

**THE IMPLICATIONS OF REZONING ON LAND USE PATTERN AND  
INFRASTRUCTURE: A CASE STUDY OF KILIMANI IN NAIROBI**

**BY**

**GATHURI JOSEPH WANJAU  
BA (LE) HONS NAIROBI**

**THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE  
REQUIREMENTS OF MASTERS OF ARTS DEGREE IN PLANNING**

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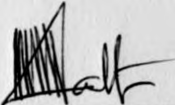
**DEPARTMENT OF URBAN AND REGIONAL PLANNING  
SCHOOL OF THE BUILT ENVIRONMENT  
UNIVERSITY OF NAIROBI**

**AUGUST, 2007**

**DECLARATION**

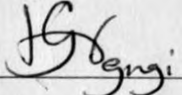
I, GATHURI, JOSEPH WANJAU do hereby declare that this thesis is my original work and has not been presented for a degree in any other university.

GATHURI, JOSEPH WANJAU  
(Candidate)

Signature:  Date: 3.9.2007

This thesis has been submitted for examination with my approval as the university supervisor

DR. GEORGE NGUGI  
(Supervisor)

Signature:  Date: 30.8.07

Department of Urban Regional Planning.

University of Nairobi

## **DEDICATION**

This work is dedicated to my wife Wanjiru and my two daughters Wambui and Wangechi for their endurance and comfort during the study period.

## ACKNOWLEDGEMENT

I would like to acknowledge the contributions of my supervisor, Dr. George Ngugi who has helped me reach this far. I further wish to extend my gratitude to Dr. Obiero whose tireless effort helped me shape up my study.

Special Thanks go to my workmates who allowed me time off for this excursion.

I cant forget the contributions of the staff of the Nairobi City Council and in particular Mr. Charles Osengo who helped me in accessing relevant city council data.

I further wish to acknowledge the contributions of Esther N. Muchiri who tidied up the work.

I would like to acknowledge the contributions of the deputy Chief Valuer Ministry of Lands, Mrs. Kimondiu who allowed me to access the land value data from lands office records.

And lastly and not least, I would like to acknowledge the support and forbearance of my family during the study period.

## ABSTRACT

Studies on urban growth have been undertaken over the last century trying to explain the spatial distribution of land uses. The most serious work was conducted in the 20<sup>th</sup> century by what is now referred to as the *Chicago School of Thought* in the land use planning paradigm.

Most of the theories tried to explain the process of urban growth but failed to explain the factors that influence decision making at the micro level by the investors whose actions shape up the land use pattern in the urban areas. It is due to the above stated shortcoming that this study was imperative in evolving a comprehensive body of knowledge to explain the complex interactions of market forces in a changing planning environment. The study examines the factors that determine the investment behavior and their contribution to the current land use pattern after rezoning. The area under study was originally zoned for low density high income residential user comprising bungalows and maisonettes on relatively large pieces of land ranging from half an acre upwards. The plots were fully serviced with water, sewer, and electricity and had bituminized roads. Rapid population growth in the city of Nairobi in the last couple of years coupled with economic growth and rising levels of income has increased effective demand for housing encouraging investors to demolish the existing improvements and develop high density residential units. The developers put pressure on the local authority to consider revising the densities on the grounds that they were not making reasonable returns on their investments due to the high land values. The zoning was eventually revised in 1987 and again in 2006 allowing densification. This meant maximization of land use with apartments as opposed

to the earlier residential maisonettes and bungalows sitting on half-acre plots. However, the densification policy was formulated without a systematic proactive planning to accommodate and guide the possible developments. The current developments have strained the existing infrastructural services like roads, water and sewer which are yet to be expanded.

This study therefore examines the trend in land use after rezoning and the factors determining the land use in Kilimani area. The study also looks at the effects of the emerging land use on the available infrastructural services and the environment.

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## **LIST OF ABBREVIATIONS**

UNEP	United National Environmental Programme
UNDP	United Nations Development Programme
UNPFA	United Nations Population Fund Agency
G.O.K	Government of Kenya
N.C.C	Nairobi City Council
C.B.D	Central Business District
WCED	World Commission on Environment and Development
UNRISD	United Nation Research Institute for Social Development
IUCN	World Conservation Union
NARC	National Rainbow Coalition
NMIMT	Non Motorized and Intermediate Means of Transport
UNCHS	United Nations Centre for Human Settlements (now UN Habitat)
UNCRD	United Nations Center for Regional Development
CDI	Country Development Index

# CHAPTER ONE

## 1.0 INTRODUCTION

The UN-Habitat Global Report on Human Settlements “The Challenge of Slums” (2003) notes that the world is urbanizing at a rapid pace and the cities of the Less Developed Countries are in the forefront. Ninety-nine percent of the population increase expected during the period 2000 – 2030 will be absorbed by urban areas of the less developed regions whose population is likely to rise from approximately 2 billion in the year 2000 to just under 3.5 billion in 2030 (*UNHABITAT 2003,p10* ). This rapid urbanization and population growth are expected to occur under conditions of economic stagnation.

The United Nations Population Fund Agency report ‘*The state of World Population Report 2007: Unleashing the Potential of Urban Growth*’, the world population living in urban areas is estimated to reach 5 billion (60% of the total population) by 2030. Globally, the report continues, all future population growth will take place in cities and nearly all of it in Africa, Asia and Latin America.

In the developed world, high urbanization reflects the degree of industrialization, modernization, westernization and socio-economic development. It is noted that these attributes of urbanization are lacking in the developing world and instead, developing world have become victims of a strong rural urban migration that has led to high urban growth rate of as high as 8% per annum (*Obudho, 1999*).

Africa is the worlds least urbanized region, with only 30% of its population living in urban areas. It has the worlds highest urbanization rates averaging around 4-6% per annum (*Obudho and Juma, 2002*). Africa has the lowest Development Index of 42.85 compared to Arab states of 64.55, highly industrialized countries 96.23, Asia Pacific 65.35 and Latin American 66.25 (*UNDP, CDI, 1998*).

The high rate of urbanization in Kenya is recognized as a source of many development problems that have bedeviled the urban areas more so the capital city with congestion, urban poverty and a myriad of related problems.

The shortage of housing is one of the major problems. The Housing Sector in Kenya has undergone an evolutionary process since independence. At independence the government performed the role of providing shelter but currently it plays a passive role of enabling the private sector. Due to rapid urbanization in the last two decades coupled with poor performance of the economy, the housing situation in the country has seriously deteriorated (GOK ,2004). Inability of the supply systems to meet demands is usually attributed to the cities high growth rates.

The National Housing Development Programme 2003-2007 estimates the current shortage in urban housing to be in the range of 150,000 units per annum. The supply of development land for housing is almost inelastic. With the increase in population, demand outstrips supply calling for innovative ways to accommodate the increased demand.

Densification of land use is one of the mechanisms used to increase the supply of land as more units are put on the same plot. The National Housing Development Programme 2003-2007 recognizes densification as one of the strategies of increasing the housing stock. Where the land had been zoned with low density housing, densification would mean sharing of physical infrastructure and as such, densification requires replanning and expansion of the physical infrastructure.

Kilimani area was rezoned for flats developments vide the 1987 Town Planning Committee recommendation. The study tries to establish the emerging trend in land use pattern after rezoning and the sustainability of the emerging land use vis-à-vis the carrying capacity of the infrastructure and the environment. Transportation facilities, water supply, sewer and garbage management were studied to establish the adequacy of the infrastructure to meet the needs of the emerging land use. The study established the factors that led to the land use change after the rezoning.

## **1.1 PROBLEM STATEMENT.**

The Nairobi City Council through its *Rezoning policy of 1979* yielded to pressure from property owners and rezoned the study area to accommodate comprehensive development. The Nairobi



Town Planning Liaison Committee of 1993 proposed further replanning and rezoning of the Hill and Kilimani areas. Under these proposals, the Hill area changed user to include highrise office developments. In Kilimani area, apartments and office user were allowed.

In 2006, a policy review for Zones 3, 4 and 5 was undertaken to take stock of the current developments. This review was guided by the principles of sustainable urban development for economic growth, conservation and healthy environment (NCC, 2006 p4) The policy review recommended regularization of the existing flats developments in Kilimani, allowing 10% greenery and harmonization of the Argwing Kodhek road to 24 meters up to Ole Odume Road.

As a result of rezoning which allowed comprehensive developments, the study area has received massive investments in office and apartment developments. Densification has increased the profitability of development ventures. Improved profits have increased the land values for redevelopment properties.

The original low density high class residential land use can not bid favorably with the emerging land use. Land use succession is now eminent with land changing use from low density to high density residential use. Rezoning has increased the land use capacity and the Highest and Best Use has changed from single unit to multiple units.

However, densification has arisen without an audit of the carrying capacity of the available infrastructure and ecosystems and thus has resulted in unsustainable development which may eventually lead to a decline in land values, rents and even environmental degradation. The study aims at establishing a sustainable development which does not exceed the carrying capacity in Kilimani.

## **1.2 PURPOSE OF THE STUDY**

Based on the above problem statement, the purpose of the study was to establish causes and trend in land use pattern and the current level of infrastructure in order to assess the sustainability of the emerging land use.

## **1.3 THE OBJECTIVES OF THE STUDY**

The objectives of the study were;

- 1) To establish the trend in land use pattern in Kilimani area,

- 2) To establish factors determining the land use change/densification in Kilimani area
- 3) To establish the infrastructural requirements to match the current and projected developments.
- 4) To propose a sustainable land use policy and a plan for the optimal development that does not exceed the carrying capacity.

#### **1.4 RESEARCH QUESTIONS**

In order to achieve the above objectives, the following research questions were addressed

- What is the immerging land uses and what are the main factors that has caused land use change?
- What are the main effects of land use change and does rezoning have an effect on land values?
- How has the current planning policy been able to direct market mechanism in a harmonious and sustainable development of the zone?

To answer the above research questions, the research methodology detailed below was used

#### **1.5 RESEARCH METHODOLOGY**

This study identified the trend and causes in land use pattern and how the current land use has impacted on the infrastructure and environment. This was achieved by first tracing the historical aspect of land use planning through literature review from secondary data. The policy guidelines and legal framework under which development has been taking place was studied. The case for rezoning zone 3, 4 and 5 was also studied from secondary data.

The following procedures were used for data collection: -

Primary data was gathered in the field mainly through direct observations and recorded by the use of a field notebook, digital camera and a field base map. Through direct observations, salient features such as land use conflicts, level of infrastructure services, environmental problems and the general growth trends of the areas were captured.

Personal interviews of a selected sample of respondents using structured questionnaires were undertaken. The questions asked dwelt on planning challenges and constraints and the policy

framework interventions in place to address the growth and management of zone 4. The infrastructure conditions and their adequacy in meeting the demands of the current population was established. The study area had 600 number of plots approximately and a sample of 10% was considered giving a total number of 60 plots which were administered with questionnaires. A total of 55 (92%) of the questionnaires were returned successively filled in. The rest of the questionnaires were not returned by the respondents.

Formal focus group discussions and informal open discussions with Nairobi City Council Technical Officers, informal sector traders operating in the area, School heads, developers and other stakeholders was undertaken. For the developers and investors, sample size of 5 was considered. To get the most recent data, the sample was drawn randomly from active sites within the study area.

Secondary data was fundamental to the findings of the research study. The secondary data was obtained mainly through literature review of the existing work by academicians and researchers on urban land use pattern and policy administration. Land values were obtained from Lands Department and estate agency firms. Current applications for development permission were obtained from the Nairobi City Council.

After Literature review, a wind shield survey was conducted in the research area to identify the current level of development, its impact on the environment, and the adequacy of the infrastructure to meet the demands of the current land use. After the questionnaires were administered, they were analyzed using SPSS statistical packages and conclusion drawn from the analysis. Based on the findings, recommendations were made and a sustainable plan was proposed.

## **1.6 ASSUMPTION OF THE STUDY**

1. That the zone 4 will remain unchanged during study period.
2. The current demand for apartments will be unabated in the foreseeable future
3. No rezoning policy will be formulated for the area in the near future to radically alter the existing land use pattern.

4. The current population and economic growth in the country will be maintained in the foreseeable future.

### **1.7 JUSTIFICATION OF THE STUDY**

The study is socially, economically and academically significant because it will amongst other things:

1. Shed light on the consequences of densification without adequate expansion of the infrastructure.
2. It will also shed light on demands of the emerging owners/tenants.
3. It will help in understanding the shortcoming of the rezoning policies formulated without adequate institutional and legal framework and detailed studies of possible developments resulting from rezoning. The study will enrich policy interventions on such issues as the city continues experiencing rapid growth

### **1.8 SCOPE OF THE STUDY**

The study covers the Kilimani Block 17 and attempts to

- Establish the trend of developments taking place
- Establish factors that have led to the emerging land use
- Propose alternative development policy which is sustainable

### **1.9 OPERATIONAL DEFINITION OF KEY TERMS USED IN THE TEXT**

- ***Carrying capacity***

Carrying capacity is defined as the maximum population density that an area can accommodate indefinitely without straining or degrading the current infrastructure or the environment and without diminishing the net worth of investments in future.

- ***Highest and Best Use***

This is defined as the most profitable land use in a particular zone at a given time subject to the planning ordinances in force.

- ***Sustainable development***

Sustainable development is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

- ***Zoning and rezoning***

Zoning is the division of land according to building design and use

Rezoning is the revision of the existing zones altering the allowed densities, plot ratios, maximum height a building can go, set backs, plot coverage etc.

## **1.10 ORGANIZATION OF THE STUDY**

The study is organized in six chapters as follows:

Chapter one carries the introduction, giving the background to the research problem from which study objectives, justification, scope, and limitations is spelt out. The same chapter also covers the research methodology.

Chapter two covers detailed literature review which results in identification of knowledge gaps and a conceptual framework.

Chapter three covers a comprehensive discussion of the situation analysis of the physical and socio-economic background of the study area. Historical background of zoning regulations in Nairobi in general and in zone four in particular is discussed in the same chapter.

The concept of sustainable urban development is also be discussed

Chapter four discusses land use determinants and how each factor is relevant in informing the current land use pattern in the study area

Chapter five gives a detailed examination of the current infrastructure provision and the adequacy of same to meeting the emerging land use.

It also covers the extent to which the planning authority has adhered to the current policy.

In chapter six, collected data is analyzed and discussed.

The chapter also discusses the future strategies for effective planning and management for sustainable growth in the study area. Summary, conclusion and recommendation of the study is covered in the same chapter. The last part of the thesis text covers the references and appendixes.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK**

This chapter reviews existing literature in land use patterns and various theories advanced to explain the spatial distribution of various land uses in urban areas. Each theory was evaluated in view of its strength and weakness in explaining land use patterns. Gaps were identified which culminated in a conceptual framework which eventually informed the study.

The study of land use patterns and their determinants has attracted scholars of various disciplines including geographers, sociologists, economists and planners amongst others. What determines the location and spatial distribution of land uses has been studied over time. Certainly people have reasons for living where they do. They are attracted to their various location by varying factors including moving near their place of work, near relatives or amenities and the like (Catanesi and Snyder, 1979).

Location preferences results in patterns of *Concentration* or *Dispersion*. Land use planners can either reinforce these natural patterns or create new patterns through zoning and other land use controls (Ibid pg 235).

There exists a lot of literature on the pros and cons of densification and the following arguments are outstanding.

### **2.1 LAND USE DENSIFICATION**

Densification in residential land use is the increase of the number of residential dwelling units per area in order to cope with increase in population. This is in contrast to urban sprawl where growth takes place in the urban fringe or countryside. Densification results to what land use planners refer to as *compact cities* i.e. a coherent urban region with high density settlements with vertical spread as opposed to horizontal spread.

Those who support compact cities ideal argue that urban sprawl increases the cost of services provision per urban inhabitant and leads to loss of farmland. They further argue that compact cities allow more efficient and less expensive provision of infrastructure and utilities. Public mass transport is easily and efficiently provided under compact city development.

On the other hand ,supporters of low density development argue that low density is possibly more efficient and desirable (Gordon and Richardson, 1997). One argument that holds ground is

that job opportunities are decentralized with the C.B.D loosing some businesses to other growth centers outside the C.B.D. In Nairobi, this is evident with satellite towns like Athi River, Githurai, Limuru, etc becoming a center of employment and residence.

In conclusion compact cities are more desirable as they utilize the urban land more efficiently and enable development of efficient infrastructure. They also ease development pressure on urban open spaces, forests, wetlands and provide least disturbance to the agricultural hinterlands. But what determines the spatial distribution of various land uses and what factors lead to high or low density residential land use?

Various theories have been advanced to explain the various land use patterns. In order to understand the current land use patterns, existing body of knowledge is considered as here below.

## **2.2 THEORIES OF URBAN LAND USE STRUCTURE**

The most celebrated theories were developed between the First World War and Second World War (1924-1945).

These were popularized as *Chicago School of Thought* in the Land use planning paradigm. These theories represent the western world point of view borrowing heavily from the western cities growth pattern. The leading models include the Concentric Growth Model, the Sector Model and the Multiple Nuclei Model which are discussed in detail here below.

### **2.2.1 Concentric Growth Model**

This was developed by Burgess in 1924 after observations in the city of Chicago. The basis of his model was the outward expansion of the city and the social economic groupings of its inhabitants. He used the concept of plant ecology as had been presented by the University of Chicago and applied ecological terms such as *Invasion*, *Competition*, *Dominance* and *Succession* to groups of people.

He based his theory on the following assumptions.

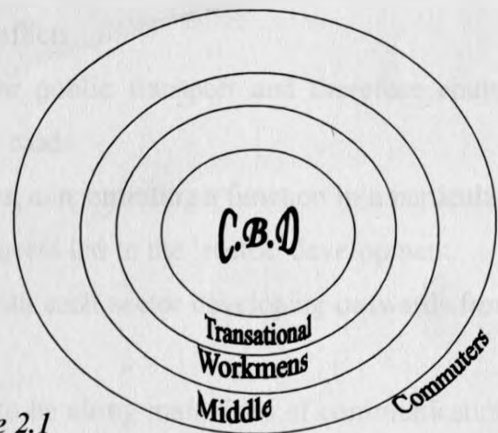
- 1) The city was built upon a flat isotropic surface with equal advantages in all directions.
- 2) Transport systems were of limited significance as all areas were equally accessible.



- 3) Land values were highest at the centre of the city declining with distance to give zoning of urban functions.
- 4) The oldest buildings were in or close to the city centre with progressively newer ones towards the city boundary.
- 5) Cities contained a variety of well defined socio-economic and ethnic areas.
- 6) The poorer classes had to live near to the city centre and places of work as they could not afford transport or expensive housing.
- 7) There were no concentrations of heavy industries. He came up with concentric zones of land use.

The main contention here is that an urban area is divided into concentric zones.

- (1) Centre where the C.B.D. is found.
- (2) Transitional zone
- (3) The working men's houses.
- (4) Middle class dwelling houses.
- (5) Commuter zone.



*Figure 2.1*

*Source* Adapted from Chapin 1965. p14

The Central Business District accommodates major shops, offices and is the centre of commerce, entertainment and is the focus for transport routes.

The transitional zone has the old housing either deteriorating into slum or being invaded by light industry. The low class housing occupies the third ring while medium class housing and high class estate occupies the forth and the fifth rings respectively.

This model is criticized basically on its assumptions. Concentric rings are not always clear and one zone can have more than one land use. The distance and transport charges have to a great extent been rendered irrelevant by advancement in information technology. It does not also

explain land use change within the same concentric ring. The study is important as it has established the dynamics of land use in the same concentric ring.

### **2.2.2 Sector theory**

This was developed by Hoyt in 1939 and was based on mapping of eight housing variables from 142 cities in the U.S.A. He tried to account for the changes in and the distribution of residential patterns.

Hoyt made similar assumption as Burgess with addition of three new ones. These assumptions were;

- 1) Wealthy people who could afford the highest rents choose the best sites i.e. competition was based on the ability to pay resolved land use conflicts.
- 2) Wealthy residents could afford private cars or public transport and therefore could live further from the industry and nearer to the main roads.
- 3) Similar land use attracted other similar land uses, concentrating a function in a particular area and repelling others. This “attract and repel” process led to the ‘sector’ development.

Figure 2.2 below describes Hoyt’s sector growth with each sector developing outwards from the CBD.

He suggested that the area of highest rent tended to be along main lines of communication and that the city grew in a series of wedges. He also claimed that once an area had developed a distinctive land use it tended to retain that land use as the city extended outwards.

The model is criticized on the same lines as the concentric model. It was further criticized on the following.

- 1) His model was based on housing ignoring other land uses.
- 2) It was assumed that there are no planning restrictions on land use.
- 3) Only cities in the U.S.A were studied.

