



**MINISTRY OF LANDS  
PHYSICAL PLANNING DEPARTMENT**

**PHYSICAL PLANNING HANDBOOK**

## PREFACE

The purpose of this handbook is to provide clear, user friendly guidelines and minimum standards on the process and practice of physical planning. In compiling this handbook, every effort has been made to nationalize the rules, regulations, guidelines and performance standards that exist in various statutes, relevant subsidiary legislations, technical standards and principles that apply under relevant professional and technical disciplines. Extensive reference and cross-referencing was made to the following statutes and their relevant subsidiary legislations:

- The Physical Planning Act – Cap 286
- The Survey Act – Cap 299
- The Public Roads and Roads of Access Act- Cap 399
- The Local Government Act – Cap 265
- The Public Health Act – Cap 242
- The Electricity Act
- The Communications Act
- The Environmental Management and Coordination Act (1999)
- The Agriculture Act- Cap 318

To ensure that the handbook is relevant and up to date with the latest technological developments and regulations, relevant to the built environment, extensive consultations were made with a wide spectrum of both institutional and individual stakeholders. The outcome of these consultations was the development of a rich reservoir of information that formed a sound basis for compilation of this handbook. Amongst the individuals and institutions that provided support by way of information and technical advice include the following:

- Ministry of Education
- Ministry of Roads and Public Works
- Ministry of Transport
- Kenya Power and Lighting Company Ltd

- Communications Commission of Kenya
- Kenya Airports Authority
- Kenya Railways Corporation
- University of Nairobi (Department of Urban and Regional Planning)
- The Lake Basin Development Authority
- Coast Development Authority
- Ministry of Local Government
- Director of Surveys
- Ministry of Housing
- National Environmental Management Authority
- Ministry of Agriculture
- Kenya Institute of Planners
- Architectural Association of Kenya
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As this Handbook is released to the public, I wish to make it clear that while it is meant to provide a reliable reference for application of relevant regulations, guidelines and standards, it should not be construed to be a substitute for substantive law and relevant subsidiary legislations.

Whereas every effort has been made to ensure that the Handbook is in harmony with relevant laws and regulations, users are requested to bring to my immediate attention any matter that may have been inadvertently omitted or noted to be in conflict with provisions of any substantive law.

With the release of this handbook, all practitioners in urban and regional planning are expected to observe and apply the

relevant standards and guidelines in the process of preparing physical development plans and submission of applications for development permission.

## **ACKNOWLEDGEMENT**

I wish to take this opportunity to acknowledge with appreciation the contribution made by the many institutional and individual stakeholders towards the successful compilation of this Handbook. I am particularly grateful to the staff in the Department of Physical Planning who diligently researched, prepared and finalized the Handbook.

Lastly, I would like to express my gratitude to the Permanent Secretary, Ministry of Lands, for facilitating the preparation and finalization of this Handbook through provision of financial resources.

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# **PART I**

(Introduction, Legal and Institutional framework)



## CHAPTER ONE: INTRODUCTION

### 1.0. Introduction

Land use planning is deciding in advance what to do, where, when, with what, how, on or under the land. It is a thought process that guides land use activities on space. This process has to be guided by a set of rules, regulations and standards. These can be in the form of a Parliamentary statute or a subsidiary legislation. This handbook will be part of the subsidiary legislation of the Physical Planning (PPA) Act Chapter 286 Laws of Kenya.

The purpose of this planning handbook is to provide a supplemental guidance and standards on the process and practice of land use planning. Land use planning includes regional plans and local physical development plans as provided for in **Sections 16 and 24** of the Physical Planning Act (Cap 286).

### 1.1 Problem Statement

Lack of gazetted planning standards and guidelines have meant that development continued to take place in a haphazard and uncoordinated manner lacking both form and character. There has been no harmonized and detailed planning standards, guidelines, measurement and considerations leading to untimely, inaccurate and not uniform land use decisions. The repealing of Land Planning Act (Cap 303) and the Town Planning Act (Cap 134) and enactment of the Physical Planning Act (Cap 286) made it mandatory that physical planning standards and regulations be prepared to guide land use planning.

As a profession, physical planning is gaining recognition due to:

- Declining resources in the face of increasing population
- Environmental concerns
- Social instability resulting from resource use conflicts e.g. human-wildlife
- Rapid urbanization and urban sprawl
- Sectoral and institutional resource utilization conflicts

This has meant that preparation of the Physical Planning Handbook is imperative for guidance and standardization of both process and practice. There has been an increase in administrative units and formal and informal urbanization. This has resulted

in an unprecedented increase in demand for preparation of regional and local physical development plans.

### **1.2 Purpose of the Physical Planning Handbook**

A planning handbook is a set of gazetted rules and regulations that guide the standardization of physical planning process and practice. The preparation of these plans needs to be guided by a framework that spells out guidelines, methodologies, standards and planning considerations.

### **1.3 Objectives of the Handbook**

- To operationalize Physical Planning Act Chapter 286 of the Laws of Kenya and subsequent legislations.
- To develop a comprehensive land use planning guidelines and standards for emerging opportunities and challenges.
- To integrate physical planning guidelines and standards with other relevant statutes, guidelines and regulations.

### **1.4 Targeted Users**

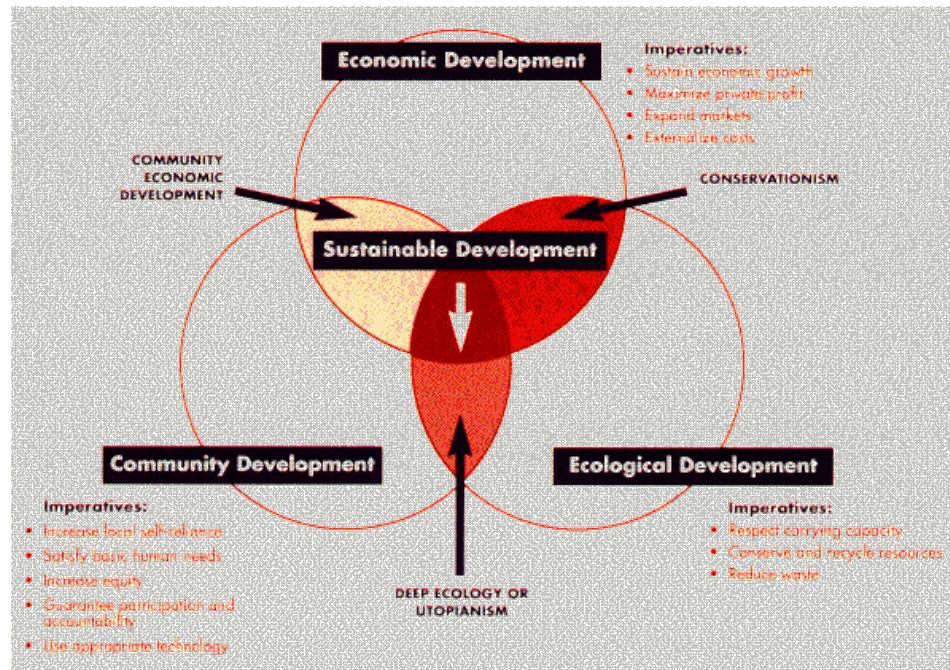
- Land use planners in the public service
- Land use planners in the private practice
- Students of planning schools
- Universities and other academic institutions
- Professional in the built-environment: Surveyors, Architects, Engineers, Valuers and other relevant professionals

### **1.5 Conceptualization and Principles**

Sustainable development requires the negotiation of a balance among the three distinct, everyday development processes: economic development, community development, and ecological development. The importance of maintaining a balance among these three processes is evident in cities, towns and regions throughout the world. For example, if a local water supply is not affordable (economic development), clean and hydrologically sustainable (ecological development), and available to all inhabitants (community development), then the livability and viability of that community will eventually decline.

Balancing the diverse interests of business, the environment, and community development requires partnerships. This is especially true in today's environment of rapid urbanization and globalization. The pressures facing local communities today make it

increasingly difficult for any one institution to single-handedly develop, supply, and maintain an essential service. Traditional service roles (of government, the private sector, community organizations, trade unions, religious organizations, neighbors, and families) are rapidly changing due to fiscal constraints, constitutional and legal reforms, resource scarcity and ecological concerns, globalization of economies and market liberalization, changing values and social norms, and demographic pressures.



*Figure 1.0 Conceptualizing sustainable development*

Each of these processes has its own distinct imperatives.

The development imperatives of the current economic system favor market expansion, externalization of costs, and sustained

private profit. The current imperatives of community development are to meet basic human needs, increase economic and social equity, and create community self-reliance. The imperatives of ecological development are established in the natural order. Humans can support ecological development by limiting the consumption of natural resources to a rate that allows nature to regenerate resources and by reducing the production of wastes to levels that can be absorbed by natural processes.

Sustainable development is a process of bringing these three development processes into balance with each other. The implementation of a sustainable development strategy therefore involves negotiation among the primary interest groups (stakeholders) involved in these three development processes. Once an Action Plan for balancing these development processes is established, these stakeholders must each take responsibility and leadership to implement the plan.

## **CHAPTER TWO: LEGAL AND INSTITUTIONAL CONTEXT**

### **2.0 Introduction**

This Physical Planning handbook has been prepared as a prerequisite for the formulation of regulations to be made by the Minister under Section 49 of the Physical Planning Act (Cap 286). These regulations are for the provisions of carrying into effect the purposes of the Act.

### **2.1 Relevant Parliamentary Statutes**

The following Acts may be referred to in conjunction with the Physical Planning Act on matters of relevant guidelines and standards:

- The Local Government Act (Cap 265)
- The Government Land Act (Cap 280)
- The Trust Land Act (Cap 188)
- The Registered Land Act (Cap 300)
- The Land Control Act (Cap 302)
- The Survey Act (Cap 299)
- The Public Health Act (Cap 242)
- The Environmental Management and Co-ordination Act (No. 8 of 1999)
- The Agriculture Act (Cap 318)
- The Water Act, (2002)
- The Mining Act (Cap 306)
- The Forest Act, (2006)
- The Petroleum Act (Cap 116)
- The Way leaves Act
- The Public Roads and Roads of Access Act (Cap 399)
- The Weight and Measures Act (Cap 513)
- The Maritime Act

## **2.2.0. Stakeholder Involvement**

"Stakeholder" may be defined as a person, group of persons or institution (s), bodies with demonstrable interest on an issue and whose situation/condition may impact or be impacted upon negatively or positively by a planning intervention/action.

### **2.2.1 Guidelines on Selection of Stakeholders**

The following guidelines shall be used in selecting stakeholders in a planning process:

- People with registerable interests
- Registered property owners
- Registered Faith-based, Community-based institutions, Non-Governmental Organizations operating in the area
- Inter Governmental Organizations
- Traditional/ Cultural institutions
- Constitutionally elected leaders
- Defined vulnerable groups in the area
- People with business interests
- Service Providers
- Government Line Ministries/Departments

### **2.2.2. Need for stakeholder participation**

- to create a shared community vision of the future;
- to identify and prioritize key issues, thereby facilitating immediate measures to alleviate urgent problems;
- to support community-based analysis of local issues, including the comprehensive review of long-term, systemic problems that confront particular service systems and the need to integrate different service strategies so that they are mutually supportive;
- to develop action plans for addressing key issues, drawing from the experiences and innovations of diverse local groups;
- to mobilize community-wide resources to meet service needs, including the joint implementation of sustainable development projects; and
- to increase public support for municipal activities and local understanding of municipal development needs and constraints.



## CHECKLIST 1

<b>PARTNER SELECTION FOR SUSTAINABLE DEVELOPMENT PLANNING</b>	
	<b>Ensure Representation of:</b>
(5)	<ol style="list-style-type: none"><li>1. Under-represented groups.</li><li>2. Service users—those people who use and are affected by services.</li><li>3. Service providers—those people who control and manage services or service systems.</li><li>4. Parties with a particular expertise related to the relevant services or issues.</li><li>5. Parties whose interests are affected by the service and the service system.</li></ol>
(6)	<b>In Selecting Partners Consider:</b>
(6)	<ol style="list-style-type: none"><li>1. The scope of work to be undertaken by the partners.</li><li>2. The involvement of a critical mass of organizations and individuals who have the political will to take action.</li><li>3. The degree of inclusiveness you hope to achieve.</li><li>4. The skills, knowledge, and experience that different individuals or organizations can contribute.</li><li>5. The inclusion of parties who will need to be involved in the implementation of any plan.</li><li>6. The inclusion of organizations or individuals with credibility within their own constituencies.</li></ol>

**Figure 2.0: Partner selection for sustainable development**

### **2.3.0. Institutional Linkages**

Preparation and approval of plans requires linkages with institutions that have a stake in the plan and/or may have relevant information. This is done through plan circulation, public notices, gazette notice, consultative meetings, and stakeholder participation.

### **2.3.1 Local Physical Development Plans**

A Local Physical Development Plan is a plan for the area or part thereof of a city, municipal, town or urban council and includes a plan with reference to any trading or market centre. Such plans include:

#### **(a) Part Development Plan (PDP)**

This is a plan indicating precise sites for immediate implementation of specific projects or for alien purposes.

#### **(b) Action Plan**

It is a comprehensive plan selected for intensive change, which is to commence within a specific period by improvement, redevelopment, restoration and reuse of derelict land

#### **(c) Advisory or Zoning Plan**

It is a plan indicating permitted subdivision and use of land specified in such plan.

#### **(d) Subject Plan**

It is a detailed treatment of a particular aspect of planning in relation to a part or the whole of a local physical development plan.

These plans ( a, b, c, and d above) respectively shall be circulated to:

- Local Authority
- Commissioner of Lands
- Director of Survey
- District Commissioner
- Relevant formal bodies whose interest could be impacted on by the proposed development. (Stakeholders shall be determined by the parameters in section 2.2).

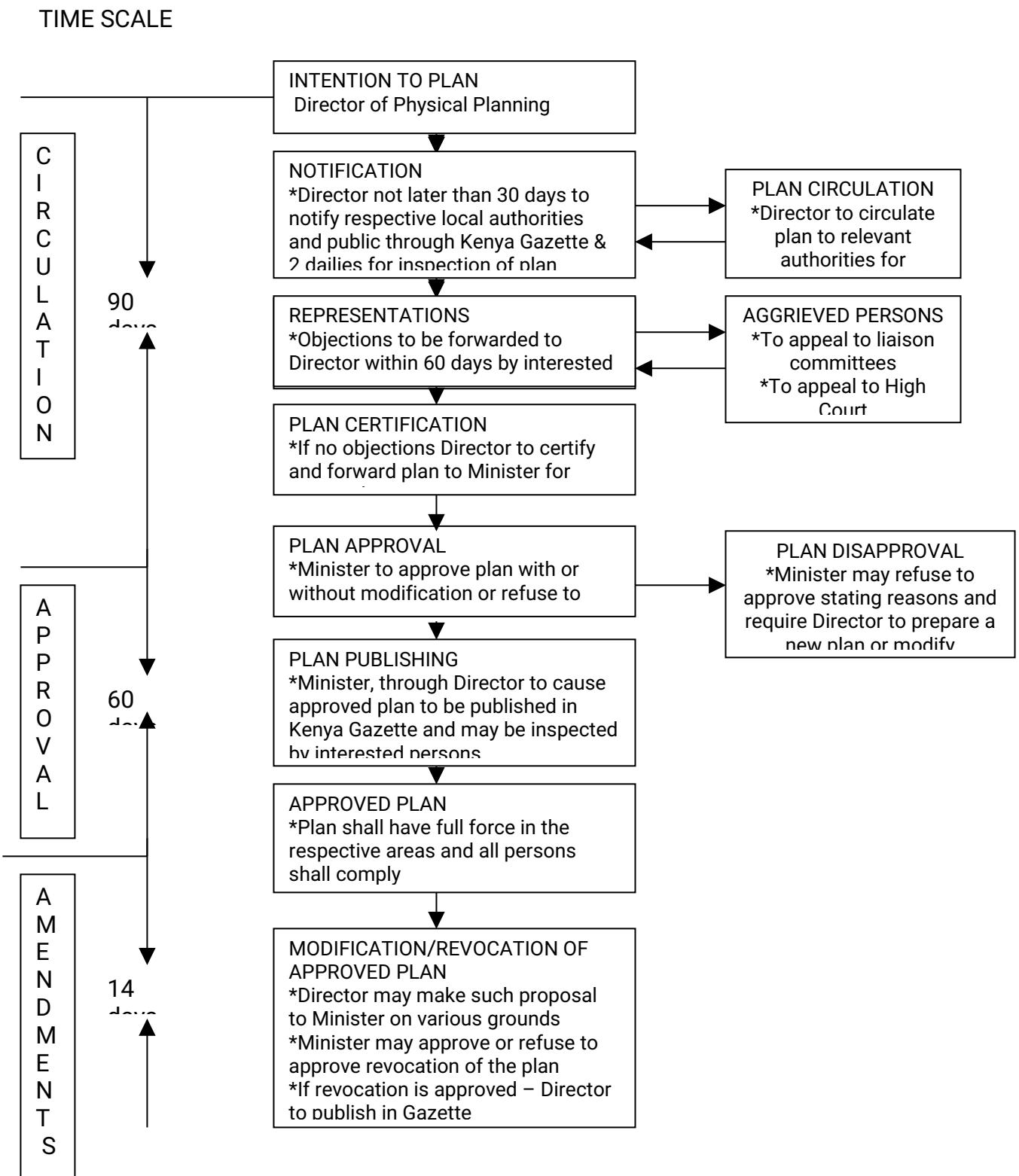


### **2.3.2 Regional Physical Development Plans**

A regional physical development plan is a long term plan providing a framework for development of a region for a period of about 30 years.

