids
- Hazardous/Poisonous chemicals and substances
- Inflammable materials
- Electricity
- Wastes
- Air emissions
- Water emissions
- Vehicles and service trucks, etc.

Decommission Phase HSE Aspects

- Falling debris
- Air emissions
- Water emissions
- Heated surfaces, solids and fluids
- Hazardous/Poisonous chemicals and substances
- Moving vehicles and trucks
- Heavy equipment and materials, etc.

6.8.2 HSE Resources and Responsibilities

An important part of the HSEMP is to delineate all the resources required for its effective implementation so as to ensure it remains as cost effective as possible. This will be duty of the HSE Manager all resources human and financial should be listed alongside the remedial actions employed against each of the project's risks. Financial records should be maintained to ensure the HSE remains accountable and basically makes business sense by showing the costs avoided by maintaining the system in terms of lives saved, man hours saved, health care etc.

Whereas the human resources responsible for undertaking all activities that carry or create risk should be kept in record and maintained. This will ensure the project has a documented, maintained and established method of managing HSE responsibilities. This will in addition keep all the staff undertaking these activities abreast with not only the policies in place but also with the risks involved with their activities and importantly know how to manage the risks and carry out their duties safely. This information will also be vital when undertaking audits and targeting training towards the staff and foster greater accountability in the staff in terms of monitoring and reporting since all duties will be known and documented.

6.8.3 Medical Program and Insurance

The proponent and his contractors should also ensure the medical program is maintained for the project's staff on induction, during the job and include rehabilitation where appropriate and commensurate to the risks that the staff will be exposed to. This program should include regular check-ups to ensure the project's staff are medically and mentally fit to undertake their duties. It should also form part of training through an ergonomic and social curricular that will also include facilitations for lifestyle improvement and raise knowledge on diseases such as HIV/AIDS, STIs and other infectious illnesses.

The proponent and his contractors should additionally ensure adequate facilities and services are in place which promote employee rest, relaxation and rejuvenation. This may include rest and recreational areas, provision of clean water, undertaking stress relieving activities such as games, counselling and peer chats among others.

Importantly and as legally required the proponent and his contractors should provide a medical/insurance cover for all staff. The cover should in the least be able cover for all injuries, illnesses and incidents that may occur on the job and follow up with rehabilitation that at least returns the employee(s) to their initial state before the occurrence where possible. It should be noted that although the proponent may provide insurance, it should be mitigation based by firstly promoting the actions of the HSEMP which when followed all risks will well managed.

6.8.4 Emergency Preparedness and Response Plans

The proponent through an all-inclusive process should develop an EPRP as part of the HSEMP and through which the project will stay ahead of risks presented by both man-made and natural hazards that have the capacity to turn into disasters. The proponent and his contractors should do this by first identifying all hazards pertinent to the project and its site in line with the risks register but with specific difference being that these hazards will have greater potential of turning into a disaster. This should also be done in line with national policies on disaster management such as the National Disaster Management Response Plan of 2009, and involve all key players in disaster management nationally. This stakeholder involvement will enable the EPRP to be cross sectoral and multidisciplinary and the proponent should lead the process.

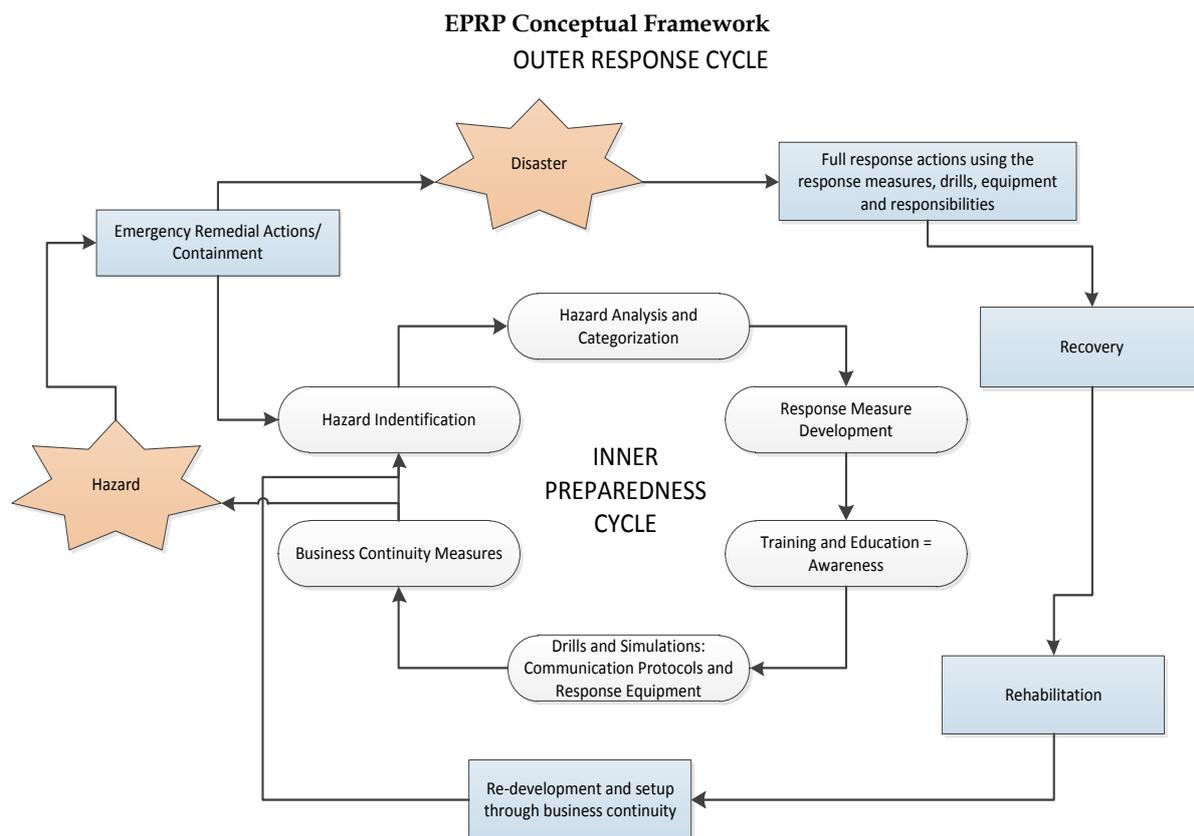
The method of identifying these hazards should be documented and maintained as well as an analysis and categorization of the risk of the hazards. This will ensure prioritization on remedial and mitigation actions so that attention is paid where it's actually due, and enable preparedness and response measures to be developed in accordance to the level of risk. Similarly to all other HSE actions a hierarchy of early avoidance should be adopted and two sets of actions developed, established and maintained which are the preparedness measures and response measures. The former will focus on pre-hazard or pre-disaster actions aimed at both reducing risk and arming the stakeholders involved with the right tools and knowledge to respond. Thus the preparedness measures will include:

- Awareness and education e.g. workshops, posters, educative emails etc.
- Simulation drills and training, and setting benchmarks for response
- Undertaking business continuity measures.
- Preparing and maintaining response equipment where necessary

The response measures will include a detailed set of actions geared at either containing the hazards where possible or getting people to safety where or when necessary. They will include setting internal and external communication protocols that will be easily accessed on hazard occurrence and setting easily understandable procedures that the responders can undertake. The response plans should include the novel signs and facilities such as building plans and floor maps (showing where the person is and the closest escape routes, fire safety equipment, and assembly points), alarms and sirens, shut down procedures (where applicable), access points around the site for fire responders-brigades, ambulance, search and rescue team, first aid amongst others procedures. These should all be developed into established and maintained procedures and the people responsible for implementing them should be known and their contacts made available.

Similarly to the whole management of HSEMP, the EPRP should also have monitoring, evaluation and reporting procedures documented and frequently updated to keep the EPRP relevant. This will also converse reporting to state agencies and authorities and members of the public. This EPRP can be envisioned as two cycles with an inner cycle being the preparedness measures and an outer cycle being the response measures as illustrated in Figure below.

It should also be noted that a hazard becomes a disaster when either vulnerable people or their vulnerable assets are exposed to it in magnitudes that compensate their coping capacities. Therefore if: an anthropogenic hazard is managed; or the vulnerable entity is not exposed to the hazard, or the vulnerability to a natural hazard is significantly, then it can only be an emergency at most.



6.8.5 Public Consultation and Disclosure Plan

The HSEMP adopted by the project should also include a PCDP through continual and continuous stakeholder engagement will be undertaken. This plan will ensure due diligence and good practice on the part of the project especially since the risks it presents may affect members of the general public with special focus on the neighbouring community. The PCDP should be developed by the PIU by listing all stakeholders including those ones identified in this ESIA and assigning modes and contents of engagement to each stakeholder based on an analysis of their level of interest/influence on the project. The modes and content chosen should be tailor made for their intended audience and should therefore be culturally appropriate as well as ethical in the same respect. Some common modes may include circulars, workshops, public meetings, social investment strategies, emails, phone calls, posters etc.

Important to this PCDP will be denotation of the frequency of engagement for each stakeholder and the responsibilities for the engagement. An internal and external register should also be maintained in line with GIIP such as ISO 9001:2008 and any follow up actions documented. This is because one important method and aspect of risk identification and management is engagement of stakeholders and facilitating productive discussions based on exchange of information.

6.8.6 Grievance Redress System

The proponent should also develop a GRS and make it accessible to all stakeholders internal and external. The GRS should always seek to address grievances through legally acceptable methods and as fast as possible whilst not preventing any complainants from seeking other legally acceptable methods to justice. Such a GRS should be made available to staff on recruitment and to members of the public either through government agencies/offices through grievance application forms, and

internally by establishing procedures for investigation and quick redress that will be recorded and tracked (Appendix 8: GRS Application Forms and Grievance Logging Table).

The GRS should be monitored through indicators of its efficiency and effectiveness of solving the grievance and producing lessons learnt through which corrective actions can be undertaken to improve the project's HSEMP. Additionally as part of monitoring and review all grievances should be reported to the relevant authorities and the corrective actions taken, to ensure the system is credible and transparent. The process should also be culturally appropriate, transparent and non-coercive

Table 6-1: Project ESMP

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
CONSTRUCTION PHASE					
5.2.1.1 Loss of Flora and Faunal Habitats	<p>Landscaping with indigenous species on completion of construction.</p> <p>Maintaining of landscaped gardens, terraces, conservation and management of the vegetation and gardens.</p> <p>Clearing vegetation only in construction areas and demarcating areas where no clearing will happen.</p>	<p>Project Proponent</p> <p>City Council</p> <p>NEMA</p> <p>Contractor</p>	Within project costs	% of paved area to vegetated area	Once
5.2.1.2 Changes in surface and sub-surface hydrology	<p>During construction, the design (of the drainage system) should ensure that surface flow is drained suitably into the public drains provided to control flooding within the site.</p> <p>Drainage channels should be installed in all areas that generate or receive surface water such as car parking, driveways and along the building block-edges of the roofs. The channels should be covered with gratings or other suitable and approved materials to prevent occurrence of accidents and entry dirt that would compromise flow of run-off.</p> <p>The channels should be designed with regards to the peak volumes such as periods or seasons when there is high intensity of rainfall which is also not common in the project area but just in case such an event occurs. They should never at any time be full due to the resulting heavy downpours.</p> <p>The drainage channels should ensure the safe final disposal of run-off /surface water and should be self-cleaning which means it should have a suitable gradient.</p>	Project Proponent and Project manager	Within project costs	<p>Presence of drainage channels</p> <p>% of paved area</p>	

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	<p>Storm water generated from roof catchments should be harvested, stored and made use in various household activities such as general cleaning. This will reduce run-off reaching the drainage channels.</p> <p>Paving of the side walkways, driveways and other open areas should be done using pervious materials such as cabro to encourage water recharge and reduce run-off volume</p>				
5.2.1.3 Changes in soil characteristics	<p>Sprinkling water on the soil to prevent dust from rising.</p> <p>Creating specific paths for the trucks</p> <p>Ensuring there is enough space for normal percolation of water.</p> <p>Preventing pollution from construction wastes by having specific sites for collection, sorting and transport of wastes.</p> <p>Proper installation and configuration of drainage structures to ensure their efficiency.</p> <p>Installing cascades to break the impact of water flowing into the drains.</p> <p>Controlling the earthworks and ensuring the management of excavation activities.</p> <p>Compacting areas with loose soil.</p> <p>Landscaping.</p> <p>Providing soil erosion control structures on the steeper areas of the site & controlling activities during the rainy season.</p>	NEMA Contractor – Site Foreman Project Proponent	Within project costs	<p>Amount of dust per volume of air.</p> <p>% of paved area to vegetated area.</p> <p>Amount of run-off i.e. flow rate of run-off in m³/s</p> <p>Amount of soil in run-off or drained water – kg/m³</p>	<p>Weekly</p> <p>Once</p> <p>Daily</p> <p>Daily</p>
5.2.1.4 Emissions of Air pollutants	<p>Sprinkling water on soil before excavation and periodically when operations are under way to prevent raising of dusts.</p> <p>Enclosing the structures under construction</p>	Project Proponent Contractor NEMA	100,000	Amount of gaseous emissions per day: ppm in air per day	Monthly

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	with dust proof nets. Using efficient machines with low emission technologies for the ones that burn fossil fuels. Controlling the speed and operation of construction vehicles. Regular maintenance and services of machines and engines. Use of clean fuels e.g. unleaded and de-sulphurized fuels. Educate and raise awareness of construction workers on emission reduction techniques.			Amount of particulate emission per day: ppm in air per day	Monthly
5.2.1.5 Generation of Noise	Using equipment with noise suppressing technologies. Providing workers with PPEs against noise e.g. ear plugs. Placing signs around the site to notify people about the noisy conditions. Regular maintenance of equipment to ensure they remain efficient and effective. Complying with the EMCA noise regulation Legal Notice 61. Construction works should be carried out only during the specified time which is usually as from 0800 hrs to 1700 hrs. There should not be unnecessary honking of the involved machinery. Provision of bill boards at the construction site gates notifying of the construction activity and timings	Project Proponent Contractor Workers working in noisy conditions or with noise generating equipment Member of the public	50,000	Quality of PPEs (ear muffs, ear plugs) Amount of noise generated: dB	Daily Daily