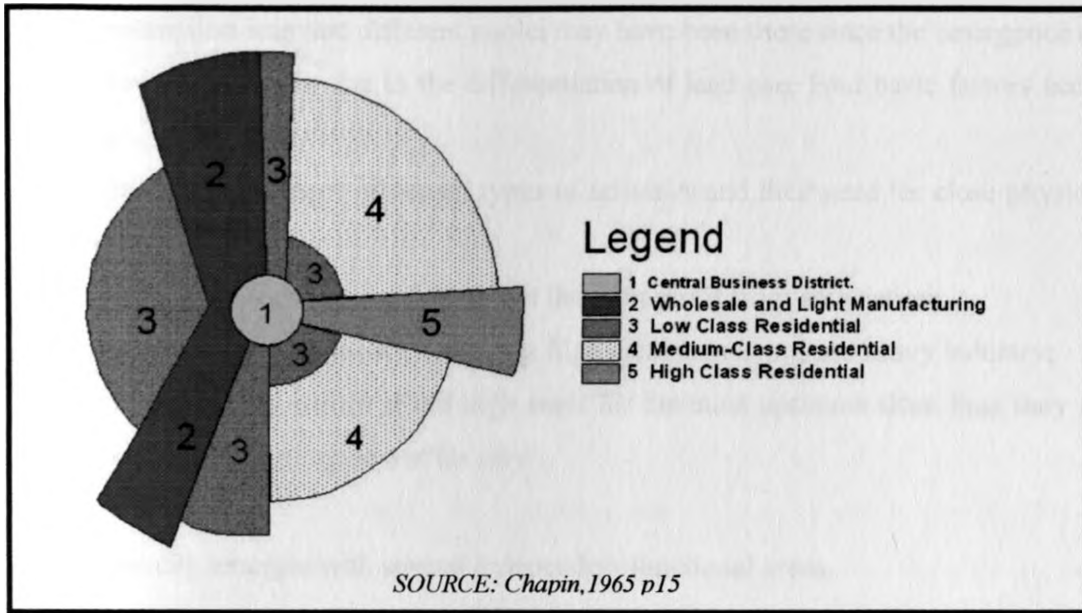


Figure 2.2 The Hoyt Sector Model

This model like the Concentric Growth model fails to explain why one land use is succeeded by another land use making this study imperative. The study established the factors that determine land use patterns where a high class residential area is invaded by a middle income class through the operation of the market mechanism.

### 2.2.3 The Multiple Nuclei Theory (Concept)

The situation in most cities is too complex to be easily understood by the generalization of the concentric and sector models. As a result Harris and Ullman (1945) research produced a concept which is more applicable to reality but less understood than the earlier concepts. They advanced the multiple nuclei Theory which combined the concentric and sector theories adding a few other ingredients (factors) to explain the land use pattern of the city.

They suggested that frequently, the land use pattern of a city is built around several discrete nuclei rather than around a single centre. The term nucleus as used refers to any attraction element which growth of residential business, industrial and others take place.

The assumption was that different nuclei may have been there since the emergence of the city or may have come about due to the differentiation of land use. Four basic factors account for this theory:

- 1) The interdependence of certain types of activities and their need for close physical proximity to one another.
- 2) Like activities group together so that they can profit from association;
- 3) Some activities are incompatible e.g. high income housing and heavy industry;
- 4) Some activities cannot afford high rents for the most optimum sites, thus they are forced to move on to the periphery of the city.

Thus the city emerges with several independent functional areas.

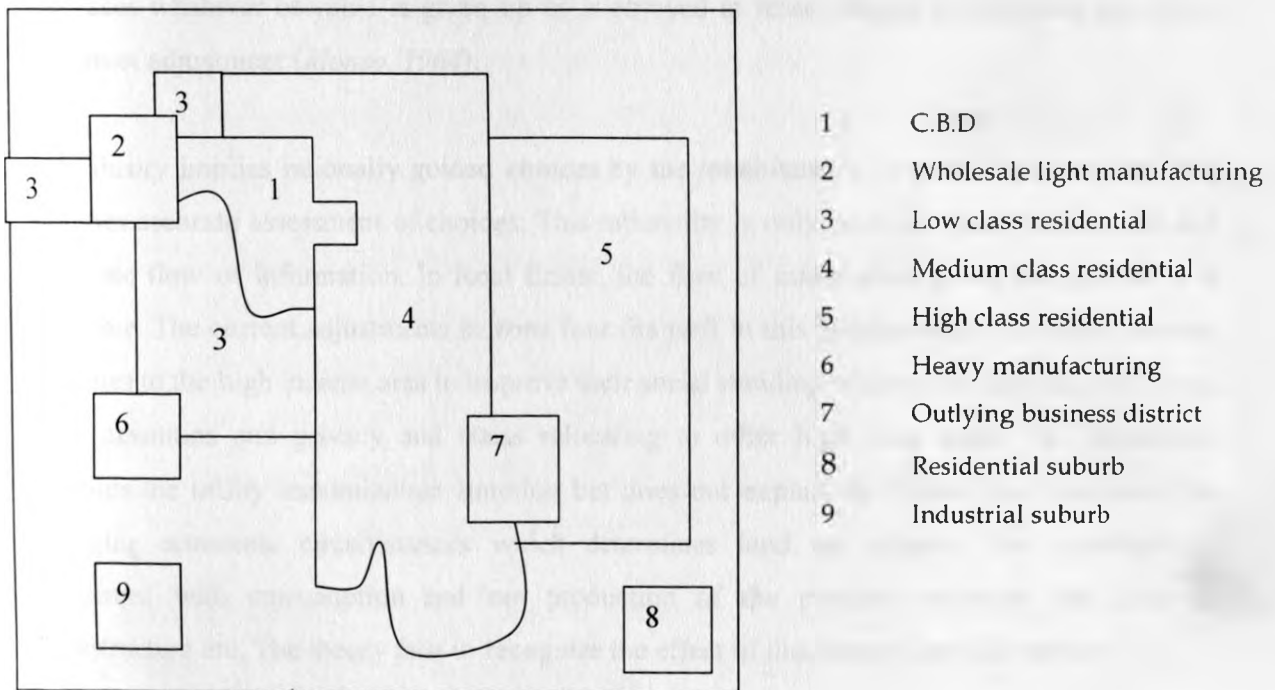


Figure 2. 3: The Ullman-Harris Multiple Nuclei Model

Source: Chapin. 1965 p15

**Figure 2.3** above indicates possible distinct centers acting as nuclei of growth.

As a hypothesis, the multiple nuclei concept appears to recognize many of the realities of contemporary metropolitan land use pattern (Chapin, 1965) the theory explains the spatial

distribution of land uses but does not explain land use succession like the taking place as in the study area.

Alonso (1964) tried to study the factors behind urban human settlement behavior and came up with the hypothesis of minimum cost and maximum satisfaction in adjusting population to environment as detailed below.

#### **2.2.4 Hypothesis of Minimum Cost –Ecological Approach**

The Hypothesis by Quin states that Ecological units tend to distribute themselves throughout an area so that the total cost of gaining maximum satisfaction in adjusting population to environment (including other Men) are reduced to the minimum. Cost refers not only to economic rent but also dangers encountered and disagreeable experiences undergone. It embraces whatever of value is given up or is enjoyed in lesser degree in obtaining any given pattern of adjustment (*Alonso, 1964*).

This theory implies rationally guided choices by the inhabitants of a certain location and also assumes accurate assessment of choices. This rationality is only possible where there is free and adequate flow of information. In Real Estate, the flow of information is not free neither is it adequate. The current adjustments in zone four fits well in this hypothesis as the middle income migrates to the high income area to improve their social standing whereas the high income loses their amenities and privacy and starts relocating to other high class areas. The hypothesis explains the utility maximization function but does not explain the factors that determine the changing economic circumstances which determines land use pattern. The hypothesis is concerned with consumption and not production of the physical attributes like housing, infrastructure etc. The theory fails to recognize the effect of distance on land use pattern.

The Bid-Rent Theory suggested by Alonso captures the effect of the distance from the CBD with different uses bidding at different distances from the CBD hence the ability to bid determines the user. The concept is discussed in detail here below.

#### **2.2.5 The Land Value or Bid-Rent Theory**

This Model of urban structure is similar to Von Thunen's ideas of rural land use as it is based on locational rent. The main assumption is that in a free market the highest bidder is likely to be the

one who can obtain the maximum profit from that site and so can pay the highest rent. Competition for land is keener at the centre of the city (CBD).

Land Rent is the key concept in Land Economics Theory (Barlowe 1986). Land Rent is defined as the returns that provide the theoretical base for explaining the value we place on real estate resources between individuals and between competing uses. The terms Contract Rent, Land Rent and Economic Rent are used interchangeably but have specialized concepts in land economics.

*Contract Rent* is the payments tenants make for use of a particular property. These rents are usually agreed upon by the landlord and tenants in advance. This is normally referred to as Rent. It should be noted that the contract rent payable over time is an estimate of market trends and may not reflect the market rents after some few years. Landlords, in most cases, insert a clause providing for a percentage increment to hedge against inflation and upwards market adjustments. In stable rent period, we find new tenant paying low market rates (as per the dictates of the market) than sitting tenants whose rent is adjusted periodically as provided in the lease agreement.

*Economic Rent* refers to the economic earnings of land and has a meaning more or less synonymous with the present day concept of Land Rent. Economic rent is now treated by economists as a short-term economic surplus that a productive factor can earn because of unexpected demand or supply conditions. In the long run equilibrium is established where the issue of economic rents disappears. *Land rent* is viewed as a residual economic surplus i.e. remains after payment is made for total factors costs.

The Concern of the Economists with rent dates back to the times of the physiocrats of the 18<sup>th</sup> century (Alonso, 1964). The physiocrats were a group of French Economists the most prominent of them being Francois Quesnay and R. J. de Turgot (Kingoriah, 1977). By rent they meant, as most economists still do, that payment for agricultural land. Theirs was an agricultural society and cities were of less importance in the landscape and viewed as parasitic on the honest toil of agriculture (Alonso 1964). The physiocrats believed in the existence of a natural order and preserving property (Kingoriah, 1977).

Rent in Economic terms is the payment made for factors of production which have inelastic supply curve. Other factors of production include labour, capital and entrepreneurship. This rent may be considered to include the rent of the house, the land it sits on and the amenities fixed thereto. It can be seen as payment for the factors of production that the landlord has used to construct the house recapitalized as monthly payments (Kingoriah 1977). The landlord invests his money in all these improvements expecting a return on his investments. He can also sell his house and here he capitalizes all future expected rents into a lump sum figure.

### **Ricardian Theory Of Rent**

David Ricardo was intellectually active in the late 18<sup>th</sup> and early 19<sup>th</sup> century during the Napoleonic wars. During this period, there was an increase in demand for foodstuff to feed the army, the rent for arable land hiked sharply and it was thought that the landlords were profiting from the misfortunes of the rest of the society. Economists during this period thought that the high price of foodstuffs during the war resulted from high land rent that was being charged by the aristocratic landlords to the peasant farmers.

After rigorous research and analysis, Ricardo defined rent as the payment for the “original and indestructible powers of the soil”. He believed that the price of wheat was high due to the high demand that existed during the war and not because of the land Rent charged for it. The demand for arable land increased after increase in food prices leading to peasants outbidding one another. The land “Scrabble” in Ricardo’s opinion is what caused high agricultural rents.

Ricardo’s findings were first published in 1815 bearing the title. Essay on the influence of the low price of corn on the profits stock and later elaborated in 1817 in a larger work in a book entitled Principles of Political Economy and Taxation. In both works, Ricardo brought out the Principle of derived demand through his argument that factors of production are not demanded for their own sake but because of the demand for goods that they are used to produce.

Ricardo also recognized that land which is near the market bears lower transport costs and this advantage also accrues to the landlord as a form of rent as a result of competition between farmers (Alonso, 1964). He however devoted most of his attention to fertility differentials. It was

Von Thunen who developed location differential to its fullest a few years later. The various agricultural land uses around a market place bid for the use of land and land is assigned to the highest bidder. Perishable and highly priced goods will outbid other products for the nearer land to the market. Location differential was further refined by Dunn and Isaard. The early economists had little to say about urban land and urban rent. Alfred Marshall Emphasized the importance of location within the city and defines, "Situation Value" as the sum of the money values a situation commands due to the location advantages of a site.

There are various general considerations which, as cited by Isaard, determines land rent as:-

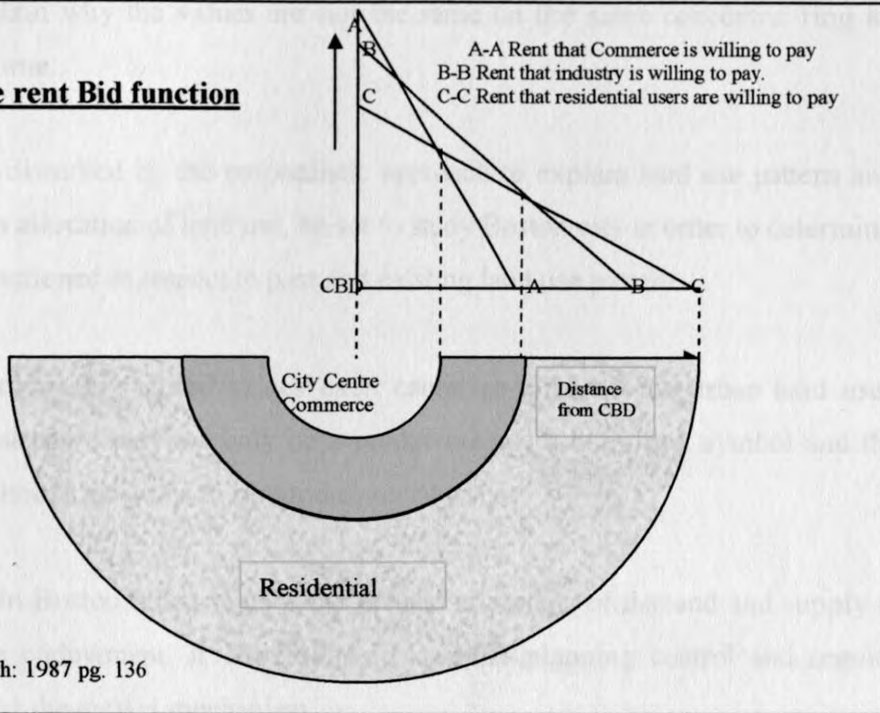
1. Effective distance from core (C.B. D)
2. accessibility of the site to potential customers
3. Number of competitors, their location and intensity with which they vie for sales.
4. Proximity to complimentary land uses.

The most expensive or 'prime site' in most cities is the C.B.D mainly because of its accessibility and the shortage of space. Here shops, especially department stores conduct their business using a relatively small space. With high turnover they can bid a higher price for the land (which they try to compensate by building upwards and by using the land intensively).

Figure 2.4 below provides a theoretical description of land bid with commerce at the CBD outbidding all the other users.



Figure 2.4:  
A composite rent Bid function



Away from the CBD, land rapidly becomes less attractive for commercial activities. Industry partly because it makes up more space and uses it less intensively bids for land that is less valuable than that prized by shops and offices. Residential land which has the flattest of the three bid-rent curves is found further out from the city centers where the land values have decreased as there is less competition for land. Individual householders cannot afford to pay the same rents as shopkeepers and industrialists.

As population increases and economy grows, the concentric rings expand and some uses are squeezed further away. One of the basis of this model is that *'the more accessible the site, the higher its land value'*. Rents will therefore be greater along main routes leading out of the city and along outer ring roads. Where two of these routes cross, there may be a secondary or subsidiary land value peak. The land use at this point is likely to be a small suburban shopping arcade or a small industrial estate.

The theory explains why we have different values as we move away from the city center but does not explain why the values are not the same on the same concentric ring and why they change over time.

*Firey (1974)* disturbed by the rationalistic approach to explain land use pattern and the market mechanism in allocation of land use, he set to study Boston city in order to determine how values and ideals functioned in respect to past and existing land use pattern.

He noted that socially rooted values exert causative influence on urban land use pattern. He concluded that space may not only be a productive agent but also a symbol and that groups of people may choose locations to respond to social issues.

Firey works in Boston failed to consider economic aspects of demand and supply and assumed equal service endowment. It also failed to consider planning control and regulations which affects directly the market mechanism.

*Yahya (1975)* observed that effective urban land policy is necessary for coordinated urban development. He further observed the scarcity of infrastructure in urban areas in Kenya. He did not give reasons or policy proposals to alleviate the inadequacy.

*Ratchliffe (1979)* Dealt mainly with urban land use focusing on the interplay of market forces and came up with the conclusion that economic activity in each community are influenced by the nature of that population and that population tends to influence future land use in urban areas.

*Kingoriah (1980)* while studying on the policy impacts on urban land use patterns in Nairobi came to the conclusion that the central government and local Authorities have strongly influenced the land use pattern in Nairobi. He observed that sectoral pattern of land use in old city area was caused by the implementation of land use policies based on racial segregation. He further concluded that the economic operation of the theories of urban land use structure had

only a limited effect on shaping of old city area. He observed that the semblance of the land use pattern of the old city and the sector model by Hoyt was only coincidental.

*Barlowe (1986)* works in his book *Land Resource Economics* considered the concept of *land use capacity* as the ability of a given piece of land resource to produce a surplus of returns and or satisfaction above the cost of utilization.

The concept of Highest and Best Use was also expounded where he said that land is at its Highest and Best Use when it provides the optimum returns to the operator or to the society. He concludes that the Highest and Best Use is dynamic and subject to changes and can be affected by changes in technology, changes in demand and even changes in zoning ordinances and other public policies.

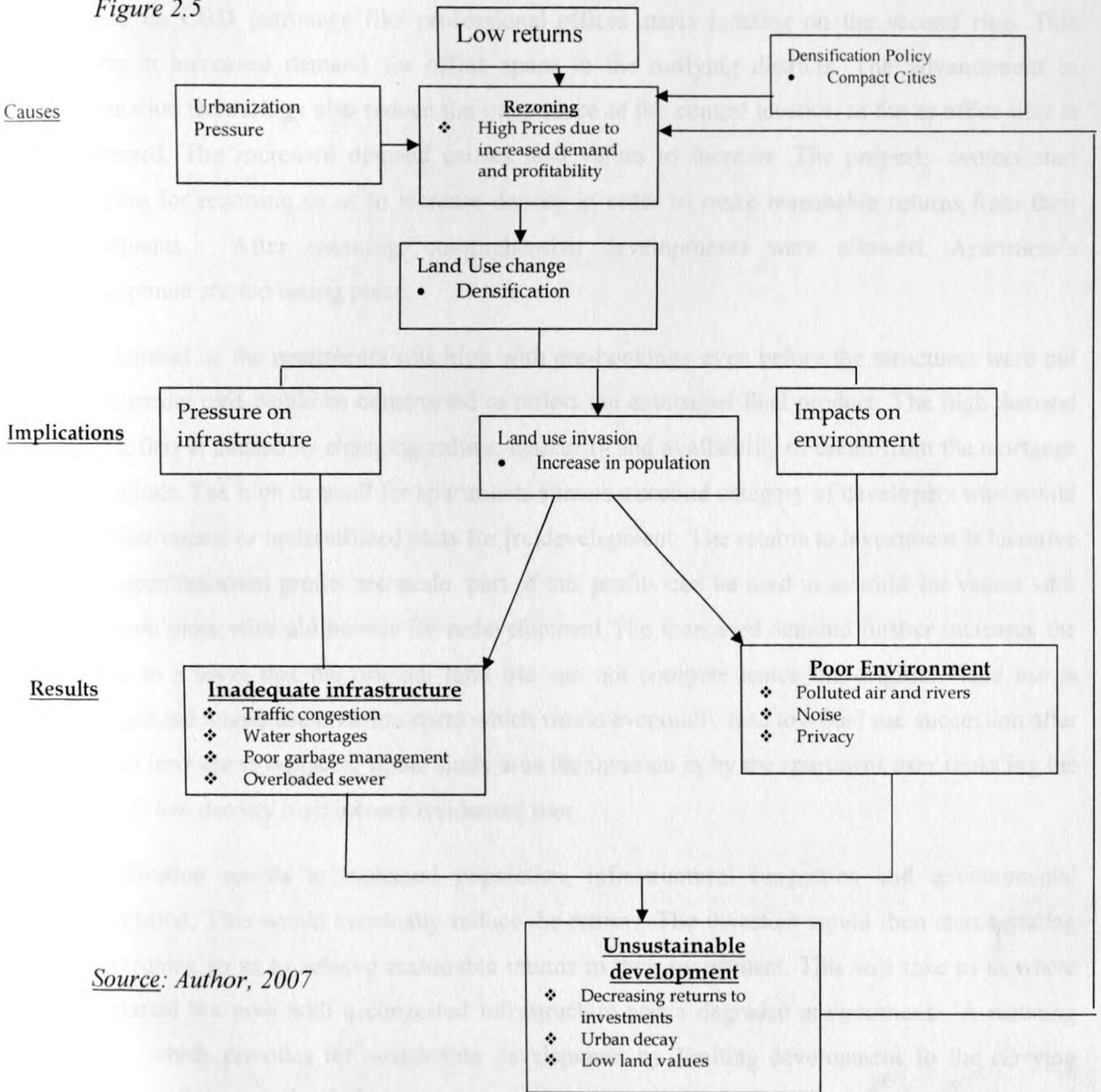
He concludes that land resources tend to move to those operators who bids the highest and for those uses that offer the highest returns for their utilization. Land use succession will occur where the highest and best use or the land use capacity has not been attained in the current use unless prevented by institution barriers. His works explains the dynamism in the land use pattern but does not consider their causes or effects if the land use succession is not well managed

*Ngeli (1997)* while assessing the impact of land use regulations and policies and land utilization in Mombasa observed that land control measures have proved ineffective and proposes preparation of a comprehensive land use plans or advisory plans backed by stringent measures to be adopted through appropriate legislation. He also sees lack of skilled manpower in planning department as a main stumbling block to effective management of urban land use.