These plans shall be prepared and approved according to the following model:

**Figure 3.0 Plan Preparations and Approval Process**



## **2.4 Development Permission Application Procedure**

Development Permission Application is made in the form P.P.A 1 as prescribed in the Fourth Schedule to the Physical Planning Act (Cap 286), to the clerk of the local authority where the land is situated. The application is accompanied by such plans and particulars as are necessary to indicate the purposes of the development.

The local authority shall circulate the application to the respective offices for comment. These include: - District Physical Planning Officer (DPPO), District Public Health Officer (DPHO), District Works Officer (DWO) and District Architect among others.

Upon receiving the comments the application is forwarded to the technical committee of the local authority for approval. The comments from the various offices form the bases for the decision to approve or reject the application for development permission.

Development permission is granted in the P.P.A 2 form with or without conditions as prescribed in the fifth schedule. The local authority may also refuse to grant the applicant such development permission stating the grounds for refusal.

The local authority shall notify the applicant in writing of its decision within thirty days of the decision being made. Any person aggrieved by the decision of the local authority may appeal against such decision to the relevant liaison committee.

# Development Permission Application Procedure

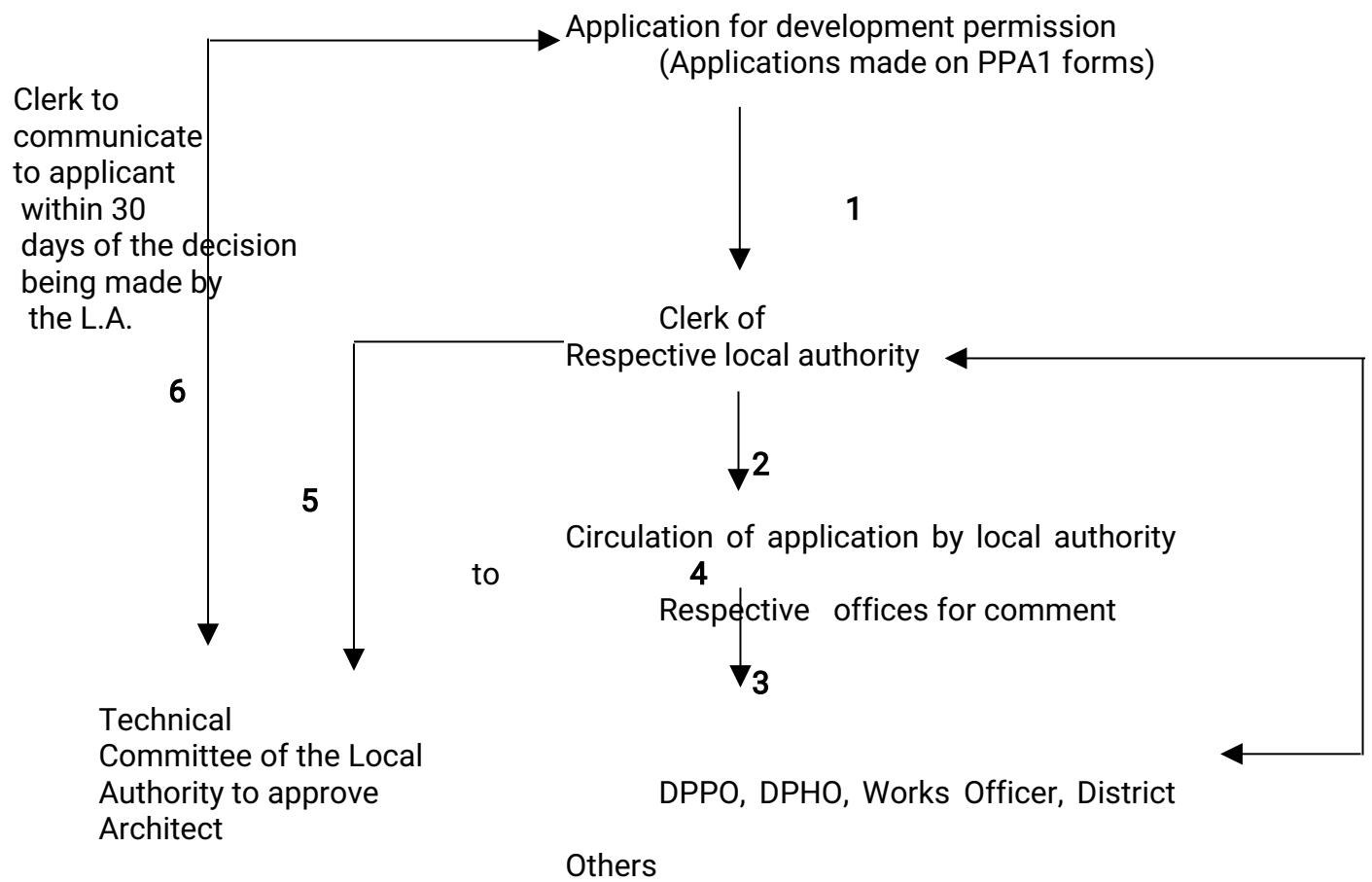


Figure 4.0 Development Permission Application Procedures



## **2.5 Public Notification**

- All advertisement should be on box form with 4 centimeters by 8 centimeters as the minimum size.
- A Bill Board measuring 1mx1m and 2m from the ground should be erected on site.
- Notification shall be within 30 days of completion of the plan.
- Local community media may also be used
- Notification can also be placed at strategic focal points.

Members of the Public shall submit written comments to the Director within 30 days of the publication

**PART II**  
**(Regional Planning)**

## CHAPTER THREE - REGIONAL PLANNING

### 3.1 Definition and Concept of a Region

A region refers to an area of homogenous characteristics that can be delineated on the basis of commonality of; administrative, physiographic attributes and/or similarity of challenges and opportunities.

A Region may be delimited along, inter alia, the following:

- A Drainage Basin
- District/ Local Authority
- An area covering more than one District/Local Authority but with a common resource(s)

A Regional Physical Development Plan is a long term plan, which provides a framework for development of a region for about 30 years. The regional plan has to be in conformity with national goals, policies and strategies. A regional development plan is normally prepared for a district/Local Authority although it may transcend a district/Local Authority when the issues being dealt with go beyond the district/ Local Authority boundaries.

#### 3.1.1 Principles:

##### (i) Partnerships:

Between and among all actors from public, private and community or organization and individuals. Broad based participation to ensure:

- Formation of alliances
- Pooling of resources
- Sharing of knowledge

- Contributing skills
- Capitalization, comparative advantages and collective action

## **(ii) Equity**

- Regional planning should promote efficient human settlements where all people women, men, and the youth have equal access to basic housing infrastructure, health care, green and open spaces
- Equal opportunity for education, for productive and freely chosen livelihood and for personal, spiritual, cultural and social development.
- Equal rights and obligations with regards to the conservation and use of natural and actual resources, and
- Equal opportunity to participate in public decision making.

## **(iii) Sustainable development**

Regional development planning should guarantee

- Sustainable human settlements where economic development, employment opportunities and social progress with least possible detrimental impact on the environment
- Carrying capacity of the ecosystem should not be exceeded. Should they be inhibiting the opportunities of future generations?
- Replenishment of the stock of resources while drawing upon them.
- Maintenance of biodiversity and cultural diversity and
- Promotion of human health as well as air, water and soil qualities

## **(iv) Livability**

- Physical conditions and spatial characterised of towns, villages and cities.
- City layout and district land use patterns, population and building densities and ease of access to adequate public amenities.



## **STAKEHOLDER PARTICIPATION**

### **LEGAL MANDATE**

The Physical Planning (Development Plans) Regulations, 1998, Legal Notice number 137 Rule 3(2) provides for the legal mandate for the participation of stakeholders in the planning process.

### **MERITS OF THE STAKEHOLDER PARTICIPATION**

- Empowerment of the local community
- Minimise land use conflicts
- Ownership of the plan
- Resource mobilization
- Protection of the public resources and public interests

### **LEVELS OF PARTICIPATION**

For effective stakeholder participation, it is important to ensure transparency in the flow of information, define clear rules and roles for all the stakeholders and to maintain constant dialogue throughout the entire process. **This may entail:**

- Constant consultations
- Circulation of relevant information
- Drawing of Memoranda
- Briefs for local traders

### **CATEGORIES OF STAKEHOLDERS INCLUDE;**

- (i) Public sector agencies
  - central government
  - local government
  - representatives of the various ministries in the district
- (ii) Public service providers

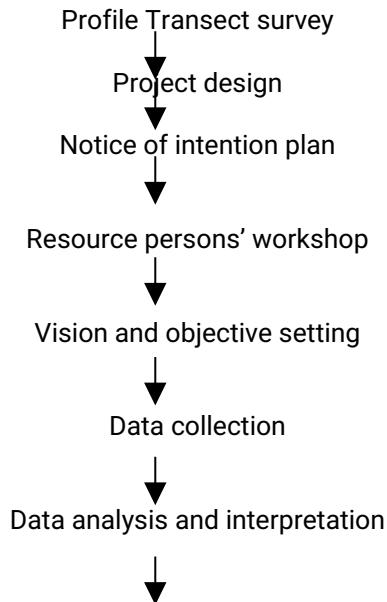
- Kenya Power and Lighting Company (KPLC)
  - Telkom
  - Kenya railways(Rift Valley Railways)
  - Matatu associations
  - Market associations
- (iii) Private sector
- Industrialists
  - Juakali/small and micro enterprises
  - Business people-wholesalers/retailers
- (iv) Religious institutions  
Representatives of the various religious groups in the region
- (v) NGOs
- (vi) Development partners
- (vii) Farmers
  - Large scale farmers
  - Small scale farmers
  - Specialized farmers-horticulture
- (viii) Professional bodies  
People of traditional and cultural interests  
Opinion leaders

## **REPRESENTATION**

Representation should be broad based in order to cater for all interest groups and wide stake-holder participation.

### **3.2 Methodology (adopt the process in the Regional Planning Manual)**

The regional planning methodology will involve a consultative, strategic and implementation oriented process. The process involves several stages as outlined in the flow chart





### **3.3 Guidelines and Standards**

Guidelines and standards for regional planning will focus on natural resource planning and conservation, planning for rural and agricultural land, planning infrastructural services and human settlements.

#### **3.3.2 Rural and Agricultural Land Planning**

##### **a) Land subdivision**

**Definition:** Land Subdivision means the division of any land, other than buildings held under single ownership, into two or more parts whether the subdivision is by conveyance, transfer or partition or for the purpose of sale, gift, lease or any other purpose.

##### **(ii) Land sub division procedures**

Applicants are required to fill in Form PPA 1 with copies of subdivision plans attached. The PPA 1 is submitted to the relevant local authority for processing and approval. The local authority shall circulate the subdivision proposal before the necessary approval is granted. Approval/rejection by the local authority is communicated through Form PPA 2.

**(iii) Land sub division standards in rural areas**

When subdividing rural agricultural land, the minimum size of land subdivisions should be based on the agro ecological zone. Consideration is given to how much land can support a family before the minimum acreage is determined.

**(iv) Preferred farm layout**

For the purpose of ensuring optimal utilization of land, the layout plan should involve consideration of settlement in a suitable site in the farm. The haphazard type of land uses should be avoided.

**b) Floriculture Farming**

Floriculture farming in Kenya is expanding and is the leading source of employment, income and foreign exchange earner. The following guidelines are recommended for floriculture farming activities:

- Provide adequate land for greenhouses
- Regulation of floriculture activities through Environmental Impact Assessment
- Environmental Audits
- Regulation of water abstraction for irrigation
- Provision of corridors for livestock and wildlife
- Planning for human settlements for workers in flower farms

**c) Planning for Plantations/Estates**

Crop plantations for tea, sisal, coffee and sugar cane provide sources of livelihoods to many people.

The following guidelines are recommended for plantations farming activities:

- Planning for residential quarters for workers within the estates complete with amenities such as schools, clinics and water and sanitation facilities
- Provision of machinery parking yards and garages
- Design for the processing plant site
- Conservation of water courses through the provision of buffer zones.

#### d) Livestock carrying capacity

The aim of the national livestock policy is to increase the national livestock herd through sustainable land use and management through intensive farming systems that will discourage overstocking and overgrazing. The policy uses a unit of livestock intensity/density per unit area known as stocking unit where a stocking unit is equivalent of a mature zebu cow weighing 300kg or 7 sheep or 7 goats. For simplicity there are seven Agro- ecological Zones in Kenya and each zone has been assigned a recommended stocking rate.

*Table 1.0 Stocking Rate (Lu/Ha)*

UH1	Sheep Dairy Zone	0.3
UH2	Pyrethrum Zone	0.4
UH3	Wheat/Barley	0.4
UH4	Ranching/Barley	0.8
UM2/UM3	Coffee Zone	1.1
UM4	Upper Sisal Zone	1.2
LH1	Tea Zone	0.6
UM1	Coffee Tea Zone	0.8

**Source:**

It should be noted that for areas zoned for livestock production provision should be made for cattle track and livestock with width ranging from 80m to 100m. This is to ensure movement of livestock from the grazing areas to various watering points.

#### e) Planning of Group Ranches

The following guide lines should be observed when planning for group ranches.

- Maintain recommended number of livestock unit and land carrying capacity
- Overstocking beyond the carry capacity is prohibited
- Paddocking of group ranches is encouraged
- Provide watering points in convenient locations

- Encourage conservation and protection of wetlands during the process of group ranches land subdivision
- Set aside areas for common uses when subdividing group ranches e.g. cattle dips, trading centres, dispensaries and schools.

### **3.3.3. Planning for Human Settlement**

Human settlements are concentration of activities and people. These range from smallest village in the rural area to the largest metropolis (Republic of Kenya, 1978). Rural settlements are human habitats which dot across the countryside while urban settlements are agglomerations of 2000 people and over (Republic of Kenya, 1999). Human settlements are considered focal points of commercial, industrial, administrative, health, educational and recreational activities required by the population.

#### **a) Designated Service Centres**

These are a network of strategically located centres into which basic services are concentrated to ensure the most efficient use of capital resources and services to the rural population. Human settlements are thus classified into four categories of service centres as:

- Local centres,
- Market centres,
- Rural centres
- Urban centres.