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
5.2.1.6 Increased Pressure on Utilities	<p>Employing water conservation techniques and only using the required amounts of water to prevent wastage.</p> <p>Employing power saving techniques such as switching off equipment when not in use, using natural light whenever possible.</p> <p>Using machines with power saving technologies i.e. high efficiency equipment.</p> <p>Providing proper sanitary facilities for construction workers.</p> <p>Inspecting the drainage facilities regularly to ensure they are free of debris that may reduce their efficiency.</p>	<p>Project Proponent</p> <p>Contractor</p> <p>City Council</p> <p>KPLC</p> <p>NCWSC</p> <p>Members of the Public</p> <p>Ministry of Nairobi Metropolitan Development</p>	Within project costs	<p>Amount of water consumed per day: m³/day</p> <p>Amount of electricity consumed per day: Kwh</p> <p>Number of machines and equipment serviced per month</p> <p>Amount of fuel consumed per day: m³/day</p> <p>Number of drainage blockages per month</p>	<p>Daily</p> <p>Daily</p> <p>Monthly</p> <p>Daily</p> <p>Monthly</p>
5.2.1.7 Increased Heavy Traffic	<p>Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site.</p> <p>Ensuring all drivers for the project comply to speed regulations.</p> <p>Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations.</p> <p>Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.</p>	<p>Project Proponent</p> <p>Contractor</p> <p>Truck drivers</p> <p>Members of the Public</p> <p>City Council</p> <p>Traffic Police</p> <p>KENHA</p> <p>Ministry of Nairobi Metropolitan Development</p>	50,000	<p>Quality of the signs</p> <p>Number of incidents/complaints per month</p>	<p>Daily</p> <p>Monthly</p>
5.2.1.8 Population Influx	<p>Workers to be issued with jobs cards to monitor their movements in the site area</p> <p>Only authorised personnel should be allowed entrance to the site</p> <p>Presence of a work registry book where workers sign in and out</p> <p>Educating the workers on proper sanitation methods</p> <p>Sensitizing the worker on HIV/AIDS</p>	<p>Project manager and Project Proponent</p>	Within project cost	<p>Presence of a work registry book</p> <p>Issuing of job cards</p> <p>Presence of sanitary services</p> <p>Amount of waste generated</p>	

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	<p>Making available suitable facilities for the collection, segregation and safe disposal of the wastes.</p> <p>Ensuring all waste is dumped in their designated areas and legally acceptable methods</p>			<p>per day i.e. Kg/day per specific waste type</p>	
<p>5.2.1.9 Generation of Construction waste</p>	<p>Following EMCA regulations on Waste Management, Legal Notice 121.</p> <p>Employing a waste management plan. (See Appendix 6)</p> <p>Using waste minimization techniques such as buying in bulk.</p> <p>Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so.</p> <p>Making available suitable facilities for the collection, segregation and safe disposal of the wastes.</p> <p>Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, timber, metals etc.</p> <p>Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected.</p> <p>Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation.</p> <p>Creating adequate facilities for the storage of building materials and chemicals and controlling access to these facilities.</p> <p>Ensuring bins are protected from rain and animals.</p>	<p>Project Proponent Contractor NEMA Members of the public District Public Health Officer</p>	<p>175,000</p>	<p>Amount of wastes generated per day i.e. kg/day per specific waste type.</p> <p>Quality of PPEs</p> <p>Quality and capacity of waste management equipment (bins, signs, PPEs etc.)</p>	<p>Daily and often as possible</p> <p>Daily and often as possible</p>

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
5.2.1.10 OSH Risks	<p>Employing an OSH plan that will outline all OSH risks and provide a strategy for their management. (See Appendices 7 & 8)</p> <p>Ensuring all potential hazards such as movable machine parts are labelled.</p> <p>Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment.</p> <p>Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out.</p> <p>Placing visible and readable signs around where there are risks.</p> <p>Ensuring there is security in and around the site to control the movement of people.</p> <p>Providing safe and secure storage for equipment and materials in the site and maintaining MSDSs.</p> <p>Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.</p> <p>Providing fire fighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly.</p> <p>Labelling chemicals and material according to the risks they possess.</p> <p>Creating safe and adequate fire and emergency assembly points and making sure they are well labelled.</p> <p>Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular</p>	<p>Project Proponent Site personnel Contractor NEMA Area OSH Officer City Council District Public Health Officer</p>	200,000	<p>Number of incidents/accidents per month</p> <p>Quality of all PPEs</p> <p>Number of drills per quarter</p> <p>Effectiveness of drills</p> <p>Visibility and clarity of signs and alerts</p> <p>Efficiency of equipment such as fire fighting equipment</p> <p>Quality and efficacy of storage</p> <p>Level of awareness of workers</p> <p>Number of assembly points</p>	<p>Weekly</p> <p>Daily and as often as possible</p> <p>Quarterly</p> <p>After every drill</p> <p>Daily and spot checks</p> <p>Weekly and spot checks</p> <p>Daily and spot checks</p> <p>Quarterly and spot checks</p> <p>Once</p>

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	drills and involving the neighbours.				
OPERATIONAL PHASE					
5.2.2.1 Increased Pressure on available utilities	<p>Implementing water conservation techniques such as having faucets with dead man tap openers.</p> <p>Using only the required amounts of water during normal operations.</p> <p>Creating awareness through signs of conservation of water and electricity.</p> <p>Using natural light during the day for lighting purposes.</p> <p>Using machines and equipment with a high level of power efficiency in the offices and residential houses and servicing them as often as required to maintain their efficiency.</p> <p>Using gas in the kitchens/restaurants for cooking purposes.</p>	<p>Proponent City Council Project Staff and Office staff Members of the Public KENHA Ministry of Nairobi Metropolitan Development Project Occupiers (Residents and Business people)</p>	100,000	<p>Amount of water consumed per day: m³/day</p> <p>Amount of electricity consumed per day: Kwh</p> <p>Number of machines and equipment serviced per month</p> <p>Amount of fuel consumed per day: m³/day</p> <p>Number of drainage blockages per month</p>	<p>Daily</p> <p>Daily</p> <p>Monthly</p> <p>Daily</p> <p>Monthly</p>
5.2.2.2 Increase Land Values and Land Use Changes	<p>Complying to zoning bylaws</p> <p>Collaborating with public and planning officials on the development and future developments</p> <p>Aligning the project's objectives with those of national, county and district development policies</p>	<p>Proponent NCC KENHA Ministry of Housing Ministry of Nairobi Metropolitan Development Ministry of Planning</p>	Within project costs	<p>KSHS per acre</p> <p>Ratio of new settlers to host community</p> <p>Land use balance trend</p>	Half-yearly
5.2.2.3 Micro-climate modification	<p>Advocating for the use of other renewable sources of energy such as wind and solar energy</p> <p>Use of clean fuels e.g. unleaded and de-sulphurized fuels in vehicles</p> <p>Paving should only be carried out where necessary to reduce the reflection of the solar radiations.</p> <p>Landscaping the site with indigenous</p>	<p>Project proponent Contractors Project Occupiers (Residents and Business people) NEMA MoE</p>	Within the project cost	<p>Numbers of trees planted</p> <p>Ratio of paved surface to unpaved surfaces</p>	<p>Yearly</p> <p>Half-yearly</p>

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	species of plants Using sustainable drainage systems that mimic the natural percolation of water into the soil, and green roofs where possible Using efficient equipment that emit little or no waste heat				
5.2.2.4 Security Threats	Employing of security guards/competent security firm at the site and searching all vehicles and people entering the project Use of CCTV cameras to monitor security within the site Collaborating with the national police on security matters Placing alarms around the project and establishing emergency preparedness and response procedures (EPRP – See Appendix 8)	Project proponent Kenya Police Ministry of State for internal security. Security firm Project staff Project Occupiers (Residents and Business people) Members of the public	250,000	Presence of a security personnel Number of security incidences Number of security drills and emergency response drills	Daily Weekly Monthly
5.2.2.5 Sociocultural Impacts	Integrating Equal Opportunity Principles in Procurement and human resource policies. Promoting social cohesion and integration among people in the area. Creating awareness towards the diversity of cultures and different economic background of the people in the project staff and residents through sensitization. Allowing the residents and businesses to form social groups and networks that build social capital. Targeting social investment programs towards the local communities and region.	Proponent Project staff Ministry of Labour Project Occupiers (Residents and Business people) Members of the public Ministry of Gender and Youth Affairs Ministry of Justice, National Cohesion and Constitutional Affairs	200,000	Staff Diversity ratios Number of discrimination incidences and reports Number of social groups Number of social investment strategies targeted at the local community Level of integration of cultural appreciation into staff training programs	Quarterly Quarterly Yearly Yearly Every time training is held and reviewed.
5.2.2.6 Increased Air pollution	Install scrubbers in the exhausts of motor vehicles to filter the toxic fumes	Proponent NEMA		Efficacy of equipment and machinery	Weekly and on procurement

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	<p>Use of clean fuels such as solar and wind energy sources</p> <p>Use of de -sulphurized and unleaded fuels in vehicles</p> <p>Banning the burning of wastes and other materials at the site.</p> <p>Using efficient equipment, machines and engines that emit less pollutants</p>	<p>Contractors</p> <p>Project Staff</p> <p>Project Occupiers (Residents and Business people)Member of the Public</p> <p>Area OSH Officer</p> <p>Area Public Health Officer</p>		<p>Amount of gaseous emissions per day: ppm in air per day</p> <p>Amount of particulate emission per day: ppm in air per day</p>	<p>Bi-weekly</p> <p>Bi-weekly</p>
5.2.2.7 Increased surface runoff	<p>Using materials that mimic natural percolation of water.</p> <p>Landscaping to ensure there are areas where water will percolate underground.</p> <p>Constructing proper drains and monitoring them to ensure there are no blockages. This also includes ensuring the size of the drains can accommodate storm flows during the rainy season.</p>	<p>Proponent</p> <p>Contractor</p> <p>NEMA</p> <p>City Council</p> <p>NCWSC</p> <p>Project Occupiers (Residents and Business people)</p> <p>Members of the public</p>	Within project costs	<p>Drainage flow rate: m³/day</p> <p>Ratio of paved areas to vegetated areas</p> <p>Number of drainage blockages</p>	<p>Daily</p> <p>Quarterly</p> <p>Quarterly</p>
5.2.2.8 Increased traffic	<p>Erecting visible and clear signs to control the movement of vehicles in and out of the site.</p> <p>Having alternative entrances and exits for emergency operations.</p> <p>Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site.</p> <p>Ensuring all drivers for the project comply to traffic regulations</p> <p>Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations.</p> <p>Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.</p>	<p>Proponent</p> <p>City Council</p> <p>Traffic Police</p> <p>Project Staff and Office staff as well as hotel residents</p> <p>Members of the Public</p> <p>KENHA</p> <p>Ministry of Nairobi Metropolitan Development</p> <p>Project Occupiers (Residents and Business people)</p>	Within project costs	<p>Number of traffic jams per day</p> <p>Duration of traffic jams: hours</p> <p>Number of traffic incidents and accidents per month</p>	<p>Daily</p> <p>Daily</p> <p>Monthly</p>
5.2.2.9 Generation of waste	Developing and implementing a waste management plan. (See Appendix 6)	<p>Proponent</p> <p>Project Maintenance Staff</p>	150,000	Amount of waste generated per day per waste type:	Daily

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	<p>Following EMCA regulations on Waste Management, Legal Notice 121.</p> <p>Using waste minimization techniques such as buying in bulk, buying pre-processed foods in the restaurants etc.</p> <p>Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled by personnel licensed to do so.</p> <p>Making available suitable facilities for the collection, segregation and safe disposal of the wastes.</p> <p>Creating waste collection areas with clearly marked facilities such as colour coded bins and providing equipment for handling the wastes. The bins should be coded for plastics, rubber, organics, glass, paper, electrical equipment etc.</p> <p>Ensuring all wastes are dumped in their designated areas and through legally acceptable methods and that the bins are regularly cleaned and disinfected.</p> <p>Assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation.</p> <p>Creating adequate facilities for the storage of materials and chemicals and controlling access to these facilities.</p> <p>Ensuring bins are protected from rain and animals.</p>	<p>City Council NEMA Area OSH Officer District Public Health Officer Project Occupiers (Residents and Business people)</p>		<p>Kg/day</p> <p>Adequacy/quality of waste management equipment (bins, PPEs such as gloves, boots etc.)</p> <p>Visibility and clarity of notices and signs</p>	<p>Weekly</p> <p>Daily</p>
5.2.2.10 OSH Risks	<p>Employing and EHS/OSH plan. (See Appendices 7 & 8)</p> <p>Provision of PPEs to all personnel working in potentially hazardous areas or with potentially hazardous equipment, and replacing the PPEs on wear and tear.</p> <p>Placing readable signs alerting people of</p>	<p>Proponent NEMA City Council Traffic Police Area OSH Officer Project Staff Project Occupiers (Residents</p>	<p>Within project costs</p>	<p>Number incidents/accidents of per monthly</p> <p>Quality of all PPEs</p>	<p>Weekly</p> <p>Daily and as often as possible</p>

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY	
	<p>hazardous such as for slippery floors. Servicing equipment and machine to ensure efficiency.</p> <p>Providing fire fighting equipment and maintaining them to ensure they are fully functional.</p> <p>Delineating fire and emergency assembly points and creating awareness to ensure all people at site are aware of them, e.g. through the use maps on elevators, staircases etc.</p> <p>Putting in place and ERP and ensuring all people in the project are aware of it and the procedures to follow commensurate to the level of emergency.</p> <p>Providing adequate storage for hazardous and flammable substances and controlling access to them.</p> <p>Monitoring the movement, handling and management of wastes to ensure they safely managed and don't present any EHS risks.</p> <p>Working state agencies in the management of emergencies and disasters to ensure multilateral and inter-sectoral approaches to this management.</p> <p>Performing emergency drills on a frequent basis, setting benchmarks for response and evaluating performance to ensure continuous improvement of response and preparedness.</p>	<p>and Businesses) Members of the Public District Public Health Officer</p>		<p>Number of drills per quarter</p> <p>Effectiveness of drills</p> <p>Visibility and clarity of signs and alerts</p> <p>Efficiency of equipment such as fire fighting equipment</p> <p>Quality and efficiency of storage</p> <p>Level of awareness of workers</p> <p>Number of assembly points</p>	<p>Quarterly</p> <p>After every drill</p> <p>Daily and spot checks</p> <p>Weekly</p> <p>Daily and spot check</p> <p>Quarterly</p> <p>Once</p>	
	<p>5.2.2.11 Generation of Noise</p>	<p>Erecting signs and notifying other users of noisy activities.</p> <p>Conducting all noisy activities during the day when permissible levels are higher.</p> <p>Provision of PPEs such as ear plugs for employees working in noisy conditions or</p>	<p>Proponent Project Maintenance Staff Office and Hotel Staff NEMA Area OSH Officer Members of the Public</p>	<p>150,000</p>	<p>Visibility and Clarity of Signs</p> <p>Amount of noise generated per day: dB</p> <p>Adequacy and quality of</p>	<p>Daily</p> <p>Daily</p>