He does not consider the effect of population growth, culture and values in urban land use pattern. The above models and theories fail to explain the current phenomenon in zone 4 where after rezoning; an increased demand for land has resulted which has effectively led to an increase in land prices. The study aims to fill the existing gap on the relationship between rezoning, land values and their implication on land use patterns in Kilimani area. Figure 2.5 below presents a conceptual framework informing the causative relationship of factors determining land use pattern in Kilimani

## Conceptual framework

Figure 2.5



Source: Author, 2007

The above diagram shows a conceptual framework developed to aid in understanding the issues under the study. As the population increases coupled with economic growth, the concentric rings as described in the Concentric Growth Theory enlarges outwards encompassing land that was previously on the second ring. The use capacity in the second ring increases as it acts as a substitute due to proximity to the city center. The city center (first ring) is operating at full potential with lettable spaces fully let. Due to scarcity, high rents are charged to any space falling

vacant. In such instances, there is traffic and human congestion and those uses which do not depend on CBD patronage like professional offices starts locating on the second ring. This results in increased demand for office space in the outlying districts. The advancement in information technology also reduce the importance of the central location as far as office user is concerned. The increased demand causes land values to increase. The property owners start agitating for rezoning so as to increase density in order to make reasonable returns from their investments. After rezoning, comprehensive developments were allowed. Apartment's development started taking place.

The demand of the apartments was high with pre-bookings even before the structures were put up. A model unit would be constructed to reflect the envisaged final product. The high demand for the flats is caused by changing values, insecurity and availability of credit from the mortgage institutions. The high demand for apartments attracts a second category of developers who would purchase vacant or underutilized plots for [re]development. The returns to investment is lucrative and super/abnormal profits are made. part of this profits can be used to overbid for vacant sites and even plots with old houses for redevelopment The increased demand further increases the values to a level that the original land use can not compete hence the original land use is replaced and a land use invasion starts which would eventually lead to a land use succession after the old land use is replaced. In the study area the invasion is by the apartment user replacing the original low density high income residential user.

Densification results to increased population, infrastructural congestion and environmental degradation. This would eventually reduce the returns. The investors would then start agitating for rezoning so as to achieve reasonable returns to their investment. This will take us to where we started but now with a congested infrastructure and a degraded environment. A rezoning policy which provides for sustainable development by limiting development to the carrying capacity of the existing infrastructure or one that advocates for infrastructure led development would reverse this phenomenon for sustainable urban development. In order to formulate such a policy a situation analysis of the study area including infrastructure, physiographical characteristic social amenities etc is required. The proceeding chapter will analyze the above items in detail.

## **CHAPTER THREE**

### **BACKGROUND INFORMATION**

#### **3.0 INTRODUCTION**

In this chapter, the physiographical characteristics of Nairobi area in general and Kilimani area in particular are considered in detail. This will help us understanding the physical environment in which growth is taking place and how these factors influence the urban form. The historical background and previous planning interventions will also be considered.

#### **3.1 LOCATION OF THE STUDY AREA**

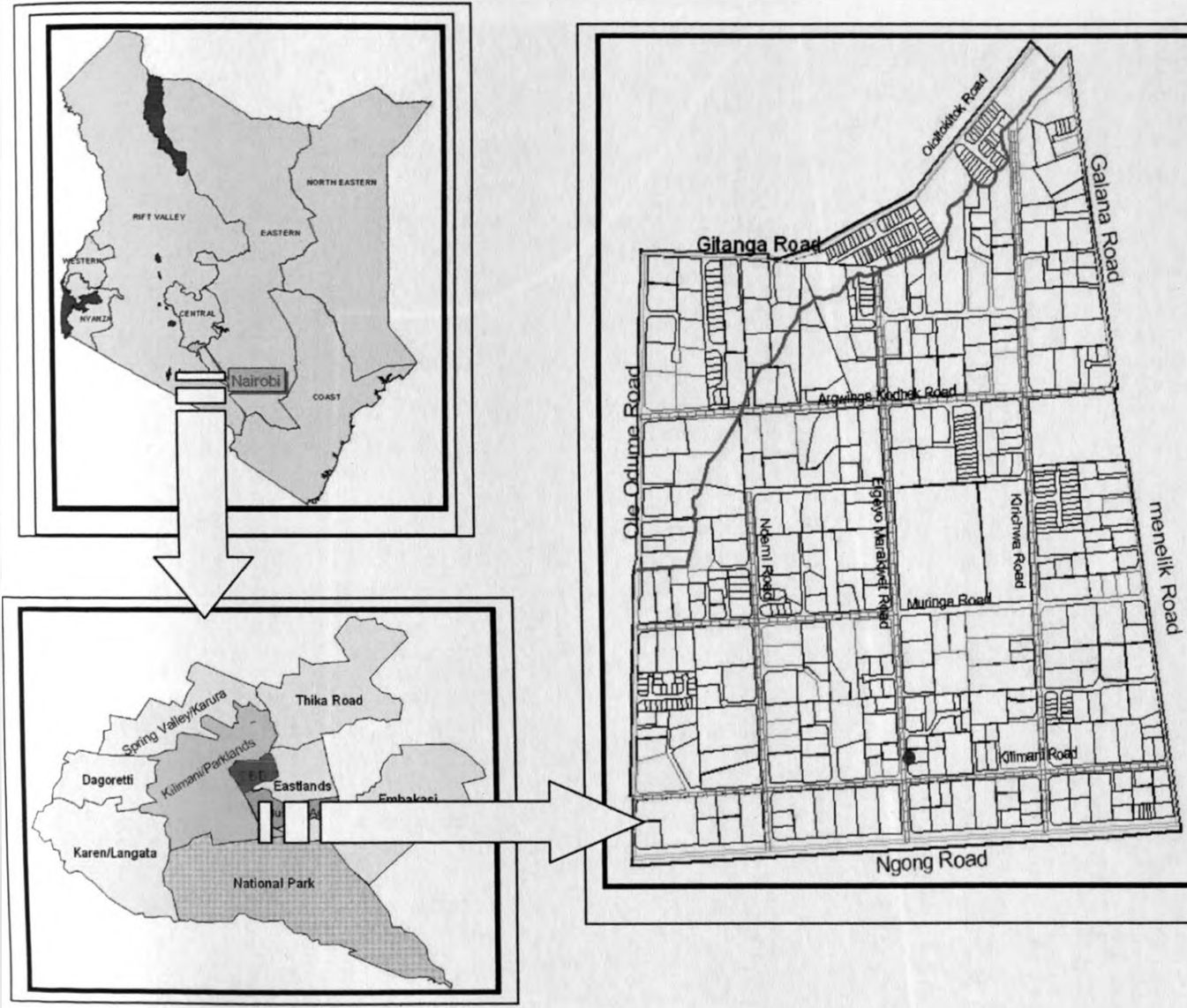
Kilimani area lies due south west of the old city. The study area is approximately 6km from the G.P.O. Nairobi City lies between latitude  $1^{\circ} 16's$  and longitude  $36^{\circ} 48'E$ . The city is approximately 1700 meters above sea level.

The study area is part of Zone 4 according to the current Nairobi City Zoning schedule. The study area covers area north of Ngong Road with Menelik Road and Galana Roads forming the Eastern boundary. The western boundary is marked by Ole Odume Road. The Northern boundary is marked by Oloitokitok and Gitanga roads. The area under study is known as Nairobi Block 17- Kilimani

Map 3.1 below indicates the location of the study area in terms of regional and national context. Plate 3.1 below shows an aerial photograph of the area taken in 1993 which gives a vivid view of the area before massive densification set in.

# Kilimani in the National and Regional Context

Map 3.1



Source: Author, 2007

**KEY**

Nairobi CBD



Nairobi Zone 4



Plate 3.1 Aerial View of the Study Area



*SOURCE:* Adapted from JICA Aerial Photo, 2003



### **3.2 HISTORICAL BACKGROUND OF THE STUDY AREA**

Nairobi developed as railway station during the construction of Mombasa –Kisumu railway line between 1895-1905. The town was first settled in 1896 as a transport depot. The main attraction was the clean water and cool climate. The site was halfway between Mombasa and port Florence (now Kisumu).

The colonial administration which had established their administration base in Machakos also moved to Nairobi in 1899. As the town developed there was a need for housing of the Indian railway workers and European administrators.

In 1897, the East African Order in Council vested more administrative powers on the protectorate office. The railway administrative authorities had to adhere to the views and laid down regulations by office of the Sub-commissioner. The Sub- commissioner created a local authority, Nairobi Municipal Committee which was charged with overall responsibility of Nairobi's administration. The authority's jurisdiction was limited to a radius of 1.5 miles.

By 1901, the population had grown to 8,000. A private company was contracted to clean the streets, collect garbage, clean the drains and to light the streets. The company failed and a plague epidemic struck in 1902. A second plague broke out in 1904 due to poor environmental conditions.

Nairobi was made a capital in 1905 despite those shortcomings.

By 1906 the city had sorted itself into distinct functional zones as follows

- a ) The railway center
- b) The Indian Bazaar
- c) The European business and administrative center
- d) T he railways workers quarters
- e) Washerman's quarters
- f) Military barracks outside the town limits

The European housing occupied the western side of the city where the soils were red. The area had good drainage also. There were few Africans in the city during this period.

In 1906, a commission was set up to investigate the sanitary conditions of the town after the two plagues broke out in the Indian Bazaars. The commission found out that the site was totally unsuitable for further development. The possibility for its relocation was debated twice with no political goodwill to allow for its relocation.

In 1912, a third plague broke out. This necessitated the formation of Simson Commission which recommended on racial segregation with Indians, Africans and European living in separate quarters. In 1919, the Municipal Committee was dissolved and replaced by a fully fledged Nairobi Municipal Council

In 1928, a local government commission headed by Justice Feedham made a review of the town's structure and development. It proposed amongst others a change in boundary which effectively brought the autonomous area into Nairobi to create the Nairobi Extra provincial district of 1928.

In 1948, *The Nairobi master plan for a colonial capital* was prepared. The plan was prepared by Thornton White and was inspired by the colonial planning approach. The plan advocated for racial segregation and was based on the European model of urban form rather than the traditional African settlement pattern (Obudho, 1997).

The plan defined European and Asian housing areas (Zones) while African areas were situated next to areas designated for industries. The plan was prepared when the population of Nairobi was only 109,000.00. The population was growing at 5% and it was estimated that by 1975, it would grow to 270,000.

The plan was revised in 1963 and 1978. The goal was to formulate a more integrated planning system with emphasis on provision of employment and housing for the rapidly growing population.

The plan gave rise to the development of the site and services schemes in Mathare North, Dandora and Kayole. Alongside these schemes, slums upgrading programs were implemented in Kibera, Pumwani, Mathare valley and Kariobangi areas between 1973-1983.

In 1967, the Nairobi Urban Study Group was formed. The study was occasioned by shortages in water supply, traffic congestion and shelter provision. The group was to study the economic, social and physical variables, urban information system and growth frontiers.

The group recommended on the following: -

1. The growth direction of the city
2. The infrastructural requirement to accomplish development objectives.
3. The proposed physical layout of the city
4. Detailed method of implementation of the recommendations
5. The social-economic development plan for the city including financing policy.
6. The urban development. It recommended that the growth should not extend to north or west in order to preserve the rich agricultural land but instead should extend to the Athi Plains and towards Thika (Mostly black cotton soils areas which were seen as poor soils for cash crop farming)

In 1987, Nairobi was zoned into 20 land use zones. Kilimani was zoned together with parklands, Kileleshwa, Thomson Estate and adjacent lands as Zone 4.

### **3.3 PHYSIOGRAPHICAL CHARACTERISTICS OF THE STUDY AREA.**

In looking at the physiographical characteristics, we look at the physical features, like terrain, soils, climate, geological formation etc. which impacts on urban development.

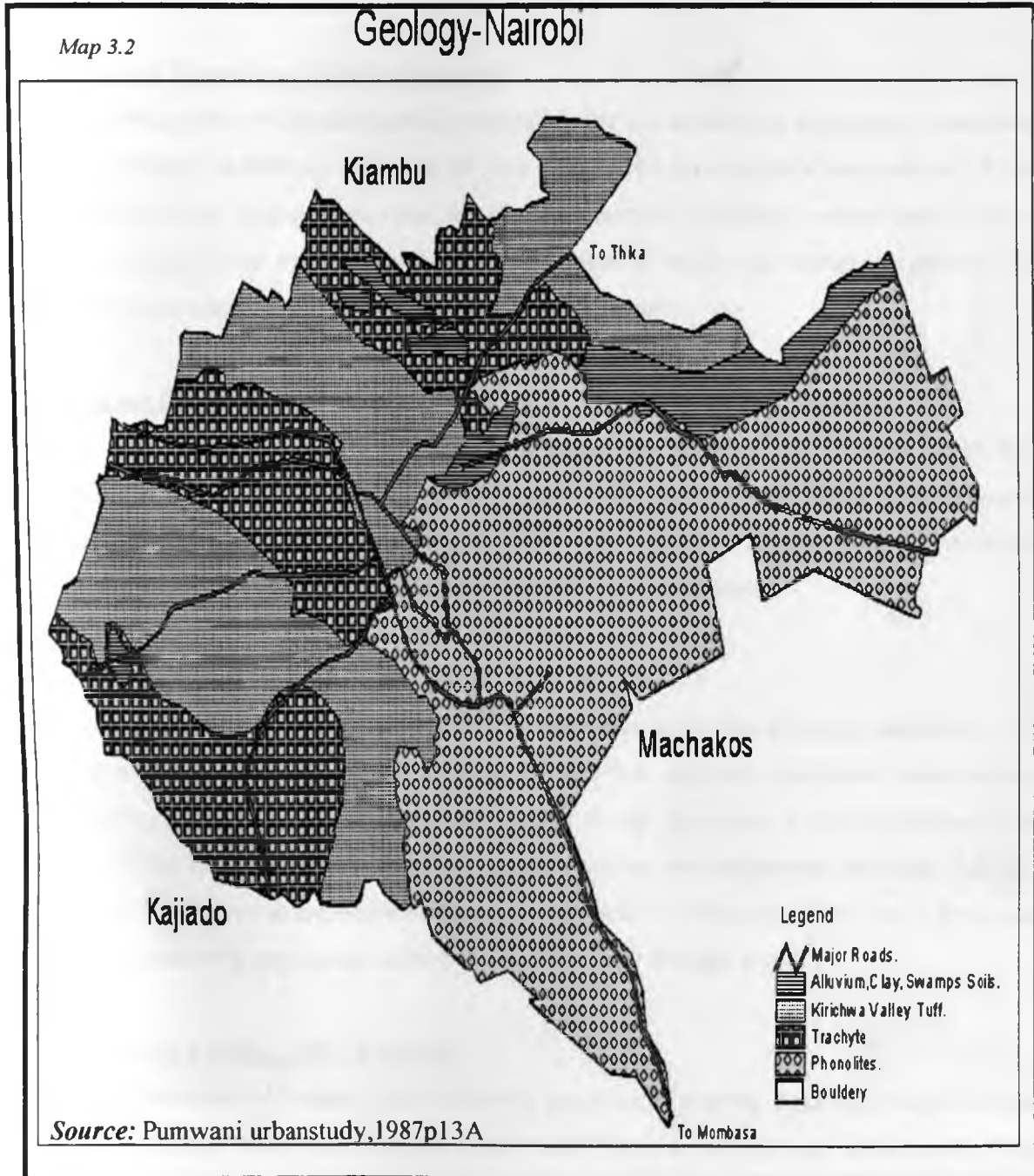
#### **3.3.1 Geology**

The geology of Nairobi is shaped by both volcanicity and tectonic movements. The rocks in the area were formed as early as the Precambrian era through volcanicity.

The physiographical units found in the Nairobi area include:

- i) The lava Plains
- ii) The rift frank
- iii) The Kikuyu Highlands
- iv) Ngong Hills

Map 3.2 below shows the distribution of the various geological units in Nairobi



The geological units found in and around Nairobi city are: -

**a) Mbagathi Phonolites**

These are lavas occurring across the Nairobi National Park and part of Athi River plains. These phonolitic trachytes contain numerous closely spaced feldspar phenocrysts about 1cm long in a grey rather coarse groundmass. The phenocrysts often display sub-parallel alignment, indicating the direction of flow of lava. The rocks are frequently weather to shades of rusty brown

**b) Nairobi Phonolites (Middle Phocene)**

Nairobi Phonolites which are quarried extensively for use as concrete aggregate, road stone and railway ballast, underlies a large part of Athi Plains. The lava attains a thickness of 120 meters and differs from Kapiti Phonolites in that the Nairobi phonolites contain less conspicuous feldspar crystals and smaller nephilines. Small flakes of biotite are sometimes present. Nairobi phonolites are estimated to be at least 5.2 million years old.

**c) Ngong Basalts (Phocene)**

This is a variety of basic lavas, tuffs and agglomerates forming Ngong Hills, South-West of Nairobi. A succession of 600 meters is exposed in the steep western scarps where major faults truncated the volcano, down-throwing part of it into the floor of the Rift Valley to be concealed by Pleistocene Trachytes which are banked against the fault scarps.

**d) Nairobi Trachtes (Phocene)**

This is exposed north and west of the city, but the outcrop is discontinuous, occurrences of lava being separated by the Kerichwa Valley tuffs. The flow evidently originated from centres near the rift valley between Ngong Hills and Kikuyu though its source is now concealed by young Limuru Trachytes. Strong topographic features such as the escarpment bounding the hill area west of the city centre are eminent. Nairobi Trachytes is a pale grey molted lava, fresh surfaces having a glistening appearance caused by numerous tiny feldspar crystals.

**e) Kerichwa valley Tuffs (Phocene)**

During the period of erosion, which followed extrusion of Nairobi Trachytes, deep river valleys were cut into by lava. With renewed volcanic activity these valleys were subsequently filled by

proclastic rocks of trachytic composition known locally as Kerichwa valley tuffs. A variety of rock types is present, the most important being devitrified welded tuffs (The Nairobi Stone) used extensively for building purposes. The Nairobi stone is underlain by dark ashes and tuffs and is overlain by agglomeritic tuffs some of them welded.

### **3.3.2 Soils**

The soils of Nairobi originated from the above geological units. On weathering much of the lavas and tuffs alter to pale brown or reddish ferrucetes (Murrum). The materials is frequently hard and of sufficient thickness to allow quarrying for road materials e.g. on Langata Road immediately west of Nairobi dam where Nairobi trachytes escarpment is weathered enough to provide deposits of ferricrete. Nairobi National Park authorities and other contractors get murrum from near the base of the scarp and utilize it for surfacing earth roads and tracks.

The soils found in Athi Plains include vertisols, Lithosols (Shallow soils) and Nitisols.

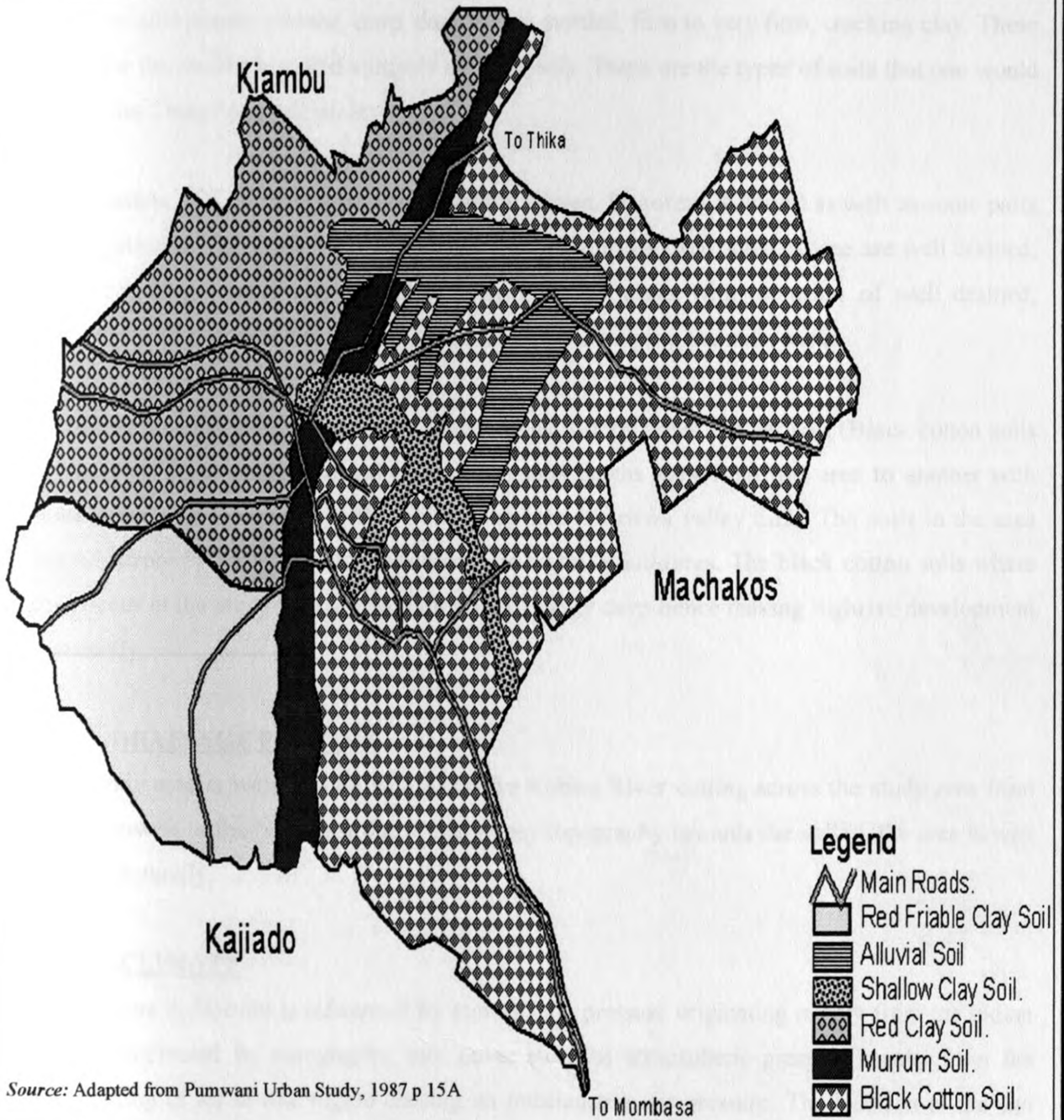
East of Nairobi city where drainage is impeded over Athi Plains the soils are black to dark grey clays (Grumisols) and comprise the so called "Black Cotton Soils" and other calcareous and non- calcareous variants. The soils overlie Nairobi phonolites which is an impermeable stratum over which ill-drained soils can be expected to develop.