*Table 2.0 Classification of settlement*

	Catchment Population	Resident population
Local centre	5000	-
Market centre	15,000	<2000
Rural centre	40,000	2,000 to 10,000
Urban centre	100,000-150,000	5000>

#### **(i) Designated local centre**

A local centre, should serve a catchment population of 5000 people. The local centre should contain:

- Full primary school,
- Several shops,
- A dispensary,
- A public water supply systems
- An open air market.

**(ii) Designated market centre**

A market centre should be planned to serve a catchment population of 15,000 to support a primary, a secondary school and a health centre. The market centre should have the following facilities:

- A public water supply
- post office
- telephone facilities
- a police post
- a local bus service
- Other social commercial and local administrative services.

Market centres should to be served by a minor road as a minimum and should have a resident population of at least 2000.

**Designated rural centre**

A rural centre should serve a catchment population of 40,000 and accommodate a residential population of 2,000 to 10,000. Such centres represent the lower end of the urban hierarchy. The following facilities should be provided:

- A secondary school of at least four streams
- A health centre with a maternity facilities
- Development of better shopping facilities
- Markets and Banking facilities
- A piped water supply and sewerage disposals systems
- Electricity and telephone services postal

Rural centres should be planned to have secondary roads

### **Designated urban centre**

An urban centre is designated to have resident population of over 5000 and a catchments population of 100,000-150,000. An urban centre should have the following facilities, among others:

- A hospital
- A secondary school
- Commercial, industrial, administrative and recreational services

### **b) Human Settlement Development Strategies**

Strategies to be adopted in planning for human settlement include:

- Development of service centres
- Development of growth centres
- Development of integrated transportation systems
- Rural development
- Development of appropriate standards for urban infrastructure

#### **(iii) Development of service centres**

The overall guidelines adopted in planning are to provide:

- One designated local centre for a catchment population of 5000
- One designated market centre for a catchment population 15,000
- One designated rural centre for a catchment population of 40,000
- One designated urban centre for a catchment population of approximately 120,000.

#### **(iv) Development of growth centre**

The development of growth pole strategy is aimed at inducing growth functions in a few strategically selected centres which have potential for one or more specialized growth functions that can achieve major redistribution of the population.

Selection criteria should consider the following:

- Strategic location relative to existing or potential population distribution
- Resource development and transportation networks
- Existing economic organization and level of infrastructure

Major centres for education and administration. The selection process is based on a thorough analysis of development potential of the catchment area and the centre itself.

**(v) Development of an intergraded transportation and communication network**

Any strategy for human settlements can be successful if it is complemented by appropriate systems of transportation networks aimed at achieving equitable and balanced development. The principles for the required transport services include:

- All principal towns should be linked by national trunk road systems as a minimum – 60m
- All designated urban centres should have primary roads as minimum -40m
- All designate rural centres should be linked by secondary as a minimum – 25-30m
- All designated market and local centre should be linked by minor roads as a minimum – 20m

**(vi) Rural development**

The overall objective of rural development in Kenya is the increased productivity of land and all the land based resources as the major precursor to all other rural development activities. The strategies for promotion of rural development include:

- Increased non farm employment opportunities
- Provision of supportive services e.g. extension, market development, processing, education, farm training and credit
- Rural works and infrastructural development e.g. roads, water supply and electricity
- Promotion of Self help activities and small and micro enterprises
- Improved administration of rural development programs

It is advisable to concentrate the above activities, amenities and services at selected places to generate urban and rural settlements.

*Appropriate standards for urban infrastructure*

The policy on appropriate standards of urban infrastructure aims at improving conditions by definitive minimum standards which could be applied throughout all areas and are geared towards the creation of a safe and healthy living environment.

It aims at ensuring a more equitable distribution of infrastructure development between different sectors. These standards should be:

- Flexible
- Suitable to local conditions and economic wellbeing of the people concerned and
- Sustainable

### c) Patterns of Urban Development

There are three possible patterns of urban development:

- Concentration
- Complete dispersal
- Selective dispersal
- Selective concentration

The following are possible policy considerations in planning human settlements:

#### (i) Model of concentration

The model of concentration involves redirecting population and investments in one part of the region with the sole purpose of releasing land and other resources in the hinterland for more economic uses.

#### (ii) Model of complete dispersal

This model entails the spreading of resources throughout the rural areas and to promote the manufacturing sectors in new settlements areas and discouraging new industries from locating in towns which are already developed.

#### (iii) Model of selective dispersal

This model involves development of hierarchical arrangement of human settlements within a given region with the main objective of ensuring balanced growth of towns.

#### (iv) Model of selective concentration

This model is basically urban development oriented as it deals with the distribution of major urban and industrial growth

functions. The alternative growth pole should therefore be developed to a size sufficient to generate economies of scale, the development of such an urban pattern tends to prevent excessive urbanization in some few centers and usually results in a more balanced distribution of urban and industrial development

### 3.3.4 Planning for Infrastructure Services

Infrastructure services act as a lubricant to the economic systems to the extent that absence of the same inhibits development. A planner needs to therefore ensure that these services are provided for and are accessible to the people at any given time.

Infrastructure services can be divided into physical infrastructure and social infrastructure. *Physical infrastructure* includes: roads, railways, airports, water supply, power line, pipeline and cables. *Social infrastructure* includes: health, schools, community center, police stations, post office and administrative centers

#### a) Physical infrastructure

##### (i) The Hierarchy of Roads

A planner needs to ensure that the correct hierarchy of roads is provided for when planning a settlement or neighborhood.

- Activities incompatible with traffic flow to be restricted on designated roads.
- Reduction of number of intersections to reduce the risk of accidents.
- Concentrate traffic movement to a few selected corridors (Table 3.0 )

*Table 3.0 Road Classification*

Classification		Desirable Reserve in metres	Reduced
International roads	trunk	A	60      40
National trunk roads		B	60      40
Primary roads		C	40      40
Secondary road		D	25      25
Minor roads & Special		E	20      20

Programme (SPR)	Roads		
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(ii) *Highway Development on Environment*

- The conduct of feasibility and engineering studies of the highway, alignment and structure of the road shall be carefully studied to minimize negative effects on the natural environment.
- Upon completion of construction prompt action should be taken to protect the exposed ground by tree planting, turfing of slopes and other protection measures.
- Appropriate land use planning for adjacent land to be carried out carefully.
- Provide for boulevards along the transport corridor at by planting tress on the clear zones and shrubs where visibility may be interfered with.
- Beautify the entire road systems by allowing compatible users such as flower selling business.
- Integrate transportation with recreation by providing bicycles paths and outdoor resting places.
- Provide for stop over facilities at reasonable interval such facilities may include Supermarket, stalls selling local produce, conveniences such as toilets, baby-changing areas, internet cafes, restaurants e.t.c.

(ii) *Airport and Airstrip*

The compatibility of an airport with its environs is made possible by proper planning of the airport, control of pollution generating sources and land use planning of the area surrounding the airport. The aim is to provide the best possible conditions for the needs of the airport, community in the surrounding area and the ecology of the environment. Airport planning must be recognized as an integral part of an area wide comprehensive planning programme. The location, size and configuration of the airport need to be coordinated with patterns of residential, industrial, commercial, agricultural and other land uses of the area, taking into account the effects of the airport on the people, flora, fauna, the atmosphere, water courses and other facets of the environment.

**Basic requirements for location of an airport/airstrip**

- Bird strikes-Land use planning around the airport to ensure no dumping sites which attract birds.

- Flying objects-Ensure no quarrying or charcoal burning in airport vicinity. Availability of ample flat land.
- Developments in vicinity should be controlled.
- Location away from town (isolated)
- Feasibility should be done to ensure stability of the rock

*Table 5.0 Electricity Cables*

<b>Capacity of line</b>	<b>Way leave</b>
11 KV	10m
33KV	20m
40KV	20m
66KV	30m
132KV Single circuit towers	50m
132KV Double Circuit towers	60m

*(vi) Pipeline*

- 30m way leave for petroleum
- No parking of vehicles
- No tree planting
- No access along pipeline

*(vii) Railway*

- 60m way leave
- Design gradient
- Sub-stations should be located in:
  - o Areas of high population concentration
  - o Factories, warehousing
  - o Areas of high production
  - o Industrial sites
  - o Mining areas.

(viii) *Water supply system*

Water supply in a region context depends on the sources and existing reticulation systems and infrastructure. Provision of these facilities should consider catchments population to be served and the per capita consumption in the relation to the available water.

(ix) Sources of water within a region can be identified and delineated as those of surface run-off and ground water. The surface sources are

springs, streams and rivers. Ground water reserve is equally an important source of water, where hand dug wells and boreholes are dug for water abstraction.

Protection and conservation of this water source is critical for sustainable development

Water reserves require buffer zones. While springs protection will also require a buffer zone. Appropriate ground cover should be encouraged in these areas.

(x) *Water reticulation systems* are enhanced through provision of water facilities such as water intake points, and pipeline way leave. Buffer

zones should be provided in areas where these facilities are located. Intake points treatments work and communal water points require buffer zone of 10 meters (radius).The reticulation systems in form of pipeline should be designed in a hierarchical manner, from the main pipeline distributor to the minor in order to achieve equity in distribution. The main water pipeline requires a way leave of 10metre. The design of reticulation system should consider the following:-

- Population size
- Distance from water intake
- Quality of water/pollution levels
- Source of water-water intake
- Analysis of principal economic activities whether for industrial, domestic, irrigation to get demand levels.
- Ownership of the water supply system-Ensure stakeholders involvement so that they don't rapture the pipes and provide water to source population to encourage them protect catchment.

- Gradient
- Piping diameter-Bigger diameter for far away areas

(xi) *Electricity Sub-stations*

**Guidelines**

- Source and availability of electricity supply
- According to electricity usage requirements for domestic, commerce and industry
- Main receiving sub-stations require a minimum of 5% of the exterior spaces that are reserved for landscape.

Main receiving sub-stations 275KV are not suitable to be close to residential areas, open spaces and public facilities. Require buffer zones in between sub-stations and other land uses (about 50m)

*Table 6.0 Size and Function of Electricity Sub-station*

Type	Requirement	Condition
Main receiving sub-station	1.6 hectares	Buffer zones
Main distribution sub-stations	45mx45m	Building entry ways
Electricity sub-stations	16.5mx13.5m	
Single chamber	16.5mx13.5m	
Double chamber	17mx13.5m	

(xii) *Hill areas*

- No development allowed in areas that have height of 150m from sea level to avoid risk of flooding.
- When siting them ensure you preserve the natural topography as much as possible. Cutting only allowed for purposes of providing roads and construction of related structures.

- Ensure designs for the developments so that the natural skyline remains beautiful and in harmony with the environment.
- Construction prohibited in slope areas exceeding 30°

### b) Social Infrastructure

Presence of social facilities enhances unity, instills a sense of care, and encourages high morals, visionary and competitiveness.

*Table 7.0 Social facilities*

<b>Local centre</b>	<b>market centre</b>	<b>Rural centre</b>	<b>Urban centre</b>
<ul style="list-style-type: none"> <li>• Primary school</li> <li>• Dispensary</li> <li>• Public water supply</li> <li>• Minimum minor road</li> </ul>	<ul style="list-style-type: none"> <li>• Primary school</li> <li>• Secondary school</li> <li>• Health centre (with family planning facilities)</li> <li>• Public water supply</li> <li>• Sub-post office</li> <li>• Telephone facilities</li> <li>• Police post</li> <li>• Airstrip in remote areas</li> <li>• Minimum minor road</li> <li>• Several shops</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary school</li> <li>• Health centre (with maternity)</li> <li>• Piped water supply</li> <li>• Electricity</li> <li>• Banking</li> <li>• Sewage</li> <li>• Telephone</li> <li>• Postal services</li> <li>• Minimum secondary roads</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary school</li> <li>• Hospital</li> <li>• Piped water supply</li> <li>• Sewage system and a disposal plant</li> <li>• Administrative unit</li> <li>• Minimum primary roads</li> <li>• Banking</li> <li>• Industries</li> <li>• Recreation</li> </ul>

### c) Educational facilities

Information is power therefore when you educate the populace; you empower them to exploit the opportunities at their disposal. Provision of educational facilities therefore is a pre-requisite to the development process.

*(i) Nursery schools*

These are preparatory schools where children between 5-6 years are taught prior to joining primary schools. They may be attached to existing primary schools. It is desirable that a nursery school is attached to every primary school. These nurseries therefore will follow the pattern of distribution of primary school at 5000 catchment population. The recommended distance is 300-500meters and land requirement of 0.15-0.25hectares.

*(ii) Primary schools*

Assuming that there will be 40 pupils per class and the classes will be from standard 1-8 and that the school may want to expand facilities in future, an area of 3.9 ha. may be provided as a minimum. However, schools are encouraged to build storied buildings for economy of space. If accommodation is to be provided for teaching staff another 0.8 hectares should be provided.

*Table 8.0 Primary Schools*

Catchment population	No. of primary school	Area ha	Walking distance
5000	1	3.9	500m-2km

*(iii) Secondary schools*

*Table 9.0 Secondary schools*

Catchment population	No. of secondary school	No. of streams	Area ha	Walking distance.
25000	1	1	3.4	500m-3km
50000	1	2	3.5	
75000	1	3	4.5	

Secondary schools provide education for a period of four years to children who have completed standard eight in Primary School. Secondary school age for statistical purposes is taken to be from 14-17 years inclusive and this age group accounts for approximately 10% of the total population in Kenya.

#### *Demand and Distribution of Secondary Schools*

The demand for secondary schools education in Kenya ranges between 20% and 100%. On the basis of an average demand of 60% and taking into account that 10% of the populations are secondary schools age then 1 school of 480 pupils would be required for a population of 8000.

#### *Land Requirements*

Unlike a primary school, a secondary school needs more land for laboratories (chemistry, physics and biology), workshops, and assembly-hall and playground for various games. The land provided should therefore be used economically so as to leave room for future expansion. Storied buildings should therefore be encouraged, wherever possible, for classes, offices and dormitories. This will help to on land.

#### *Location Requirements*

Secondary schools require location within residential areas related to principle **pedestrian networks**. At gross densities of 50 persons per hectare and above, each secondary school should be within an easy walking distance i.e. relative to pupils' ages, of 500 – 600 metres. At gross densities lower than 50 persons per hectare pupils will probably be taken to school by car or by public transport and facilities for safe collection and parking should be available. It is necessary that planning applications for educational institutions should include details of all relevant information to facilitate the determination of amount of acreage they require. It also requires that after land for educational facilities has been allocated drawings of site layout plans be submitted to relevant authorities for approval to avoid haphazard development. In all cases educational institutions should be integrated with major open spaces whenever possible so as to encourage the sharing of the open spaces and playgrounds with members of the public. Further justifications for space requirements for various educational facilities are illustrated in Chapter 8.

#### **d) Health services**

The quality of the population will greatly determine the overall productivity of an economy. This quality depends on the availability of health facilities and services plus accessibility to the same. Provision of health facilities therefore will be a prerequisite to the development of a country. As a general rule of thumb, the distribution of health facilities should follow the hierarchy of centers as provided for in the human Settlement Strategy of 1978.

*Distribution:* Health services are deployed by the central government through a network of provincial, district and sub-district hospitals. At Local Government/Authority level we have health centers, sub-centers and dispensaries. Kenyatta National Hospital is the central referral and teaching center. Church missions, industrial health units and private institutions and individuals also provide a variety of health services. However, these have tended to concentrate in a few urban centers with appropriate infrastructural base. Their development has rendered health services to be geographically, socially and economically accessible to the rich.