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	with noisy equipment. Using equipment with low noise ratings or noise reduction technologies such as for the generators	Workers working in noisy conditions or with noisy equipment/machines Project Occupiers (Residents and Businesses)		noise PPEs (ear muff, ear plugs)	Daily or as often as necessary
DECOMMISSIONING PASE					
5.2.3.1 Generation Of Noise	Carrying out the decommissioning works only during the specified time from 0800hrs to 1700hrs where permissible levels of noise are high and acceptable. Machineries should be maintained regularly to reduce noise resulting from friction. Providing workers with Personal Protective Equipment such as earmuffs when operating noisy machinery and when in a noisy environment. Provision of bill boards at the construction site gates notifying people of the activities and timings. Shielding the area to reduce noise propagation	Proponent Project Maintenance Staff Office and Hotel Staff NEMA Area OSH Officer Members of the Public Workers working in noisy conditions or with noisy equipment/machines	Within project costs	Quality of PPEs (ear muffs, ear plugs) Amount of noise generated: dB	Daily and as often as possible Daily
5.2.3.2 Generation of demolition waste	Following EMCA regulations on Waste Management, Legal Notice 121. Employing a waste management plan, which will involve assessing and creating opportunities for Regulation, Reducing, Reusing, Recycling, Recovering, Rethinking and Renovation. (See Appendix 6) Removing reusable and recyclable material from the building before demolition to minimize the amount of waste. Allocating responsibilities for waste management and identifying all sources of wastes, and ensuring wastes are handled	Demolition Contractor Project Proponent NEMA City Council Members of the Public Area OSH Officer District Public Health Officer	200,000	Amount of wastes generated per day i.e. kg/day per specific waste type. Quality of PPEs Quality and capacity of waste management equipment (bins, signs, PPEs etc.)	Daily Daily and as often as possible Daily

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	<p>by personnel licensed to do so. Making available suitable facilities for the collection, segregation and safe disposal of the wastes. Ensuring all wastes are dumped in their designated areas and through legally acceptable methods.</p>				
5.2.3.3 Increased Heavy Traffic	<p>Placing signs around the site notifying other vehicles about the heavy traffic and to set the speed limit around the site. Ensuring all drivers for the project comply to speed regulations. Making sure the construction doesn't occupy the road reserves and complying to traffic and land demarcation obligations. Ensuring all vehicles used for the project are in good working condition both legally and commensurate to their intended use.</p>	<p>Demolition Contractor Project Proponent NEMA City Council Members of the Public Traffic Police Area OSH Officer Ministry of Nairobi Metropolitan Development</p>	20,000	<p>Quality of the signs Number of incidents per month Complaints per month</p>	<p>Daily and as often as possible. Monthly Monthly</p>
5.2.3.4 OSH Risks	<p>Employing an OSH plan that will outline all OSH risks and provide a strategy for their management. (See Appendices 7 & 8) Ensuring all hazards such as movable parts are labelled. Raising awareness and educating workers on risks from equipment and ensuring they receive adequate training on the use of the equipment. Providing the workers with adequate PPEs and monitoring regularly to ensure they are replaced on time when they wear out. Placing visible and readable signs around where there are risks and undertaking the riskier demolition activities first and in isolation. Ensuring there is security in and around the site to control the movement of people.</p>	<p>Demolition Contractor Project Proponent NEMA Area OSH Officer Project Security Firm Members of the Public</p>	150,000	<p>Number of incidents/accidents per monthly Quality of all PPEs Visibility and clarity of signs and alerts Efficiency of equipment such as fire fighting equipment Quality and efficiency of storage Level of awareness of</p>	<p>Monthly Daily and as often as possible Daily and as often as possible Weekly and as often as possible Weekly and spot checks Bi-weekly and spot</p>

LIKELY IMPACT	MITIGATION MEASURES	RESPONSIBILITY	COSTS (KSHS)	INDICATOR	FREQUENCY
	<p>Providing safe and secure storage for the waste and materials in the site.</p> <p>Placing visible and readable signs to control the movement of vehicles and notify motorists and pedestrians around the, and workers in the site.</p> <p>Providing fire fighting equipment and in easily accessible areas as well as ensuring site personnel are well trained to use them as well as maintaining them regularly.</p> <p>Labelling chemicals and materials according to the risks they possess.</p> <p>Creating safe and adequate fire and emergency assembly points and making sure they are well labelled.</p> <p>Establishing emergency procedures against hazards and ensuring the workers stay aware/educated on following them and commensurate to the magnitude and type of emergency, by conducting regular drills and involving the neighbours.</p>			<p>workers</p> <p>Number of assembly points</p>	<p>checks</p> <p>Once</p>
<p>5.2.3.5 Emission of Air Pollutants</p>	<p>Using efficient equipment and machines with efficient engines meaning low emission.</p> <p>Using clean fuels such de-sulphurized diesel and unleaded fuels.</p> <p>Using Dust screens.</p> <p>Removing components with potential of emitting hazardous gases or particulates separately and under caution to prevent emissions.</p>	<p>Demolition Contractor</p> <p>Project Proponent</p> <p>NEMA</p> <p>City Council</p> <p>Members of the Public</p> <p>District Public Health Officer</p> <p>Area OSH Officer</p>	<p>100,000</p>	<p>Amount of gaseous emissions per day: ppm in air per day</p> <p>Amount of particulate emission per day: ppm in air per day</p>	<p>Daily</p> <p>Daily</p>

Environmental and Social Action Plan

ACTION	REFERENCE STANDARD(S)	DURATION	INDICATORS	RESPONSIBILITIES
1.0 Social Welfare Actions				
1.1 Develop a PCDP 1.1.1 Stakeholder Identification 1.1.2 Stakeholder Analysis 1.1.3 Stakeholder Engagement Plan	ISO 14001; IFC PS 1; OSHAS 18001; IFC PS 4; IFC PS 6; IFC EHS Guidelines; ISO 9001; ISO 19011.	1 Week	ISO 9001 Certification; External Communications Register; ISO 19011 Certification; ISO 14001 Certification; OSHAS 18001 Certification	Project Proponent, Contractors and Third Parties
1.2 Develop a Grievance Redress Management System	ISO 14001; IFC PS 1,2,4,6; OSHAS 18001; IFC EHS Guidelines	1 Week	Public and Employee Awareness; ISO 9001 Certification; ISO 14001 Certification; OSHAS 18001 Certification	Project Proponent, Employees and Third Parties.
1.3 Develop and Document a Labour Policy in line with the Employment Act of 2007	IFC PS 2; OSHA 2007; Employment Act 2007	2 Days	Employee Awareness; Documented Labour Policy	Project Proponent
1.4 Develop a Traffic Management Plan	ISO 14001; IFC PS 1,4; IFC EHS Guidelines	2 Weeks	ISO 14001 Certification; Documented Project Traffic Management System; Traffic Management Reports;	Project Proponent; KENHA; NCC
1.5 Establish a Formal Procurement Policy and Procedures in line with the Procurement Act of 2005	ISO 14001; IFC PS 1,2,3,4,6; ISO 9001; IFC EHS Guidelines	1 Week	ISO 14001 Certification; Documented Procurement Policy and Procedures; Procurement Reports; Procurement Evaluation Criteria of goods, services and labour; Second and Third Awareness of Procurement Policy and Procedures	Project Proponent
2.0 Environmental Actions				
2.1 Develop a Method of Continuously Identifying and Assessing the Project's Aspects and Impact	ISO 14001; IFC EHS Guidelines; OSHAS 18001; IFC PS 1,2,3,4,6.	2 Weeks	Aspect and Impact List; Documented Procedure of Impact Identification and Assessment Categorization	Project Proponent
2.2. Establish methods continuous and continual regulatory compliance evaluation	ISO 14001; IFC EHS Guidelines; OSHAS 18001; ISO 9001; IFC PS 1,2,3,4,5,6,7,8.	1 Week	Compliance Register; Documented Procedure for Compliance Evaluation	Project Proponent, Second and Third Parties

ACTION	REFERENCE STANDARD(S)	DURATION	INDICATORS	RESPONSIBILITIES
2.3 Establish and Implement a Waste Management Plan acceptable by LN 121	ISO 14001; IFC EHS Guidelines; OSHAS 18001; IFC PS 1,3,4,6	1 Month	Staff Awareness; Waste Management Integrated Procurement Policy and Procedure; Waste Assessment and Categorization Reports and Results	Project Proponent, Second and Third Party
2.4 Establish and Implement a Hazardous Material Safety Plan acceptable by LN 57 and the Public Health Act 2005	ISO 14001; IFC EHS Guidelines; OSHAS 18001; IFC PS 1,2,3,4,6; ISO 9001	2 Weeks	Hazardous Material List; Hazardous Material Safety Procedures; Hazardous Material Integration in Procurement	Project Proponent; Project's Second and Third Party Employees/Contractors.
2.5 Establish and Implement an Energy Consumption and Conservation Strategy acceptable by the Obligations of the KEA of 2005 and certifiable the Green Star Standards	ISO 14001; IFC EHS Guidelines; IFC PS 1,3,4,6 Green Star Standards	2 Weeks	Energy Assessment and Facility Rating Report/Assessment; Energy Conservation Opportunities Identification and Assessment	Project Proponent; Project's Second and Third Party Employees/Contractors
2.6 Establish and Implement a Water Resources Management Strategy acceptable by KWA 2002 & LN 120 Obligations	ISO 14001; IFC EHS Guidelines; IFC PS 1,3,4,6	1 Week	Water Conservation Opportunities Identification and Assessment; Periodic Water Use Survey Report; ISO 14001 Certification; Water Use and Abstraction Permits	Project Proponent; Project's Second and Third Party Employees/Contractors
3.0 Health and Safety Actions				
3.1 Establish and Implement an OSHMP acceptable by OSHA 2007 obligations.	OSHAS 18001; IFC EHS Guidelines; IFC PS 1,2,3,4,6; ISO 14001; ISO 9001	3 Weeks	OSHAS 18001 Certification; Register of OSH Risks; OSH Audit Reports	Project Proponent; Project's Second and Third Party Employees/Contractors; Area OSH Officer ; Project's Residents and Tenants
3.2 Establish and Implement a Community Health, Safety and Security Plan	OSHAS 18001; IFC PS 1,2,3,4,6; IFC EHS Guidelines; ISO 9001	2 Weeks	OSHAS 18001 Certification; Register and Assessment of CHSS Risks; Minutes of Meetings with Community Members; External Communication Register.	Project Proponent; Project's Second and Third Party Employees/Contractors; Area OSH Officer; Members of the Public Residing in and around the project.
3.3 Establish and Implement an EPRP acceptable	OSHAS 18001; IFC PS 1,2,3,4,6; IFC EHS Guidelines;	4 Weeks	ISO 14001 Certification; Hazards Assessment Reports; Training Drills	Project Proponent & Their Employees; Project's Residents and Tenants

ACTION	REFERENCE STANDARD(S)	DURATION	INDICATORS	RESPONSIBILITIES
by Kenya's National Disaster Response Plan and OSHA 2007	ISO 9001		Review; Documented Disaster Management Plan	
4.0 Management Actions				
4.1 Develop and Implement a Training Program	OSHAS 18001; IFC PS 1,2,3,4,6,8; ISO 14001; IFC EHS Guidelines; ISO 9001	3 Weeks	Documented Training Plan; Training Registers; Training Curriculums; Meeting Minutes	Project Proponent; Project's Second and Third Parties
4.2 Establish and Implement Continual Improvement and Monitoring and Evaluation Procedures	OSHAS 18001; IFC PS 1,2,3,4,6,8	2 Weeks	Monitoring Plans; Monitoring and Evaluation Reports; Audit Reports; Meeting Minutes; Corrective Action Close out Reports	Project Proponent; Project's Second and Third Parties
4.3 Establish, Implement and Document an ESMS acceptable by International Standards	OSHAS 1800; IFC PSs; IFC EHS Guidelines; ISO 9001; ISO 14001	After All of the Above	Meeting Minutes; Documented ESMS; ISO 9001, ISO 14001, and OSHAS 18001 Certification	Project Proponent and all Stakeholders

7 MONITORING GUIDELINES

Continuous observations and assessment will be essential.

7.1 ENVIRONMENTAL MONITORING SYSTEMS

The management of the construction of the proposed apartments will introduce a monitoring system for the various activities.

7.1.1 Waste production monitoring systems

The waste to be produced will include:

- (i) Solid wastes such as those from polyfiller polythene bags and paint tins.
- (ii) Liquid wastes from lavatories, kitchen and the washrooms.
- (iii) Air pollutants from burning activities within the site.

7.1.2 Solid waste monitoring system

This monitoring system will include follow-ups on the solid waste production within the office area. Strategies on how to handle the wastes in the apartments i.e. kitchen wastes etc, will have to be designed through the monitoring system. Liquid wastes from the toilets and the washrooms will have to be carefully monitored to ensure there are no constraints caused by occupants of the apartments on the sewage piping system.

7.2 MONITORING THE ENVIRONMENTAL HEALTH AND SAFETY

This will include follow-ups on the environmental health and safety criteria in place together with the environmental management policy. The shortcomings will be noted and measures designed to counteract the impacts.

Alternatives must be sort for any foreseen safety danger. Risk assessment of fire outbreaks, and others will not be ignored while waste management in the office will be strictly monitored. Mitigation measures of storm water management are essential. Safety standards will constantly be maintained. Therefore the guidelines will encompass the following: -

- Accidents and risk assessment arising from the use of water, roads, electricity and/ or any other amenity.
- Waste management
- Health and safety measures using such standards as ISO 14000 and EMS and the laid down regulatory framework.

8 PUBLIC PARTICIPATION

As part of the ESIA process for the Thika Road Mixed Use Development project several key stakeholders were engaged to inform both the study and the project. These stakeholders were consulted based on their institutional mandates which govern the project and its activities, and members of the general public who are neighbours to the project. The stakeholders were engaged through the Project Background Document (Appendix 3) and the Public Participation Questionnaire (Appendix 4). The three main purposes of this exercise were to:

- Informing stakeholders about the project and its likely effects
- Canvass their inputs, views and concerns, and
- To enable their views to be taken into account during the decision making.

Thus to achieve these the process was targeted at:

- Obtaining local and traditional knowledge that may be useful to decision making including any Indigenous Knowledge Systems (IKS);
- Facilitating consideration of alternatives, mitigation measures and trade-offs (if any);
- Ensuring that important impacts are not overlooked and benefits are maximized;
- Reducing chances of conflict through early identification of contentious issues;
- Providing an opportunity for the public to influence the project design and operational plan in a positive manner;
- Improving transparency and accountability of decision making, and
- Increasing public confidence in the ESIA.

The comments stakeholders raised were collated and analysed to see which issues are of concern and should be addressed through this ESIA. The following subsections list these stakeholders and the comments they raised, whilst referencing to the impact assessment section and the proposed mitigation measures to elaborate how they contributed to the formulation of the ESMP of this report (as referenced above). This was done in respect to the fact that public concern is fundamental to the delineation and management of the project's significant risks.