These however are intermingled locally with swamp and vlei soils and luvium which are recognized as dark soils overlying parts of Nairobi city. These are classified as greyish brown mottled clay (grey Soils, Vlei Soils), some of which over lie the generally flat surface of Nairobi Trachyte.

The map below shows the distribution of soils in Nairobi

Map 3.3

## Soil Types- Nairobi



The next group is a complex soil of moderately well drained, shallow, yellowish red to dark yellowish brown friable, gravelly clay. These are referred to as ironstone soils or Lithosols (Shallow soils).

These are also poorly drained, deep, dark brown mottled, firm to very firm, cracking clay. These constitute the undifferentiated vertisols and Gleysols. These are the types of soils that one would find on the Thika Volcanic plain.

North-eastern and northern portions of Nairobi (Karen, Dagoretti, Kikuyu) as well as some parts of Langata and Gigiri, are found to be covered with Nitisols (Red soils). These are well drained, extremely deep, dusky red to darkish brown, friable clays with inclusion of well drained, moderately deep dark red reddish brown, friable clay overlying the main rock.

The study area has red volcanic soils mostly to the sloppy areas and vertisols (Black cotton soils to the fairly level poorly drained areas). The soils depths vary from one area to another with some areas near the Kirichwa River exposing bare Kirichwa valley tuffs. The soils in the area has a Nairobi Stone base which accommodate highrise buildings. The black cotton soils where they occur in the study area are not more than 1 meter deep hence making highrise development less costly.

### **3.3. DRAINAGE PATTERN**

The study area is well drained with Kirichwa Kubwa River cutting across the study area from the Southwest to the Northeast due to the sloppy topography towards the valley, the area is well drained naturally.

### **3.4 CLIMATE**

The climate in Nairobi is influenced by atmospheric pressure originating mostly from the Indian Ocean moderated by topography, tree cover etc. The atmospheric pressure results from the overheating of air in one region causing an imbalance in air pressure. The location of the sun thus determines to a large extent the climate.



In Kilimani, like the rest of Nairobi, experiences two seasons with long rains falling between March to May and short rains coming between October to December. The rainfall varies between 500-1500mm per annum. The temperatures in Nairobi varies with a daily average varying between 17<sup>0</sup>C in July/August and 25<sup>0</sup>C in March with a maximum daily range of 10<sup>0</sup>C to 30<sup>0</sup>C in May and February respectively.

After looking at the physiographical characteristics and weather patterns in the study area and their influence on land use pattern, the other major determinant of land use pattern is the zoning regulations which determine the extent of development a particular area can legally achieve.

### **3.5 ZONING**

Zoning is the division of land according to building design and use (Catanese and Snyder, 1979)

The type of regulation most commonly associated with the implementation of a land use plan is Zoning ordinance (Catanese and Snyder Eds. 1988). A traditional zoning ordinance consists of a map (or series of maps) and a text. The map divides the community into districts and the text lists the type of uses permitted in each district or zone and sets forth regulations governing the way in which the uses may occur (*ibid pp234*).

In most cases these regulations establish the minimum plot sizes, the plot coverage, size and height of structures, the maximum density of development (for example the number of dwelling units per plot), Maximum set backs and yard requirements ,off street parking etc.

This kind of zoning has been criticized because of its many weaknesses

- The best economic use of land is not always anticipated by the zoning plan.
- There is always political interference
- Does not protect the public from harmful effects.

Zoning is a powerful tool in land use planning. Any development proposed contrally to the permitted land use plan may not be approved. Zoning allows the type of buildings to be put up, the heights, and the accommodation to be created and thus influence the urban design and densities. Since the demand for land is a *derived* demand, the net worth of the improvements likely to be allowed would determine the value of a development property.

The implications of zoning ordinance on land use and land values was well demonstrated in the Euclids case. In the case of Village of Euclid Vs Ambler Realty Co. (No. 31) 295 Fed. 207, Southland J delivering the opinion of the Court (Supreme Court of the United States) reversed a decision of the Lower Court that had ruled that a Zoning Ordinance was unconstitutional as it had deprived the appellants liberty and property without the due process of the law.

The facts of the case were that the appellants land measuring 68 acres, situated in Euclid village, a suburb of the city of Cleveland where in 1922, a Planning Ordinance was adopted by the Village Council establishing a comprehensive zoning plan for regulating and restricting the location of trades, industries, apartments etc, their heights and built up areas and their types.

The appellants claimed that their property value would be reduced drastically to \$ 2,500 per acre from a high of \$ 10,000 per acre if the residential user was upheld.

It was specifically averred that the ordinance attempted to restrict and control the lawful use of appellants land so as to confiscate and destroy a great part of its value; that it being enforced in accordance with its terms; that prospective buyers of the same for other users like industrial would be deterred from buying it by the existence of the ordinance. The ruling in this case shows the inherent powers of zoning regulation, its police power and how it affects land use pattern and land values.

The City of Nairobi has a history of zoning dating back to the colonial period where it was used to racially segregate the urban population. The historical development of the zoning policy is captured below so as to shed light on the factors that has lead to policy change over the last two decades.

### **3.5.1 Chronology of City Council of Nairobi zoning policies**

Zoning in Nairobi started in the early 20<sup>th</sup> century. The allocation of land was based primarily on ownership. Railways land was separate from Crown land governed by the protectorate officials and both were distinct from land held by private individuals (*Navanlinna, 1996, Pg. 15*). The major land use was railway workshops and railways housing, protectorate administration offices

and barracks. However the Indian Bazaar had mixed uses from shops warehouses and dwelling to religious buildings.

Later as noted on page 28, plague outbreaks in the Indian Bazaar in 1911, 1912, 1913 made the Europeans apply racial segregation as a way of zoning. It was alleged that poor sanitation conditions in those zones was to blame. Europeans had created special zones where 'others' could practice what deviated from their (European) set standards. These were the Indian Bazaar above and the native location (Pumwani) for African habitation. By 1912 the population of Nairobi had grown to 20,000 the town was attracting investments and land prices went up. Significant profits could be made by selling plots bought earlier at very low rates and subdividing larger plots into smaller ones. Major congestions in the Indian and African areas was experienced since they had been restricted to small portions of town.

Thus in 1913, a town plan entitled *Nairobi Sketch Map of Segregation proposal* was made through a local commission headed by Professor W.J. Simpson.

It divided the city into 6 zones

- i) The European residential area (Upper Hill and North)
- ii) The High Class Commercial Area (West of Government Road)
- iii) The Asiatic Residential Area (North East of Nairobi River)
- iv) The Middle Class Commercial Area (East of government Road)
- v) The Africa Area (South East)
- vi) The Protective Zone between African Area and the Middle Class Commercial area.

This zoning policy was to stay in place for some years until after the 1<sup>st</sup> World War when each group started agitating for their rights. In the Municipal Council, the interests of the Europeans dominated issues important to their well being like construction and maintenance of public utilities and services e.g. roads street lighting, water, electricity, sewage and drainage especially for the city center and the Europeans residential areas. Hence the taxing of the majority to service the minority was established European even opposed high rates and revenue came from taxation of the Africans. On their part the Municipality released more land for African housing

trying discourage the construction of huts by using government funds to build houses in the Eastern part of the City i.e. Kariokor, Starehe and Muthurwa for the railway workers.

### **3.5.2 The Feetham Commission**

By 1930, the population of Nairobi was nearly 49,000 (*Nevanlinna, 1996 Pg. 140*). Problems within the Municipality could not be ignored and the governor appointed Justice R. Feetham to chair a local government commission to look into the organization of the city. In 1926, F. Walton Jameson of Kimberly was also appointed as a consultant to prepare a new town plan. The Commission recommended extension of the town boundary, which despite opposition from European settlers in Muthaiga was done in 1928 including areas like Eastleigh, Upper Parklands and Westlands to the North part of the Hill and Kilimani and the Thomson Estate. Jameson proposed a plan which realigned the railway and in its place proposed a wide avenue. It is here that an explanatory memorandum of 1927 of the town planning authority described the establishment of zoning to regulate the land use in different parts of Nairobi as a primary function of the authority.

Thus the possibility of controlling the occupation of land was hatched. This was so because systems of control included adopting of building by laws in 1926 and zoning.

A part from zoning for particular function, residential areas were also defined for ethnic groups. In the zones densities were specified. This plan also tried to recognize the vehicular traffic within the municipality. There were about 5000 cars in the whole country then. (*Nevanlinna 1996, Pg 143*). Roads had 72% of the available financial allocation of the plan. Major roads were: -

- ❖ Connecting Eastleigh to Industrial Area
- ❖ Connecting Kabete Road with Ngong Road at the edge of Upper Hill Estate and one
- ❖ Connecting Kabete with Muthaiga

These roads were designed to serve the settlers in traveling in and out of Nairobi. They also set in place more racial segregation, as Africans could not move to European sides since there were no connections.

### **3.5.3 Nairobi Master Plan For a Colonial Capital**

After the Second World War the population of Nairobi increased rapidly and in 1945 a team of L.W.T. White, L. Silberman and P.R. Anderson were invited from S. Africa to prepare a plan for Nairobi. This plan was very comprehensive as it gave the background of Nairobi, analyzed the economic performance, population, physical and social infrastructure amongst others.

Among the objectives of the plan was to: -

- a) Provide areas adequate in size for probable future requirements of Nairobi for residential, housing, commercial and business, industry, public buildings, recreation etc.
- b) To zone the above areas to ensure their most efficient inter relationship
- c) To establish reserves which act as contingency zones the use of which may be decided in future

The plan estimated a population of 250,000 persons and zoned the city into 14 zones each with specified land use. The zoning set limits to building heights, restricted trunk roads from passing through the center.

The heights of building were further zoned into 2 zones where the city square area was 100 feet and the remaining parts 50 feet. Zone 1 was the area to the west of present day Tom Mboya Street and bordering Uhuru Highway. To the west of the commercial center a strip was zoned for flats or terraced houses for lower paid Europeans.

The authors noted that these were young Europeans starting from scratch and had to be assisted by letting them live close to their work places to reduce on transport costs. Further they recommended some arrangement to cover foundation costs incase of lateral extension of the black cotton soil.

It cannot be avoided to mention that residential area zoning was intended to cater for specified economic groups and develop a particular racial character as indeed units do throughout the world. Two areas were also zoned for official housing where the municipality, railway, government could develop housing estates to accommodate workers.

#### **3.5.4 The Nairobi Metropolitan Growth Strategy (NMGS)**

With independence, Nairobi's Population grew at a tremendous rate. By 1978 the Population had reached about 700,000 and it was estimated to reach 3,000,000 by 2000. To address the new challenges that came with population growth, the Nairobi Metropolitan growth strategy was formulated in 1973. This report recommended among other things that: -

- ❖ Restrictions be placed upon the growth of the present central business district and industrial area linked with a policy for development of additional centres at strategic locations throughout the expanded city and other industrial employment centers in areas at the periphery.
- ❖ The establishment of public land reserve well in advance of development needs for low and moderate income housing, industrial estates, major commercial areas and other public services.

This plan emphasized a lot in traffic reorganization by establishing segregated bus routes, reduction of bus fares, increased tax on personal cars, fuel taxes and increased parking fees. It also recommended staggered working hours and restriction of number of employees at the CBD to be 100,000. To retain this number it was suggested that alternative services center within different districts of the city; and consequent decentralization to them of certain land uses not necessarily located in the center and would benefit from an outlying labour force. Such uses would be education, shops serving day to day needs, some entertainment, commercial offices and national and local government offices.

#### **3.5.5 Current Rezoning Policies by City Council of Nairobi.**

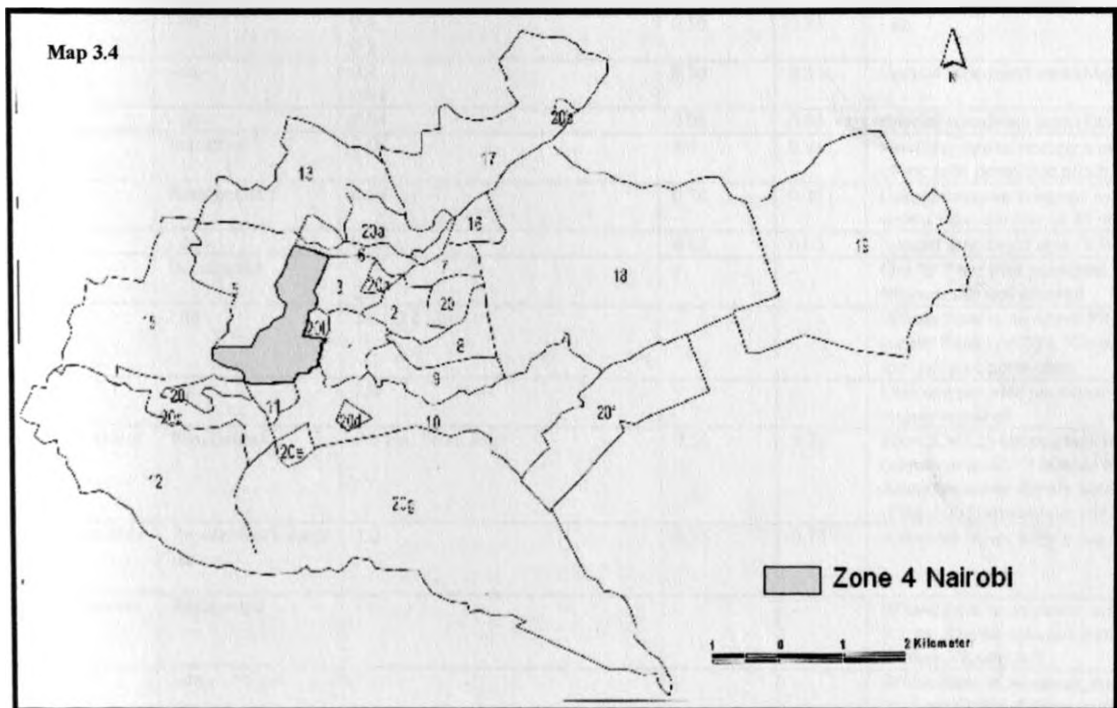
Zone 4 comprises Parklands, Westlands, Lavington, Bernard Estate, Thompson Estate, Kilimani and Kileleshwa. The size of the area is approximately 40,000 hectares. The first development policy for the area was approved in 1968. Minimum plot sizes and plot ratios in the whole city were set. In the above zone, plots on sewer were allowed ground coverage at 35% up from 33.3% .For plots without sewer; it was 25% and 20% for plots on septic and conservancy tanks respectively. Plot sizes on sewer remained at 0.1 Ha and without sewer at 0.2 Ha for single dwelling units. To be comprehensively developed 1 hectares was the minimum size. In 1981 this

was raised to 0.4 Ha and the rest remained the same. Later in 1986 the comprehensive development was left to be guided by ground coverage and plot ratios.

In 1987 the town planning committee observed that the 1986 recommendation would create a population of 864,000 people that could not be supported by then existing services and public utilities. It further observed that with minimal expansion of available services only 300,000 people could be accommodated in these zones.

Thus the recommendation which were adopted were:

- ❖ Limit Population to 300,000
- ❖ Minimum plot sizes to be 0.05 ha on sewer and unsewered to 0.2 ha for single dwelling units.
- ❖ High rise developments to be limited to sewerred areas at 10% ground coverage and plot ratio of 0.75 ha and not exceed 4 floor.
- ❖ Plot of 1.0 ha and above were to surrender 10% open space to city council



### Land Use Zones of Nairobi City

Source: Nairobi City Council

Here below are the permitted land use for each zone

Table 3.1

Zone	Current Land Use	Proposed Land Use	Minimum Plot Size (Ha)	Plot Ratio	Maximum Plot Coverage	Remarks
A	Commercial/Residential/ Light Industry	Commercial/Residential/ Light Industry	0.05, 0.1 and 0.04	1.25	0.75	Highrise flats PR= 1.0 GC=0.35
B	Offices/Residential	Commercial/Offices/Residential	0.1 and 0.2	0.50 2.0	0.33	Highrise flats PR= 1.0,GC=0.35
	Commercial/Residential	Commercial/Residential	0.05 and 0.04	1.25 0.50	0.75 0.33	Flats not allowed
	Residential	Residential	0.1 or 0.2	0.75	0.35	Flats allowed, where there is sewer PR=0.75 GC 0.35 Where no sewer no apartments
	- do -	- do -	0.05 and 0.2	0.75	0.33	Flats and Maisonettes allowed where there is no sewer PR=GC=25% (septic tank) or 20% (conserve tank)
	Residential	Residential	0.3	0.05	0.33	No Flats but Maisonettes allowed There is no sewer PR=GC=25% (septic or 20% (conserve tank)
	- do -	- do -	0.4 0.3	0.50	0.33	- do -
	- do -	- do -	0.4 0.08	0.50	0.50	Special scheduled area (Mathare)
	- do -	- do -	0.04	0.05	0.05	Special scheduled area (Eastlands).
	Industrial	Industrial	0.04	3.0	0.75	Ancillary use to occupy a maximum of 20% of the total permitted plinth
0	Residential	Residential	0.04	0.50	0.33	Comprehensive schemes will be allowed with a max. density of 35 units per ha
1	- do -	- do -	0.04	0.05	0.05	Special scheduled area (Kibera)
2	Residential	Residential	1.0 2.0	-	-	One unit per plot permitted; flats and Maisonettes not allowed
3	- do -	- do -	2.0 0.2 1.0	-	-	Where there is no sewer PR=GC=25% (septic Tank) or 20% (Conserve Tank), one unit per plot permitted
4	- do -	- do -	2.0	-	-	One unit per plot permitted; adequate water supply required
5	Agricultural/Residential	Residential	0.1 Ha Township	0.50	0.20	PR=GC=0.25 (Septic tank) PR=GC=0.20 (conserve tank). Terraced houses allowed Adequate water supply necessary (Dagoretti) (special density area)
6	Agricultural/Residential/ Industrial	Residential/Industrial	1.0	1.25	0.75	Adequate water supply required (Ruaraka).
7	Agricultural/Residential	Residential	-	-	-	Where there is no sewer, min plot size = 0.1 ha. Special scheduled area (Kahawa/Kasarani)
8	- do -	- do -	-	-	-	Where there is no sewer, min plot size 0.1 ha Special scheduled area (East of Embakasi Airport) where there is no sewer, minimum plot size=0.1 ha
9	Agricultural	Agricultural/Residential	-	-	-	Special Density area (Eastern Extension) max. of 3 units per plot allowed.
10	Public	Public	-	-	-	Forests, Game Reserve, Defense Areas etc.

Source: Nairobi City Council



### 3.6 THE CURRENT ZONING POLICY IN KILIMANI

The area was exclusive high class low density residential. Most recent planning proposal is the 1993 Nairobi town planning liaison committee *Proposed Replanning of Hill and Kilimani Areas* which recommended the following;

- a) Removal of the restriction on office user to 1.5 km radius from another office or commercial center and the restriction to ownership. However the council was left with the discretion of defining profession
- b) All professional offices to maintain residential character in terms of development ie in both plot ratio and ground coverage.
- c) Professional offices to be located on plots of minimum 0.1Ha.
- d) Professional offices should not be allowed in comprehensive schemes (flats).
- e) Professional offices to provide on site parking facilities within their own plots.

For residential hotel development, it recommended that;

- a) The plot should be of minimum 0.2 Ha
- b) The development should maintain residential character in terms of ground coverage and plot ratio.
- c) Residential hotels to be located along major roads and should not provide disco facilities.

For residential it recommended that the area should remain residential with 1 acre being the minimum plot size for comprehensive development on sewerred plots. 10% land to be surrendered to the council free of charge. The maximum height allowed is four floors.

The 2006 policy review for zones 3.4 &5 recommends rezoning of zone 4 to accommodate the pressure for offices ,housing and commercial developments with the infrastructure financing being funded by the developers. It also recommends the zone to be divided into sub zones with each sub zone having its specific zonal guidelines. Our study area would fall in zone 4G where the proposal maintains a ground coverage of 35%, but increases plot ratio to 1 with a minimum plot size of 0.2 hectares for flats development. The sky line is maintained at four floors plus an attic.

### Current land uses in Kilimani

The current and land uses are characterized of mixed development with the old high class low density houses coexisting with the upcoming high density apartments or high density maisonettes which are as a result of subdivision of the original half acre plots. The study area has two public schools situated diagonally opposite each other. Kilimani primary school is the oldest while Milimani primary was established in the early 70s. The land under which the later school was established had been reserved for recreation but due to increased population that time the user was changed to accommodate a school and a church.