#### *Location and Land Requirements*

The preferred location for health services should be easily accessible by an ambulance and be provided with basic infrastructural services. Dependent on the level of health service, it is necessary to reserve adequate land for future expansion and for public cemeteries. The latter should be conveniently located relative to the health facility, major open spaces and other compatible public utilities. It is recommended that applications for health facilities should be accompanied with details of site requirements to facilitate reservation of adequate land. However a minimum of the land requirements derived from empirical observations is made as follows:

- |                              |              |
|------------------------------|--------------|
| • National referral hospital | 20 hectares  |
| • Provincial hospital        | 8 hectares   |
| • District hospital          | 8 hectares   |
| • Sub-district hospital      | 4 hectares   |
| • Health center              | 3 hectares   |
| • Sub-health center          | 2 hectares   |
| • Nursing Homes              | 0.4 hectares |
| • Veterinary clinic          | 0.1 hectares |

### e) Community Center

A community center will enhance social interaction, networks and offers relaxation from normal day-to-day activities. This enables the total development of the human being and is therefore pertinent for overall national development. Every center should have a community center which will provide the following facilities:-

- Library/Resource center
- Social hall
- VCT center
- Public telephone
- Amphi-theater (Cultural dances, cinema etc)

#### *(iii) Police Station*

The locations of police stations depend on their functional requirements. If their administrative function is dominant they may locate in district centres but generally they may locate in residential neighbourhoods. There may also be need to provide stations within large commercial/industrial areas and large institutions. Space requirements should take into account residential, remand facilities, administrative facilities at different levels, parking and open spaces for recreation and for future expansion. Proposed space requirements for the various levels of stations are:

*Table 4.0 Police station*

	<b>Acreage/size</b>	<b>Catchment</b>
Police post	0.2 ha	Neighborhood
Police station	2 ha.	Township(2000 people)
Patrol base	0.1ha.	

## CHAPTER FOUR - ENVIRONMENT

### 4.1 NATURAL RESOURCE PLANNING AND CONSERVATION

#### Ecology

Ecology is the relationship between plants and living creatures to each other and to their environment. A person who is interested in ecology and believes the environment should be protected.

The Physical Planning Handbook defines and translates physical planning land use standards that form a land use system that is both practical and ecologically sound in relation to flora and fauna and to each other and their environment. Land use planning ensures sustainable development which guarantees that long term economic stability is not sacrificed on the alter of short term economic benefit.

#### a) Development along Riparian Reserves

*Riparian Reserves:* It is defined as a combination of open spaces and land which is reserved as public park and recreation where the activities can be organized either in the river corridor or riparian reserves. Planning guidelines of riparian reserves is similar to those applicable to public open spaces.

##### (i) *Importance of rivers*

- Historical settlement, water resource, drainage systems, irrigation, boundary, transportation systems and flora and fauna.
- Important as public recreational area, river activity and tourism.

##### (ii) *Implementation policies*

- Every development must provide 3%-5% of the area for water retention reservoir
- Strategic River Development plan
- River planning and approach must be based on ecological planning (emphasize preservation, conservation and variation)
- River development to be guided by river frontage development

*(iii) General guidelines*

- To plan various uses of rivers to promote tourism, communication, transportation and social facilities (recreation)
- To plan and design the landscape, to minimize soil erosion within the riverine and the built up areas
- To maximize natural resource and conserve the environment in designing the park
  - To preserve the ecological values of rivers and the surrounding
  - To minimize the natural environmental threats
  - To control sewage form of waste disposal
  - To provide access and service road to the river reserves

*Riparian Reserve (see Legal Notice 140 rule 15 (c) and (d)) of the Physical Planning Act*

**It is defined as land on each side of water course as defined. Has a minimum of 2m, or equal to the full width of the river as measured between the banks of the river course up to a maximum of 30m. (Seasonal and perennial rivers)**

**b) Development of Coastal Areas**

The Coastal Areas is defined as an area that borders 5km to the backshore and 16 nautical miles to the mean high water point (mark or shore front. The land side area includes rivers and water reserves to areas that are influenced by salt water

Coastal areas are of great potential and receive tremendous development pressure especially development related to tourism, industry and agriculture (fishery). This development is commonly associated with degradation of environmental quality and ecosystem of respective area. Development of these areas should be planned and controlled to enhance sustainable development.

**4.3.4 Planning Principles for Coastal Belt**

***Planning guidelines***

***General planning guidelines***

- Development is avoided in high risk areas such as erosion areas, hilly areas, slopes and conservation areas
- To provide sufficient buffer zone between development and present shoreline

- Entry and service roads to be provided in coastal reserve area along beaches
- Minimize the effect of air circulation with height control, design and location of buildings.
- Conservation of sprouting and sprawling plants (trees, shrubs) at coastal dunes: Must be preserved in all development conditions
- Preservation of natural elements: Each estuary must be preserved in its natural state especially in tourism zones.
- Free tidal movement: Permanent development along the shore line that blocks tidal movement shall not be permitted. No sand dredging activity to be conducted in areas that are less than 10 meters deep from the mean low tide or a 1.5 km distance whichever is further.
- Beach and land reclamation activity: It is not encouraged to undertake beach and land reclamation activity because it impacts on the natural beach process.

### **Objectives**

- a. Protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources.
- b. Assure orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state.
- c. Maximize public access to and along the coast and maximize public recreational opportunities in the coastal zone consistent with sound resources conservation principles and constitutionally protected rights of private property owners.
- d. Assure priority for coastal-dependent and coastal-related development over other development on the coast.
- e. Encourage state and local initiatives and cooperation in preparing procedures to implement coordinated planning and development for mutually beneficial uses, including educational uses, in the coastal zone.

**Context:** Understand and respect the context of the site as and minimize potential conflicts with surrounding land uses and natural resources.  
Utilize a range of transitions including vegetation, setbacks, building height density,

	intensity of uses and similar considerations.
<b>Circulation:</b>	Integrate the circulation, transportation and parking systems consistent with the planned activities and public needs. Include pedestrian and vehicular systems, public transit and bicycle access.
<b>Environment:</b>	Protect, enhance and manage the natural features and resources of the site considering adjacent areas. Focus on the environment as a unifying theme.
<b>Access:</b>	Provide connections between the coastal and regional transport system.
<b>Sustainability:</b>	Promote the use of sustainable materials and systems for all building and site improvements.
<b>Community Character:</b>	<p>Develop an integrated community presence with a common focus, shared facilities and public gathering spaces that promote human interaction and outreach to the community.</p> <p>Develop a set of design standards that will continue to implement a marine-related image, including building and site materials, scale and character, signage, and similar components.</p> <p>Respect the visual character of the site in the context of public coastal views.</p>
<b>Implementation :</b>	<p>Allow for managed development and phasing consistent with site capacity and character that encourages flexibility and adaptability to the evolving needs of the community.</p> <p>Undertake Environmental Impact Assessment &amp; Audit.</p>

#### *Specific guidelines according to land use zones*

- Public recreation zone: the activities depends on the function of the recreation zone.
- Coastal forest zone: no development is allowed therein and all types of development close must have a 60 meters wide buffer zone between the development and the coastal forest boundaries.

- Mangrove forest zone: no development is allowed except forest recreation, research and conservation of wildlife
- Turtle sanctuary zone: turtle conservation is allowed in coastal reserve areas (60m)
- River mouth and river zone: no form of permanent development is allowed
- Water and coastal boundary development zone: the number of buildings that are allowed must be controlled so that they do not disrupt the marine eco-systems and pollute water quality. Activities allowed such as chalets, restaurants, jetty, marina, recreational clubs and other developments should be built on posts that do not block the natural water flow or movement.
- Water recreation at river coastal boundary and open coast zones- determine activities that are suitable for water recreation and sports.
- Eco-tourism zone: activities allowed are passive activities that do not damage the environment such as research, forest recreation and observation without changing the natural character such as forest, water bodies (lake, pond ).
- Housing-Hotel zone: housing development that is allowed should enhance beauty of the area and social/public facility requirements. This should be separated from coastal zone by a public service road of a 15m-20m wide at edge of 30 metre high water mark.
- Port and industry zone - provide buffer zones
- Agriculture zone use of mangrove and riparian forests should be avoided.

### c) Development in Lake Areas

Lake area is one of the very valuable and sensitive natural environmental resources. Among the main issues of lake area development is the clearing activity and the earth works together with development activity that cause the destruction of the flora and fauna, serenity and aesthetics of the respective area.

#### **Lake riparian reserve**

Riparian land adjacent to a Lake Reservoir or stagnant body of water is defined as a minimum of 2m vertical height or 30m horizontal distance whichever is less from the highest recorded water level.

#### **Issues of concern**

- Tourism development in lake areas should create an organic development, promote sustainable land use development and should not destroy ecosystem.
- Integrated and comprehensive development concept that is environmentally oriented and environmentally friendly is encouraged.

*Table 10.0 Development guidelines for lake areas*

Issue	Issue specific control measures	Zone control measures	Overall control measures
Land use	Physical development must be 20m from water line. Mixed development is encouraged. Permanent development is not allowed.	Development is only allowed in development zone nodes in the littoral area. Only 20% of the development of the overall water catchments area is allowed.	Development does not exceed 10% from overall lake area density and should be controlled to a 500m setback.
Physical	<ul style="list-style-type: none"> <li>• According to suitability of soil structure</li> <li>• Design that functions well and reflects local characteristics</li> <li>• Building facing the lake</li> <li>• The provision of tarred roads is lessened and natural circulation designs are encouraged.</li> </ul>		
Water quality	Untreated waste water cannot be discharged into the lake	Activity that cause erosion and increase in the suspended solids must be controlled	Administration and enforcement of water quality must be strictly controlled.

		Maintenance of boat and motorized equipment is not allowed to close to the lake
Landscape	Plantings of various species	Ground cover plantings and new plantings should be implemented simultaneously. Felling of trees with a diameter of 0.8m is not allowed. Planted on level land with a height of 10-800m from sea level.
Public facilities	<ul style="list-style-type: none"> <li>• Access by the public</li> <li>• Provide complete basic facilities</li> <li>• Local designs, and well maintained</li> </ul>	
Eco-tourism		Only low density development is allowed. The provision of natural designed facilities are greatly encouraged
Agro-tourism		Promoting sustainable aqua tourism activities such as fish shrimp rearing in cages
Archeology		Archeological site should be conserved as national heritage Earthworks construction and as such should be halted when artifacts are found.

#### Guidelines for lake management

- Control of lake water quality
- Control of lake resource harvesting

#### d) Physical Development of Islands

Islands development are defined and categorized as follows:

*Category 1:* Development of islands that have an area of more than 90 square km and a population exceeding 20,000 people are considered major islands that have impetus to growth and hence development plans (Mfangano in Lake Victoria, and Mombasa, Lamu and Faza in Indian Ocean).

*Category 2:* Resort islands or tourists destination are islands that have the potential to be developed as an international and local tourism centre (Ndere in Lake Victoria, and Wasini, Funzi, Manda, Robinson in Indian Ocean)

*Category 3:* Marine Park and protected islands. The development limit of Marine Park is 2 nautical miles (3.2km) to the sea from the low water (Mpunguti, Kisite, and Chale in Indian Ocean).

*Controlled activities in islands area*

- Hotel, condominiums, apartments, chalets, motel and other type of housing such as terrace houses and commercial buildings
- Recreation club, jetties
- Heavy industries
- Land reclamation projects
- Cemeteries/waste disposal sites
- Sand extraction/dredging
- Quarrying
- Laying of cables and under sea pipe (petroleum)
- Construction of floating fish cages
- Construction of pontoon or other structures

**e) The Preservation of Natural Topography**

Topography is the shape of the ground formed by highlands, slopes, rivers, swamps, coastal and river networks.

- Hill area is an elevated land that has a slope of more than 12 degrees
- Highland areas are land situated more than 150metre from sea level and slope that exceeds 25 degrees.

*Guidelines*

- Hilly areas should be conserved
- No development is encouraged in areas listed:
  - Environmentally or ecologically fragile areas
  - Sloppy areas that have been zoned as mineral industry resources
  - Areas gazetted as water catchments
  - Sloppy areas gazetted as permanent forest reserves including commercial forests

Hilly areas are natural assets that can be developed as tourist attractions sites such as hotels, apartments, condominiums, and multi storey housing. Development in hill areas requires several physical criteria that must be observed not to endanger stability, balance and harmony of natural environment.

*Topography preservation control:*

- Earth works
- Slopes areas:
  - Between 5 degrees to 25 degrees are considered as medium slopes and could be developed with the implementation of slopes control measures
  - Areas with slopes that exceed 25 degrees are not allowed any development. These are considered critical for safety of human settlements.

*River flow control*

Natural flow of river and tributary should be preserved and conserved. River reserves should become green networks (buffer zones to control pollution, surface erosion, squatters' intrusion).

*Water catchments control for lakes and ponds*

A green buffer zone of 20meters should be created between catchments or lakes and development areas. Ensure primary use and justification, for the water catchments, such as water supply, drainage, power generation, flood prevention and recreation.

*Natural areas that have scientific and historical values*

Areas that are unique or have natural beauty such as waterfalls, ponds, springs and natural lakes should be preserved.

## **f) Tourism Planning**

Tourism planning within a region provides for socio-economic development, environmental protection and conservation.

### *Tourist and Public Recreation*

*Beach tourism* development is contributing to the overall growth of tourism industry in Kenya. Developments on the beach require careful planning and supervision to ameliorate pressure on the natural environment.

The following are the planning considerations:

- Condition of the beach development of harbors should focus on pollution control
- No building is permitted within the 30metre (100feet) of high water mark. The foreshore should support fairly dense vegetation to give a natural appearance.
- Public access: there should be unlimited access of the beach by the general public. Placement of sign-post is recommended to guide access points.

### *Classification of Resident Tourist*

Regional planning should encourage the attraction of various classes of resident tourists:

- o Medium cost tourist based on beach cottage or cheaper beach hotel with family car.
- o Economy tourist: that do not have own transport usually accommodate in low cost hotels.
- o High cost tourist: the use private jets and planes, cruise ships, and stay longer

### *Public recreation*

Regional planning should identify and map out public recreation spots as potential areas for development. Some of these include:

- Municipal recreation facilities that serve the town: e.g. (Central Park-Nairobi, Kenyatta Public Beach-Mombasa, Jomo Kenyatta Ground-Kisumu, Muliro Garden-Kakamega)
- Community recreation facilities serving needs of a particular neighborhood: e.g. Khayega Bull fighting grounds, Kamirithu amphitheater, Lamu cultural festival

### *Other regional attractions*

- Map out oceans or lake front beaches or shorelines that have potential for tourism development.
- Map out the cultural sites e.g. Kayas or areas of traditional interests, dominant cultural artifacts sites (Kisii soapstone) revered community sites e.g. Kit-Mikayi, Mukurwe wa Nyagathanga, Ikhonga Murwi (Crying Stones of Kakamega).
- Map out areas of scenic beauty

*Guidelines to enhance development of tourism potential area*

- Provide a buffer zone of 50meters from the edge
- The buffer zone can be used for provision of outdoor furniture, management of solid waste and sanitation
- Provide roads of access to these tourist sites
- Provide land for hotels and lodges

*National parks, game reserves and areas of significant bio-diversity*

A regional plan should delineate areas covered by national parks and game reserve, and identify other areas of significant bio-diversity and/or endangered species, for purposes of protection and conservation:

- A buffer zone of 50 meters is recommended around the park. Those less than 10 acres can have a buffer zone.
- Animal sanctuaries and wildlife breeding grounds should be protected. Forest reserve should be buffered. These include indigenous and plantation forest. The reserve can be used for compatible land uses e.g. Nyayo Tea Zones
- Wildlife corridor of 3 km. is recommended

*Environmentally fragile/hazard/risk areas*

Regional planning should take cognizance of environmentally fragile/hazard areas. These are areas with significantly biodiversities in flora and fauna. They are of importance to life and development and are threatened by pressure from human activities. Environmentally hazard/risk areas are areas where there is a danger to human life due to geological instability, hydrological phenomena and sometimes environmental pollution (air, water, land).

To promote sustainable regional development these areas require identification, mapping and delineation.