Summary Comments from Stakeholders

Stake Holder's Name, Institution & Role	Issues to be Addressed in the EIA	Comments on Public Consultation and Technical Processes	Any other Comment	Report Reference
Mr John Muriithi	Roads and Accessibility	It's a good process	None	5.2.1.7, 5.2.2.8, 5.2.3.3
Mr Clement Gitimwani	Roads and Accessibility, Security	The public becomes aware on the proposed development to be undertaken	None	5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.2.4, 5.2.1.7, 5.2.2.8
Mr. George Kamau	Security, Employment Opportunities, Improved housing	Good	None	5.2.2.4, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1, 5.1.3.3
Mr Kennedy Kavuli Jared Mamboleo	Roads and Accessibility, Security, Employment Opportunities, Access to services	Good Good Idea	None	5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.2.4, 5.1.1.1, 5.1.2.1, 5.1.3.2, 6.1.4.1, 5.2.2.1, 5.2.1.6

Stake Holder's Name, Institution & Role	Issues to be Addressed in the EIA	Comments on Public Consultation and Technical Processes	Any other Comment	Report Reference
Ms Patrick Gichuhi	Security, Access to services	Its good, it bring more customers	None	5.2.2.4, 5.2.1.6, 5.2.2.1
Mr Denis Wagah	Security, Road and Accessibility	None	None	5.2.2.4, 5.2.1.6, 5.2.2.1, 5.2.1.7, 5.2.2.8
Daniel Abusai	Roads and Accessibility, Security, Job Creation, Business Opportunities, Noise Pollution	Good work and should start urgently	None	5.2.2.4, 5.2.1.6, 5.2.2.1, 5.2.1.7, 5.2.2.8, 5.2.1.5, 5.2.2.11, 5.1.2.1, 5.1.3.2, 6.1.4.1
Mr. Caleb Injedi	Access to Amenities like school, Job Opportunities	Its good because we have been informed on the upcoming project.	None	5.2.1.6, 5.2.2.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Parbai Bhimji Hirani	Noise and air pollution, Security, Destruction of flora, job creation	Public Consultation is good because it informs people about the project	Road network should be improved after completion, Project being accessible to all	5.2.1.5, 5.2.2.11, 5.2.1.4, 5.2.2.6, 5.2.2.4, 5.2.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Ms Irene Kimani	Security, Job creation	It will be beneficial if affordable to people	None	5.2.2.4, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr Baraka	Security, Road and Accessibility, Business opportunities	Good	None	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr Stephen Muindu a Business man	Security, Waste generation, job creation, business opportunities	Good	None	5.2.2.4, 5.2.1.9, 5.2.2.9, 5.2.3.2, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr Reuben Gitonga a butcher	Road and Accessibility, Access to amenities, job opportunities, business opportunities	Good	None	5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.1.6, 5.2.2.1, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mrs Deepak a pharmacist	Security, Noise and Air pollution, Business opportunities	Good	None	5.2.2.4, 5.2.1.5, 5.2.2.11, 5.2.3.1, 5.2.1.4, 5.2.2.6, 5.2.3.5, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Ms Alice Mukima an M-Pesa Agent	Security, Solid waste management, Job creation, business Opportunities	Its good	None	5.2.2.4, 5.2.1.9, 5.2.2.9, 5.2.3.3, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr. Rajubhai	Pollution, Waste management, job opportunities	It's good	None	5.2.1.9, 5.2.2.9, 5.2.3.3, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr Hassan Fred a Butcher	Access to amenities	It promotes development	None	5.2.1.6, 5.2.2.1,
Mr Jacob Mulinge	Security, Noise pollution,	It promotes development	None	5.2.2.4, 5.2.1.5,

Stake Holder's Name, Institution & Role	Issues to be Addressed in the EIA	Comments on Public Consultation and Technical Processes	Any other Comment	Report Reference
a fruit dealer	Road and Accessibility			5.2.2.11, 5.2.3.1, 5.2.1.7, 5.2.2.8, 5.2.3.3
Ms Emily Daniel an M-Pesa Agent	Road and Accessibility, Security, Job creation	Its good	None	5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.2.4, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr Shah	Noise pollution, Security, Access to amenities such as water, power supply, Solid waste management, Cultural impact such as Prostitution, Road and Accessibility	Its good	Construct a police post, limit pollution during construction and ensure safety of children	5.2.1.5, 5.2.2.11, 5.2.3.1, 5.2.2.4, 5.2.1.6, 5.2.2.1, 5.2.1.9, 5.2.2.11, 5.2.3.2, 5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.2.5
Ms Nilia Kamani	Security, Destruction of flora and fauna	Its good	None	5.2.2.4, 5.2.1.1
Mr Onesmus Kimetu	Road and Accessibility	Its good	Seek workers from the surrounding areas i.e. Ngumba Estate	5.2.1.7, 5.2.2.8, 5.2.3.3
Ms Lucy Ngondi a resident of apartments	Security, Road and Accessibility	Good	None	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3
Mrs Christine Jawa a student	Security, Road and Accessibility	Very Beneficial	Project security will be improved and the economy in general	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3
Mrs Agnes Awour a resident at apartment	Road, security, employment opportunities	vital	Allocate room of expansion for future generation	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Ms Joan Muhow a resident	Security, Road and Accessibility, Population Influx	good	Pros and cons of the project to those living around be checked	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.1.8, 5.1.3.9, 5.1.2.3
Mr Peter Muthua a business Man	Security, Traffic, solid waste management, job creation	Good	None	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.1.9, 5.2.2.9, 5.2.3.2, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Noreen Kago	Dust, Traffic Management	Good		
Ms Tabitha Ngoyo a resident Muthithi road	Noise pollution, Safety of children	Its good	None	5.2.1.5, 5.2.2.11, 5.2.3.1, 5.2.1.10, 5.2.2.10, 5.2.3.4
Mr Aaron Musyoki a resident Muthithi apartments	Solid waste management, job creation	Findings should be made public	Make the facility available to everyone	5.2.1.9, 5.2.2.9, 5.2.3.2, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mr Kamal Kurji	Noise and air pollution, job opportunities	Its good since the public have a chance to air their	Start the project as soon as	5.2.1.5, 5.2.2.11, 5.2.3.1, 5.2.1.4,

Stake Holder's Name, Institution & Role	Issues to be Addressed in the EIA	Comments on Public Consultation and Technical Processes	Any other Comment	Report Reference
		concerns	possible	5.2.2.6, 5.2.3.5, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mrs Soneet Iqbal	Security, Road and Accessibility, Job creation	vital	The facility should be made available to the local population	5.2.2.4, 5.2.1.7, 5.2.2.8, 5.2.3.3, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1
Mrs Mohanjeet Kumar	Noise pollution, air pollution, Drainage, destruction of flora and fauna	None	Consider employing the local community in terms of labour	5.2.1.5, 5.2.2.11, 5.2.3.1, 5.2.1.4, 5.2.2.6, 5.2.3.5, 5.2.1.1
Mr Sandeep Singh	Employment opportunities, Aesthetic value	Involve more stakeholders	Good idea. It will lead to economic growth of the neighbourhood	5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1, 5.1.1.3, 5.1.3.7, 5.1.4.4
Ms Carol Njoronge an Mpesa Agent	Air pollution, Destruction of trees	good	None	5.2.1.4, 5.2.2.6, 5.2.3.5, 5.2.1.1
Sandpi Kulah	Destruction of trees, waste generation	Its good thing and should continue	Creation of job opportunities	5.2.1.1, 5.2.1.9, 5.2.2.9, 5.2.3.2
Mr Kamarjeet	Loss of flora and fauna, employment opportunities, improved housing	Good process and should be encouraged	Fear of loss of income due to no entry to the site. Rehabilitate the area by planting trees	5.2.1.1, 5.1.1.1, 5.1.2.1, 5.1.3.2, 5.1.4.1, 5.1.3.3
Ass. Chief Elizabeth Rapando	Land use, Waste management, conflict/compatibility with surrounding uses	Should be done widely	Submit EIA study report and the necessary approvals	5.2.2.2, 5.2.1.9, 5.2.2.9, 5.2.3.2
Mr Samuel Wainaina a Business man	Road and Accessibility, Destruction of flora and fauna	Its beneficial because it amasses lots of ideas from different perspectives	The project is good as long journey to get essential goods will be reduced.	5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.1.1
Ramesh Pujani	Working on Saturday, traffic, Flora and Fauna	Good process		5.2.1.7, 5.2.2.8, 5.2.3.3, 5.2.1.1

The references made to the report were used to assess the level of public concern towards the mentioned impacts and this was done as presented below (in which the issues are grouped in terms of the environmental aspect and impact which they represent).

Analysis of Comments and Perceived Impacts

Ref	Aspect/Impact	Frequency	Absolute Frequency	Relative Frequency	Public Concern Rating
5.2.1.1	Loss of Flora and Faunal Habitats	12	12	0.023	Low
5.2.1.3	Lithology and geology	1	1	0.002	Low
5.2.1.4	Air pollution and climatic changes	26	78	0.153	Moderate
5.2.3.5		25			
5.2.2.6		26			
5.2.2.3		1			

Ref	Aspect/Impact	Frequency	Absolute Frequency	Relative Frequency	Public Concern Rating
5.2.1.9	Waste	29	86	0.168	Moderate
5.2.3.2		28			
5.2.2.9		29			
5.2.1.5	Noise Generation	35	104	0.204	High
5.2.3.1		33			
5.2.2.11		36			
5.2.2.8	Traffic	45	134	0.262	High
5.2.1.7		45			
5.2.3.3		44			
5.2.1.10	OHS Risks	7	21	0.041	Low
5.2.2.10		7			
5.2.3.4		7			
5.2.1.8	Social Disruptions: Population influx, security, sociocultural changes, increased land values and land use changes.	4	53	0.104	Moderate
5.2.2.4		47			
5.2.2.5		1			
5.2.2.2		1			
5.2.2.1		11			

9 CONCLUSIONS AND RECOMMENDATIONS

In conclusion the proposed project will have several positive economic impacts during its different phases that include: creation of employment; stimulating development through revenue, taxes and income, creating a market for goods and services, and creating business opportunities for various companies and individuals. These will contribute to the achievement of vision 2030 and contribute to making Nairobi a metropolitan City by increasing the infrastructure available in the city and in quality.

However the project will present environmental and OSH risks similar to most building and infrastructure projects, which include: generation of wastes (municipal, construction and demolition wastes; changes in soil characteristics; emission of air pollutants amongst others. These risks can be adequately managed and monitored through the proposed mitigation measures, ESAP, HSEMP and EMP, that includes frameworks for developing waste management plans, OSH plans and hazardous materials safety plans.

Thus the Environmental Management Authority is advised to license the project subject to it following the proposed annual environmental audits and EMP and complying with all other statutory requirements that the project subscribes to. The project should also develop a plan for continuous engagement with stakeholders that include members of the public (its neighbours) and government bodies. This will be in compliance with the Environmental Management and Coordination Act of 1999 and the Environmental Impact Assessment and Audit regulations, 2003. Above all the proponent should carry out Environmental Audit 12 months after the project is completed and occupied.

In the recent decade Nairobi has experience a boom in urban development curtailed by the construction of numerous infrastructure projects encompassing: residential and housing projects; commercial and

industrial establishments; recreational facilities, and other amenities. These have all been in support or service to the growing population in the city and also economic development in both macro and micro scales. Most of these projects tend to have generic impacts with baselines withholding but having a cumulative impact on the natural resources that the greater population depends on. Thus as required by the EMCA of 1999 it is prudent for all these projects to comply with regulations and where possible surpass legal stipulations/obligations in order to minimize or avoid negative impacts on these resources

The project's main aim is to address a gap in rising demand for grade "A" offices in Nairobi with many multinational and established local companies setting up their offices in Westlands. There exists an untapped market for affordable high standard business hotel accommodation for business travelers in Nairobi, where the upscale hotels dominate the market, while the affordable ones do not meet the expected standards. Therefore, many hotel operators prefer to buy an already constructed structure to fit out their hotels as per their needs that fits their workings through the social and cultural heart landscape, to provide recreational facilities thereby stimulating both domestic and foreign tourism that inject capital into the economy. The project also aims at providing high quality office facilities for business that form an integral part of the spine of the country's economy. Thus the project will explicitly contribute to economic development and through compliance to the requirements of this report's ESMP; it will be a sustainable development in terms of the management of the natural resources pertinent to it. The assessment established that there are no significant environmental impacts expected to ensue from the construction work and during occupation provided that the proponent adheres to the proposed mitigation measures. The minor concerns of the project and the necessary mitigation measures have been highlighted in the report and mainly in the Environmental Management Plan of the project. Some of the anticipated impacts include noise and air pollution. During construction, air and noise pollution will increase as a result of construction activities. However, the contractor will use manual labour as much as possible to minimize the noise and air pollution as well as creating employment to reduce the cost of construction. There is no water body on site neither is the site a sensitive area.

The main activities to be carried out in the development of the proposed project includes: excavation/earthwork, actual construction and landscaping. Some of the recommendations made include, ensuring proper disposal of waste, use of safety nets/sheets, erection of safety warning signs, provision of the necessary personal protective equipment for the workers and ensuring materials are sourced from genuine suppliers and use of manual labour to minimize noise and air pollution. An Environmental Management Plan was established for the project describing the parameters to be monitored and suggesting how monitoring should be done, how frequently, who should be responsible

APPENDICES

APPENDIX 1: LAND DETAILS



006854

FORM P.P.A. 2
THE PHYSICAL PLANNING ACT (NO. 6 OF 1996) [S.33(1)(a)]

OUR REF: CPD/PIS/00203/209/64/11/NHM/sng APPLICATION REG. NO. PPA2.

NOTIFICATION OF APPROVAL OF DEVELOPMENT PERMISSION

1. ~~Sub-division~~
 2. ~~Sub-division & amalgamation~~
 3. ~~Amalgamation~~
 4. **Change of use** from Residential to Offices and Apartments
 5. ~~Extension of use~~
 6. **Extension of Lease**

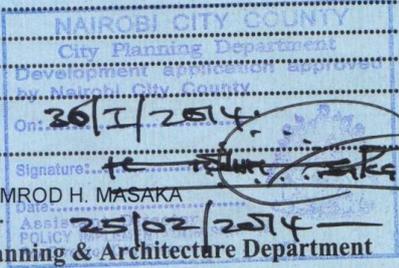
To
 Kefa Omoti
 P.O. Box 94
KITENGELA

Your application, numbered as above, submitted on 27/01/2014
 Change of use 209/64/11

Seeking permission for Westlands Muthithi Road
 Situate in Road 30/01/2014
 Was approved by the Town Planning Committee held on 46
 Under item Subject to the following/append conditions:

- i) Submission of satisfactory building plans within one year and completion of construction within two years otherwise the approval lapses.
- ii) Payment of revised ground rent as will be determined by the Commissioner of Lands.
- iii) Payments of revised rates as will be determined by the Chief Valuer - Nairobi City Council.
- iv) Subject to the plot not constituting part of the disputed public/private utility land/allocations.
- v) Subject to compliance with Sections 36, 41 and 52 of the Physical Planning Act.
- vi) Subject to compliance with the approved zoning policy.
- vii) Subject to provision of appropriate setback(s) as per the rezoning plan.
- viii) Subject to provision of adequate and functional on-site parking to the satisfaction of the City Engineer.