The study area has 4 private schools on relatively smaller pieces of land. There are no low order markets. The occupants rely on Yaya center which is a few meters away from the study area. Lack of low order shopping center has caused a make shift market outside Kilimani primary school and on Kilimani roads

The pictures below indicates the land use conflict occasioned by these unplanned land uses

Plate 3.2  
Argwing Kodhek Road, Road Side Market



Plate 3.3  
Informal Road Side Kiosks on Kilimani Road

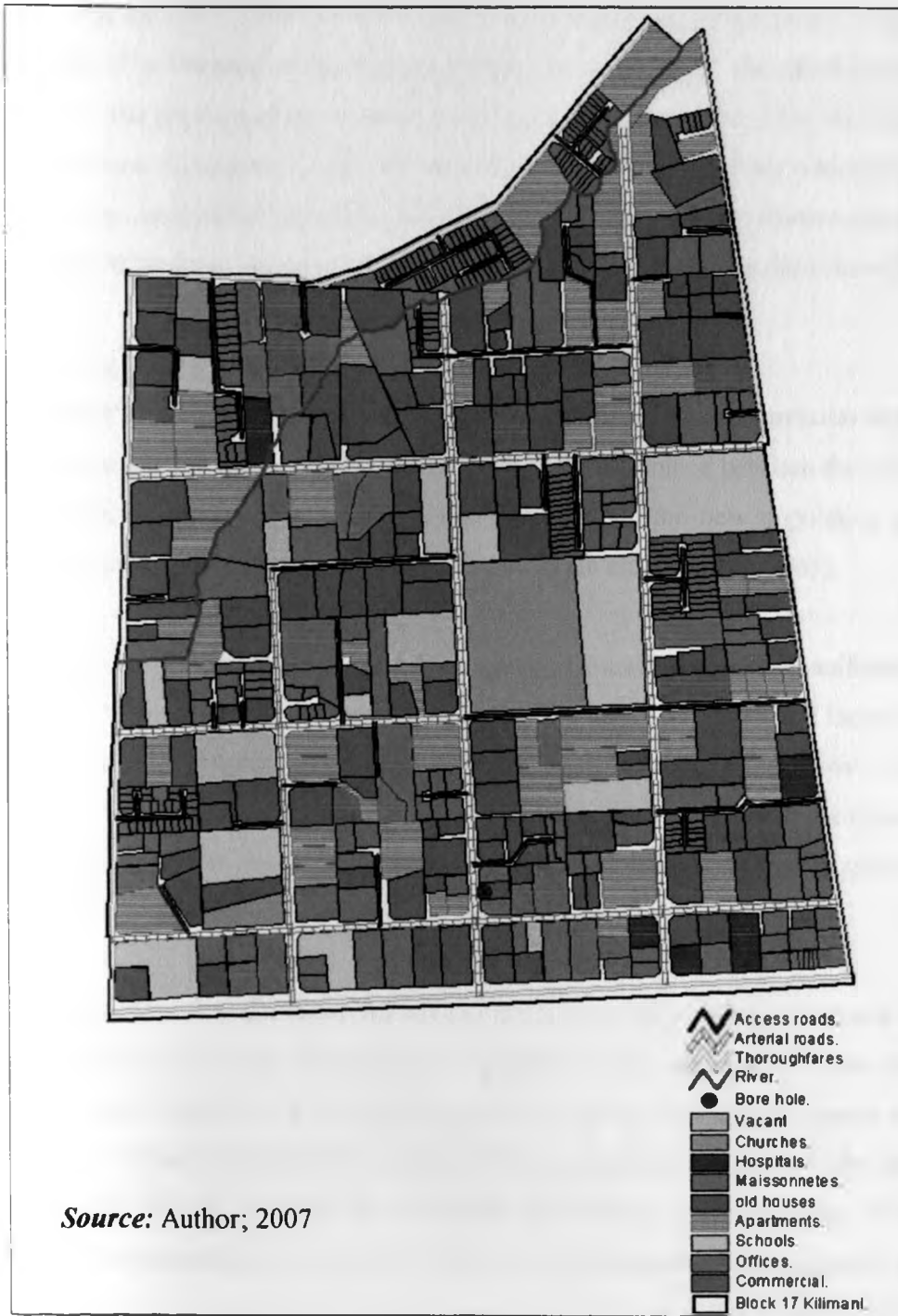


*Source:* Author; 2007

The map below shows the current land uses spatially distributed over the study area

Map 3.5

### LANDUSE PATTERN KILIMANI



*Source:* Author; 2007

From the above map, it is clear that the area is still under residential user. Comparing the above map with the 2003 aerial map on page 27 it is evident that development of apartments is on the increase. The demand of the apartments has increased due to the deteriorating state of security and also the prestige of the location to the middle income class. This has brought about another class of new occupants. At the same time the original occupants are relocating to quieter areas to escape the congestion associated with the current land use. The above scenario brings as to the concept of land use invasion and succession which is discussed in detail here below.

### **3.7 Land Use Invasion And Succession**

Land use invasion and land use succession are linked processes. Invasion is the interpenetration of one population group or use area by another, the difference between the old and the new being economic, social or cultural. Succession occurs when the new population group or use types finally displaces the former occupants or uses of the area (Chapin, 1965).

Invasion of one population group by another is usually a spatial manifestation of the change process at work in the social structure of the city (ibid pp27). Several factors contribute to land use succession in a residential area. Aging of the residents and the growth of their children will eventually cause a turn over in the ownership of the housing. Residential neighborhood bordering business district may eventually be overwhelmed by the expansion of the business district ([www realestate.com](http://www.realestate.com)).

The principal consequence of invasion is the breakup of existing population and land use make up of an area. The new population's requirements may not exactly match that of the outgoing population. They may exact pressure on the environment and may require different social and physical infrastructure from the one used by the outgoing population. The current trend in land use in the study area is from low density to high density invasion calling for policy intervention to avoid unsustainable development. The concept of sustainable development is discussed below

### **3.8 Sustainable Urban Development**

The World Commission on Environment and Development (WCED) commonly known as *Brundtland Report* brought forth and popularized the concept of sustainable development (Westendorff, 2004) which had earlier in 1980 been coined by the World Conservation Union

(IUCN) through the World Conservation Strategy. The report highlighted the dangers that conventional development path was leading to the destruction of the environment. The report said that resources were being exploited in unsustainable manner reading to depletion.

Sustainable development was seen as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Agenda 21, which was signed by most of the world head of states in Rio De Janeiro in 1992 on “Sustainable development” in the 21<sup>st</sup> Century, took the concept a notch higher with analysis of the problems of global development mostly focusing on environmental and resources utilization. It provided an analysis of the role and responsibilities of all actors from the international agencies, national and local governments and even the private sectors in developing solutions to the problem of unsustainable development.

Local Agenda 21, briefly defined in chapter 28 of Agenda 21, provides that local Authorities should reach a consensus with stake holders groups in the community to initiate a sustainable development planning and management process and that local initiatives should network with one another to exchange experiences.

The term sustainable development in the 1980s had environmental dimension. In the 1990s, the term broadened to include discourse in economics, social and politics (*UNRISD, 2004:20*). In the case of sustainable urban development, the term ‘*Brown Agenda*’ was coined to emphasize the need to deal with other issues affecting the urban population-particularly the urban poor. Some scholars differentiate sustainability into primary sustainability and secondary sustainability to differentiate the environmental aspect from economics aspect

### **3.8.1 Primary & Secondary Sustainability**

*Allen (1999)* classifies sustainability as primary and secondary sustainability. Primary Sustainability refers to the natural resources approach- Where the concern is mostly with natural resources exploitation is line with World Conservation Strategy of 1980 described above.

Secondary sustainability according to him refers to the capacity of the local authorities and community to manage resources including the environment effectively. For the secondary

sustainability to be achieved, participatory approach and democratization he adds, are pre-requisites.

It is the secondary sustainability approach which will be of importance to this study. Sustainability implies the power of a resource to accommodate use and abuse. Where a resource is unable to sustain the use indefinitely, its carrying capacity is said to be exceeded.

### **3.8.2 The principal of carrying capacity**

Ecologists define 'carrying capacity' as the population of a given species that can be supported indefinitely in a defined habitat without permanently damaging the ecosystem upon which it is dependent. However, because of our culturally variable technology, different consumption patterns, and trade, a simple territorially-bounded head-count cannot apply to human beings. Human carrying capacity must be interpreted as the maximum rate of resource consumption and waste discharge that can be sustained indefinitely without progressively impairing the functional integrity and productivity of relevant ecosystems wherever the latter may be.

Land use in the study area was originally planned for low density development the infrastructure provided for was for such land use. The current trend in land use requires therefore, improvements in infrastructure and social amenities to match the current land use. For orderly development, the legal and institutional framework in place plays a key role in defining duties of the actors and their powers. The following section looks at the institutions and legal framework informing development in the area.

### **3.9 Legal Framework:**

Various legislations define the powers and operations of the planning agents in land use planning with the supreme law, the Kenya Constitution expressly providing for compulsory acquisition for public purposes.

Part IX of the constitution of Kenya provides for the setting apart of land for public use. Development planning in Kenya is guided by the Physical Planning Act 1996. Several other legislative provisions have been passed by parliament and have strong impact on planning as detailed below.

### **i) The Physical Planning Act 1996 Cap. 286**

The Physical Planning Act of 1996 is an act of parliament providing for the preparation, implementation and enforcement of physical development plans. The act was enacted to provide a framework for conflict resolution through liaison committees from the district, provincial and national levels and also provides what should guide land uses through physical development plans (local in urban areas and regional in rural areas) and a mechanism to guide and enforce development control through Local Authorities and NEMA. The acts have linkages with the environmental monitoring and coordination acts and require that a participatory environment impact assessment be done on projects with a greater impact on the physical environment and those in environmentally fragile areas.

Section 23 provides for declaration of special planning areas to areas with unique development potential or problem for the purpose of preparation of a physical development plan irrespective of whether such a region lies within or outside the area of a local authority.

Section 29 gives the Local Authorities powers;

1. to prohibit or control the use or development of land and buildings in the interest of proper and orderly development of its area
2. to control or prohibit the subdivision of land or existing plots into smaller areas
3. to consider and approve all development applications and grant all development permissions
4. to ensure the proper execution and implementation of approved physical development plans
5. to formulate by-laws to regulate zoning in respect of use and density of development and
6. to reserve and maintain all the land planned for open spaces, parks urban forests and green belts in accordance with the approved physical development plan.

Section 30 prohibits developments which are not approved as provided by the act

### **ii) Local Government Act Cap 265**

This act deals with creation, administration, management and running of local authorities in Kenya.

- Section 162 just like the physical planning act give local authorities' power on subdivision of land and 166 powers on development control.

- Section 162(g) gives the local authorities powers to prohibit registration of any subdivision carried out contrarily to the provision of the Act
- Section 168 gives the local authority power to establish and maintain sewerage and drainage works and allows them to lay pipes and the infrastructure to go with it.
- Other services to be provided are housing, water supply and diversion of streams with due regard to the water act.

### iii) The Environmental Management and Coordination Act, 1999

- This act allows for appointment of provincial and District Environmental committees which are charged with the proper management of the environment within a Province or District.
- Section 58 requires that any development as in 2<sup>nd</sup> schedule will be carried out only after an environmental impact assessment has been done. Such developments include new townships, industrial estates, shopping centers and complexes etc.

### iv) The Land Acquisition Act CAP 295 of 1968:

Section 6 (1) gives the Minister powers to acquire land compulsorily if he is satisfied that the land is for public interests of defense, public safety, public order, public morality, public health, town and county planning or the development or utilization of any property in such a manner as to promote public benefit.

In conclusion we have observed that the study area is dynamic in land use whereas the infrastructure provision is lagging behind. This would lead to the emerging land use exceeding the infrastructural carrying capacity leading to unsustainable urban growth.

There are several factors which lead to Land Use dynamism. The following chapter discusses the land determinants and their relevance in the study area.



## **CHAPTER FOUR**

### **4.0 DETERMINANTS OF LAND USE PATTERN**

This chapter examines the various determinants of land use patterns in an urban set up. This will assist in understanding the factors that determine the current land uses in the study area.

*Chapin (1965)* categorizes land use determinants into three broad categories as follows;

- Economic determinants
- Socially rooted determinants
- Public interest as a determinants

### **4.1 ECONOMIC DETERMINANTS**

The economic explanations of the urban land use pattern begin with forces extending far beyond the immediate environment of any particular urban center of interest and involve considerations of the structure and functioning of the urban economy of the region and the nation (*Chapin, 1965*). The demand and supply of urban land determines the price of land in an urban land market. The price, as we will see later, determines to a large extent the land use pattern.

Supply for land is almost inelastic as the overall supply is fixed. The most single factor restricting the supply of land and buildings at present time is the planning legislations.

The powers of the planning authority in restricting the supply of land is exercised through

1. The power to allocate land for particular use. An allocation for residential use, for instance can not be developed for commercial purposes.
2. The power to restrict changes in the use of buildings.
3. The power to restrict the intensity of land use.

Suitable spaces may be available in underused residential buildings but will require planning permission to convert to another use. Despite shortages and high demand for residential land, idle industrial land will remain untapped for residential use in areas zoned for industrial development. Ground coverage, plot ratio and height limitations will reduce the total built up area in a given plot.

Reducing supply is equally difficult to achieve. The existing stock can only be reduced by change of use or demolition. In conclusion, the supply of urban land for a particular use is almost inelastic in the short run due to planning legislation and regulations.

The demand for land is a *derived* demand. Land is one of the factors of production and its demand arises when there is a demand for products it is used to produce. An increase in demand for hotel services will increase demand for suitable premises suitable for hotel use.

Factors that influence demand includes changes in the size of population particularly when accompanied by an increase in prosperity will increase demand for landed properties (Johnson et al, 2000). Changes in the composition of the population, e.g. change in family sizes, occupants ages, tastes also influences demand for residential properties.

The price of land would certainly be the greatest determinant of demand. An increase in price of a landed property would reduce effective demand. The converse will happen when the prices are reduced.

Borrowing from the economics theory, the equilibrium is reached when the demand of land is matched by the supply of suitable land for the specific use.

The third law of demand and supply states that price adjusts at that level which equates demand and supply (Hardwick et al, 1994). Figure 4.1 gives a theoretical supply and demand situation with DD being the demand curve and SS being the supply curve. The equilibrium price is reached at price  $P_1$  where the market clears.

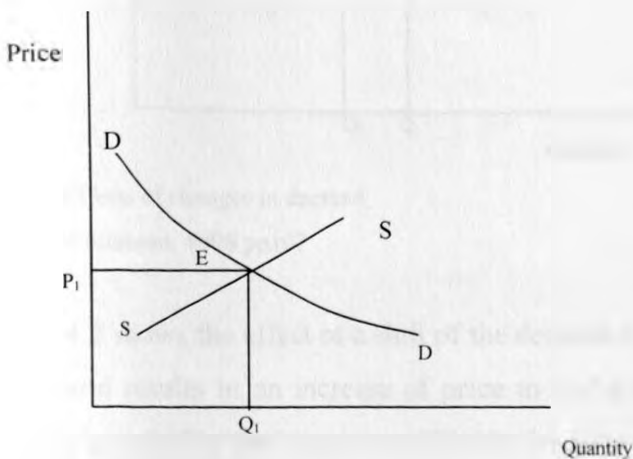


Fig.4.1 Equilibrium price  
Source: Author 2007

From the above,

- ❖ Demand is high when the price is low
- ❖ Supply is great when prices are high
- ❖ Equilibrium is set where price is satisfactory to supply and demand
- ❖ Price  $P_1$  is called the equilibrium price.

Changes in the conditions of demand results in a new demand curve and changes in the conditions of supply leads to a new supply curve.

Demand is very responsive to price changes because consumers are able to adjust effective demand quickly. An increase in mortgage interest rates would effectively increase the price of properties leading to a reduced demand for the same.

Supply can not be as responsive as demand as an entrepreneur has to replan his activities (Whitehead, 1996 p107)

There is always a time lag between the time demand changes and when supply can adjust itself.

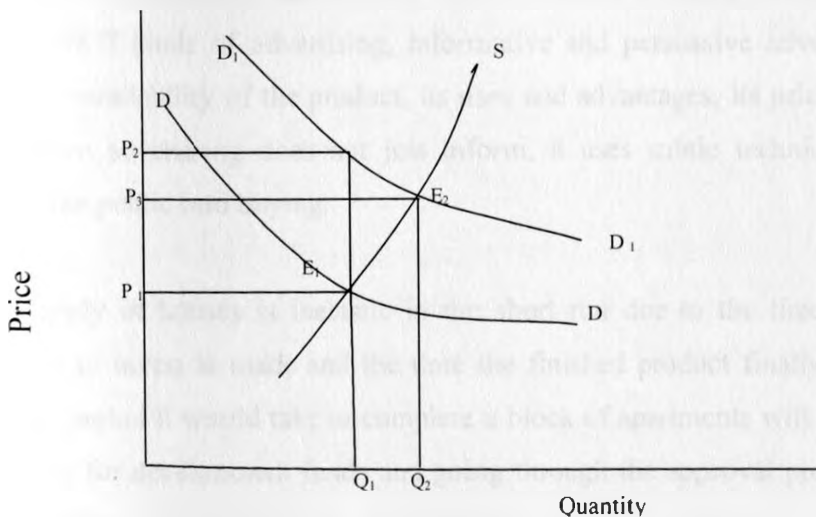


Fig.4.2 Effects of changes in demand

Source: Whitehead, 1996 pp107

Figure 4.2 shows the effect of a shift of the demand curves and its effects on price. An increase in demand results in an increase of price to  $P_2$ . An increase in price leads to an increase in quantity supplied in the long run stabilizing the price at  $P_3$ . This phenomenon is summarized as follows:

Due to changes in demand conditions like change of taste, fashion, income etc demand shift to  $D_1$  from  $D$

- ❖ Supply can not react at once because entrepreneur has to modify his plans. A shortage arises where the price shoots to  $P_2$  from  $P_1$
- ❖ Under the influence of these profits the firm expands output and supply creep from  $Q_1$  to  $Q_2$
- ❖ As the supply increases, the price fall from  $P_2$  to  $P_3$  a new equilibrium is established at  $E_2$
- ❖ Increased demand has eventually pushed the price up to  $P_3$

Where the supply is almost inelastic, an increase in demand results in increase of price to  $P_2$

Supply of land or houses is by a few people or firm in a highly differentiated market. There is no uniformity of the product and information flow is not free. Such production is referred to as oligopolist system by economists. Characteristic of oligopolist production system includes:

1. The products are not homogeneous
2. There are several suppliers and entry to the industry is still possible
3. Heavy expenditure in advertising: This is a feature of brand promotion.

There are 2 kinds of advertising, informative and persuasive advertising. Informative makes clear the availability of the product, its uses and advantages, its price quality and terms of sale. Persuasive advertising does not just inform, it uses subtle techniques to persuade and even delude the public into buying.

The supply of houses is inelastic in the short run due to the time lag between the time the decision to invest is made and the time the finished product finally comes to the market. The shortest period it would take to complete a block of apartments will not be less than 18 months. Sourcing for development funds and going through the approval process may delay the project even further.

Revisiting figure 4.2 above and redrawing it below, we find that in the short term a change in conditions of demand results in a change in price to  $P_2$  with no increase in quantity supplied

Figure 4.3 below indicates the profits enjoyed by the supplier in such a market. The supplier of the commodity enjoys an abnormal profit equal to  $P_1 P_2 E_1 C$

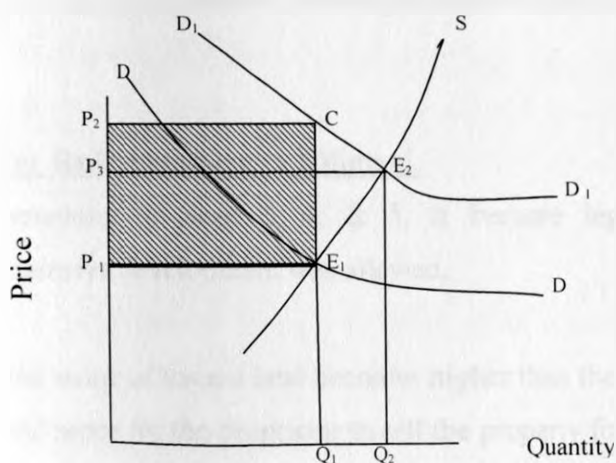


Figure 4.3 Short run profits in a supply inelastic situation

The factors that cause a shift in demand in the housing market includes:

- Changes in the levels of income
- Changes in tastes
- Changes in the terms of mortgage including the interests rate, down payments required
- Population growth
- Availability and prices of alternative premises.
- Location of employment centers.

An increase in the levels of income leads to an increase of effective demand. Likewise a change in taste would increase the demand of the preferred good and a decrease of the demand of the alternatives. Population growth in the urban areas would mean increased demand for housing.

The majority of the purchasers of real estate use mortgage finance to acquire properties. The availability of credit and the terms of the loan will determine the level of demand. A reduction of interest rates would effectively reduce the monthly repayments and eventually the price of the property.

The supply of mortgage funds is determined by the returns and the risks on all possible forms of debt and investments opportunities available to the financial institution (Brueggeman and Fisher, 1997). The government's fiscal and monetary policy affects the available loanable funds through reserve ratio, government borrowing in the domestic market competing for the same funds.

Developers are profit motivated and will only commit their funds where they expect maximum returns for their investments. Looking at zone 4, there is a strong case for redevelopment.

### Case For Redevelopment in Kilimani.

After rezoning of zone 3, 4, & 5, It became legally possible to increase densities, as comprehensive development was allowed.

When the value of vacant land becomes higher than the value of the developed property it makes economic sense for the proprietor to sell the property for redevelopment.

According to *Goodall (1972)*, the building will not be demolished as long as the present capital value is greater than the value of cleared site.

$$Be > Sn$$

Where  $Be$  = Present Capital Value

$Sn$  = Value of Cleared Site

$Sn$  is determined as follows: -

$$Sn = Yn - Cn - On - De$$

Where  $Yn$  = The present Capital Value expected earnings from the replacement of building.