- Flood prone areas are delineated using high water mark and creating a buffer zone of a minimum of 10m from the edge. Other management strategies includes damming, channeling that include agriculture (rice and fish farming)

- Mass wasted land (landslides areas). Management strategies for these areas include soil and water conservation, afforestation and controlled settlements

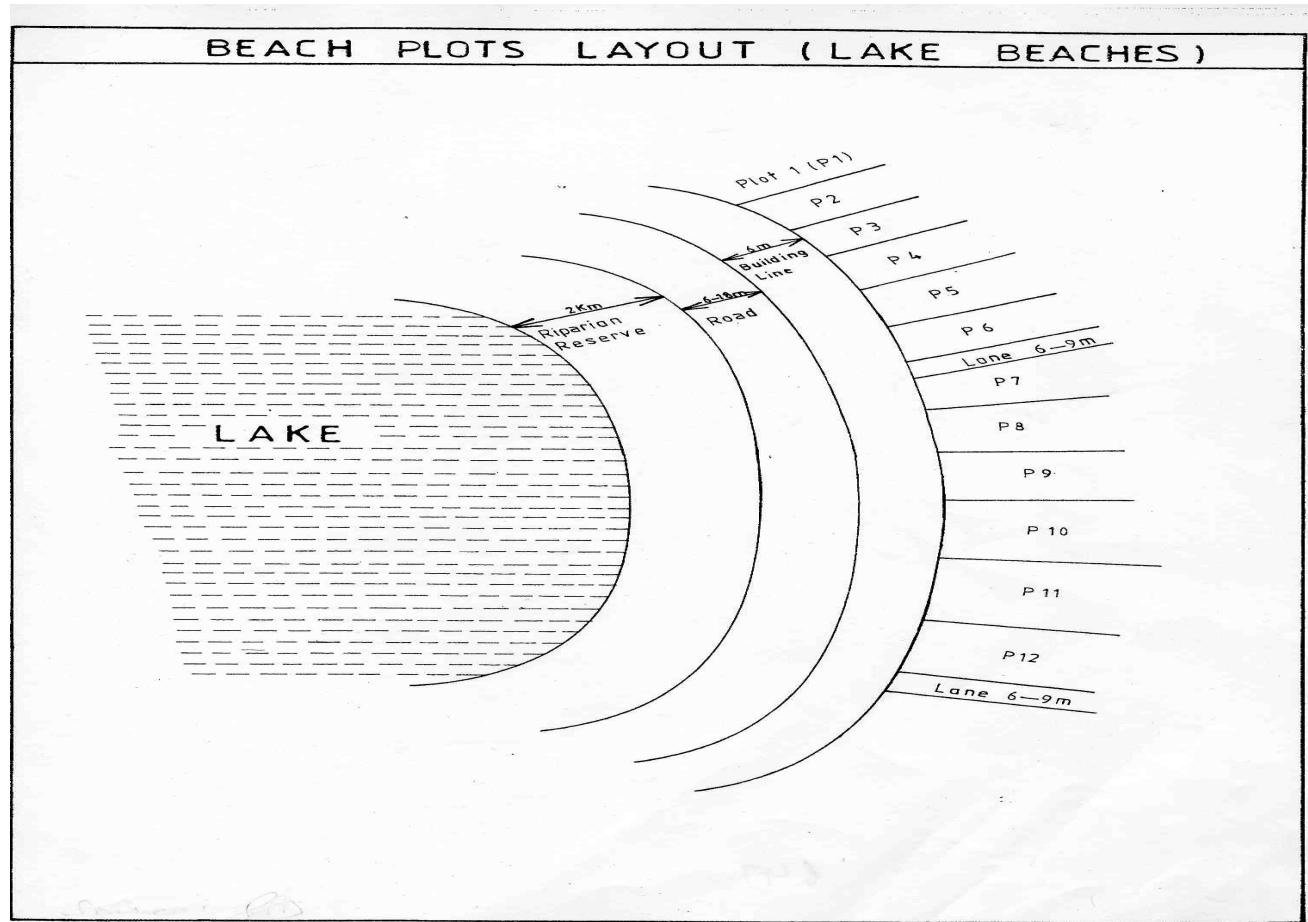
#### *Wetland conservation*

Wetlands are areas that are permanently or seasonally flooded by water where plants and animals have adapted e.g. swamps, areas of marsh, peat land, mountain bogs, banks of impeded drainage, or brackish, salt or alkaline.

- Wetland habitats that require conservation include fish, fruit, papyrus, grass, soil, stone, gravel, and sand.
- Sustainable utilization of wetlands should be encouraged in a way compatible with the maintenance of the natural properties of the ecosystems.

#### *Guidelines for wetland conservation*

- Identification, delineation and mapping
- Species inventory.
- Buffer zone is recommended around wetlands and water masses.
- Development permission on wetlands zones.
- Pollution control measures include prohibiting activities such as car washing, location of sanitary facilities and solid waste disposal.



*Figure 5.0 Beach Plot Layout*

PART III  
(URBAN SECTOR)



## CHAPTER FIVE: URBAN PLANNING

### 5.0 Definition and Concept

Urban planning is a process of influencing, controlling or directing changes (or non change) in the use of land overtime and space in an urban area. It involves plan preparation and development control.

Planning principles

1. Convenience
2. Economy
3. Aesthetics
4. Environmental stability

### 5.1 Types of Plans

Broadly plans can be categorized based on spatial extent and timeframe. These include regional and local physical development plans, long and short term plans respectively.

1) *Long term plans*- cover a period of 20 to 30 years

- a) Regional physical and development plans
- b) Local physical development plans
- c) Structure plans

2) *Medium term plans*

Cover a period of between 6 – 10 years.

3) *Short term plans*

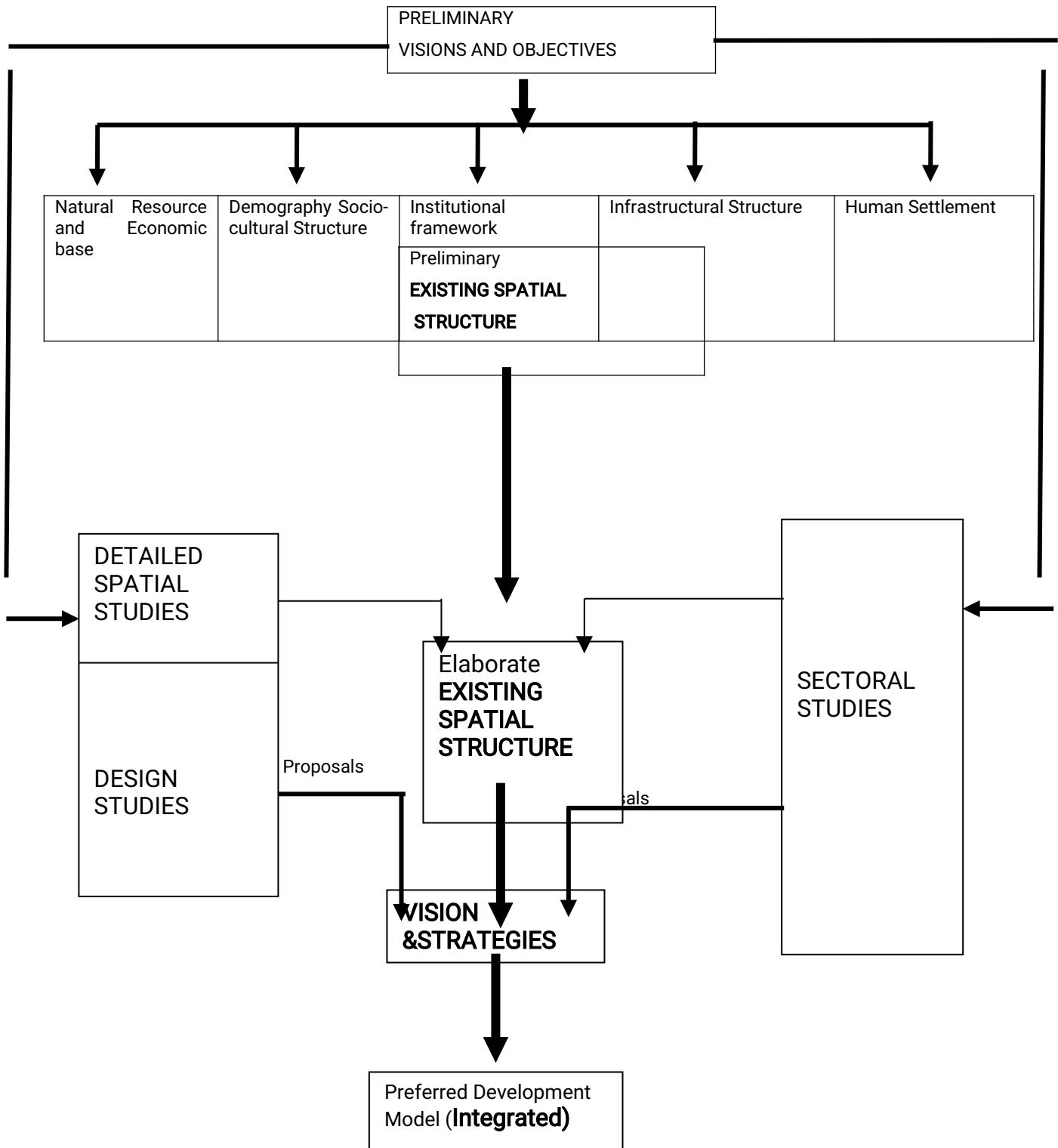
Cover a period of 3 to 5 years. These include:

- a) Action plans
  - b) Subject plans
  - c) Advisory plan/Zoning plans
  - d) Part Development Plans
- 4) *Urban Renewal*

## **5.2. Methodology**

This is a description of the process involved in preparation and derivation of the plans. Figure 3, a flow chart, indicates the process of preparation of local physical development plans, action plans, subject plans, advisory and zoning plans.

**CONCEPTUAL GUIDE TO THE PREPARATION OF PLANS**



*Figure 6.0 Conceptual Guide to Plan Preparation*

### **5.3. Procedure for land use allocation on a plan**

The determination of urban land use requirements is a very important exercise in land use planning because land is a scarce resource and the various uses are competing for it. The exercise involves determining how much land is to be reserved for residential, industrial, education, recreational, public purposes, commercial and public utilities. Land will also have to be reserved for transportation purposes. Though agriculture is not generally considered an urban land use, nevertheless there could be land that is already under agriculture. However, urban agriculture is now gaining importance as a means of augmenting incomes and thereby help reduce poverty. Urban agriculture also enhances the environment. Land whose use is not determined at the time of preparing the plan is normally deferred for future use.

Land allocation for various urban uses can be done in the following ways or as a combination:

- Uses of densities involve using a predetermined density per hectare which is applied to the town population e.g. 50 people per hectare applied to the population will give the amount of land that can be reserved for residential use. The same or a different density can be applied to determine land to be reserved for industrial purposes. Number of household per hectare or number of workers per hectare can also apply.
- For educational purposes, a catchment population threshold can be applied to the town population to determine the amount of land to be reserved for the various classes of educational institutions.(Table 12.0 ).
- Research findings can be used to determine the average percentage of land reserved for the various land uses. These percentages are then applied to the total town acreage. In Kenya a study of ten (10) towns done in 1971 established the average land use percentages. These percentages have been used to determine land use allocations during planning. Another study on the same town carried out in 2004 has shown that the percentages have increased in some cases like in residential and reduced in others. The increase in residential land could imply re-planning (Figure 4.1). Residential land has been disaggregated into the three classes as shown below. These percentages can be used as a guide when planning new

towns or assessing whether land allocations are reasonable. Care should be taken when comparing the 1971 and 2004 tables because of changes in town boundaries and different planning considerations in each period.

- Land use allocations can also be determined through the planners personal experience combined with the understanding of the local area. This involves a personal assessment of the local needs. The assessment may involve research or comparisons with similar situations elsewhere.
- A combination of any of the above methods can also be used to determine the amount of land to be reserved for the various land use when planning a town. It is important to note that rarely does the planner have all the required planning data.

*Table 12.0 Land Use Allocation Percentages in Various Centres in 2004*

	Nakuru	Kisumu	Eldoret	Thika	Nanyuki	Nyeri	Kitale	Isiolo	Nyahururu	Naivasha	Average
RESIDENTIAL 0	53.3	60.2	78.8	87.8	54.1	35.4	7.5	47.2	58.7	63.4	57.64
INDUSTRIAL 1	5.4	28.1	6.2	5.0	13.0	7.2	9.4	3.1	9.2	3.4	8.7
EDUCATION 2	9.9	3.2	5.4	2.0	6.7	12.2	20.3	13.4	13.2	7.9	9.4
RECREATION 3	9.2	3.8	1.1	0.7	1.2	18.8	5.0	2.2	2.0	8.3	5.1
PUBLIC PURPOSES 4	14.3	1.6	5.4	2.5	14.1	14.6	13.1	34.9	10.7	10.7	12.2
COMMERCIAL 5	4.9	2.0	2.7	1.3	5.9	11.7	3.0	27.9	4.9	3.6	6.8
PUBLIC UTILITIES 6	3.1	1.4	0.5	0.6	5.1	0.2	11.5	11.8	1.3	2.7	3.8
TOTAL AREA ZONE (0-6)	7506	2490	5458	6065	1081	608	1378	485	1217	3276	
C POPULATION 1999	231262	322734	197449	106707	49330	10123 8	86282	32684	37412	158678	
D TOWN DENSITY= <u>POPULATION</u> TOTAL AREA	30.8	129.6	36.2	17.6	45.6	166.5	62.6	67.4	30.7	48.4	63.5
E GROWTH RATE PER ANNUM	3.1	5.1	5.5	4.3	5.0	0.8	4.3	5.4	7.7	12.1	
F POPULATION INCREASE 1999 – 2004	38722	29915	33034	2824	9660	2679	16602	5626	7326	26569	
G GROWTH RATE % 1999-2004	16.7	9.3	16.7	2.6	19.6	2.6	19.2	17.2	19.6	16.7	

Source: Physical Planning Department

## CHAPTER SIX: RESIDENTIAL

### 6.0 Planning Standards for Residential Land Use

Categorization of the residential land use should be based on development density and level of services. The definition of various categorization of the residential land use should come up first.

*Table 13.0 Land Size for Various Categories of Residential Densities*

Centre	Low Density	Medium Density	High Density	Slums
Urban	$\frac{1}{2}$ acres (0.2 ha)	1/8 acre (0.045ha)	Below 1/8 acre or 0.03 ha	0.025ha

Basic objective of designing a residential area should be a habitable environment with the necessary amenities.

#### Factors Considered include:

- Level of services available
- Availability of land
- Prevailing land tenure
- Social economic status

- Dependent on the availability of sewer services

*Table 14.0 Plot Ratios and Plot Coverage*

	Minimum Plot size (Ha)	Maximum Plot Coverage %	Plot Ratio
<i>Low density</i>			
Bungalow	0.2	50%	-
Maisonette		50%	
<i>Medium density</i>	0.045		-
Bungalow		65%	1:3
Maisonette		65%	1:4 – 1:6
Multi-family dwelling		65%	
<i>High density</i>	0.03		
Row housing		70%	-
Detached		70%	-
Semi- detached		70%	-

## 6.1 RESIDENTIAL AREAS

Residential areas are the main places of habitation for the town residents. However, some residents may be found residing in commercial areas. Residential is normally the highest land use in a town. Residential areas may be made up of organized estates and neighborhoods.

*Table 15.0 Percentages of Residential Land Use Categories for Various Centers In 2004*

	Nakuru	Kisumu	Eldoret	Thika	Nanyuki	Nyeri	Kitale	Isiolo	Nyahururu	Naivasha	Average
<b>Low Density</b>	35	24	5.1	1.8	45.5	59.3	40.4	18.8	29.4	16	28
<b>Medium Density</b>	20	12.7	39.9	52.6	24.8	19.2	19	37.6	47.6	29.9	30
<b>High Density</b>	45	63.3	55	45.5	29.7	21.5	40.6	43.7	23	54.1	42
<b>Total Land (Ha)</b>	4001	1500	4303	5326	585	214	517	229	714	2078	

Source: Physical Planning Department

## Estates

An estate is a spatial planning unit, which is adequately provided for in terms of basic community facilities bordered by principle through roads and has an identity. The service centre which forms the focal point of the estate satisfies the

minimum walking distance from the perimeter. The population of the estate should be able to support the services within the physical entity. It is recommended that an estate shall have 100 households on the average.