Date 20/02/2014 Signed Name: NIMROD H. MASAKA
 For: Director City Planning & Architecture Department


 NAIROBI CITY COUNTY
 City Planning Department
 Development application approved
 by Nairobi City County
 On: 20/1/2014
 Signature: [Handwritten Signature]
 Date: 25/02/2014

cc The Director of Physical Planning, Nairobi
 The Commissioner of Lands, Nairobi
 The Director of Surveys, Nairobi
 The Land Registrar

 KENYA REVENUE AUTHORITY		Taxpayer Registration Certificate		Document Number: 9601394
General Data of the Taxpayer				
Name	WESTLANDS SKYE DEVELOPMENT LIMITED			Taxpayer Category
Taxpayer PIN	P051443550Z			DOMESTIC
Registration Date	Nov 12, 2013			
Activity	Construction of buildings			
Contact Information				
District	NAIROBI EAST	City/Town	NAIROBI CITY (EAST)	
Street / Road	MUTHITHI ROAD	Building	DOMINION HOUSE	
Area Name	42	LR Number	209/64/11/2	
P.O. Box	00100 - 46671			
Main Email Address	info@wia-eastafrica.com			
Tax Obligation	INCOME TAX COMPANY (IT2C)		Obligation Register Date	
			DEC 31, 2012	
*This certificate is computer generated and therefore not signed. It is valid certificate issued under the authority of KRA.				



No. CPR/2013/121449

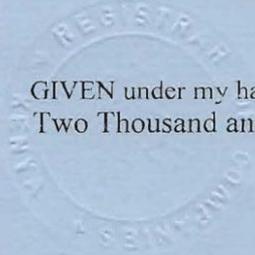
CERTIFICATE OF INCORPORATION

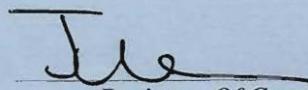
I hereby CERTIFY, that -

WESTLANDS SKYE DEVELOPMENT LIMITED

is this day Incorporated under the Companies Act (Cap. 486) and that the Company is **LIMITED**.

GIVEN under my hand at Nairobi this **4th** day of **November**
Two Thousand and **Thirteen**




Registrar Of Companies
Dr. K.

REGISTRY OF TITLES.
(Inland District).
CERTIFICATE OF TITLE.

TITLE NO. I.R. 5816.
ANNUAL RENT: SHS: 20/-
TERM: 99 YEARS FROM 1.4.1904 to 1.4.2003.

UMEDBHAI TULSHIBHAI PATEL of Nairobi in the Colony of Kenya -----
Accountant pursuant to a Transfer registered as Number I.R.1446/26
is now the proprietor as lessee from the Crown for the term of --
ninetynine years from the First day of April One thousand nine ---
hundred and four of ALL those two pieces of land situate in ----
Nairobi Municipality (Parklands) in the Nairobi District of the --
said Colony containing by measurement Nought decimal five two ----
three of an acre and Nought decimal seven nine eight of an acre --
more or less that is to say Land Reference Numbers 209/64/11 and ---
209/64/12 respectively of Meridional District South A. 37 1 which
g. II. d. said pieces of land with the dimensions abuttals and boundaries
thereof are delineated on Land Survey Plans Numbers 38389 and ---
38390 attached to the said Transfer and are portions of the land
comprised in a Grant registered as Number I.R.1446/1 subject to
the provisions of the Registration of Titles Ordinance (Chapter
142 of the Revised Edition of the Laws of Kenya) and the Crown ---
Lands Ordinance (Chapter 140 of the Revised Edition of the Laws of
Kenya) (excepting Part Eleven thereof) to such special conditions
as are contained in the said Grant and to such special conditions
and encumbrances as are notified by Memorandum written hereon and
to the payment of the annual rent of Shillings twenty. IN WITNESS
WHEREOF I have hereunto signed my name and affixed my seal this
thirteenth day of January One thousand nine hundred and fortythree.

[Signature]
REGISTRAR OF TITLES.

MEMORANDUM OF SPECIAL CONDITIONS AND ENCUMBRANCES:
NIL

COLONY & PROTECTORATE OF KENYA.

DISTRICT OF NAIROBI

Land Reference No. 209/64/11
(Orig. No.)

Locality Nairobi Municipality (Parklands)

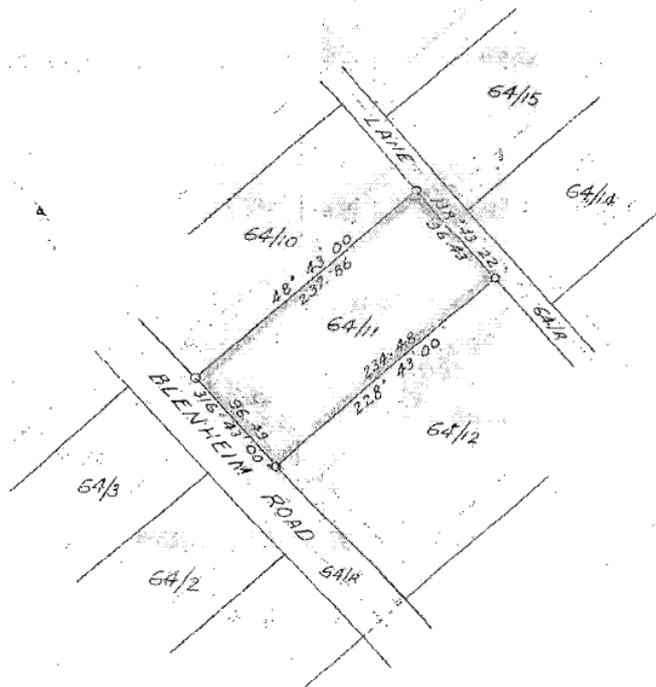
Subdivision No. (Orig. No.)
of Section No.

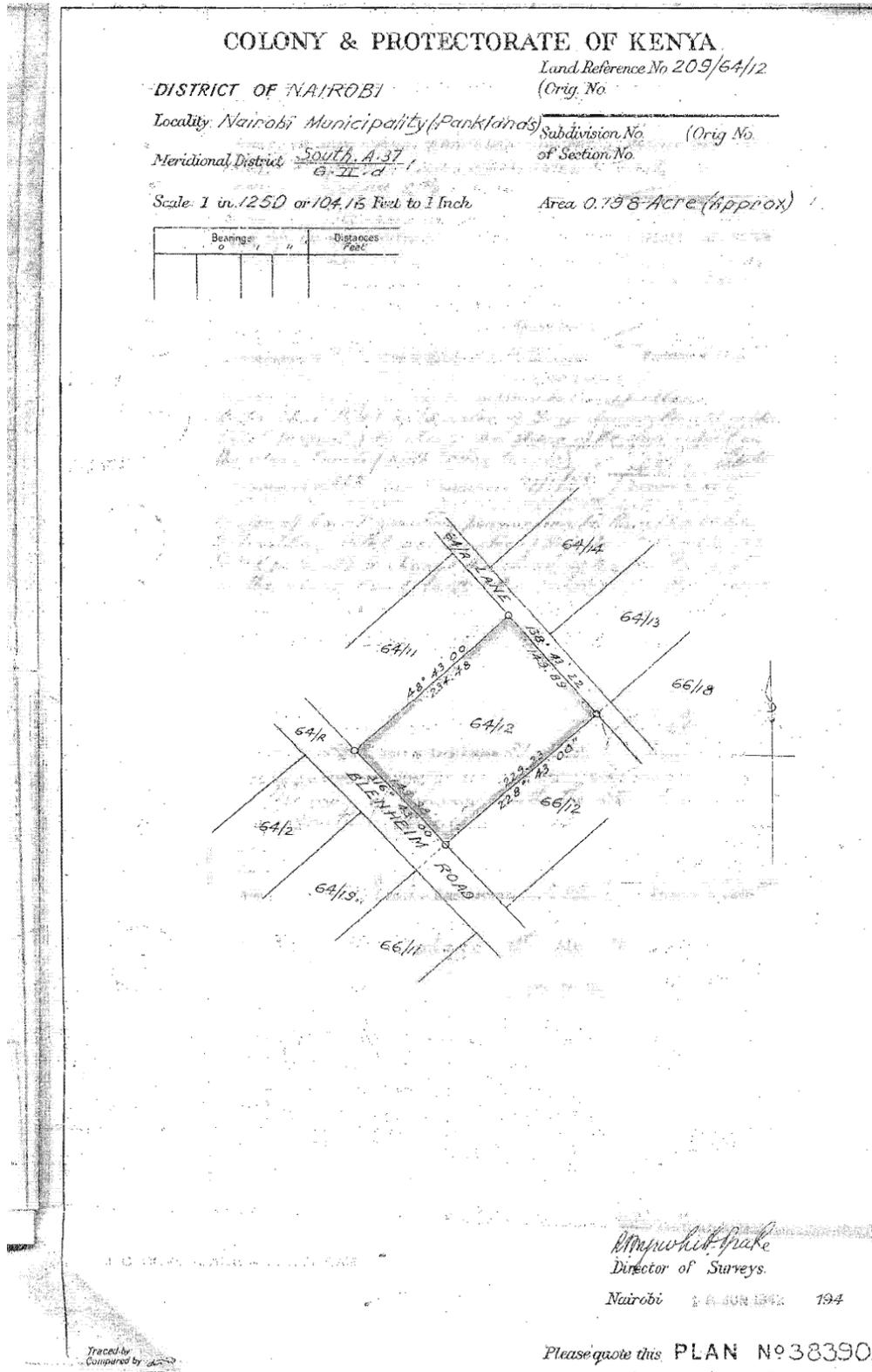
Meridional District South A 37
G.I.E. d

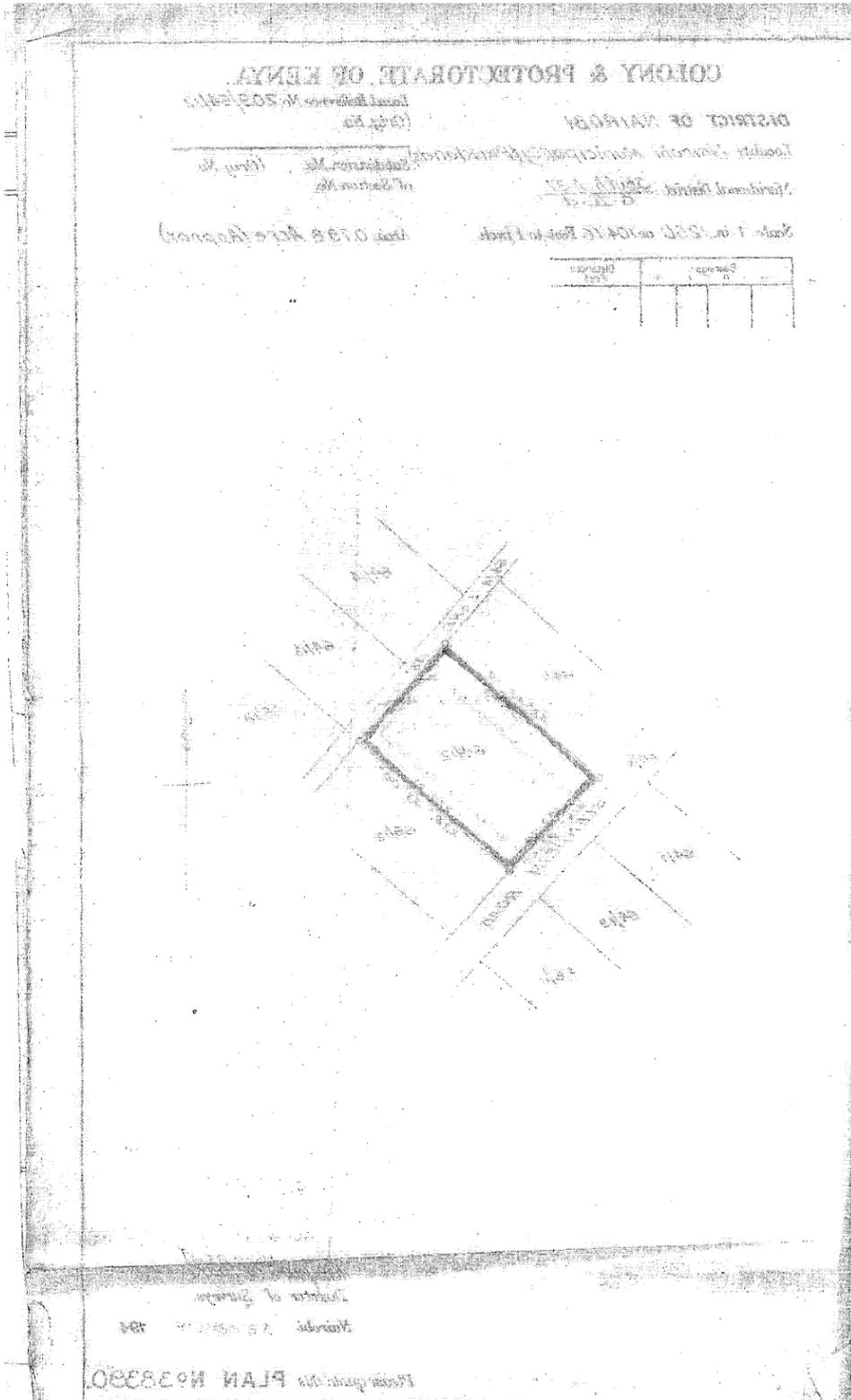
Scale: 1 in. = 1250 or 104.16 Feet to 1 Inch

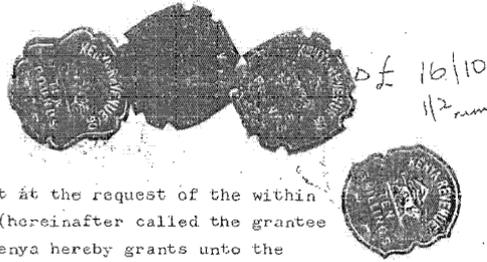
Area 0.523 Acre (Approx)

Bearings		Distances Feet
o	'	









KNOW ALL MEN BY THESE PRESENTS that At the request of the within named SUBHAGHCHAND PREMCHAND SHAH (hereinafter called the grantee the President of the Republic of Kenya hereby grants unto the grantee all that the within written piece of land for a further term of thirty one years from 1st April Two thousand and three in addition to the within written term subject however in addition to such charges Acts and special conditions as are specified or implied in the within-written certificate of Title and also to the payment in advance on the first day of January in each year of the annual rent of shillings Sixteen thousand one hundred fifteen. AND in consideration of the Government of Kenya granting the above term the grantee HEREBY AGREES to pay with effect from the first day of February, 1988 the enhanced annual rent of shillings Sixteen thousand one hundred and fifteen (Shs.16,115/-) for the within-written term in lieu of the within-written rent.

IN WITNESS whereof the Commissioner of Lands by order of the President has set his hand and the Grantee has also set his hand this *Twenty Fourth* day of *January* One thousand nine hundred and Ninety.