$Cn$  = Cost of constructing the replacement

$On$  = Operating cost replacement

$De$  = Demolition cost of the existing building and preparing the site.

According to the theory of land rent, land values are seen as surplus achieved after optimal combination of all factors of productions (Fraser, 1993). The concept of site value as a surplus implies that, in times when property values are rising relative to development costs, site values will rise to the level which just provides developers with adequate profits.(ibid pp236)

Empirical evidence from zone 4 indicates the present value of the old residential units on 1 acre in perpetuity to be between 10-20 million when let at KShs. 100,000.00 per month, the rental incomes are going down due to congestion, changed urban fabric and change in class status of the occupants. The same land is selling at 30-36 million for redevelopment. A prudent inventor would be tempted to sell the land for redevelopment and relocate to other high class estate like Runda etc.

As the building ages the cost of maintenance increases reducing the earnings on the existing use. A change in taste for a dwelling type coupled with reduced cost of finance is likely to increase the demand for such dwelling type. In Kenya this has happened with a change in taste to apartments, with the NARC government change of policy in domestic borrowing, interest rates have come down and favorable terms has made effective demand to increase. This has triggered demand for apartments with three bedroom apartment selling in the range of 5 to 9 million in the study area.

The developers have made abnormal profits and are ready to spend higher amounts to purchase redevelopment land. If this scenario is sustained most of the land would be put under apartments. This is not a problem by itself but the increased population would require increased services. This is where now the market mechanism fails as it only produces houses with no corresponding infrastructure. After looking at the economics factors lets us now look at the social factors that determines land use patterns.

#### **4.2 SOCIALLY ROOTED DETERMINANTS OF LAND USE**

It is essential to understand the role of human values and ideals in the framework of group action in order to understand how social behavior may determine land use pattern in an urban area. Chapin (1965) expresses human behavior as away in which people group themselves and how they act in the context of the values and ideals they possess. These values and ideals, whether latent or manifest, he continues, are the products of human experience in a specific cultural, economic and physical setting and consist of a kind of superstructure built around the basic drives of human life.

Mass values is the term used to indicate a consensus of values shared by a majority of the people or groups in the community. In the study area there may not be social groupings but class grouping where ability to pay dictates the tenancies and ownership.

#### **4.3 THE PUBLIC INTEREST AS A DETERMINANT OF LAND USE**

After appreciating the economic and social determinant of urban land use, we also note that any sustainable development take cognizance of the health, safety and the general welfare of the urban inhabitants. The public interest involves the control of land use for public purposes as distinguished from private economic or social values. The planning authority should reserve land for public purposes and safeguard fragile ecosystems.

Health and safety are normally defined by the building code and requires individual properties to comply with laid down regulations. The physiographic conditions in an area may warrant the use of control measures to protect the environment for example on steep slopes or flooding zones. Control measures may also be used to control exposure to adverse environmental.

All the above factor play a role in land use pattern but the economic determinants plays an enabling role for the others to play their role. For a potential purchaser of a flat to consider a purchase, there must be a supplier of the units, a financier, a profitable rental market if he does not intend to occupy the premises. Social factors play a secondary role where choice is to be made subject to the economic factors. Public interest is mostly considered at the onset of planning mostly with minimal change after settlement The study area had adequate provisions for public purposes and riparian reserve which has been reallocated for development with time.

Rezoning is one of the methods the supply of land is increased vertically. Technology has lagged behind in vertical provision of services and where available, the cost may be prohibitive. Construction of bypasses and interchanges is not cost effective in a local setting like our study area. Vertical development/densification would thus have serious implications on the environment in which development has taken place. The next chapter will look into the implications of the current land use on the infrastructure and environment.



## CHAPTER FIVE

### 5.0 IMPLICATIONS OF DENSIFICATION ON LAND USE

Densification increases the number of inhabitants in an area. The study area currently has 600 plot and assuming no densification, the area would accommodate a similar number of families. Assuming each family to be composed of 4 members, the study area would have a population of 2,400. With the current densification with flats, considering the maximum development of 24 flats per half acre plot, the population would shoot up to 54,000. The question to be addressed is whether such a population is sustainable with the current level of infrastructure.

### 5.1 INFRASTRUCTURE

The World Development Report (1994) notes that poor infrastructure policies and inefficient provision absorb scarce fiscal resources and damage macroeconomic stability. It further says that the broadest indicator of inefficient performance of infrastructure system is the extent of output lost in delivery.

Hofmeier (1973) distinguishes the various types of infrastructures and lays emphasis on material or investive infrastructure which he alludes have the following common economic features:

- ❖ It is normally very expensive, it has a long economic life and a high capital –output ratio and shows in the short run only small capacity and growth effects.
- ❖ It has a significant external effects on directly-productive investments in other sectors
- ❖ Usually it is collectively utilized; the exclusive principle can not be effectively applied.

He concludes therefore that a truly cost-based individual price for the use of such facilities is very difficult to establish and financing such projects is collectively done.

In the '*Economic Recovery Strategy for Wealth and Employment Creation 2003-2007*' transportation was identified as one of the three pillars to support economic recovery. Kenya has no urban transport policy and as such, there is no clear decision as to which modes of transport and facilities the urban area should encourage (GOK, 2004). Urban transport has received little attention as investments have been going to infrastructure development for inter-urban linkages.

The Metropolitan Growth Strategy for Nairobi which was formulated in 1973 expired in 2003 before most of its recommendations were implemented. The city of Nairobi therefore lacks an urban transport development strategy to guide it on sustainable and integrated urban transport system which is efficient and environmentally friendly.

Urban roads network is a major land use. Road transport has a comparative advantage in terms of speed, flexibility and accessibility. Due to these factors it has emerged as the most preferred mode of transport in the urban areas both for passenger and freight traffic. Roads are also used for Non Motorized and Intermediate Means of Transport (NMIMT) Urban Roads has not responded favourably to non motorized transport due to lack of appropriate policies.

Land use planning therefore plays an important role in refocusing conflicts in land use development for various competing interest ranging from transport, housing and the like. The quality of an urban settlement is highly determined by the transport system. An area or estate with inaccessible roads (Mostly in slums) have low values and are even risky in terms of disaster management and health. Uncontrolled development in urban areas would lead to high urban densities, urban sprawl, long time travel and high cost of infrastructural provision in the long run (GOK, 2004).

In our study area, Ngong Road and Argwing Khodek roads are major transport nodes serving the immediate area and the hinterlands. Argwing Khodek Road serves a high density hinterland of Kawangware while Ngong road services the suburbs of Ngong, Karen and down to Kiserian. Ngong Road is well provided with a room for expansion.

Argwing Khodek has limited space for expansion. Currently the road has exceeded its carrying capacity. The indicators include long traffic jams and non availability of pedestrian walkways.

Technology also keeps on changing and adequate road reserve may be required for any eventuality. A change in urban transport modes to accommodate efficient and environmentally friendly mode of transport like use of electric trains in future cannot be ruled out and as such at planning level, such far fetched reserve options should inform land use planning.

### 5.1.1 State of Infrastructure in Kilimani

#### a) Impact On Roads

Roads in this area were originally developed to serve a low density population. They were designed on a grid iron layout. This layout is currently counterproductive and a cause of traffic jams. The junctions of Argwing Khodek road and other tributary roads like Kirichwa, Galana, Elgeyo Marakwet experience traffic jam during the rush hours of between 7.30 and 9 am in the morning and 3 pm to 6pm in the evening.

The hierarchy of the roads is not reflected in the roads width on the ground. Argwing Khodek is the main road in the study area. The road is supposed to be 20 meters but at some sections is only 12 meters. The 1993 *Nairobi Town Planning Liaison Committee* recommended 20m road reserves for those roads within the service centers within Kilimani area with Argwing Khodek being the main road.

Such roads would accommodate 7 meters of carriageway 5m of street parking, 4m pedestrian walkways and 4m to accommodate other street furniture such as power lines, telephone cables sewer lines and water mains. Currently, the stretch of Argwing Khodek road within the study area has different widths ranging from 12 meters to 20 meters. Street furniture are provided barely a meter from the carriageway. The multiple junctions which used to serve the low density high class residential areas have resulted to traffic congestion.

***Plate 5:1***



Argwing Kodhek Road  
Congested infrastructure on a narrow road. See power transformer barely a meter from the carriage way. also note the ineadequate pedestrian walkway

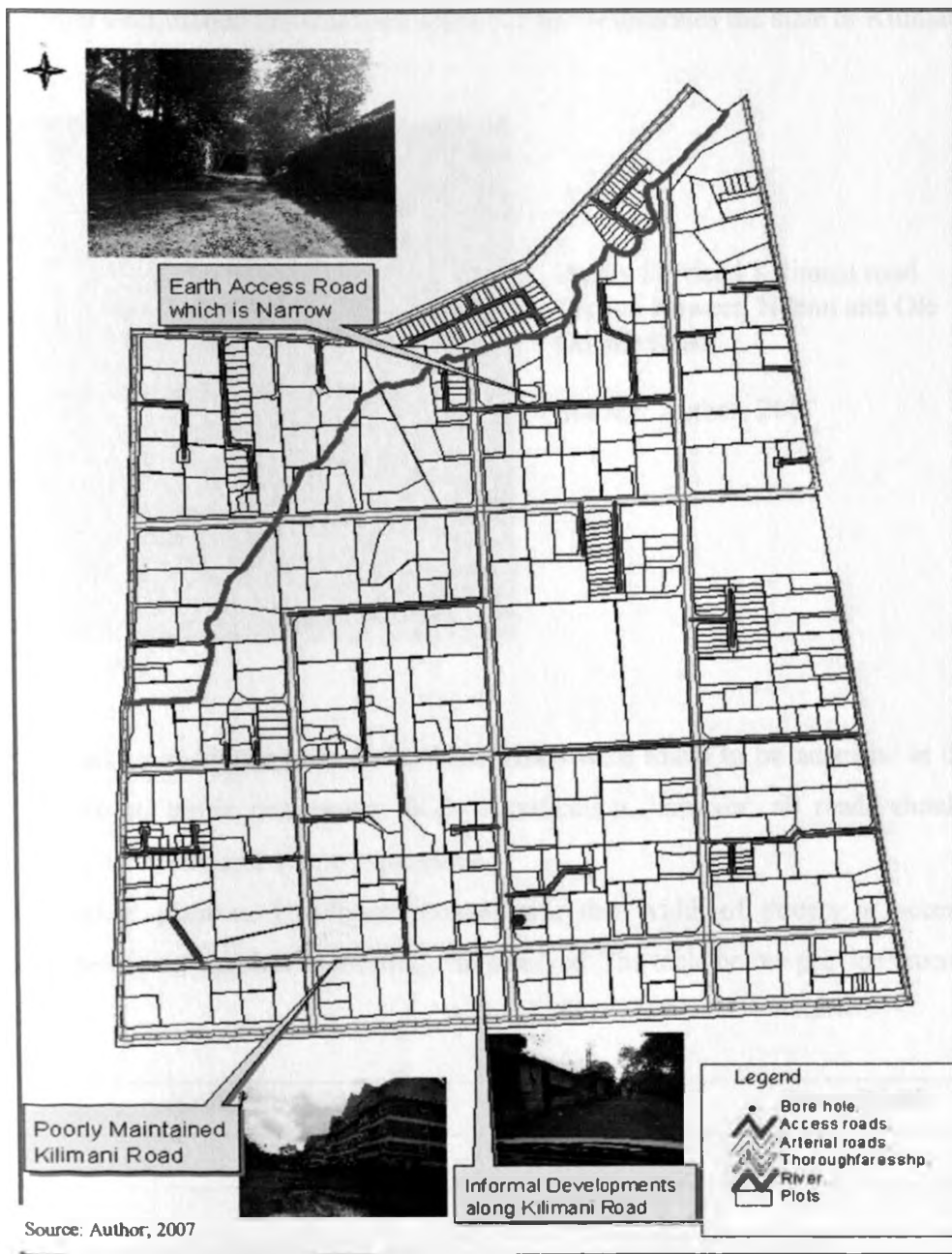
*Source:* Author; 2007

While most of the major access roads are bitumised, there exists a number of murrum roads which were originally bitumised but due to poor maintenance have gone back to murrum status. Kilimani road and Kirichwa road have gone back to Murrum status.

Plate 5.1 above shows a narrow section of Argwing Khodek Road while map 5.1 below shows the problem areas in the study area.

Map 5:1

ROAD NETWORKS IN THE STUDY AREA.



Source: Author, 2007

The interim report on Policy review for zone 3 & 4 & 5 on the proposed Local Physical Development Plan being developed by the Nairobi City Council in consultation with the Department of Urban and Regional Planning of the University Nairobi proposes the roads to be widened to 24 meters up to the junction with Ole Odume road. The area is developed and continues to develop and it requires compulsory acquisition procedures in order to achieve this width. Ole Odume roads has no bridge across Kirichwa River. This has reduced the interconnectivity of Ngong road with Gitanga and Argwing Khodek roads. Internal feeder roads are narrow with limited maintenance. Plate 5.2 below indicates the state of Kilimani Road.

Plate 5:2



Kilimani Road

Poorly Serviced Kilimani road.  
Section between Ndemi and Ole  
Odume Road

*Source:* Author; 2007

Internal access road measures 9m to 12m which were found to be adequate in the short run as there were no traffic congestion. With densification, however, all roads should have a road reserve to accommodate future expansions.

The physical planners Handbook recommends that width of streets or access roads to be determined by the number of dwelling units served .The table below provides recommended road widths

Table 5.1

<i>Number of plots</i>	<i>Street Width</i>
1 -20	9 m
21 -50	12 m

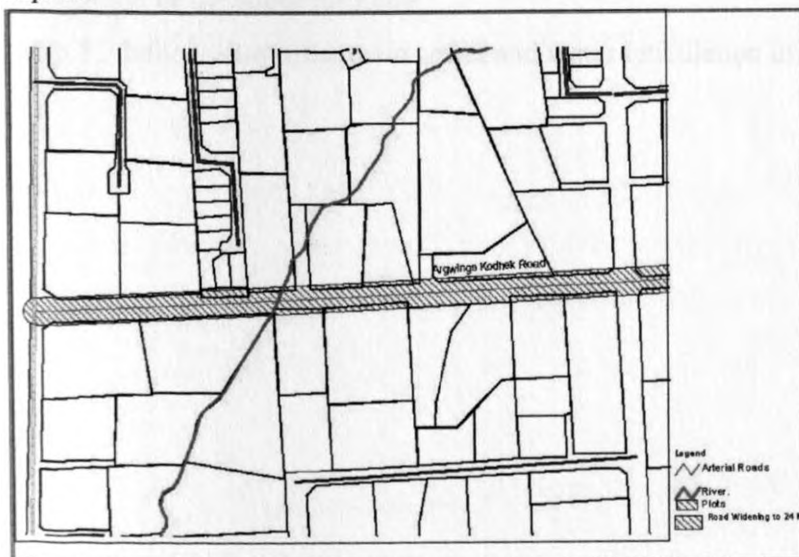
*SOURCE:* Physical planning handbook p18

For Dead-end streets (cul-de-sac), the Handbook recommends that the street should be aligned in such a way that it gives access to not more than 8-10 residential plots and should not exceed 60 meters in length. These recommendations can not be achieved where densification is taking place as a single one acre plot is capable of exceeding the recommended dwelling units. As many as 32 units can be put upon the same plot.

Argwing Kodhek is the main access road in the area. The road is characterized of heavy traffic jam during the rush hours. The carriage acts as acceleration and deceleration lanes for traffic entering the road or exiting the road to or from the roadside plots.

Map 5.2 below highlights a section of Argwing Kodhek road between Ole Odume Road and Elgeyo Marakwet roads buffered to 24 meters. Realigning the road would require a bold move by the Local and Central Government invoking the provisions of the Compulsory Acquisition Act. It will require heavy compensation for affected buildings and land.

Map: 5:2



The narrow section of Argwing Kodhek road Buffered to 24 meters

*Source:* Author; 2007

### b) Impact On Sewerage System

The area is supplied with a sewerage network. The main trunk sewer runs along the Kirichwa Kubwa River. In areas where sewer is not connected, private developers are laying the sewer at

their own cost. Laying of sewer is an expensive undertaking involving consultancy services of surveyors and civil engineers etc and local Authority Approval.

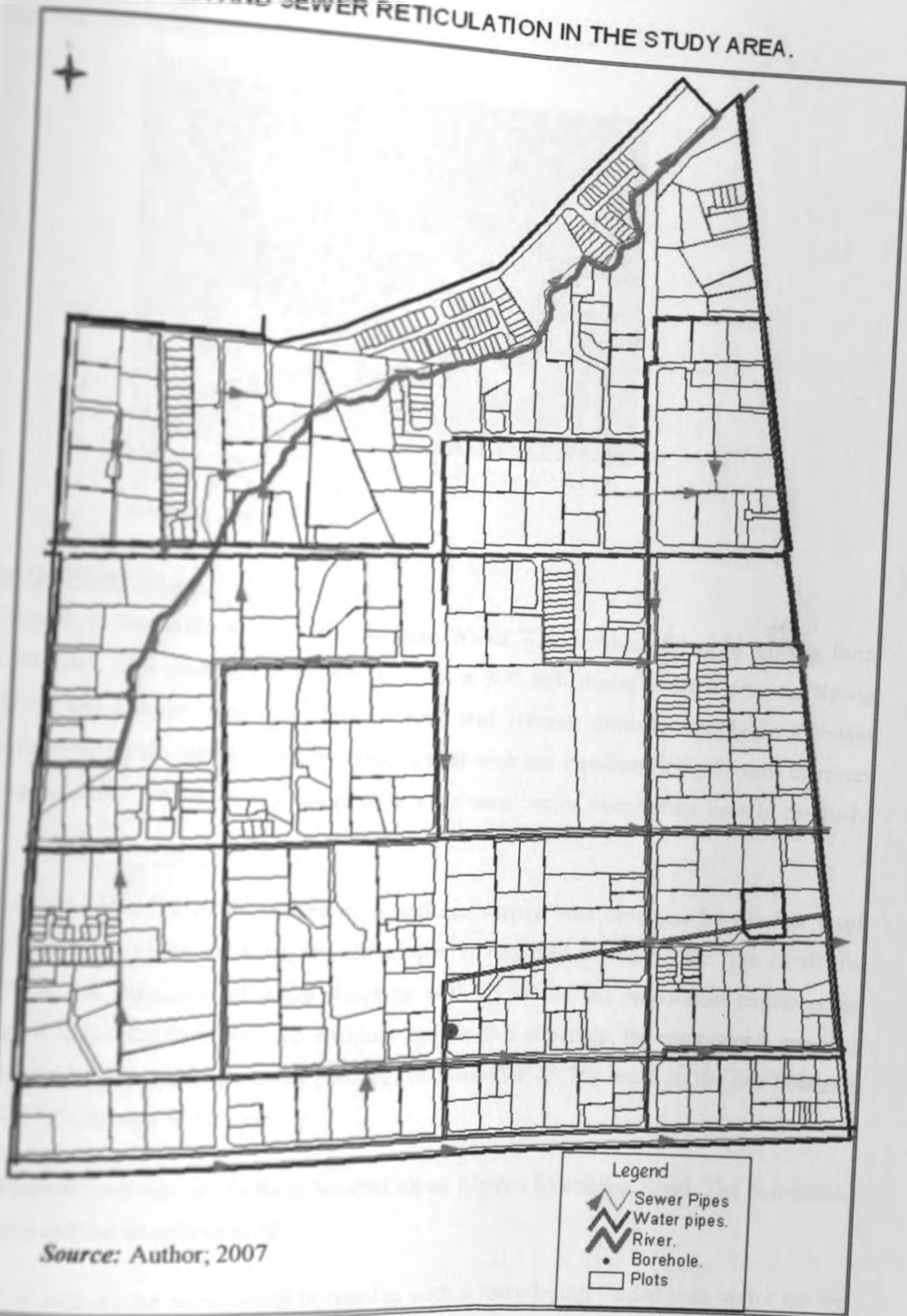
When a plot which was originally unsewered is connected to sewer, its land use capacity increases as it qualifies for densification if it meets the other zoning conditions. The minimum plot sizes also decreases to 0.1 hectares and therefore its subdivision potential increases. This justifies the high costs the private developers undergo to connect to the existing sewer. The sewer line on plate 5.3 below has costed the developer more than 1.7 million and it is not yet complete.

The question that arises is whether the private line is sustainable in future or not. Can the neighboring plots extend the sewer lines to their plots using this connection? Evidence from the site indicates that the sewer is designed to cater only for the subject plot. The line is 3.5 meters deep and has a diameter of 225 mm. For the neighboring property to connect, the owner has to construct a parallel line at similar depth. This would lead to duplication of resources and congestion of the street furniture.

Map 5.3 bellow shows the main sewer and water reticulation in the study area



# WATER AND SEWER RETICULATION IN THE STUDY AREA.



Source: Author; 2007



## Plate 5.3 private connection to the main sewer

*Plate 5:3*



Private sewer connection on L.R. No. 2/61(Plot 176) Kirichwa Road

*Source:* Author; 2007

### c) Impact On Water Supply

The water supply in the study area is from Kabete Water Works which flows by gravity from Hill Tank reservoir. The main water supply is from a 300 mm diameter steel pipe on Ngong Road supplying Ole Odume road and Menelik road and 100mm diameter supplying Kilimani Road area. Adjacent roads are supplied by lesser pipes with the smallest being 68 mm diameter distribution pipes. Map 5.4 on the next page shows the main water distribution lines in the study area.