It has all or the following characteristics:

1. Common housing design
2. Common services
3. Common entry and exit
4. Uniformity in plot size and design
5. Well-defined development period.

### **Neighbourhood**

This can be defined as a comprehensive planning unit with some of the following characteristics:

1. Socio-economic identity
2. Common facilities such as schools, recreational, shopping centers, etc.
3. An almost self contained unit
4. It may include several estates.

### **6.3 Land Allocation**

Residential areas are seen as integral parts of the overall built-up area (dwelling plots) together with day-to-day services, recreation and communication network. Table 16.0 gives the percentage allocation of land in various residential estates. They may be used as a guide in planning for residential estates and reasonable variations may be permitted depending on local conditions.

*Table 16.0 Averages Observed Land Use Allocations in Residential Neighbourhood Development*

NUMBER	LANDUSE	PERCENTAGE OF DEVELOPED AREA
--------	---------	------------------------------

		HIGH DENSITY	MEDIUM DENSITY	LOW DENSITY
1.	Dwelling plots	40-60	64-74	80-90
2.	Recreation	21-29	7-16	—
3.	Community Facilities	5-20	9-10	0.1-1
4.	Roads and Streets	4-15 1-7	6-7 3-4	8-8.8 0-2.2

### 6.3 Density of Development

Density in Development may be defined by Population size, Plot Coverage and the Number of Dwelling Units. The level of Density is determined by availability of services such as water, sewerage, size of roads, etc, and the zoning recommended. In recommending gross residential densities care should be taken that they create in spatial and functional meaning an independent system of the built-up area (both multi-family and one family dwelling units) well provided with day-to-day services, recreation and communication network. For the purpose of controlling the intensity of development Table 17.0 gives a range of densities that can be adopted. These may be varied depending on the type of waste disposal, availability of piped water, and the level of building technology to be applied.

*Table 17.0 Recommended Densities for Residential Development*

TYPE OF DWELLING	NO. OF DWELLING PER HECTARE	SPACE ALLOCATION PER DWELLING (M <sup>2</sup> ) <i>(Includes built-up area and circulation)</i>
<i>BUNGALOW DETACHED</i>		
(i) Low density	10	1000
(ii) Medium density	16	500

(iii) High density	35	285
<i>SEMI DETACHED AND ROW HOUSING</i>		
(i) Low density	20	417
(ii) Medium density	32	333
(iii) High density	70	250
<i>MULTI-FAMILY DWELLINGS</i>		
(i) Low density	50	200
(ii) Medium density	60	167.6
(iii) High density	70	142.8
(iv) Special Density	133	75

## 6.4 Site Planning

The following controls should be observed:

### Plot Frontage:

All plots on which residential buildings are to be erected should have proper and sufficient frontage to a street, such a street not being a sanitary lane or passage. The recommended minimum frontages of residential plots are given in Table 18.0

*Table 18.0 Recommended Minimum Plot Frontage by Type of Housing*

TYPE RESIDENTIAL DEVELOPMENT	OF	MINIMUM FRONTAGE IN METERS		
		DETACHED	SEMI DETACHED	ROW HOUSING
1. Slum rehabilitation and upgrading schemes		70	75	75
2. Low cost housing		70	75	75
3. Normal housing development		60	60	70

#### (a) Plot Areas (Sizes)

The minimum plot size should, generally, be determined by the user, type of waste disposal, availability of water and the level of building technology applied. Another important factor is the type of housing in the given scheme whether consisting of row housing, detached or semi-detached units. As a guide Table 19.0 gives the recommended minimum plot sizes in the different cases of types of residential development. These may be varied depending of the level and adequacy of the above mentioned factors and recommended plot coverage.



*Table 19.0 Recommended Minimum Plot Sizes for Different Housing Schemes*

TYPE OF HOUSING	MINIMUM PLOT SIZES IN SQUARE METERS		
	DETACHED	SEMI DETACHED	ROW HOUSING
1. Slum rehabilitation and upgrading schemes	223.2 334.8	148.8 223.2	111.6 167.4
2. Low cost housing	465	309.7	232.5
3. Normal housing development			

#### **(b) Plot Coverage and Plot ratios**

Plot coverage as applied to a building means the portion of horizontal area of the site of the building permitted to be built. The essence of fixing plot coverage is to ensure a healthy environment and allow for expansion and improvement of infrastructural facilities and social amenities. Plot ratio, on the other hand, is the factor by which the area of the plot is multiplied to determine the maximum plinth area of a building permitted on that plot. The recommended plot size, coverage and ratio are shown on Table 20.0 below.



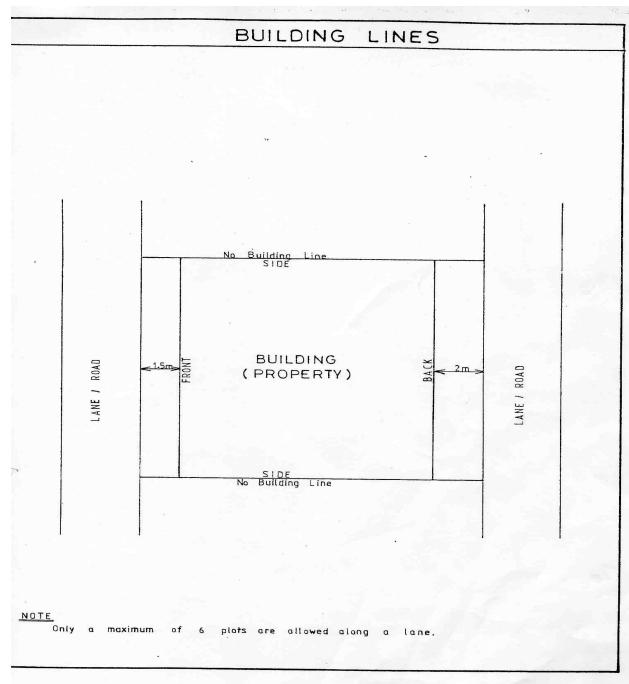
*Table 20.0 Plot Ratios and Plot Coverage*

	Minimum Plot size (Ha)	Maximum Plot Coverage %	Plot Ratio
<i>Low density</i>			
Bungalow	0.2	50%	-
Maisonette		50%	
<i>Medium density</i>	0.045		
Bungalow		65%	-
Maisonette		65%	1:3
Multi-family dwelling		65%	1:4 – 1:6
<i>High density</i>	0.03		
Row housing		70%	-
Detached		70%	-
Semi-detached		70%	-

#### **(d) Building Lines (set back lines)**

This is the minimum distance of a house or an ancillary structure from the plot boundary.

The principle value of building lines is either to achieve a visual effect or reserve a certain access of area of ground. It is not necessary to set uniform lines, they maybe flexibly drawn to produce spatial coherence and variegated character.



*Figure 7.0 Building Lines (set back lines)*

*Table 21.0 Minimum Setback of Dwelling from Plot Lines*

TYPE OF RESIDENTIAL DEVELOPMENT	MINIMUM SET-BACK IN METERS		
	FRONT	SIDE	REAR
1. Slum rehabilitation and upgrading schemes	2.5	1.5	3
	3	1.5	4.5
2. Low cost housing	6	3	4.5
3. Normal housing			

Nairobi City Council has a policy of enforcing 9m building line for all major roads including CBD, 6m building line for roads below 18m and greater than 12m. In District shopping centers and other shopping centers buildings should have a set back of 3m. The canopy should be within the plot and not on the road reserve.

The Physical Planning (Building and Development Control) Rules, 1998 provides for a building line of 9m. for roads above 18m. wide and 6m. for roads between 6m. and 18m. However, if the road is less than 6m., the building line should be the width of that road plus the difference between 6m. and the road.

No buildings should be constructed on the open space, in front of the building, created by the building line, except for a fence or wall which should not exceed 1.4m (4.6 Ft) in height, or a portico, porch, step.

### **(e) Distance Between Buildings**

**(i)** The distance between any two dwellings, front to front, across a street, walk or common area shall be not less than 2 times the total height of the taller buildings.

### **ii) Street Width**

It is recommended that the width of streets or access lane in a residential area be determined by the number of dwelling units or plots to be served. The minimum street width for given number of plots may be indicated as shown in table 22.0. It is further recommended that the street network be hierarchical so that in the future urban areas will have a high rise urban morphology even in residential areas

*Table 22.0 Minimum Street Width Per Given Number of Plots*

Number Of Plots	Street Width
1 -20	9m
21 -50	12m

### **(iii) Dead-end Streets (Cul-de-sac)**

A dead-end street should be aligned such that it shall give access to not more than 8 to 10 residential plots. It should not exceed 60m in length and shall have a turning radius of at least 15m Hammerhead.

## **CHAPTER SEVEN: INDUSTRY**

### **7.0 Major Industrial Areas**

#### **(a) Location and Special Requirements**

These areas provide suitable accommodation for the following types of industry; heavy and manufacturing, and noxious industries with large waste; large scale and users industrial plants; industries requiring excellent national/ international communication network; and industries requiring close links with other firms e.g. those firms which produce component parts for the same product or those involved in separate stages of the same industrial process. Accessibility to labour, communication routes, and ample supplies of power and water and sewage disposal facilities are of prime importance. Separation from residential areas through buffer zones is essential.

#### **(b) Land Requirements**

In selecting an area for location of major industries in Growth Centres, a site must be provided which is neither too small to inhibit the location of industries requiring large areas, not too large to increase the possibilities of congestion. The total site area for a major industrial area would therefore probably lie between 500-1200 acres for a town with a population of 200,000 and 5000,000. It will provide between 20,000 and 50,000 jobs, based on an average industrial density of 40 workers per acre.

### **7.1 Light Industrial Areas/Jua Kali**

#### **(a) Location Requirements**

Light Industrial areas/estates cater for types of industries that are compatible with residential areas. They provide favorable locations for Lab our intensive industries e.g. workshops, large laundries; dry cleansing depots, printing; packaging; food industries; light assembly furniture makers etc. These estates would be scattered throughout residential areas, approximately one estate per 30,000 population. They should be located on the major internal routes of the township with separated access from residential feeder roads.

#### **(b) Land Requirements**

The probable total area of each estate would range from 10-50 hectares, which would be sufficient to cater for 1500-7500 workers at a density of 60 workers per acre. An area of 10-20 small firms without creating congestion in the residential areas. An area of 50 hectares would allow large firms to locate in addition. Anything beyond 50 hectares would begin to create major conflicts and incompatibilities with the surrounding residential areas.

**(c) Controls**

Strong controls must be exercised if surrounding areas are not to suffer or deteriorate. It is suggested that a public authority retains the title to the land and leases it to private firms. In this way there would be stronger controls than town planning regulations alone. Buffers could be created between these estates and homes such as major internal roads, shopping and commercial centres, community buildings and school etc.\_this grouping of facilities would save journeys and could be mutually beneficial.

**7.2 Workshop Areas**

These cater for types of activities existing in a relatively uncontrolled way, close to retail activities primarily in low income residential areas e.g. repair workshops, carpenters, small tin smiths, re-use industries etc. As these workshops are also retail outlets, their location is more sensitive to the market than raw materials.

**7.3 Land Allocation**

The planned industrial area should have proper relations to residential, commercial and recreational areas as an integral part of the overall urban development plan. Overall total land reserved for industry should form 8% of the total area planned. A ratio of 1:3 should be maintained for light and heavy industry. The percentage allocation of land in an industrial area/estate may be as suggested below, depending upon the type of industries and the extent of the industrial area/estate.

- (a) Workshops ..... 50-55%
- (b) Organized open space ..... 10-15%
- (c) Utilities, services of facilities ..... 20-25%
- (d) Roads, parking lots ..... 15-20%
- (e) Others ..... 5-10%

## 7.4 Site Planning

### (i) Plot Areas and Coverage

The essence of fixing minimum plot areas is to prevent over-crowding, to ensure adequate light and ventilation and to facilitate easy movement of people, vehicles and goods. It is suggested that no industrial unit other than a service industry be allowed to allocate on a site less than **0.5 Acre**. The actual amount to plot size will depend on the type of industry, number of workers to be employed, and densities and plot coverages. It is also suggested that plot coverages should not exceed **75 percent** to allow for sufficient scope for circulation, utilities, services and facilities.

### (ii) Building Lines

The objective of fixing building lines in industrial areas is to mitigate the effects of noise, industrial fumes, odour, dust, vibration, fire, heat, glare and other hazards. The following are the recommended setback lines from centre-lines of roads to the property lines. These refer to sites devoted to only manufacturing industries and not to service industries.

- (a) Major Communication routes (Highways) .....25m. to 31m.
- (b) Spine Roads (Major roads) .....18m. to 21m.
- (c) Collector roads .....15m. to 18m.
- (d) Access streets .....12m. to 15m.

## 7.5 Road Reserves

Wide roads in industrial areas are suggested to provide for easy movement of people and heavy trucks, storm water drainage, conveyance of industrial effluents, laying out of sub-systems like water mains, electrical cables, gas mains etc. and for curb-parking, where necessary. The following widths of carriageways are suggested:

- (a) Major Communication routes (Highways).....13.5m. to 16m.
- (b) Spine roads (Major roads) .....11.5m. to 13.5m.
- (c) Collector Roads .....9m. to 11.5m
- (d) Access streets .....7m to 8.5m

The road reserves for the above suggested carriageways should take into account provisions for storm water drainage, conveyance of industrial effluents, water mains, footpaths and curb parking, where necessary. The following road reserves are therefore recommended:

- (a) Major communication routes (Highways) .....60m.
- (b) Spine road (major roads) .....25m.
- (c) Collector roads .....18m
- (d) Access streets .....15m
- (e) Service lanes .....6m.

### **Planning standards**

The categories of industries are: Heavy, medium, light, small and medium and special industries.

The factors used to determine these were: the type of technology used, type of products produced and the workforce.

*Table 23.0 Land requirements for the various categories of industries*

Type of Industry	Land Requirements in ha.	Catchment Popn	Min Land Size in Ha.
Light	4	30,000	0.05
medium	10	100,000 to 500,000	2
Heavy	none	Over 1 million	20

For heavy industries the specific land requirement was not placed because it may transcend more than one town, will depend on the type of technology and the level of services available.

### **Special industries**

These are considered for planning when need arises. They are generally located outside the town central business district because of their special features. These include:- Mining, sand harvesting, brick making, – subject to environmental regulation.

### **Planning standards for industries**

General guidelines for industrial area should be guided by:

- Site planning and zoning regulations
- Minimum plot size and size of industry
- Network system
- Transportation
- Topography
- Geology and hydrology
- Direction of the wind

## CHAPTER EIGHT: EDUCATIONAL FACILITIES

The provision of learning facilities and their land allocation depend on the age of the pupils/students and the size/number of the pupils/students.

### 8.1 Pre-Schools

These should be established in residential areas or within existing primary schools and within walking distances for all pre-school pupils.