SIGNED by WILSON GACANJA the Commissioner of Lands in the presence of:-

M. R. S. SETHI
REGISTRAR OF TITLES

SIGNED by the Grantee in the presence of:

M. R. S. SETHI
ADVOCATE
P.O. Box 4205 NAIROBI

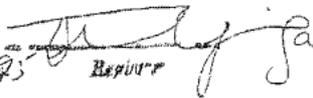
DRAWN BY:

J.M. Okungu
Deputy Principal Registrar of Titles
NAIROBI

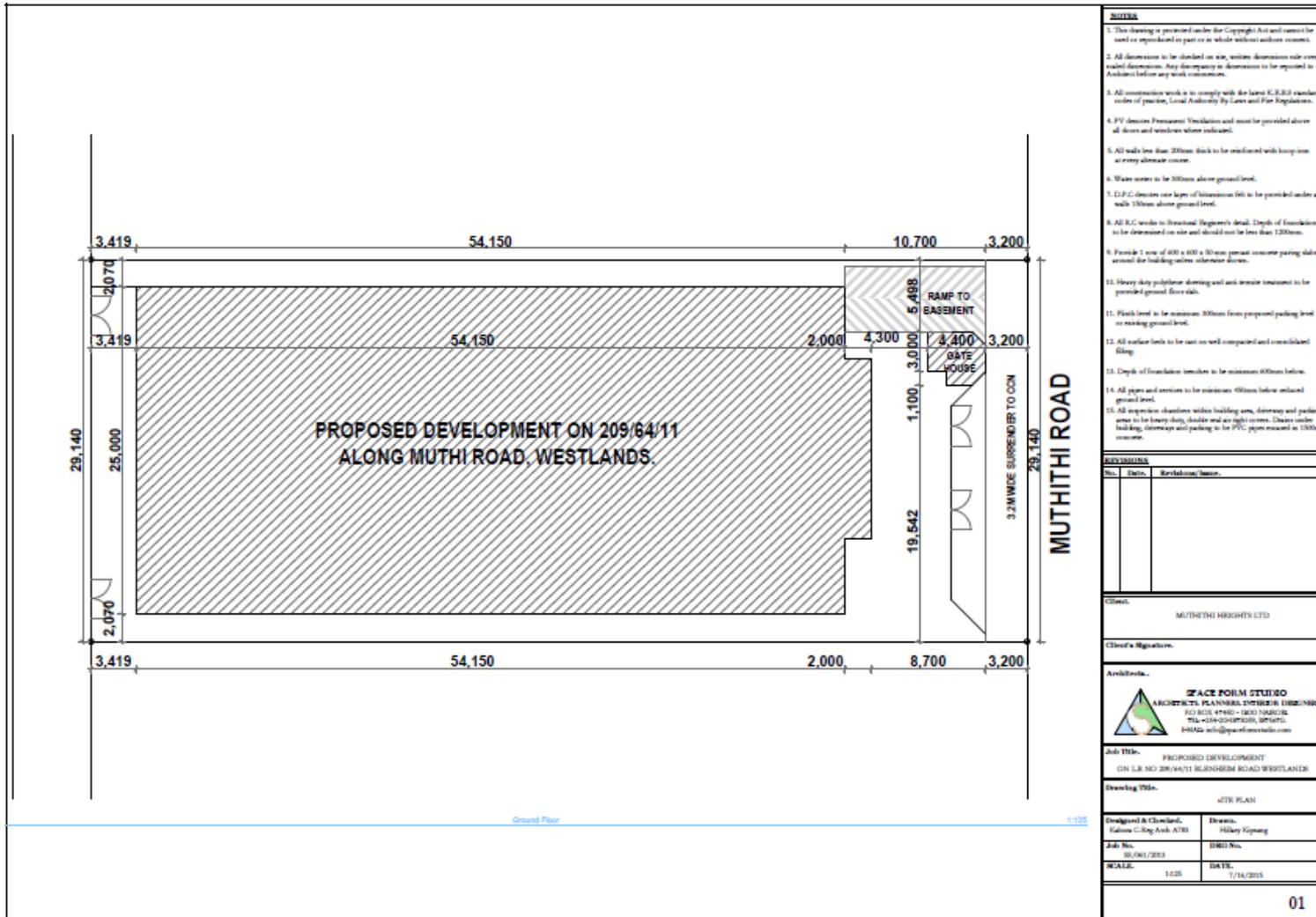
5816/18
5th February 1990
Time 16:21 hrs *Pruthi daga*

14

THE FOLLOWING INSTRUMENT HAS BEEN REGISTERED AGAINST THE TITLE
Discharge of Charge No. 17
above:

Instrument No. 759 Date of Registration 15-8-93  Registrar

APPENDIX 2: PROJECT DESIGNS AND SITE PLANS



NOTES		
1. This drawing is protected under the Copyright Act and cannot be used or reproduced in part or as whole without authors consent.		
2. All dimensions to be checked on site, written dimensions take over scaled dimensions. Any discrepancy in dimensions to be reported to the Architect before any work commences.		
3. All construction work is to comply with the latest SANS standards codes of practice, Local Authority By Laws and Fire Regulations.		
4. PV denotes Permanent Ventilation and must be provided above all doors and windows where indicated.		
5. All walls less than 200mm thick to be reinforced with hoops one at every alternate course.		
6. Wain notes to be 300mm above ground level.		
7. D.P.C. denotes one layer of bituminous felt to be provided under all walls 150mm above ground level.		
8. All R.C. works to Standard Engineer's detail. Depth of foundations to be determined on site and should not be less than 1200mm.		
9. Provide 1 row of 600 x 600 x 50mm porous concrete paving slabs around the building unless otherwise shown.		
10. Heavy duty public/private streeting and anti-traffic treatment to be provided ground floor slabs.		
11. Finish level to be minimum 300mm from proposed parking level or existing ground level.		
12. All surface levels to be set on well compacted and consolidated filling.		
13. Depth of foundation timbers to be minimum 600mm below.		
14. All pipes and services to be minimum 400mm below undisturbed ground level.		
15. All inspection chambers within building area, driveway and parking areas to be heavy duty, double and air tight covers. Covers under building, driveway and parking to be PVC pipes raised to 1500mm course.		
REVISIONS		
No.	Date	Revisions/Issues
Client: MUTHITHI HEIGHTS LTD		
Client's Signature: _____		
Architect:  SPACE FORUM STUDIO ARCHITECTS PLANNERS ENGINEERS INTERIORS PO BOX 47440 - 00100 NAIROBI TEL: +254-20-4747500, 4747501 WWW.SPACEFORUMSTUDIO.COM		
Job Title: PROPOSED DEVELOPMENT ON L.R. NO 209/64/11 BLENHEIM ROAD WESTLANDS		
Drawing Title: SITE PLAN		
Designed & Drawn by: Edwin C. Deyi Arch. A20	Drawn: Silvery Kinyanjui	
Job No.: SF/061/2015	Drawn No.:	
SCALE: 1:25	DATE: 17/10/2015	
01		

APPENDIX 3: PUBLIC PARTICIPATION MATERIALS
STAKEHOLDER ENGAGEMENT BACKGROUND INFORMATION DOCUMENT (BID)

**WESTLANDS SKYE DEVELOPMENT LIMITED MIXED USE COMMERCIAL
OFFICE/HOTEL COMPLEX PROJECT ON MUTHITHI ROAD
ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT
BACKGROUND INFORMATION DOCUMENT**

Document Purpose	Project Description
<p>As required by the Environmental Management & Coordination Act of 1999, for any project that may have an impact on the environment, an Environmental Impact Assessment should be prepared outlining these impacts and importantly how they will be managed.</p> <p>As part of the EIA process stakeholders should be engaged to facilitate this, and this is the purpose of this document.</p> <p>This document and the Comment Registration Sheet provides stakeholders with information about the Mixed use development project and enables them to comment in an informed manner thereby contributing to the objectives of the Environmental & Social Impact Assessment. All comments are welcome to the Address below before the 30/6/2012</p> <p>Mr Phillip Wandera Public Participation Office EIA Consultants Email: wanderapo12@gmail.com Phone: +254 0722486064 Address: P.O Box 1028-00517 Nairobi, Kenya</p>	<p>The development comprises the development of a modern mixed use Office/Hotel complex anchored by a Business Hotel on plot No L.R.No. 209/64/11 on Muthithi Road, Westlands, Nairobi County. The project shares impacts similar to most construction ditto urban development projects, and are thus manageable through the proposed EMP that was developed commensurate to the assessment of its impact in this report.</p> <p>The project will be implemented on a plot relatively flat measuring approximately 0.5 acres with two old residential buildings that will be removed to pave way for the proposed office block. The development once completed, will offer state of the art premium offices and an internationally styled business hotel housed in an 18 storied office block consisting of two towers-wing A and B. The building will have at least three (3) basements that will serve as the parking area for tenant cars having a total of 40 vehicle parking spaces each. The building will also be serviced with four (4) lifts, have fibre cable serving all the floors. As part of the building services; Electricity and water are readily available. The project wants to achieve a work and play character making it appealing to potential tenants. The construction will have the following but not limited to:</p> <ul style="list-style-type: none"> • Ground floor; a restaurant the will house a coffee house , lettable commercial space that will be converted to shops, general storage space, service yard for vehicles, building lobby, docking areas for delivery and a transformer room. • First floor; having several meeting rooms, lobby, restaurant and accompanying office space. • Subsequent floors will have typical floor plans that will comprise; office spaces that will be partitioned according to need, office lobby areas and storage areas complete with WC, kitchenette facilities. Each floor will have a balcony area with fire escape, served with both staircases and lifts for each tower. • Top floor of the building will have an artic/ service floor that will consist of the following; Gym space, adult and baby swimming pool, sauna, steam, treatment and changing rooms. This floor will have a bridge between the towers that will characterize it, being the only floor that links tower A and B. this floor will have an executive lounge, luxury bar-roof top bar, kitchenette, infinity pool and external sitting space on wing B. <p>The project will be implemented in two phases i.e. construction of tower A followed by that of Tower B. This is due to the limitation of financial resources.</p> <p>In terms of services and utilities the project will use: Power from the national grid and also have back-up generators; Water from the Nairobi water mains and also sink a borehole; Sewerage through the Nairobi Sewerage network.</p>

Public Participation Questionnaire

Environmental and Social Impact Assessment for the Proposed Construction of Westlands Skye office Block Project on L.R.No. 209/64/11 COMMENT REGISTRATION SHEET
--

Please complete and return to either of the addresses below by 30th July 2015:

Phillip Wandera
Nairobi, Kenya | Cell +254 0722486064
Email: wanderapo@gmail.com

TITLE		FIRST NAME	
INITIALS		SURNAME	
ORGANISATION		EMAIL	
POSTAL ADDRESS			
		POSTAL CODE	
TEL NO		FAX NO	

COMMENTS (please use separate sheets if you wish)

1. **The following environmental, social and economic issues must be addressed during the ESIA process:**

--

2. **My comment on the public consultation and technical processes is as follows:**

--

3. **Any other comments:**

--

4. **Please add the following colleagues / friends to your mailing list:**

Name:		Sector/Organisation:	
Telephone & Address:			
Name:		Sector/Organisation:	
Telephone & Address:			
Name:		Sector/Organisation:	
Telephone & Address:			

THANK YOU FOR YOUR PARTICIPATION

Questionnaire No.	Title	Initials	First name	Surname	Email	Organisation/occupation	Postal addresses	Postal code	Tel no
1	Mr		Fred	Okiru	kellymaina25@yahoo.com				714781621
2	Mr		Kellen	Maina					708148153
3	Mrs		Margret	Kwamboka					721568705
4	Mr		Mwihia	Raphael					722426981
5	Miss		Mary	Omollo					725733816
6	Mr		Denis	Wagah	wagahdenis@yahoo.com				717682921
7	Miss		Joy	Mwikali					708472189
8	Mrs		Mary	Mokko					721617127
9	Mrs		Sidney	Mercy					729853399
10	Miss		Irene	Kimani		Business Woman			721766504
11	Mr		Elisha	Otieno		Westlands Resident			721600797
12	Mr		Stephen	Muindu		Business Man			722696361
13	Mr		Reuben	Gitonga		Butcher			727831973
14	Mrs		Patricia	Ndung'e		Pharmacist			727942339
15	Miss		Alice	Mukiama		Mpesa Agent			726232853
16	Miss		Irene	Musau		Beauty Center			722993425
17	Mr		Hassan	Fred		Butcher			727787281
18	Mr		Jacob	Mulinge		Fruit Dealer			720869466
19	Miss		Emily	Daniel		Mpesa Agent			715522757
20	Mr		Herman	Akumu			3772	00100-NAIROBI	721246232
21	Miss		Lucy	Kemboi					719197034
22	Mr		Onesmus Muia	Kimetu			587 TALA		725874026
23	Miss		Lucy	Ngondi					707556963
24	Mrs		Christine	Jawa	christineja235@yahoo.com				718893661
25	Mrs		Agnes	Awuor					731545308
26	Miss		Joan	Muhow	nyakiryuaus@yahoo.com		31796	00600-	720618128

Questionnaire No.	Title	Initials	First name	Surname	Email	Organisation/occupation	Postal address	Postal code	Tel no
								NRB	
27	Mr		Peter	Muthua		Business Man			700112241
28	Miss		Tabitha	Ngoyo	tabithamanyasi@yahoo.com				721239398
29	Mr		Aaron	Musyoki	musyokiaaronsmwel@yahoo.com		80 KAT HIAN I	9010 5	729063106
30	Mr	D k m	Dennis	Mbaluka	kimanthi.dennis@yahoo.com		41412	100	726240272
31	Mrs		Janet	Jawa	jmishy2008@yahoo.com				712241550
32	Mrs	J. W .N	Jane	Wairimu	jane.njogu@eabl.com	Eabl	30161, NRB		864000
33	Mr.		Wanjohi	Thumbi	wanjohithumbi@gmail.com	Lenum Pharmacy			729352314
34	Miss	C w n	Carol Wanjiku	Njoroge	carol@gmail.com	Mpesa Agent	637- 00618 ruara ka	9\8 Naro bi	
35			Daniel	Oriango		Homeland Boda Boda			718156972
36	Mr.		Ronald	Muchi		Homeland-Boda Boda			738293038
37	Deo- Kasar ani		Catherine	Thaithi	catethaithi@yahoo.com	Nema	67839	oo20 0	020-217804
38	Mr.		Samuel	Wainaina	soyalslim7@yahoo.com	Business Man			720887431
39	Mrs		Ann	Muthoni		Business Lady			724150785
40	Mr		John G	Gachai nja		Business Man			713392843
41	Miss		Angela	Mwongeli		Business Lady			713311397
42	Mrs		Carol	Ochiong		Business Lady And A Resident For 4yrs			700126328
43	Mr		Charles	Kamau		Mpesa Agent			
44	Mr		Martin	Odhiambo		Resident 10 Yrs			
45	Mr.		Simon	Musyoka		Business Man/ Resident			711143123
46	Miss		Rose	Wambui		Business Lady			720764732
47	Mr		Charles	Marango		Business Man			
48	Mr.		Joseph	Muriu		Business Man-			