Water reticulation had covered the whole area and the supply was designed for the low level housing. When a subdivision is done, the developer is required to extend the line to all the subplots. The area is experiencing water shortage with 81.5% of the respondent experiencing water outages at least once per week. To mitigate against this shortage, the respondents reported the use underground water storage tanks (68.6%) and another 13.7% result to the use borehole water supplied by commercial vendors.

There is one private commercial borehole located along Elgeyo Marakwet Road. The borehole is serving the area and the neighbourhood.

Plate 5.4 below indicate the commercial boreholes with a lorry being loaded with water just by the roadside causing obstruction

Plate 5:4

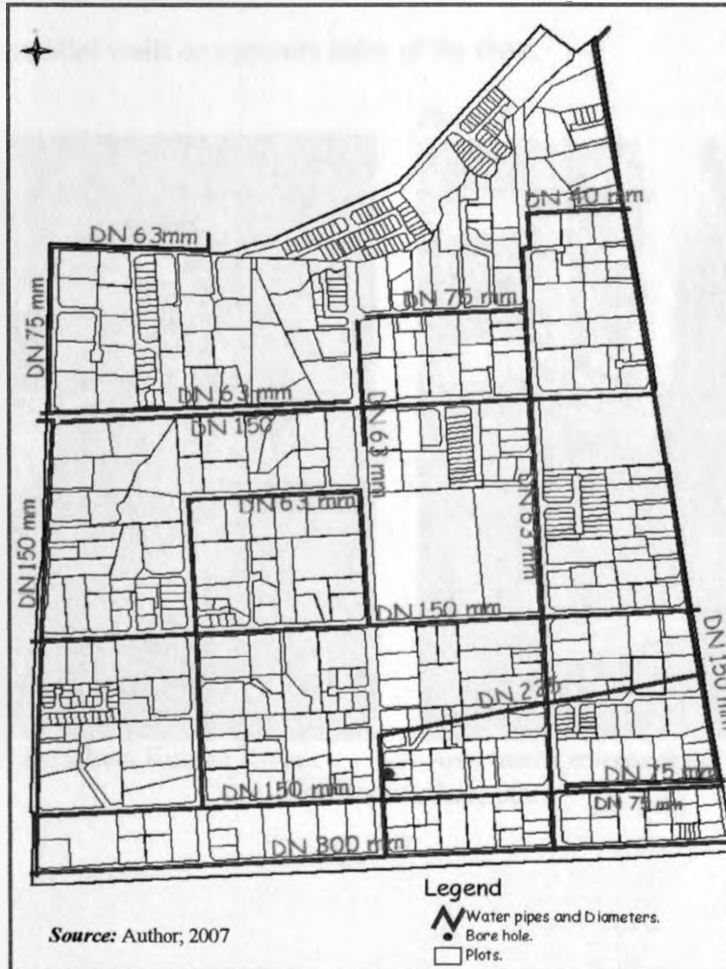
Private Borehole on plot No.439 Elgeyo Marakwet Road



Source: Author 2007

Map: 5:4

WATER RETICULATION IN THE STUDY AREA.



## 5.2 IMPACT ON ENVIRONMENT

The Kirichwa Kubwa river passes through the study area and forms one of the fragile ecosystems in Kilimani. The river is canalized for most of its length along the study area. High walls have also been erected to block the occupants from the awful sight of highly contaminated waters which can also be a health hazards. The increased concrete paved area also increases the run off to the river causing floods.

Section 84(1) of the Water Resource Management Authority (WRMA) Draft Rules 2006 provides that the minimum riparian reserve on each side of the river should be 2 meters or equal to the full width of the river as measured between the banks of the water course up to a maximum of 30m.

The riparian reserve is not respected in this area with houses being built barely 3 meters from the centerline of the river. Densification has worsened the matters with developments being carried to the banks of the river. The overloaded trunk sewer runs along the river with overspill finding its way easily to the river. Pates 5.5 and 5.6 below show the polluted river and apartments constructed next to the river respectively.

Plate 5.7 shows two parallel walls on opposite sides of the river.

Plate 5.5



The highly polluted Kirichwa Kubwa River

Plate 5.6



Apartment encroaching on Riparian reserve

*Source:* Author; 2007

Plate 5.7



Boundaries Walls  
Constructed down to  
the river bank

Developments by the river bank with the riparian vegetation enclosed in the compound.

*Source:* Author 2007

From the outgoing, the implications of densification on the infrastructure and environment are adverse resulting to unsustainable development. Roads require widening and alignment and recarpeting. Missing links needs to be established with a bridge constructed across Kirichwa Kubwa River on Ole Odume road.

The Kirichwa Kubwa River is highly polluted mostly by upstream users while developers in the study area have encroached on the riparian reserve in order to achieve maximum development potential as provided by the current zoning policy.

Water and sewer are being utilized at full capacity. Having this information in mind it will not be difficult to foretell the possible consequence which will be caused by further developments without infrastructure expansion. The following chapter will analyze data collected from the field in order to established the views of the stakeholders.

## CHAPTER SIX

### 6.0 Findings, recommendations and conclusion

This chapter covers the research findings and conclusions derived from the findings. A plan for sustainable development is proposed.

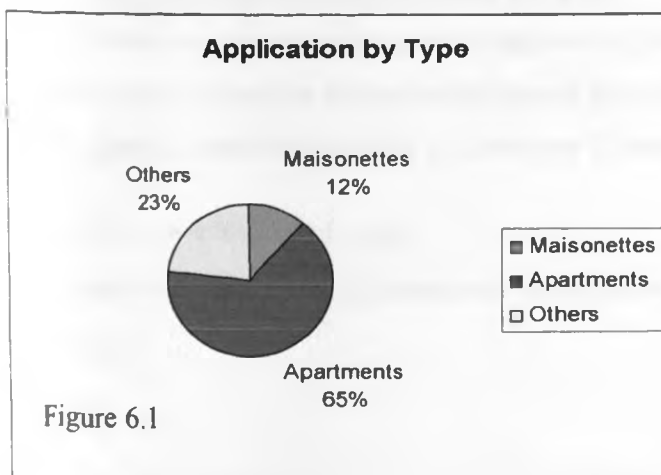
### 6.1 General Information

In the study, 60 questionnaires were administered with 55 successfully answered. The data gathered was to help the author answer the three research questions on page 4 as per the research objectives.

### 6.2 Land use trend and factors determining the current land use pattern

The trend in land use pattern has been established by historical analysis of land uses. The aerial map on page 26 compared with the current land use plan on page 45 indicates that there were only thirteen blocks of apartments in the study area in 2003, one of them being an institution development owned by the former Kenya Post & Telecommunication Corporation for staff housing. Currently there are 46 plots developed or in the process of being developed with apartments in the study area. These are expected to accommodate 986 units estimated from the existing flats and proposed accommodation of the structure coming up.

According to the development applications made to the Nairobi City Council covering Kilimani area between January 2006 and May, 2007, that 76.7% were for high density redevelopment with apartments constituting 65.1%. There was only a single application for a bungalow constituting 2.3% of the total applications.



From the above, it emerges that the area is changing from low density residential to high density apartments. The study has established that the current land use pattern is caused by the original land use inability to compete with the emerging land use. The land values in the area for the last five years are indicated here below

### 6.2.1 Land values trend in Kilimani area

Land values have been increasing at an increasing rate. Figure 6.2 below indicates that the average price of land increased from 17.76 million in year 2003 to 36 million in year 2007.

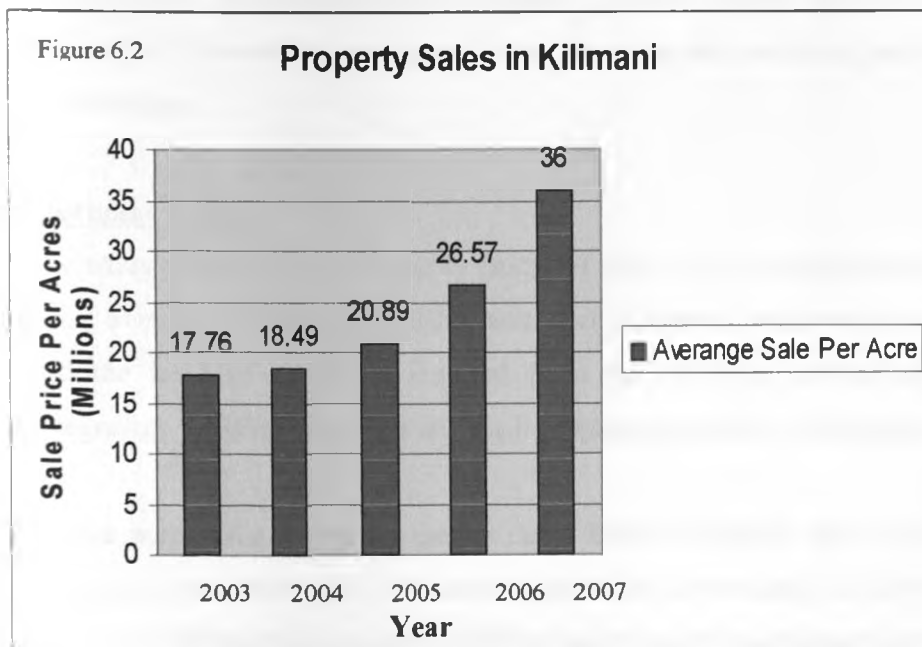


Fig6.2: Sale price of properties of Kilimani

### 6.2.2 Rate of returns of the emerging land use

The returns to investment in the area are captured by the case study below.

The case study is a project located along Ngong Road in Kilimani. The project comprises 24 apartments on 1 acre developed by an Insurance Company. They were completed in year 2006.

Estimated Cost including Cost of Capital	78 Million
Actual cost on completion including developers profit and agents fee	83 million
Cost of land	35 million
<b>Total cost</b>	<b>118 million</b>

After completion the units were sold as follows:

8 X3 bedrooms apartments @ 8 millions each	64 Million
16 X2 bedrooms @ 6 million each	96 million
<b>Total sales</b>	<b>160 million</b>
<b>Profits</b>	<b>42 million</b>

The above case indicates a lucrative submarket whereby an investor is making an abnormal profit of 36% above the normal developer's profits. Most of the sales were concluded through mortgages. Demand for mortgages is determined by the prevailing interest rates and the terms of the mortgage.

**Mortgage Finance**

The study reveals that the majority (83%) of the investors taking house mortgages are first time home owners. The study established that there is a strong relationship between the purchase price and the level of financing required from the mortgage institutions. The table 6.1 below categorizes the property prices and the mortgage requirement per category.

People purchasing properties in the range below 5 million are dependent on mortgage. The Purchaser contributes only 10% and the financier contributing the difference. Those purchasing properties whose prices exceed 20 million rarely require mortgages. They only require short term bridging capital.

Table 6.1 mortgage financing

Price range	2-5m	5-10m	10-15m	15-20m	20m and above
Purchasers contribution	10%	42.5%	60.6%	84.9%	95%*
Mortgage requirement	90%	57.5%	39.4%	15.1%	5%*

*Source: Compiled by the author from various Estate Agents firms.*

\*Difficult to estimate the actual percentage as short term credit is also involved.

This means availability of credit is critical to those purchasing properties in the study area which ranges from 5 million to 9 million per apartment. This implies the importance of the cost of finance.

The Mortgage interest rates have been declining over the last 8 years from a high of 25.19% in 1995 (Statistical Abstract: 2005) to the current range of 11.75-17%. Leading financial institutions are lending long term mortgages at as low as 11.75% with no deposit required. This has attracted many investors to the market who would otherwise not have qualified for mortgage and by extension for home ownership.

Table 6.2 below analyses the current interest rates in the market.

Table 6.2: Prevailing interest rates range

Term	10 years	15 years	20 years
Interest range	11.75-14%	11.75-15%	11.75-15.75%

*Source:* compiled from Leading Financial Institutions

Low interest rates has thus increased the effective demand for properties in the range between 5 millions and 10 millions. In conclusion the trend in land use pattern is in favour of apartments due its profitability after densification was allowed and also due to other land uses inability to bid for the same land to the extent the apartments are bidding. The area is undergoing a land use invasion with the emerging land use having a negative impact on the infrastructure and environment.

### **6.3 Impacts of the current land use pattern on infrastructure.**

The area is undergoing a transformation with densification bringing in a new crop of inhabitants. The study established that the current occupants are young working class population with 59.3% below the age of 35 years. The population over age of 55 are only 11.2%. The occupants are employed with 77.6% being in formal employment and 22.4% working in the informal sector. Majority of the occupants are tenants (85.4%) paying rents and service charge in the range of 30,000 to 80,000 per month.

The high population generated by the emerging land use has an impact on infrastructure. The study observed as follows:



**a) Transportation**

Most of the roads are passable but congested during the rush hours. The study established that the majority (81.1%) of the respondents experience traffic jam between 7am – 8.30 a.m in the morning and from 4.30 to 6.30 p.m. in the evenings. The respondents attributed the congestion with narrow roads and increase in the number of vehicles on the road.

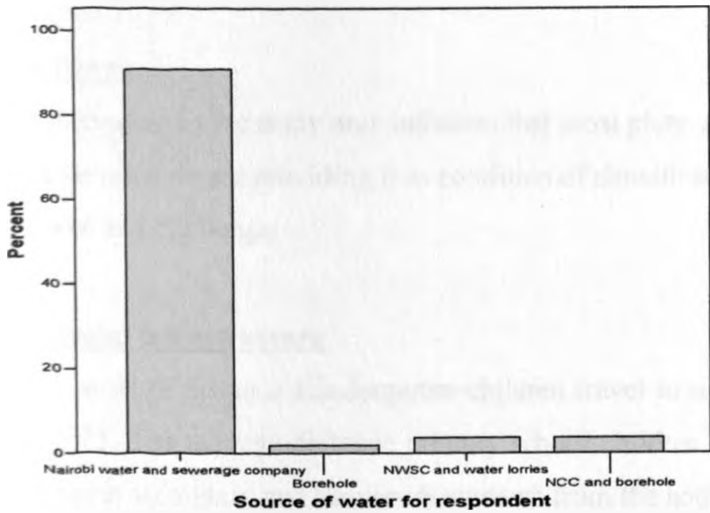
The study revealed that the current access roads though adequate for the outgoing user, are inadequate for the emerging user. The minimum street width set for the low density housing is now exceeded by the new land use. The physical planning handbook recommends a cul-de-sac of 9 meters to service 8 to10 plots (assuming each plot accommodates one household) and a 12meters road to serve 21 to 50 plots. After densification such a cul- de-sac serving 10 plots of half acre each if developed with apartments would accommodate 240 units assuming each is developed with 24 flats. The population to be accommodated in such a neighbourhood assuming four family members per unit would be 960 persons. The study area has no bus park on Argwing Kodhek road.

The study showed that about 49% of the respondents use matatu to work as 34.5% use their personal cars to work. 1.8% cycle to work.

**b) Water supply**

Majority of the respondents (90.9%) get their water from the Nairobi City Water and Sewerage Company while only 1.8% gets their water from boreholes. 81.5% experience water shortages in atleast of once a week (85.1%) while 24.7% experience water outage twice a week.

Figure 6: 4



The respondents coping mechanism were as follows:

68.6% of the respondents have underground water storage tanks while 13.7% purchase water from lorry vendors

**c) Garbage Management**

Most of the respondents have contracted private garbage collectors (81.8%) with 16.4% being managed by the Nairobi City council. The majority (68.5%) were satisfied by the services of the garbage managements 81.8% of the respondents have the private firms collect garbage. 16.4% are served by the Nairobi city council. 61.1% have their garbage collected twice in a week. 37% once in a week.

**Table 6:3: Cross tabulation of satisfaction with garbage collection services.**

		Whether garbage collection service satisfactory		Total
		Yes	No	
Group collecting garbage in respondent's area	NCC	4	5	9
	Private firms	32	12	44
	Both NCC and private firms	1	0	1
<b>Total</b>		<b>37</b>	<b>17</b>	<b>54</b>

73% of those who get their garbage collection services from the private firms are satisfied with the services while 44% of those who get their services from NCC are satisfied with the garbage collection services.

**d) Sewer**

Observation in the study area indicates that most plots are on sewers. Where there is no sewer, the developers are providing it as condition of densification. Most of the respondents do not see sewer as a challenge.

**e) Social infrastructure**

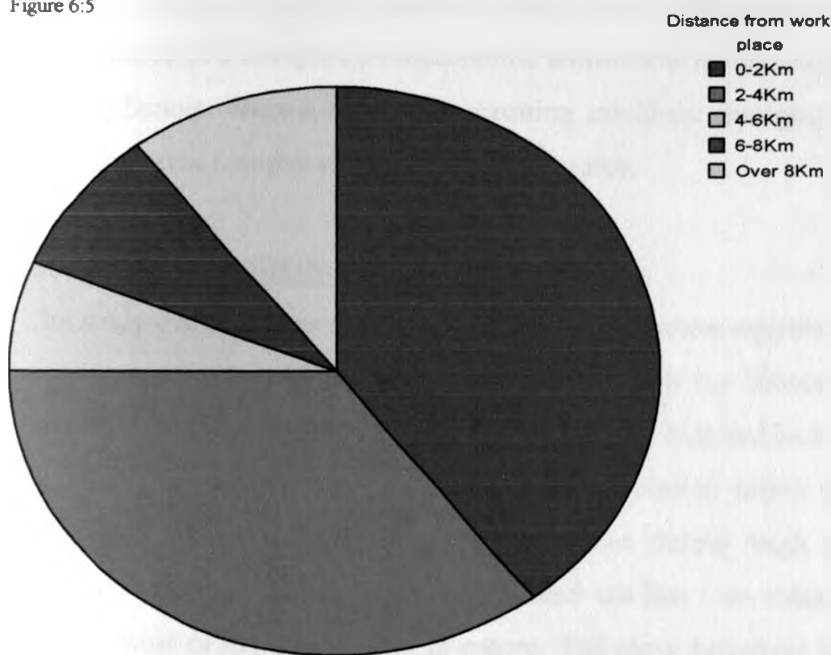
The average distance Kindergarten children travel to school is 1.4Km with a standard deviation of 0.75. The average distance primary school children travel to school is 2.89Km. The average distance secondary and university students from the households travel to school is 5.39 and 12.33

respectively. 72.2% of the respondents' children attend private schools. 22.2% attend public schools as 5.6% attend both public and private schools.

The area has two public primary schools with a total population of 2200 students and an average of 53 students per class. Majority of the students (68.7) come from nearby estates. The average distance to the nearest health facility is 1.59Km and the average time taken to the work place is 0.76hours

Figure 6.4 below indicates the distances to work for the respondents

Figure 6:5



### **Distance from work**

Wherever the respondents worked, 39.6% worked less than 2Km from their residences. 35.4% worked between 2-4Km from their residence. 10.4% worked more than 8Km from. There are no public recreation areas within the study area. The only space which was reserved for recreation was allocated to a public school and a church.

### **6.3 Effectiveness of the current zoning policy**

The current zoning policy allows blanket densification with conditions. The first condition is a 10% surrender of the land free of charge. The mechanism of such surrender is not well

understood. Of the five developers we interviewed, only one had heard of this condition. None of the five had surrendered the 10% land .Plots that are accessed via a cul-de-sac and those on the last row would find it impossible to surrender unless those to the frontage also surrenders theirs. Development control is weak in the area. All the developers interviewed reported presence of development control officers from Nairobi City Council who they reported are corrupt and easily compromised.

#### **6.4 Areas for further research**

The economics of the market mechanism is a complex process requiring an understanding of microeconomics. Variable factors are many and each factor is time dependent. Land use invasion is a function of a complex socioeconomic adjustment which can be researched on to establish the driving factors. Were it not for the rezoning ,could the emerging land use have occurred? These are some areas recommended for further research.

#### **6.5 CONCLUSION**

The study demonstrates a case of planning failure where equilibrium was not arrived at between development and proactive planning measures which is evidenced by such negative externalities as infrastructural congestion, environmental degradation and lack of essential amenities.

The major implication of rezoning is land use invasion which will eventually lead to land use succession. The land use is changing from low density high income to high density middle income residential user. The change in land use has been caused by a multiple of interacting factors most of them economic in nature. The most important factor is the market mechanism where the highest and best use has shifted to high density apartments. This user is able to pay higher prices than other users.

Demand for land as seen elsewhere is a *derived* demand and the price paid for it is a function of the yield of the venture to be undertaken. Rezoning has allowed for comprehensive development thus increasing the land use capacity and changing the highest and best use from high class low density residential use to medium class high density development.

Densification has allowed the development of as many as 32 apartments on a single acre. This has attracted commercial developers who have been able to reduce the cost of construction to as low as 3million per flat making a huge abnormal profits.

Developers are purchasing old buildings on large plots with the aim of demolishing them to create room for apartments. As the supply of such land is inelastic, and the demand is high, the developers are ready to pay more than market price to secure the most favourable sites. This competition has led to price war on such sites increasing the price to the current 36 million per acre.

A typical bungalow on  $\frac{1}{2}$  acre with servant quarter and mature gardens are letting in the same range as the apartments. If we consider such a bungalow letting at KShs. 100,000.00 per month, this would translate to KShs. 1,200,000/= per year and only 12 million in 10 years. If this income is discounted appropriately, the value of the income would be even less. This being the case, a rational investor with such an old house confronted by the developers with an offer of 36 million will find the offer hard to resist. He would sell such a plot and invest the proceeds elsewhere. Alternatively he can also decide to change user and likewise develop the same with apartments. The above indicates that on rationality principle, we can project that most of the land parcels with old houses would change user to apartment in the near future.