Nursery Schools fall into 3 categories according to age groups they serve:

- (i) **Day Care Centres:** - where infants between the ages of 1 day to 2 years are accorded the basic childcare.
  - (ii) **Kindergartens:** - where children between 2-5 years are organized into play groups and taught object lessons.
  - (iii) **Nursery/Pre-Primary Schools:** - establishment of preparatory schooling at which children between 5-6 years are taught prior to joining primary school education. These institutions may be attached to existing primary schools.
- (a) Demand for Kindergartens and pre-primary schools**

On the basis of 100% demand for nursery schools and given that children between 2-6 years represent 14.8% of the total

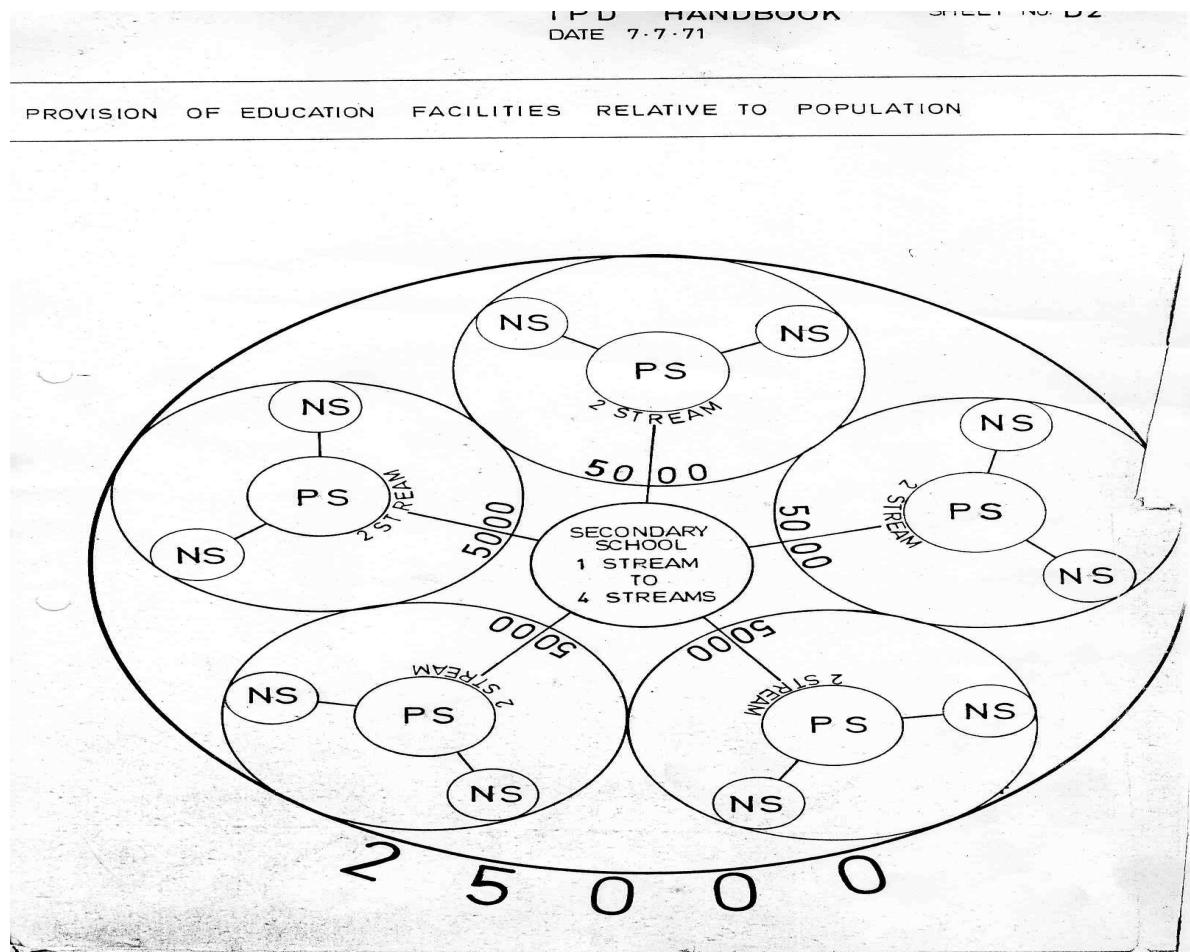
population in the country, then one school of 150-260 children will be required for a population of 2500.

**(b) Distribution of Nursery Schools**

It is desirable that a pre-primary school is attached to every primary school. These schools will therefore follow the same distribution pattern as primary school at 3500 catchment population. In addition, a kindergarten independent of primary school should be provided for 2500 catchment population.

**(c) Land Requirements**

By their nature young children like playing in scattered groups and adequate land is needed to cater for their needs. An additional area of 0.15-0.25 hectare should be attached to every primary school at 3500-catchment population. Similar amount of area land is required for every 2,500 people in low-income areas and 3500 people in high-income areas



*Figure 8.0 Education facilities and population*

#### **(d) Locational Requirements**

Nursery schools should be located within and integral to residential areas. Ideally, they should be located on major pedestrian

routes so that the catchment pedestrian population should not cross major roads. At recommended densities for low-income housing, the nearest school would be within easy walking distance the **300-500** meters. In high –medium class areas, facilities should be available for dropping and picking up children by car without obstruction on the main vehicular flows on feeder roads. Ideally nursery schools should not front roads.

## 8.2 Primary Schools

### (a) Demand for Primary schools:

A primary school is an establishment providing basic education covering a period of eight years for children age between 6-13 years inclusive. Allowing for 100% demand for primary schools education and taking a pupil enrolment of 40 per class for a three-streamed school from class 1 – 8 i.e. 960 pupils per primary schools maximum, then one school would be required for a population of 3,500.

### (b) Distribution

The distribution of primary schools in urban areas on the basis of 100% demand should take into account the urban area's catchment population. This is so because pupils are known to move from surrounding rural areas into urban areas for school places. Allowing therefore for 12.5% pupil population from the surrounding areas, it is recommended that primary schools be provided on the basis of school/population ratio of 1:3500 in urban areas and 1:4000 in rural areas.

### (c) Land requirements:

The idea here is to provide the neighborhoods with adequate land for primary schools with the future requirements being taken into account. It is suggested that an area of at least **3.25 ha.** should be set aside, for every 3,500 population in urban areas and 4000 population in rural areas. However, reasonable variation may be made depending on recreational needs of the pupils. The 3.25 ha. Include an area of about **0.25 ha** for a nursery school. To economize on land and reduce on distance that pupils have to walk form one place to the other within the schools compound, it is suggested that tuition blocks, libraries and offices should be accommodated in well designed storeyed buildings wherever possible.

**(d) Locational Requirements:**

Primary schools require locations within residential areas related to principle pedestrian networks. At gross densities of 50 persons per hectare and above, each primary school should be within easy walking distance of 250-300 m. At gross densities of below 50 persons per hectare, pupils will probably be taken to schools by car and faculties for safe collection and parking should be available.

### **8.3 Secondary/Technical Schools**

Secondary schools provide education for a period of four years to children who have completed standard eight in Primary School. Secondary school age of statistical purposes is taken to be from 14-17 years inclusive and this age group accounts for approximately 10% of the total population in Kenya.

**(a) Demand and Distribution of Secondary Schools:**

The demand for secondary schools education in Kenya ranges between 20% and 100%. On the basis of an average demand of 60% and taking into account that 10% of the populations are secondary schools age then 1 school of 480 pupils would be required for a population of 8000. The distribution of secondary schools should therefore be on the basis of school/population ratio of 1:8000.

**(b) Land Requirements**

Unlike a primary school, a secondary school needs more land for laboratories (chemistry, physics and biology), workshops, and assembly hall and playground for varied games. The land provided should therefore be used economically so as to leave room for future expansion. Storeyed buildings should therefore be encouraged, wherever necessary, for classes, offices and dormitories. This will help save a lot of land.

**(c) Locational Requirements**

Secondary schools require location within residential areas related to principle pedestrian networks. At gross densities of 50 persons per hectare and above, each secondary school should be within an easy walking distance i.e. relative to pupils' ages of 500 – 600 meters. At gross densities lower than 50 persons per hectare pupils will probably be taken to school by car or by public transport and facilities for safe collection and parking should be available. It is necessary that planning applications for educational institutions should include details of all relevant information to facilitate the determination of amount of acreage they require. It also requires that after land for educational facilities has been allocated drawings of site

layout plans be submitted to relevant authorities for approval to avoid haphazard development. In all cases educational institutions should be integrated with major open spaces whenever possible so as to encourage the sharing of the open spaces and playgrounds with members of the public. See further Figure 2.1 justifications for space requirements for various educational facilities

## **8.4 Space Requirements for Educational Facilities**

### **A NURSERY SCHOOL**

#### **(a) Nursery School Concept**

- Classes 1-4 plus administration
- 25 children per class
- Age Group 2-6years
- Mixed School
- Circulation space per pupil of  $2.46m^2$  ( **$3m^2$** )
- **1 Toilet for every 25 children**

#### **(b) Basic Outdoor Playing Facilities**

- Soft play areas (grass)
- Sand pit
- Swing/seesaw
- Circulation space

#### **(c) Space requirements**

##### **(i) Single Stream (100 Pupils)**

#### **Recreation and Circulation**

- Soft play area (grass) 246.00m<sup>2</sup>
- Swing/seesaw 28.60m<sup>2</sup>
- Sand pit 28.60m<sup>2</sup>
- 10% circulation space 24.60m<sup>2</sup>

### **Accommodation**

- Kitchen 9.10m<sup>2</sup>
- Office/store 10.20m<sup>2</sup>
- 4 classrooms @ 55.10m 220.40m<sup>2</sup>
- Sanitation block 15.30m<sup>2</sup>
- Parking 104.92m<sup>2</sup>
- **Total** **687.72m<sup>2</sup>**

Therefore minimum area for a single stream is approximately 0.10 Ha. or 0.25 acre.

### **(ii) Double Stream (200 pupils)**

- Single stream 687.72m<sup>2</sup>
- 4 classrooms 220.40m<sup>2</sup>
- Staffroom 6.83m<sup>2</sup>
- Sanitation Block 15.30m<sup>2</sup>
- Outdoor facilities 553.90m<sup>2</sup>
- **Total** **1,484.15m<sup>2</sup>**

Therefore minimum area for a double stream is approximately 0.15 Ha

### **(iii) Triple stream (300 pupils)**

• Double stream	1,484.15m <sup>2</sup>
• 4 classrooms	220.40m <sup>2</sup>
• Sanitation Block	15.30m <sup>2</sup>
• Outdoor facilities	<u>553.90m<sup>2</sup></u>
	<b><u>2,273.75m<sup>2</sup></u></b>

Therefore minimum area required for a triple stream is approximately **0.23 Ha.**

Where sleeping facility is proposed on the plot, then it would be necessary to increase the plot size relative to the ratio applicable in the area to accommodate the building and circulation space.

(iv) Day Care Centres (Based on 9 pupils playgroup concept and age group (1 day to 2 years.)

* Residential (Medium income)	136.61m <sup>2</sup>
* Residential circulation space	253.64m <sup>2</sup>
* 1 classroom	13.66m <sup>2</sup>
* Reception area	2.28m <sup>2</sup>
* Kitchen	5.46m <sup>2</sup>
* Sanitation	5.01m <sup>2</sup>
* Play area of 2.48m per pupil	22.32m <sup>2</sup>
* Access/parking area	<u>62.75m<sup>2</sup></u>
	<b>501.73m<sup>2</sup></b>

Therefore minimum area required is **0.05 Ha.**

## B PRIMARY SCHOOL

The setting up of Primary Schools depends on the population of the catchment area and mode of living of the population.

(a) Primary School Concept

- Classes 1 – 8 plus administration
- 40 students per class
- age group 6 – 13 years
- Co-educational facility
- Circulation space per pupil of  $6m^2$  for boys &  $5m^2$  for girls

(b) Basic Outdoor Sports Facilities

- Soccer field (medium)
  - Netball
  - Athletic track (cricket)
  - Swimming
  - Hockey field
  - Gymnasium
  - Tennis Court etc

(c) Space Requirements

(i) Single stream (320 pupils)

**Accommodation**

• Administration	200m <sup>2</sup>
• 8 classrooms	448m <sup>2</sup>
• 1 laboratory	135m <sup>2</sup>
• 1 home science block	168m <sup>2</sup>
• Sanitation block	40m <sup>2</sup>
• 1 workshop	170m <sup>2</sup>
• 1 Library	190m <sup>2</sup>
• Assembly Hall	656m <sup>2</sup>

Recreation and Circulation

• Circulation @ 6m per pupil	1920m <sup>2</sup>
• 1 Soccer field 80 x 100	8000m <sup>2</sup>
• 1 netball field	<u>255m<sup>2</sup></u>
<b>Total</b>	<b>12,182m<sup>2</sup></b>

Therefore minimum area required for single stream is **1.2 Ha.**

(ii) Double Stream (640 pupils)

• Minimum single stream	12,000m <sup>2</sup>
• Circulation space	1,920m <sup>2</sup>
• Netball	255m <sup>2</sup>
• Swimming pool	135m <sup>2</sup>
• Gymnasium	255m <sup>2</sup>
• Hockey pitch	5,060m <sup>2</sup>
• 1 laboratory	135m <sup>2</sup>
• Workshop	170m <sup>2</sup>
• Sanitation block	<u>40m<sup>2</sup></u>
<b>Total</b>	<b>19,970m<sup>2</sup></b>

Therefore minimum area required for a double stream is **2.0 hectares.**

**Note :** Classroom not included due to storey concept.

(iii) Triple Stream (960 pupils)

• Double stream	19,970m <sup>2</sup>
• Plus 8 classrooms	448m <sup>2</sup>
• Circulation space	1,920m <sup>2</sup>
• Soccer pitch/athletic track 80x100	800m <sup>2</sup>
• Netball	135m <sup>2</sup>
• Tennis court	<u>140m<sup>2</sup></u>

Total	31,253m <sup>2</sup>
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**Notes:**

1. The above minimum averages assume an average of 40 pupils per class and that the classes will be from standard 1 to 8 to the above acreages **add 0.4 – 0.8 ha.** for agricultural demonstration plot.
2. It should be noted that since all schools expand, even if a school will start as a single stream initially, it should be allocated the minimum **3.9 ha** so as to forestall the problem of land shortage in case there is need for expansion.
3. The maximum number of children is limited to **960** in order to avoid the risk of congestion in using facilities like playgrounds, libraries and classes. Each school should therefore be developed to a 3 stream capacity.
4. In case members of the teaching staff have to be accommodated on the compound, then an additional land of **0.8 ha** should be allocated for the purpose of housing. The houses should be **flats** wherever appropriate to economize on space.
5. If a boarding school, then **0.4 ha** should be added to cater for every 200 students in terms of dinning halls together with dormitories, preferably storey buildings.
6. Walking distance for rural schools should be between 0.5 - 3km while for urban schools it should be 0.5 - 2km.

## C SECONDARY/TECHNICAL SCHOOL

### (a) Secondary School Concept

- Administration, classrooms, hall, library, laboratories, workshops, canteen, car park, staff-quarters sanitation etc.
- 40 students per class, form I to VI
- Co-educational facilities with equal number of boys and girls.
- Age group 14 – 17 years inclusive.
- Circulation space per pupil of 6m<sup>2</sup>
- Playfields.

(b) Space Requirements

(a) Single stream (160) pupils

**Recreation and circulation**

- Maximum size of soccer field with cricket and athletic track (95 X 180) 17,100m<sup>2</sup>
- Medium size practice soccer/hockey field equal (dual use (90 x 100) 9,000m<sup>2</sup>
- Netball (18 x 33) 594m<sup>2</sup>
- Tennis Court (22x 24) 528m<sup>2</sup>
- Swimming pool (20 x 25) 500m<sup>2</sup>
- Gymnasium (33 x 36) 1,188m<sup>2</sup>
- Circulation (6 x 160) 960m<sup>2</sup>

Accommodation

- 4 classrooms 224m<sup>2</sup>
  - 3 laboratories @ 343.8m<sup>2</sup> 1,031.4m<sup>2</sup>
  - Art and crafts block, domestic science 281.3m<sup>2</sup>
  - Workshop 281.3m<sup>2</sup>
  - Library 781.3m<sup>2</sup>
  - Administration 199.6m<sup>2</sup>
  - Assembly Hall 1,093.8m<sup>2</sup>
  - Sanitation Block 67.2m<sup>2</sup>
- Total** **33,829.9m<sup>2</sup>**

Therefore minimum area required for single stream mixed secondary school form I-IV is **3.4 hectares**.

## (ii) Double stream (320 pupils)

• Minimum single stream	33,829.9m <sup>2</sup>
• Netball	528.0m <sup>2</sup>
• Circulation	960.0m <sup>2</sup>
• Sanitation	<u>67.2m<sup>2</sup></u>
	<b>35,385.1m<sup>2</sup></b>

Therefore minimum area required for double stream mixed secondary school form I – IV is **3.5 hectares**.