Questionnaire No.	Title	Initials	First name	Surname	Email	Organisation/occupation	Postal addresses	Postal code	Tel no
				ngi		Hotel			
49	Mrs.		Esther	Michuki		Business Lady			714093503
50	Mr.		Titus	Mwangi		Business Man-Workshop			
51	Miss		Caroline	Kagwiria	kagwiriacar@yahoo.com	M-Pesa Agent	56, Nairobi		734318554
52	Mr		Njoroge	John		Mseto Club			
53	Mr		Moses	Maina		Mseto Club			724692392
54	Mdm		Lucy	Wangu		Mseto Club			718549147
55	Mrs		Rose	Achien		House Wife			
56	Miss		Hellen	Adhiambo		House Girl			706647298
57	Mrs		Catherine	Muthe		House Wife			722878028
58	Mr		Joseph	Mbugua	jambugs@yahoo.com	Business Man			
59	Mrs		Rose	Awiti		Business Lady			717921758
60	Mr.		Martin	Mburu	matyng@gmail.com	Tripple M Motors	31412, NRB.	00600	020-8164066
61	Mr.		David	Kimondo		Business Man			712462760
62	Mr		Sammy	Mwaura	tony@yahoo.com				786225099
63	Mr		Peter	Mwangi					720208863
64	Mr		Joseph	Githinji					731050206
65	Miss		Irene	Gathuki					727714667
66	Mr.		Benard	Andabwa		Salama Inn			705767437
67	Miss		Ruth	Kamande		M-Pesa Agent			715713385
68	Electrical Engineer		Tom	Omwan	tom.omwange@eabl.com	Eabl	30161, NRB		
69	Miss		Irene	Adoyo	iadoyo@yahoo.com				705994978
70	Miss		Juliana	Mukami		Resident-10 Months			
71	Mrs		Esther	Mwikali		Resident			

Questionnaire No.	Title	Initials	First name	Surname	Email	Organisation/occupation	Postal address	Postal code	Tel no
72	Mr		Joseph	Mwangi		Resident/Boda Boda Business			734283728
73	Mr		John	Kamau		Resident			700123476
74	Mr.		Mosses	Mwangi		Resident-5 Years			722145498
75	Miss		Judy	Wambua		Resident-5 Years			714258191
76	Mr		Raphael	Aballa		Ruaraka Baptist	655	618	721531234
77	Office Asst	E w m	Elizabeth	Muraguri	lizkinyua@gmail.com	Providence Academy	655	618	208562729
78	Administrator	C. A	Stephen	Mlewa	lambstiv@yahoo.com	Ruaraka Baptist	1194	618	721221308
79	Headteacher	L. N. O	Lucy	Otieno	cylunjoroge@yahoo.com	Providence Academy	655	618	722778822
80	Mr.	P	Gerald	Taylor	taylor@swiftkenya.com	Willmary Development	303	618	720892222
81	Miss	F w w	Florence	Mwangi	flowangechi@yahoo.com	Pck	5878	100	723704441
82	Mdm	M .K	Margaret	Kiambi	maggy.kiambi@yahoo.com	Pck	1436	232	
83	Mr		Ben	Barasa					720657591
84	Director		Paul	Muya	muyapaul63@yahoo.com	Ugua-Pole Pharmacy	18711	100	736813884
85	Mdm		Esther	Munyo	esther-munyao@yahoo.com		59 katan gi		789217854
86	Mr.	W m g	Mutahi	Gathendu		Driver	295 Nyeri		723541334
87	Mr.	C m n	Mbogo	Njeri		Driver	212 Othaya		720643115
88	Mrs		Anastatia	Maina		Cosmetic Shop			725833970
89	Mr		Paul	Okedah		Sajojo	48409 Ruaraka		710412310
90			Ann Janet				1207	618	
91	Mr		Collins	Wafula					716915651
92	Mr		Emmanuel Juma	Wekesa					715558797
93			Harison	Mutua					202092557

Questionnaire No.	Title	Initials	First name	Surname	Email	Organisation/occupation	Postal address	Postal code	Tel no
94			Grace	Mwangi		Mpesa Agent			725613819
95			Patrick	Makau		Sdv Transmia Contractors			726261340
96	Mr		Gerald	Kaduyu		Businessman	503782		7234838
97			Priscilla Kajaira	Muhongo	kajairaprisilla@yahoo.com				716342971
98	Mr	Enk	Eustus	Kanyeki	keustus@yahoo.com	Cybertronics	937 RUA RAKA	618	712862583
99			Andrew Gitau	Mwangi	mwangigt@yahoo.com	Partnership Upways Hotel And Erivine Hardware	10714	400	202428157
100	Mr		Micheal	Onyango		Eabl Employee	30161	100	
101			Joyce	Macharia	joyce.macharia@eabl.com	Environmental Manager Eabl			715513106
102	Miss		Mary	Athiambo					725084667
103	Mrs		Janet	Mbuvi					737747727
104	Mr		Samuel	Thuita		Doshs	34120	100	020-2067722
105	Logistic Co-Ordinator	Janet	Jeff	Deasy	LC-Kenya@plancetenn.com	Baptist Mission Of Kenya	30405	100	0733 610280

APPENDIX 4: WASTE MANAGEMENT PLAN DEVELOPMENT

This framework proposes a methodology by which a plan (and its key elements) could be developed to manage the waste that will be generated in the Proposed project. The purpose of this plan will be primarily to ensure that the waste generated is well managed implying the activities, administrative and operational that are used in handling, packaging, treatment, conditioning, reducing, recycling, reusing, storage and disposal of the waste. Under this framework plan, the term waste refers to but not limited to wastes such as:

- Solid waste
- Domestic waste
- Hazardous waste

This framework is broken down into the following listed subsections that explain the methods and tools that will be necessary to develop the waste management plan framework (WMPF):

- Introduction and Preamble
- Policy
- Legal Framework
- Identification and Assessment of different wastes
- Documentation
- Responsibilities
- Monitoring and Reporting
- Budget

Introduction and Preamble

The WMPF can begin with a preamble explaining its scope and purpose, whereby the scope will clearly explain the spatial and temporal extent of the plan. The extent of the scope of this plan will ensure its credibility and guide it to achieving its overall objective of ensuring that the different type of waste generated are handled, stored, transported and disposed safely when necessary. A glossary of terms can be appended to the WMPF.

Waste management Policy

A waste management policy which will be the driving force of the WMPF should be developed and signed by the facilities' top management. The signatures of the top management will show the commitment to the plan and it should be made available to all parties involved in the project such as staff, suppliers, temporary staff, residents, private firms or people working on behalf of the project's management etc. This policy should be developed through a consultative process to ensure commitment to it.

This policy should be made available to anyone who may have a direct or indirect role in the management of the waste generated in the project. The policy should be structured in accordance to the scope of the WMPF and should be as practical and easy to understand as possible. In cases where services may be consulted the policy should form part of the procurement guides and the firms/individuals contracted to work on behalf of the project/company should be made aware of the policy and be subject to it.

The policy should be aimed at an overall goal of safe and sustainable management of wastes and be then broken down to specific goals and thereby targets for every type of waste generated in the project. These targets are what will be used to develop methodologies for waste management that will ensure the goals

are achieved. Overall the primary goal of the WMPF should be to take all practical steps of ensuring that the waste is managed in a manner which will protect human health and the environment against the adverse effects which may result from the waste during the duration of the project.

Legal Framework

The WMPF should include an assessment of laws dealing with the management of wastes such as Environmental Management and Co-ordination (waste management) Regulation, 2006 and City Council by laws on waste management, OSHA of 2007 amongst others. This assessment should be brief and focussed on what the acts stipulate in terms of waste management placing more emphasis on waste minimization, cleaner production and segregation of waste at the source.

Identification and Classification of wastes

An identification of all waste that will be generated in the different phases of the project should then be done. The wastes should be identified in terms of their:

1. Type e.g. if they are solid waste, Domestic waste or hazardous waste.
2. Nature e.g. if they are chemicals their chemical composition and chemical formulae including common names for ease of identification
3. The risk the waste present should also be classified and rated based on the effect they may have on human, animals and the environment.

Commensurate to the level of risk all the waste should have procedures established for their: handling, transportation, storage, use, emergency response and all the equipment involved in all these. These procedures should be documented, established and maintained to enable them to be updated as necessary in a continuous improvement cycle.

A table can be developed to manage all this information for every category of waste placed in a row and the parameters in columns and this can also be stored as a worksheet or database dependent on the number. This will enable the parameters and waste to be easily updated as the project proceeds.

Documentation

The WMPF should also have documents and document control for all the sets of information that will be necessary for its implementation. These will include documents for: the WMPF itself; the established procedures; PPEs; maintenance; responsibilities; budgets; reports; licenses; finances; incident logs; communication logs; results of the identification and assessment of wastes; emergency response, and MSDS amongst other aspects of the WMPF. The documents should as much as possible kept and maintained digital formats for ease of updating and backing up.

Responsibilities

The WMPF should also delineate all parties involved in the management of wastes in accordance to their contractual obligations which put them in play in the project. It is assumed that some of these responsibilities may be outsourced while others will remain the duty of the facility management. These institutional arrangements of WMPF should all be established in the scope of the WMPF as well as the level and detail of engagement of each party will be given in detail.

Additionally the specific roles of the individuals who will be involved with the wastes should also be given by the activity they will be charged and the particular type of waste involved. This will enable an ease in the identification of the procedures to be followed in every stage of their management. A hierarchy of responsibility should be made known in the plan and communicated to all parties involved whilst making the

contacts of the people involved known and easily accessible. The requisite qualifications of all those involved in implementing the WMPF should be listed and updated as necessary in order to inform any capacity building training that may be targeted at the individuals.

Lastly all communication protocols necessary for the effective implementation and management plan will also be established in part of the plan and explained in terms of the organizational structure necessary for the WMPF. This will enable buck stopping and follow up whilst facilitating timely and effective communication which is vital for the achievement of the plan especially in the event of incidents or accidents. This communication channels will also include communication with external parties such as state institutions charged with the management of Wastes e.g. NEMA and the County City Council. Other external parties will also be included in the establishment of communication protocols and these will include: private firms that may be hired to work on behalf of the project or suppliers of materials that will generate waste in the project cycle. Standardized templates for communication may be developed and internally circulated before being disbursed to the addressee in the case of external communication. An external communication register should also be maintained on the part of the WMPF.

Monitoring and Reporting

The WMPF should have an established procedure for internal monitoring based on indicators that measure its effectiveness, efficiency and impact in achieving the pre-set objectives: goals and targets. A good selection of practical indicators should be made in line with those proposed in the ESMP of this report as well as statutory indicators. Data analysis softwares can be used to measure and record these indicators and performance graphs and thresholds deduced. Monitoring records should also be maintained to enable for external review and auditing, and each aspect to be monitored should have specifications for how often the monitoring parameters will be measured or recorded in line with statutory requirements.

Lastly the project management or personnel charged with waste management should develop standard methods for both internal and external reporting. External reporting will mainly be to state organizations such as NEMA and the frequency will be as legally defined by the acts governing waste management in the country and on any incidences. Standard templates can be developed for any reports and logs to be used in the reporting and the records should be maintained as stipulated in the documentation section. Importantly internal reporting can be at the discrepancy of the plan but it should allow for effective internal communication therefore it must be at higher frequencies than those of external reporting. Thus a schedule for reporting and monitoring can be developed and appended to the WMPF.

Budget

The HSMP should also include a budget that will contain all costs associated with its implementation. This will include costs associated with: equipment, outsourced services, training, monitoring, reporting, document control, implementing the procedures etc. The budget should always be clear and reflect the actual needed finances for the WMPF since this always forms an important monitoring aspect that will inform decision making based on the plan's cost effectiveness.

APPENDIX 5: HAZARDOUS MATERIAL SAFETY PLAN DEVELOPMENT

This framework proposes a methodology by which a plan could be developed to manage the hazardous materials that will be used in the proposed project. The purpose of this plan will primarily to ensure that the hazardous materials are used, handled, stored, transported and disposed safely when necessary. This will be in order to minimize or eliminate the risks of toxic spills and contamination that may impact both the environment and human life. This framework is broken down into the following listed subsections that explain the methods and tools that will be necessary to develop the HMSMP:

- Introduction and Preamble
- Policy
- Legal Framework
- Identification and Assessment of HazMats
- Documentation
- Responsibilities
- Monitoring and Reporting
- Budget

Introduction and Preamble

The HMSMP can begin with a preamble explaining its scope and purpose, whereby the scope will clearly explain the spatial and temporal extent of the plan. The extent of the scope of this plan will ensure its credibility and guide it to achieving its overall objective of ensuring that the hazardous materials are used, handled, stored, transported and disposed safely when necessary. A glossary of terms can be appended to the HSMP.

HazMats Policy

A HazMats policy which will be the driving force of the HSMP should be developed and signed by the facilities' top management. The signatures of the top management will show the commitment to the plan and it should be made available to all parties involved in the project such as staff, suppliers, temporary staff, residents, private firms or people working on behalf of the project's management etc. This policy should be developed through a consultative process to ensure commitment to it.

This policy should be made available to anyone who may have a direct or indirect role in the management of HazMats in the project and more specifically anyone who will be handling, storing, working with or nearby, transporting or disposing HazMats in the project or a by-product of the project. The policy should be structured in accordance to the scope of the HSMP and should be as practical and easy to understand as possible. In cases where services may be consulted the policy should form part of the procurement guides and the firms/individuals contracted to work on behalf of the project/company should be made aware of the policy and be subject to it.

The policy should be aimed at an overall goal of safe and sustainable management of HazMats and be then broken down to specific goals and thereby targets for every HazMat in the project. These targets are what will be used to develop methodologies for HazMat management that will ensure the goal for each HazMat is achieved. Overall the primary goal of the HSMP should be to manage all risks from HazMats and there being no incidences of pollution, contamination or biophysical hazards from HazMats during the duration of the project.

Legal Framework

The HSMP should include an assessment of laws dealing with the management of HazMats such as Legal Notice 121 (Waste Management Regulations) and OSHA of 2007 amongst others. This assessment should be brief and focussed on what the acts stipulate in terms of HazMats, procedures, labelling, monitoring and reporting.

Identification and Classification of HazMats

An identification of all HazMats that will be used in the different phases of the project should then be done. The HazMats should be identified in terms of their nature e.g. if they are chemicals their chemical composition and chemical formulae including common names for ease of identification. The risk the HazMats present should also be classified and rated based on the effect they may have on human, animals and the environment. The normal categories of HazMats can be used such as: Toxic substances; Poisonous substance; Noxious fumes etc. This classification should form the basis any labelling which should also be in accordance to any legal obligations for the same. This identification and classification should be established into a procedure that can be easily updated and re-run as often as necessary. Importantly, in cases where a waste may be classified as a HazMat then the procedures for handling and disposal should be similar to the ones in WMP i.e. they should reflect each other.

Commensurate to the level of risk all the individual HazMats should have procedures established for their: handling, transportation, storage, use, emergency response (Training & Drills, Spills, Contaminations & biophysical accidents) and all the equipment involved in all these. These procedures should be documented, established and maintained to enable them to be updated as necessary in a continuous improvement cycle.