The demand of the finished product, the apartment is also high casting a vote for their development. Currently the units are sold even before the units are put up in what estate agent term as pre-selling with only a model in place. This has reduced the cost of construction as the developer uses the deposits from interested purchasers to put up the units. We established from the field that mortgage financing has become efficient with very low interests being charged. We noted that Stanbic Bank is charging the lowest with 11.75% fixed repayment for ten to twenty years. The availability of credit has attracted more purchasers to this sub-sector as it has increased their effective demand.

The supply of housing has a time lag- the time between the decision to supply and the time the final product is put in the market. This time ranges from one to three years or more depending on the technology used, fund disbursements methods and even the time taken to approve the plans.

The housing market is characterized by many actors each developing independently using the currently available information. In order to maximize profits, the developers are exceeding the allowed heights. The maximum height allowed by the 1987 & 1993 rezoning policy is four

floors. Five floor developments are evident with the fifth floor accessible from the fourth floor and being referred to as a duplex. Plots of less than 1 acre are being developed with apartments. The 10% land which was supposed to be surrendered to the council is rarely surrendered. The developers are currently transferring the flats under the Registration of Documents Act. The original titles do not reflect the subdivision and as such, the City Council is basing their rating on the old title but bearing the burden of additional families.

The action of these developers can be summarized by the tale "the tragedy of commons" where each is interested in maximizing profits and each assumes his individual action will not adversely affect the infrastructure and the environment. When all the plots are developed, the impact will be disastrous with congested infrastructure and environmental pollution consequently reducing the property values. This will lead to urban decay and unsustainable development.

## **6.6 RECOMMENDATION**

To reestablish the equilibrium and achieve sustainable development, an integrated approach to solving the myriad of problems is proposed. The first step is to accept that there is land use succession and a younger generation whose demand may be slightly different from those of the outgoing generation is unavoidable and then proceed to plan for the emerging land uses.

**Infrastructure:** Roads should be opened up where they don't exist. Ole Odume road should be opened up to connect with Ngong road. Argwing Khodek road which is a hive of activity should be widened and aligned. Bus stops should be provided on Argwing Kodhek road at reasonable distances. This would be achieved by compulsory acquisition of a buffer zone. A service lane should be created parallel to Argwing Khodek road to act as acceleration and deceleration lanes to reduce traffic queuing on the road awaiting entry or exit to the main road.

On sewer, the Nairobi City Water & Sewage Company should expand the sewer system to cover all areas. The private sector should participate in the sewer expansion Programme with the beneficiaries contributing to the cost.

The Local Authority should formulate a policy which encourages land use densities and regulations that promote efficient development patterns and relatively low municipal utility cost. To achieve this,

- The rating policy should be reviewed with a view to changing the basis of valuation to include the apartments. The current practice is to base the value on the original title or the Sectional Titles as per Sectional Titles Act. Most of the titles to the flats are registered as sub leases. Each flat should be rated separately to improve the rates kitty.
- The plans approval should be pegged on surrender of the 10% of the land to the city council free of charge.
- A specific land use map to be prepared on plot by plot basis. The plan should be based on the physiographical characteristics of the plot, its likely impact on environment and the carrying capacity of the infrastructure. All plots next to the river should retain the old use to avoid disturbances on the fragile ecosystems.

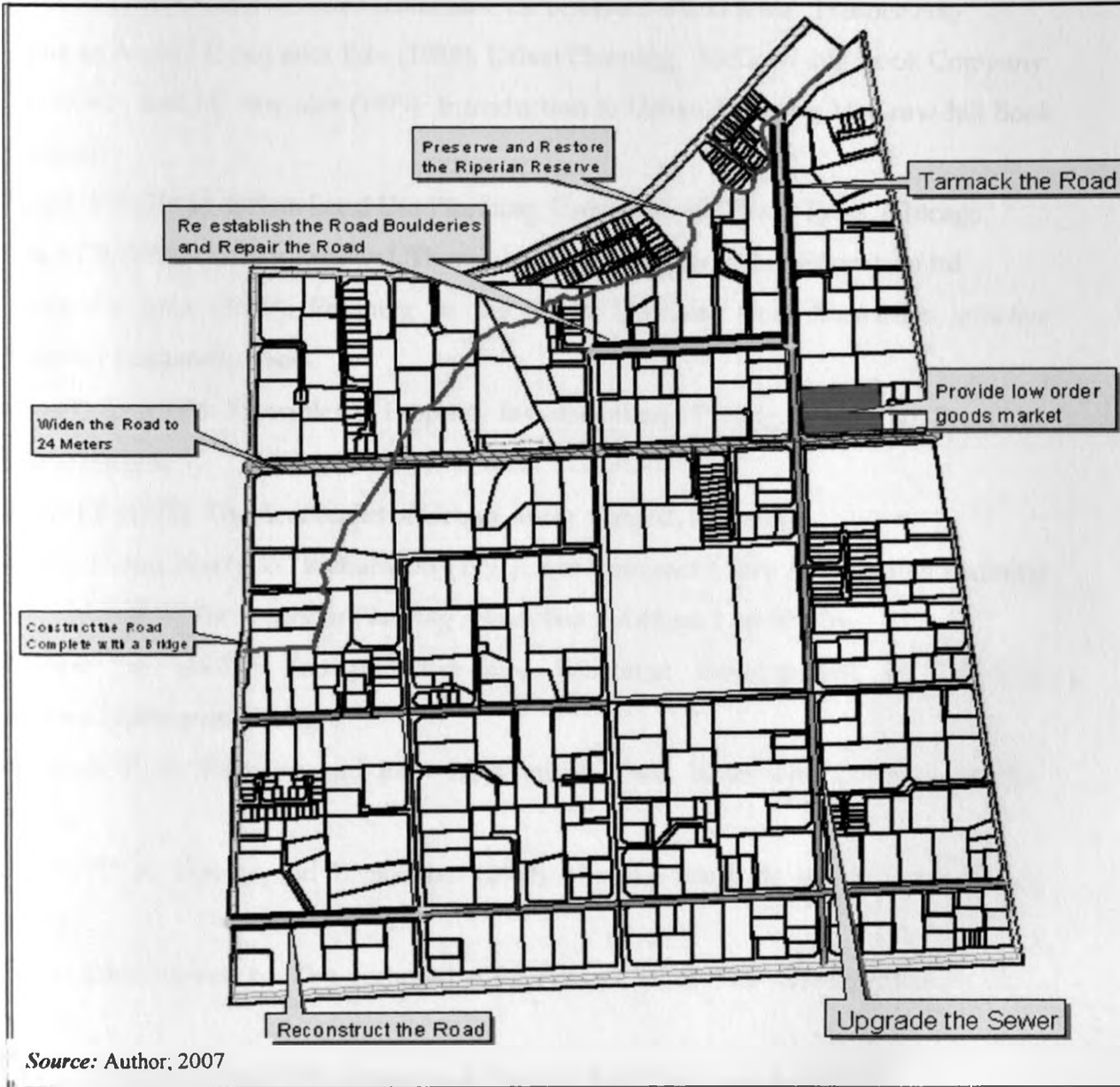
On social Infrastructure, there is a demand for a shopping centre within the study area. There is a growing demand for fast moving goods and grocery shop as witnessed by the roadside market on Argwing Khodek Road in front of Kilimani Primary School. A suitable site should be identified to accommodate a low order market.

There is overdevelopment of public primary schools in area which are not serving the interest of the local community. Approximately 72.2% of the respondents take their children to private schools. At the same time the majority of the children (60.5%) in the two schools don't originate from the neighborhood. This makes a case for privatization of one school to provide the quality of education being sort elsewhere by the residents.

Map 6.1 below is a preferred medium term spatial plan for the study area with the local Authority and the local stakeholders as the actors.

Map 6.1

## Medium Term Development Plan.





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## APPENDIX I

### HOUSE HOLD QUESTIONNAIRE

#### INTRODUCTION

As part fulfilment for award of a degree of Master of Arts in planning at the Department of Urban and Regional Planning a student is required to conduct a research and write a thesis on planning issues and a such I Joseph W. Gathuri Reg. No. B50/P/8318/04 is conducting a research on sustainable Development after rezoning in Kilimani area.

This is therefore to confirm that the data being collected is purely for research purposes and will be treated with strict confidence.

Your co-operation is highly appreciated.

#### A: HOUSEHOLD DATA (EITHER SPOUSE OR HOUSEHOLD HEAD)

1. Name of respondent (Optional) .....
2. L.R. No. \_\_\_\_\_
3. Gender      Male      
                    Female
4. House No. \_\_\_\_\_
5. Age of respondent (Years)    Below 30        
  30-35        
  36-40        
  41-45        
  Over 45
6. Marital status      Single      
  Married
7. How long have you lived in this neighbourhood? .....  
State reasons why you prefer staying here? .....

8. Number of Children

Males \_\_\_\_\_

Females \_\_\_\_\_

9. Number of children in the following age bracket

0-5

6-13

14-18

Above 18

**B. EMPLOYMENT**

1. Are you employed; YES  NO

2. If employed, type of employment

(a) Formal

(b) Self

3. Monthly Income (*tick one*)

(i) Below KShs. 20,000

(ii) KShs. 20,001-50,000

(iii) KShs. 50,001-100,000

(iv) KShs. 100,001-200,000

(v) Above KShs. 200,000.00

4. If working, please give the distance your work place: 0 – 2 km

2 – 4 km

4 – 6 km

6 – 8 km

Over 8 km

5. Which means do you use to work?

- (a) Personal car
- (b) Matatu
- (c) Trip sharing
- (d) Any other (please state) \_\_\_\_\_

**C. EDUCATION INSTITUTIONS**

1. Which school do your children attend?

Public

Private

2. How many children do you have at the following schooling levels?

- (a) Kindergarten .....
- (b) Primary .....
- (c) Secondary .....
- (d) University .....

3. Do you have schools within your neighbourhood? Yes  No

4. What is the distance your children travel to school?

- a) Kindergarten \_\_\_\_\_ Km
- b) Primary \_\_\_\_\_ Km
- c) Secondary \_\_\_\_\_ Km
- d) University \_\_\_\_\_ Km

5. What means of transport do they use to go to school?

- a. Personal car
- b. Public means
- c. College bus
- d. Walking
- e. Cycling

**D. HEALTH;**

1. Has any of your family member fell sick in the last one year?

Yes  No

2. What type of sickness?

Water related

Sanitation related

Other (Specify)

3. Do you have a health facility in the neighbourhood Yes  No

4. If yes what type of health facility

a) Dispensary

b) Health Centre

c) Public Hospital

d) Private Hospital

5. How far is the nearest health Facility (*tick*)

(e) 0-1 km

(f) 1-2 km

(g) 2-5km

(h) Over 5km

## E. PLOT/HOUSE OWNERSHIP

1. Occupier status (If owner go to part E question 2 and if tenant go part E question 3)

(a) Owner

(b) Tenant

2. If owner complete this section

(a) Cost of the house purchase (price/construction cost)

(b) Method of financing

(i) Savings

(ii) Mortgages

(iii) Tenant purchase

(iv) Any other specify

(c) If on mortgage monthly repayment

(i) Below 30,000.00

(ii) 30,000.00 – 50,000.00

(iii) 50,000.00 – 70,000.00

(iv) Over 70,000.00

(d) Date of purchase \_\_\_\_\_

3. If a tenant complete this section

(i) Monthly rent payable

(a) Below 30,000.00

(b) 30,000.00 -50,000.00

(c) 50,000.00 -80,000.00

(d) Over 80,000.00

) Do you have a house help? Yes  No

5) If you have, where does she live? \_\_\_\_\_

6) Why do you prefer staying in this area?-



**F. LANDLORDS/DEVELOPERS**

1. Type of house approved plans

- (a) Maisonatte
- (b) Flats
- (c) Bungalow
- (d) Any other (specify) \_\_\_\_\_

2. Do you have approved plans? Yes  No.

3. How long did take to have your plans approved?

- Less than a month
- 1-3 Months
- More than three months

4. What challenges did you faced when going through the approval process?  
.....  
.....  
.....

5. Number of floors of the building \_\_\_\_\_

6. Number of units \_\_\_\_\_

7. Estimated project cost \_\_\_\_\_

8. Estimated returns/selling price \_\_\_\_\_

9 Source of finance a)mortgage  
b)savings  
c)others (specify) \_\_\_\_\_

**G. SERVICES**

**(A) Water**

1. What is the source of your water?

- (a) Nairobi water and sewerage company
- (b) Bore hole
- (c) Rainwater
- (d) Water lorries
- (e) Other (Specify) \_\_\_\_\_

2. Do you experience water shortages? Yes  No

3. How many times in a week do you usually experience these shortages?

- 1) Once a week
- 2) Twice a week
- 3) Thrice a week
- 4) More than three times a week

If yes indicate how often

4. How do you safeguard against water shortage in your house

- (a) Bore hole water
- (b) Underground storage tanks
- (c) Any other (specify) .....

5. Is there problem of waste water drainage in the neighbourhood?

YES  NO

**(B) Garbage Collection**

1. Who collects garbage in your area

- (a) NCC
- (b) Private firms
- (c) Any other specify \_\_\_\_\_

2. How many times per week

- 1) Once
- 2) Twice
- 3) More than two times

3. Is the service satisfactory? YES  NO

4. Do you have dumping site nearby? YES  NO

**(C) ROADS**

1. Type of road leading to your property

- (a) Tarmack
- (b) Earth
- (c) Murram

2. Do you experience traffic congestion YES  NO

3. If Yes at what time? .....

4. What do you think is the cause of the traffic congests

- (a) Narrow roads
- (b) Increase in number of vehicles
- (c) Poor state of the roads
- (d) Other specify .....

5. How long do you take to your place of work? \_\_\_\_\_ Hours

**H GENERAL COMMENTS**

Are you pleased with the kind of development taking place in Kilimani area?

Yes  No

If no what type of development would you like in the area?

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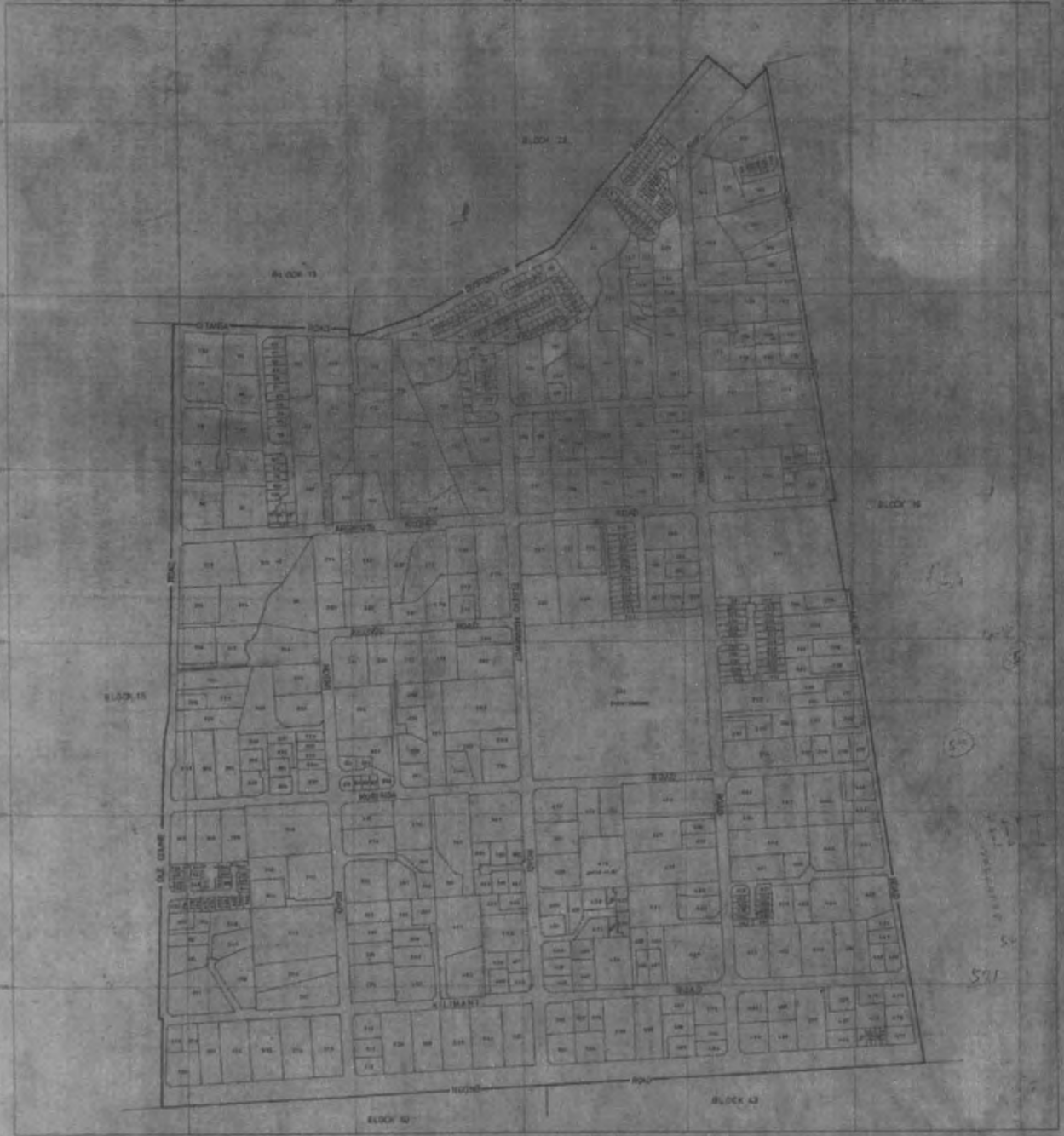
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# Appendix II

SCALE 1 : 2500

NAIROBI BLOCK 17 (KILIMANI)

NAIROBI BLOCK 17  
MUNICIPALITY OF NAIROBI  
1964



Prepared by the Survey Department, Nairobi, Kenya

Scale 1:2500

Survey Department

MEMORANDUM

No.	Date	Particulars	By	For	Initials	Signature	Remarks
1	1964	...	...	...	...	...	...
2	1964	...	...	...	...	...	...
3	1964	...	...	...	...	...	...
4	1964	...	...	...	...	...	...
5	1964	...	...	...	...	...	...
6	1964	...	...	...	...	...	...
7	1964	...	...	...	...	...	...
8	1964	...	...	...	...	...	...
9	1964	...	...	...	...	...	...
10	1964	...	...	...	...	...	...

### **Appendix III**

#### **TECHNICAL QUESTIONNAIRE FOR DEVELOPMENT CONTROL OFFICERS**

- 1.** How is the development control unit in your City/Municipality structured?
- 2.** How do you monitor on what is going on the ground?
- 3.** How do you enforce the development control in your area?
- 4.** Do you have any statistics on the interventions carried out in the last 2 years?
- 5.** At what point do you intervene? Is it during Groundbreaking, during construction or after completion and why?
- 6.** What parameters do you use to declare a development substandard or contrary to development control condition?
- 7.** Do you have problems in enforcing the stop notices?
- 8.** Most of the structures we can see are multi storey multiple tenants flats. Are they approved?
- 9.** What are the zoning requirement for property development in this area?
- 10.** What do you consider to be your main challenges in effecting development control in your area of jurisdiction?

# MINISTRY OF SCIENCE & TECHNOLOGY

Telegrams: SCIENCE TEC", Nairobi

Fax No.

Telephone: 318581

When replying please quote



GOVERNMENT OF KENYA

JOGOO HOUSE  
HARAMBEE AVENUE  
P. O. Box 9583-00200  
NAIROBI  
KENYA

MOST13/034/Vol.II /78

21<sup>st</sup> February 2007

The Chairman  
Department of Urban and Regional Planning  
University of Nairobi  
P. O Box 30197-00100  
NAIROBI

(Attn. Prof. Peter M. Ngau)

## RE: RESEARCH AUTHORIZATION

Reference is made to your letter dated 14<sup>th</sup> February 2007 on the above subject matter.

This is to inform you that the 8 (eight) MA (Planning) Students of your Department whose names appear on the attached list have been authorized to carry out research on the topics shown against their names in Meru Centra, Siaya, Nairobi, Thika, Kajiado and Machakos Districts for a period ending 30<sup>th</sup> May 2007.

Advise the students to report to the District Commissioners and the District Education Officers before commencing their study

It is noted that the research is a requirement for their course work in MA (Planning).

M. O'ONDIEKI

FOR: PERMANENT SECRETARY

Copy to:

PERMANENT SECRETARY  
MINISTRY OF EDUCATION  
SCIENCE AND TECHNOLOGY

The Provincial Commissioner  
Nairobi

The Provincial Director of Education  
Nairobi

The District Commissioners

The District Education Officers



**University of Nairobi**  
**Department of Urban and Regional Planning**  
**School Of The Built Environment**  
P.O. Box 30197, 00100 GPO Nairobi, Kenya  
Tel: 274524-6 Fax: 2718548  
e-mail: durp@uonbi.ac.ke

Ref:.....

Date: April 26, 2007

**The Permanent Secretary**  
**Ministry of Lands and Housing**  
**P.O. BOX 30450**  
**NAIROBI.**

**REF: JOSEPH WANJAU GATHURI- REG. B/50/P/8318/04**

The above named person is a bona fide graduate student in the Master of Arts programme (Urban and Regional Planning) here at the University of Nairobi.

Mr. Gathuri is currently carrying out a research for his thesis project entitled, **Rezoning and Sustainable Development- a Case Study of Killimani Area**. Any assistance accorded to Mr. Gathuri to enable him fulfill his degree requirement will be highly appreciated.

Prof Peter M. Ngau  
Chairman,  
Dept. of Urban ad Regional Planning