A table can be developed to manage all this information for every HazMat placed in a row and the parameters in columns and this can also be stored as a worksheet or database dependent on the number of HazMats. This will enable the parameters and HazMats to be easily updated as the project proceeds.

Documentation

The HSMP should also have documents and document control for all the sets of information that will be necessary for its implementation. These will include documents for: the HSMP itself; the established procedures; PPEs; maintenance; responsibilities; budgets; reports; licenses; finances; incident logs; communication logs; results of the identification and assessment of HazMats; emergency response, and MSDS amongst other aspects of the HSMP. The documents should as much as possible be kept and maintained in digital formats for ease of updating and backing up.

Responsibilities

The HSMP should also delineate all parties involved in the management of HazMats in accordance to their contractual obligations which put them in play in the project. It is assumed that some of these responsibilities may be outsourced while others will remain the duty of the facility management. These institutional arrangements of HSMP should all be established in the scope of the HSMP as well as the level and detail of engagement of each party will be given in detail.

Additionally the specific roles of the individuals who will be involved with the HazMats should also be given by the activity they will be charged and the particular type of HazMat involved. This will enable an ease in the identification of the procedures to be followed in every stage of their management. A hierarchy of responsibility should be made known in the plan and communicated to all parties involved whilst making the contacts of the people involved known and easily accessible. The requisite qualifications of all those involved in implementing the HSMP should be listed and updated as necessary in order to inform any capacity building training that may be targeted at the individuals.

Lastly all communication protocols necessary for the effective implementation and management plan will also be established in part of the plan and explained in terms of the organizational structure necessary for the HSMP. This will enable buckstopping and follow up whilst facilitating timely and effective communication which is vital for the achievement of the plan especially in the event of incidents or accidents. This communication channels will also include communication with external parties such as state institutions charged with the management of HazMats e.g. NEMA. Other external parties will also be included in the establishment of communication protocols and these will include: private firms that may be hired to work on behalf of the project or suppliers of material that can be classified as HazMats. Standardized templates for communication may be developed and internally circulated before being disbursed to the addressee in the case of external communication. An external communication register should also be maintained on the part of the HSMP.

Monitoring and Reporting

The HSMP should have an established procedure for internal monitoring based on indicators that measure its effectiveness, efficiency and impact in achieving the pre-set objectives: goals and targets. A good selection of practical indicators should be made in line with those proposed in the ESMP of this report as well as statutory indicators. Data analysis softwares can be used to measure and record these indicators and performance graphs and thresholds deduced. Monitoring records should also be maintained to enable for external review and auditing, and each aspect to be monitored should have specifications for how often the monitoring parameters will be measured or recorded in line with statutory requirements.

Lastly the project management or personnel charged with HazMat management should develop standard methods for both internal and external reporting. External reporting will mainly be to state organizations such as NEMA and the frequency will be as legally defined by the acts governing HazMat management in the country and on any incidences. Standard templates can be developed for any reports and logs to be used in the reporting and the records should be maintained as stipulated in the documentation section. Importantly internal reporting can be at the discrepancy of the plan but it should allow for effective internal communication therefore it must be at higher frequencies than those of external reporting. Thus a schedule for reporting and monitoring can be developed and appended to the HSMP.

Budget

The HSMP should also include a budget that will contain all costs associated with its implementation. This will include costs associated with: equipment, outsourced services, training, monitoring, reporting, document control, implementing the procedures etc. The budget should always be clear and reflect the actual needed finances for the HSMP since this always forms an important monitoring aspect that will inform decision making based on the plan's cost effectiveness.

APPENDIX 6: OSHMP DEVELOPMENT

This framework presents the steps through which the Proposed Project can establish, implement and document an OSHMP. The overall purpose or objective of the plan should to continuously and continually ensure the project complies all OSH laws and regulations by managing (minimizing and eliminating where possible) all OSH risks that may emerge during the life cycle of the project through an informed participatory approach. This approach can be broken down into six main steps that are explained in the subsections herein:

- Introduction and Regulatory Obligations
- Step 1: Develop an Occupational Health and Safety Policy and Programs
- Step 2: Methods of Consultation
- Step 3: Training Strategy
- Step 4: Hazard Identification and Workplace Assessment
- Step 5: Risk Control Strategies
- Step 6: Promoting, Maintaining and Improving Strategies
- Monitoring and Reporting
- Budget

Introduction and Regulatory Obligations

The OSHMP can begin with an introduction to the plan giving a background to it as well as defining its scope temporally and spatially. Contractual obligations or arrangements can also be spelt out in this part of the plan in addition to contact details of the personnel responsible for the different aspects of the plan such as: emergencies; fire brigade; security personnel; waste management personnel; OSH officers; response personnel; section heads; company personnel responsible for OSH in the case for the companies that will working in the office blocks.

An important part of this preamble will to list and assess the laws relevant to OSH such as the OSHA of 2007. This assessment should be brief and focussed on the obligations of the different parties involved in the project in line with their contractual agreements. The legally defined obligations set out in the OSHA should also be listed to enable everyone on site to be aware of their responsibilities. These will include responsibilities for:

- Employers
- Supervisors
- Workers
- Prime contractors
- Owners
- Responsibilities of others/members of the public

Develop an Occupational Health and Safety Policy and Management Program

The health and safety policy should be a statement of the principles that project will uphold. It should be brief and intent in order to give a clear direction from the management. It will also form the basis for any OSH decisions and action by being the driving force for them. The policy should be signed by the top project management and this will: show commitment; ensure accountability; encourage co-operation, and will be able to be understood by all employees. The policy should be reviewed and updated as may be necessary.

Once the policy is developed program to meet the objectives and commitments made in the policy should be developed. The program should be a planned and coordinated activity meaning it should involve as many people as possible. It should be targeted at the specific H & S needs of the project and should the project have an OSH committee or staff they should be charged with this responsibility.

Hazards and risks will need to be identified before listing the objectives to ensure they are targeted at them. Consultation will be important in developing the OSH program therefore all people affected by it should be consulted or atleast made aware of it. This will ensure the program will have support from all people involved in the project.

The program should detail new ways, if appropriate, to perform tasks; includes information and training given to managers, supervisors and employees, such as manual handling training. The program should have a timetable for implementation and list those responsible for this. each program should be monitored so that problems are dealt with as they arise. An OHS program should be on-going so that they may be evaluated, reviewed and changed as necessary.

The policy and its related programs should be made available to all personnel by promoting it in meetings, seminars, the newsletters, notice boards and other information sources. The policy should be included in the project's induction, lease and procurement program.

Methods of consultation

Methods of consultations should then be established both internal and external and the consultation process should include:

- Establishing a workplace OHS committee
- Having meetings, workshops, suggestion boxes, and surveys to let employees know what you are doing
- Providing general OHS information such as explaining the Occupational Safety and Health Act 2007 and its implications to the project
- Making sure the input of all employees is valued
- Ensuring management shows strong commitment to the OHS committee
- Involving employees in the identification and assessment of hazards, and the development of control strategies and evaluation of controls.

Setting up a training Strategy

An OSH specific training program should be developed or included in any other training programs that will be developed in the project. This training strategy should include adequate information, instruction and supervision to ensure it is effective in the achievement of the plans objectives and statutory requirements. Since everyone directly involved in the project has duty of care they should be trained in OSH.

The training program should involve developing skills to enable everyone in the workplace to carry out their health and safety responsibility. OSH training should include more than just hazard training because OSH is part of day-to-day management. Health and Safety should be included in:

- Induction training
- Supervisor and management training
- On-the-job training
- Specific hazard training
- Work procedures and skills training
- Emergency procedure training
- First aid training

The training program should be developed through:

- Analysing work tasks and assessing the knowledge or skill level required for these tasks
- Planning and conducting appropriate training and skill development for the safe performance of all work tasks

- Planning and conducting training in these safe systems of work
- Including OHS principles in employee induction programs
- Planning and conducting training in emergency procedures
- Evaluating your training program to monitor its effectiveness
- On-the-job training of employees including apprentices

Hazard Identification and Workplace Assessment

An assessment of all workplaces present in the project and identifying all potential hazards should then be undertaken. This is because hazards are the prime identifiable cause of occupational health and safety problems, and controlling the risk arising from them will offer the greatest area of opportunity for reducing injury and illness in the workplace.

Hazards arise from: the workplace environment, the use of plant and substances in the workplace, poor work design, inappropriate management systems and procedures, and human behaviour. A set of procedures specific to the project should be developed to enable workplace hazards to be identified and assessed according to the level risk they present. This identification can be done through:

- Health and Safety Audits
- Workplace inspections
- Accident investigations
- Consultations
- Injury and illness records
- Health and environmental monitoring
- Reviewing of Complaints
- Observations

Once all potential hazards have been identified, their significance can then be assessed. The level of significance will determine the priority assigned to its elimination or control. Hazards may be; physical, chemical and biological for example, and the methods for assessing them will differ. Some of the general points that will need to be considered when assessing hazards can be:

- a. **More than one cause** - There may well be a number of factors which contribute to the probability and degree of injury or illness for a particular hazard. For example, a chemical may be toxic if split and absorbed through the skin; and a worker may not have been trained in safe clean-up procedures.
- b. **Exposure** - The significance of the risk of injury or illness may be affected by the level of a worker's exposure to a hazard. For example, the hazard posed by exposure to a solvent increases with the frequency and duration of exposure.
- c. **Severity** - This concerns the extent of the injury or degree of harm which might be caused by a hazard. A severe effect may even include death, permanent disability or an illness such as cancer or hepatitis. Some examples are electrical hazards and machinery, chemicals such as acids, and dust particles such as asbestos.
- d. **Human differences** - Hazards need to be assessed in terms of the individual or groups of employees who are exposed to them. Their skills, experience, training and physical capabilities must be taken into account. The risk from manual handling hazards can be increased by physical limitations and lack of experience in dealing with the hazard.

A matrix can be developed to measure the level of risk for every hazard by plotting its probability against the consequences it may have. This is illustrated by the color coded Table below.

OSH Hazards Matrix

Probability	Consequences		
	Death or Disability	Several Days Off Work	First Aid
Very Likely	<i>High Risk – 12</i>	08	04
Likely	11	07	03
Unlikely	10	06	02
Very Unlikely	09	05	<i>Low Risk - 01</i>

Risk Control Strategies

Risk control strategies should then be developed, established, documented and implemented in accordance to the risks identified in the hazard assessment and identification. Their purpose will be in accordance to the OSHMP's objective and be targeted at eliminating or reducing the exposure to the risk. They should also be developed by involving manufacturers and suppliers, since they usually have ready-made risk control strategies for their products. A hierarchy for the strategies can be established as follows:

1. Engineering Controls

- 1.1 DESIGNING a way that will ensure that hazards are 'designed out' when new materials, equipment and work systems are being planned for the workplace.
- 1.2 REMOVING the hazard or substitute less hazardous materials, equipment or substances.
- 1.3 ADOPTING A SAFER PROCESS through alteration tools, equipment or work systems that can often make them much safer.
- 1.4 ENCLOSING OR ISOLATING THE HAZARD through the use of guards or remote handling techniques.
- 1.5 PROVIDING EFFECTIVE VENTILATION through local or general exhaust ventilation systems.

2. Administrative Controls

ESTABLISHING appropriate ADMINISTRATIVE PROCEDURES such as:

- Job rotation to reduce exposure or boredom; or timing the
- Job so that fewer workers are exposed;
- Routine maintenance and housekeeping procedures, and
- Training on hazards and correct work procedures.

3. Personal Protective Equipment (PPE)¹³

PROVIDING suitable and properly maintained PERSONAL PROTECTIVE EQUIPMENT and training in its use.

Promoting, Maintaining and Improving Strategies

All OSH programs and procedures should be continually and continuously promoted, maintained and constantly improved. They should be reviewed regularly since their promotion and evaluation is essential for ongoing effectiveness of the OSH policy. The responsibilities involved such as the OSH committee should be involved in this review.

Some strategies for maintaining the OHS program can include:

¹³ It should be noted that PPEs do not address hazards they only provide a way of working with them. This is why they are lowest in the hierarchy of risk control strategies.

- Communicating with people in the workplace about OHS activities including the success of control strategies
- Making sure that OHS is integrated into all management procedures eg. planning, budgeting, performance objectives
- Evaluating the success of the control strategies, such as an injury review, accidents and "near miss" reports and records
- Evaluating and reviewing education and training programs
- Seeking advice from employees to check whether they feel the control strategies are working and whether there are any problems with the OHS programs, e.g. checking whether the control strategies have created new problems of their own
- Strong commitment to OHS from management.

Monitoring and Reporting

The OSHMP should have an established procedure for internal monitoring based on indicators that measure its effectiveness, efficiency and impact in achieving the pre-set objectives: goals and targets. A good selection of practical indicators should be made in line with those proposed in the ESMP of this report as well as statutory indicators. Data analysis softwares can be used to measure and record these indicators and performance graphs and thresholds deduced. Monitoring records should also be maintained to enable for external review and auditing, and each aspect to be monitored should have specifications for how often the monitoring parameters will be measured or recorded in line with statutory requirements.

Lastly the project management or personnel charged with health and safety management should develop standard methods for both internal and external reporting. External reporting will mainly be to state organizations such as: NEMA, City Council, Ministry of Labour, Ministry of Public Health and Sanitation amongst others. The frequency of reporting will be as legally defined by the acts governing OSH management in the country and on any incidences. Standard templates can be developed for any reports and logs to be used in the reporting, and the records should be maintained. Importantly internal reporting can be at the discrepancy of the plan but it should allow for effective internal communication therefore it must be at higher frequencies than external reporting. Thus a schedule for reporting and monitoring can be developed and appended to the OSHMP.

Budget

The OSHMP should also include a budget that will contain all costs associated with its implementation. This will include costs associated with: equipment, outsourced services, training, monitoring, reporting, document control, implementing the procedures etc. The budget should always be clear and reflect the actual needed finances for the OSHMP since this always forms an important monitoring aspect that will inform decision making based on the plan's cost effectiveness.

APPENDIX 7: SAMPLE GRIEVANCE APPLICATION FORM AND GRIEVANCE LOG
Sample Public Grievance Form

Reference No:		
Full Name:		
Contact Information Please mark how you wish to be contacted (telephone, mail, e-mail).	By Telephone: _____ By Post: Please provide mailing address: _____ _____ _____ By E-mail _____	
Description of Grievance:	What happened? Where did it happen? Who did it happen to? What is the result of the problem? Has the grievance triggered an incident investigation? <i>(Continue on additional pages as required)</i>	
Date of Grievance -----	One time grievance (date _____) Happened more than once (how many times? _____) On-going (currently experiencing problem)	
What would you like to see happen to resolve the problem?		
Signature: _____ Date: _____ Please return this form to:		
<i>Action identified to resolve the grievance</i>	<i>Date taken</i>	<i>By whom</i>
<i>Complainant satisfaction with implemented action?</i>		

Sample Grievance Log

REF No.	Description of Complaint	Date Identified	Corrective/Preventative Action	Responsible Party	Date Resolved	Other information/Status Update

NOTE: This log will be expanded as necessary when in use.