**Note:** Additional classrooms are not included due to story concept.

## (iii) Triple stream (480 pupils)

• Minimum double stream	35,385.1m <sup>2</sup>
• Foot-ball field	9,900.0m <sup>2</sup>
• Circulation	960.0m <sup>2</sup>
• Classrooms	<u>224.0m<sup>2</sup></u>
	45,469.1m <sup>2</sup>

Therefore minimum area required for triple stream mixed secondary school is **4.5 hectares**.

### Notes:

1. At schools where the teaching of agricultural courses is to be provided additional land estimated at 10% of the above minimum space requirements will have to be provided.
2. Where schools by virtue of their geographical siting, the stipulated minimum space requirements cannot be met, share use of sports facilities should be encouraged so long as such sharing does not adversely affect required area and the net benefits derived by each of the sharing schools.
3. In case members of the teaching and subordinate staff have to be accommodated at the compound, then an additional land of bout 2.5 acres should be allocated for the purpose of housing. In such cases, for the

- purpose of economy, vertical development concept will have to be encouraged.
4. If a boarding school, then 1 acre should be added for every 200 pupils in terms of dining halls together with dormitories, preferably story buildings.
  5. The minimum acreages proposed above assume an average of 40 students per class and that the classes will be from form I to IV. Since all schools expand, even if a school will start a single stream initially, it should be allocated at least 6.9 hectares so as to forestall the problem of land shortage in case there is need for expansion.
  6. Maximum size of school is limited to 480 pupils to avoid risk of congestion in using facilities like playgrounds, libraries and classes. Each school should therefore be developed to a three stream capacity.
  7. Walking distances should be the same as those for primary schools. To cater for future expansion at least 4.5 Ha of land should be reserved.

## D COLLEGES

**The recommended land requirements for colleges should be:**

Total enrolment	960 students
No. of classrooms	= 24
Classrooms	= $8 \times 8 \times 24 = 153m^2$
Tennis court	= $528m^2$
Swimming Pool	= $500m^2$
Gymnasium	= $1188m^2$
Circulation area	= $5760m^2$
Science rooms	= $3 \times 281 = 843m^2$
Agriculture room	= $1 \times 281 = 281m^2$
Home science room	= $2 \times 281 = 562m^2$
Art & Craft	= $2 \times 281 = 562m^2$
Play fields	= $17,100m^2$

Learning resource centre	= 150m <sup>2</sup>
Administration block	= 200m <sup>2</sup>
Multi-purpose Hall	= 1093m <sup>2</sup>
Ablution block	= 67m <sup>2</sup>
Boarding facilities	= 2 Ha.
Teaching staff quarters	= 2.5 Ha. (Flats)
Non-teaching staff	= 0.4 Ha.
Agriculture demonstration/farm	= 2.0 Ha.
<b>Total land</b>	<b>= 10.2 Ha.</b>

## UNIVERSITY

The Legal Notice No. 56 of 1989 contains the Universities establishment, standardization, accreditation and supervision rules of the Universities Act.

### Land Requirements

The land size for a University should be at least 50 hectares made up of the following:

1. 20 hectares or more to support up to 500 students.
2. 10 hectares or more for the main campus.
3. 2 hectares or more for auxiliary services e.g nursery school, staff quarters
4. 2 hectares or more for open spaces and car parking exclusively.
5. 2 hectares of land set aside for sewerage plant where there lacks Local Authority sewerage system.
6. 5 hectares or more for outdoor sports for 500 students.
7. A University offering agriculture as a course should in addition provide 10 hectares of land for a farm.

Every University should provide the following minimum Physical facilities to accommodate its activities.

- (a) Classroom or Lecture rooms.
- (b) Departmental areas, staff offices and seminar rooms
- (c) Central Administration offices.
- (d) Library.

- (e) Auditorium or Lecture theatre.
- (f) Staff common rooms.
- (g) Student common rooms with indoor recreational facilities.
- (h) Outdoor recreational facilities in form of games or sports facilities.
- (i) Drainage system, proper sanitation and water supply.
- (j) Dispensary.

Every residential university, shall, in addition to the above facilities, provide:

1. Kitchen and dining facilities.
2. Students accommodation, including adequate laundry and storage facilities.

A university offering Urban and Regional Planning shall have adequate studio space for every year of study and the University shall also have a model making workshop.

A master plan should be prepared in accordance with these standards and all applicable laws and designs in such a way that all including facilities and proposed developments are functionally related and compatible and all academic buildings, classrooms and other facilities are in close proximity to one another.

<del>No. of students</del>	<del>Minimum usable space in sq.m. per student</del>	<del>Space in sq. m. with desks and chair</del>	<del>Space in sq. m. with chairs only</del>
0-29	1.9	1.9	
30-39	1.9	1.4	
40-59	1.7	1.3	
60-99	1.7	1.2	
100-149	1.7	1.0	
150-299	1.5	0.9	

The total usable space for classrooms shall be at the minimum rate of **0.65 sq.m.** per full time students equivalent.



## CHAPTER NINE: RECREATION

### 9.0 RECREATIONAL AREAS:

Recreation is the sum total of all human, social-cultural and economic activities that enhances the therapeutic status of the mind. It brings a relaxation of the body and mind.

Recreational areas can be private or public. There is need to provide the facilities both in the rural and urban areas because of the following reasons:

- 1 Need for relaxation after a long days work/break from routine
- 2 Income generation/economic activities
- 3 Social interaction
- 4 Tourist attraction
- 5 Set as carbon sinks/breathers
- 6 preservation of socio-cultural and or religious values
- 7 Environmental conservation-forest, trees, flowers planting
- 8 Competing users due to population pressure hence overcrowding living conditions in the informal settlements.

Areas of recreation include:

- 1 Areas of scenic beauty
- 2 Areas of historic/cultural importance
- 3 Unique physiographic features
- 4 Parks, forests, water masses, etc
- 5 Play fields, stadia, green spaces, zoos, snake parks, museum, amusement parks, etc.
- 6 Discotheques and cinema halls
- 7 Conservation areas
- 8 Road reserves

## **9.1 DEMAND FOR RECREATIONAL FACILITIES**

There are several socio economic factors among the urban and rural population that suggest a real need for a generous provision of green spaces within the urban environment. These include:

### **(a) New urban population**

The majority of adult population in urban areas are migrants from rural areas and show a strong attachment to the land. The rural environment has been a formative influence in their lives.

### **(b) Low earnings**

The majority of the population lack money for all but their basic needs. They are therefore essentially pedestrian and their recreation must be found within walking distance to their homes. They cannot afford much living space and tend to live in cramped overcrowded conditions. Some relief is necessary from the pressure generated by overcrowding.

### **(c) Population Structure**

Majority of the population in major urban areas are under 25 years. Open spaces are therefore necessary for their health physical and psychological development. Overcrowded living conditions, lack variety in the environment and lack of opportunities for independent play and exploration during the early years of children tend to inhibit their intellectual development. It is therefore essential to provide opportunities for children to play in safe attractive and stimulating surroundings within the residential areas.

### **(c) Limitations on Public Expenditure**

Public funds are limited and this could result in poverty of the man made environment. A sensible landscaping policy could be one of the cheapest and most effective way of counteracting eyesores in the manmade environment; producing an urban environment in which it is attractive to live and work and providing areas of inexpensive recreational opportunity.

## **9.2 RECREATION IN REGIONAL CONTEXT**

Recreation at this level is related mainly to car owner, weekend tripper or tourists. The urban population and to some extent local population uses it primarily at weekends or during holidays.

The recreation areas here include: -

- (a) Areas of natural scenic beauty e.g. the crying stone of Kakamega

- (b) Areas of unique scenic feature e.g., ridges
- (c) Water masses e.g., water courses, water falls, etc
- (d) Forest and nature conservation areas, parks and game reserves
- (e) Community halls
- (f) Socio-cultural shrines
- (g) Stadia
- (h) Road reserves
- (i) Swamps

The above areas need to be identified, planned, gazetted and developed or conserved as nature conservation and/or recreational areas. They should be provided with public access **of a minimum 9m** and catered for recreation use by providing car-parking spaces, picnic sites and refuse disposal facilities of at least **0.4 ha**.

Tourism and recreational developments to be stimulated in the above areas should be compatible with surrounding land use patterns, cultural values of the local population and not injurious to the natural attraction of the area. Other potential regional recreational areas include:-

- (a) Well maintained road reserves that have been tree lined: and
- (b) Well-maintained rural settlement land use patterns with clearly demarcated cadastral boundaries.

#### **Principles and guidelines developed**

- The designated areas should be accessible and located in all development zones.
- The site should be deliberately planned and implemented according to the development plan.
- Functionally the area should be geared towards enhancing relaxation of the body and the mind.
- Ensure fairness in use and accessibility.
- The area should be geared towards preservation and conservation.
- They should be clean, aesthetic and hygienic

Should serve as urban areas environmental windows breaking monotonous concrete jungles

### **9.3 RECREATION IN THE URBAN AREAS**

Recreational areas are mainly meant to fulfill the physiological needs of the community which also promotes various socio cultural aspects and strengthens individual health.

Recreational facilities include: major open spaces (parks and buffer zones), stadia, sports complexes, theatre, cinemas, restaurants, etc. These demand the market of a total urban population including local and foreign tourists. It is not possible to fix standards for open spaces at the urban level as these essentially develop from opportunities in the environment. However, specific recreational spaces are preferred to mere open spaces.

#### **(a) Major Parks**

Although each park will have its own special character as determined by its topography, historical associations and immediate surroundings, it should however be able to provide a wide range of recreational opportunities from among the following: -

- (i) Areas of visual relief screened from surroundings;
- (ii) Areas for setting in quietly with scented gardens, colour gardens, flower and shrub displays, small enclosures, etc;
- (iii) Areas for walking through such as quiet paths, shades avenues;
- (iv) areas for botanical collections and exhibitions;
- (v) areas for open air exhibitions of sculpture, paintings, photography, etc;
- (vi) areas of flat expanse which encourage ball games, running about and exercising in addition to providing space for displays, fairs, shows, etc;
- (vii) areas for organized sports such as cricket, tennis courts, etc;
- (viii) arena for open air display of traditional dancing, plays, concerts, shows, mass meeting, etc;
- (ix) developed artificial lakes and pools ornamentals, boating, fishing, collection of water plants and water fowls, etc; and
- (x) Children play groups.

#### **(b) Buffer Zones**

These include 10-30 meters green belts on either side of urban ring roads and bypasses and green belts created to prevent pollution between conflicting and non compatible land uses, for example between industrial and residential areas and between main roads and residential, industrial and commercial areas. These open spaces should be

landscaped with some of the recreational opportunities listed above and be provided with refuse disposal.

**(c) Major Sports Complex**

Large areas should be set aside for intensive sporting activities. The activities would include; yachting marina, athletic tracks, centers, indoor games, hard courts, swimming pools, golf and putting ranges- with spectator facilities, catering establishments etc. They should be well served by public transport.

**(d) Entertainment**

Facilities such as theatres, cinemas, restaurants, nightclubs will develop primarily in the central areas and subsidiary centers. These will probably increase proportionally as the urban area grows in scale.

**(e) Library – Art Galleries Museums**

Expenditure on these facilities will grow proportionally as the urban area grows in scale and can support a demand for them. Increase in education should increase the demand for these facilities and they should be closely incorporated into the curricular activities of education institutions.

**(f) Sports and Social Clubs**

These are primarily private clubs which provide facilities for various sports or games e.g. golf, tennis, squash, swimming etc., together with club houses for social and cultural exchange.

## **9.4 RECREATION IN ESTATES/COMMUNITY LEVEL**

**(a) Parks**

**i) Distribution**

There should be a small area of recreational space within walking distance of all areas with a residential density above 50 persons per hectare. It would probably be 1-2 hectares per 10,000 populations in areas above 50 persons per hectare.

### **ii) Location**

For this area to be used most effectively it should be closely related to the following facilities within the urban area:  
- community centres and social halls, health centre, local shops, primary and secondary schools. It may also be used as a landscaping buffer between major roads and the housing areas and between industrial areas and housing.

### **iii) Facilities**

Besides ornamental landscaping features the part should include 1-2 playing fields and children's equipped playgrounds. In some parks there may be hard courts, in others there may be adventure playgrounds or other special features.

#### **(c) Social Halls and Community Centres**

The demand for these facilities will probably be around 1 to 20,000 catchment.

Population catchment. Land needs approximately **0.25 hectares** to be located in positions along main pedestrian routes not isolated and away from main lines of pedestrian movement.

- (d) Play areas for small children and their mothers start immediately outside the indoor housing areas. There must be areas adjacent to each house that is safe for play and do not conflict with vehicular traffic.
- (e) Landscaping devices such as screen mounds, hollows, trees and bushes, low walls etc should be provided in children playgrounds.

#### **9.5 LOCATION REQUIREMENTS AND PLANNING GUIDELINES**

In planning for open spaces due considerations should be given to the patterns of roads designs, and also to their relation to land uses.

#### **SIZES OF SPORTS FACILITIES**

## **SOCcer (FOOTBALL) PITCH**

Length:	Maximum	120m
	Minimum	90m

Width:	Maximum	90m
	Minimum	45m

### **International Dimensions**

Length:	Maximum	110m
	Minimum	100m
Width:	Maximum	75m
	Minimum	64m

## **RUGBY PITCH**

Length:	Not exceeding 100m
Width:	Not exceeding 70m

## **ATHLETICS FIELD**

The regulation track measures 400m and has 6 to 8 lanes of a standard width of 1.22m. The tracks are on the outer sides of a football pitch.

## **NETBALL COURT**

Length:	30.5m
Width:	15.5m

## **VOLLEYBALL COURT**

Length: 18m

Width: 9m

## BADMINTON

The court measures 13.4m by 6.1m

## SQUASH COURT

This is an indoor game. The squash box measures 9.7m by 6.4m ground surface while the wall where the ball hits measures 64m by 4.5m high.

## SWIMMING POOLS

### LONG COURSE

Olympic Size-

Length 50.1 m

Width 21.1 by 8 Lanes (Optional)

Depth 1.8 m. (Minimum)

### 2. SHORT COURSE

Length 25.1

Depth 1.8m. (Minimum)

Width- Optional

## DIVING POOL

Depth – Shallow End 3.5m

Deep End 5.1m

NB. 1. Diving Tower to be above deep end

2. Elevation of Tower must not exceed 10m

3 Spring Board ceiling is 3m. but can be adjusted by 1m Swimming Pools must have adequate water circulation and treatment systems. They

also require on-stream heating system.

**BASKET BALL COURT.**

Length                  26m.

Width                  14m.

**BOARD:**

Length 1.8m,

Width 1.2m,

Height 2.74m

The orientation of the playfields should be such that players do not face the sun during games.

## **CHAPTER TEN: PUBLIC PURPOSE**

### **10.0 PUBLIC PURPOSES**

#### **HEALTH SERVICES**

**(a) Distribution:**

Health services are deployed by the central government through a network of provincial, district and sub-district hospitals. At local government/authority level we have health centres, sub-centres and dispensaries. Kenyatta National Hospital is the central referral and teaching centre, Moi University Eldoret is also a teaching and referral hospital.

Religious missions, industrial health units and private institutions and individuals also provide a variety of health services. However, these have tended to concentrate in a few urban centres with appropriate infrastructural base.

**(b) Location and Land Requirements**

The preferred location for health services should be easily accessible by an ambulance and be provided with basic

infrastructural services. Dependent on the level of health service, it is necessary to reserve adequate land for future expansion and for public cemeteries. The latter should be conveniently located relative to the health facility, major open spaces and other compatible public utilities. It is recommended that applications for health facilities should be accompanied with details of site requirements to facilitate reservation of adequate land. However a minimum of the land requirements derived from empirical observations are made as follows:

- National referral hospital            20 hectares
- Provincial hospital                8 hectares
- District hospital                 8 hectares
- Sub district hospital            4 hectares
- Health center                      3 hectares
- Sub-health centres                2 hectares
- Nursing Homes                    0.4 hectares
- Veterinary clinics                0.1 hectares

## **10.1 ADMINISTRATIVE AREAS**

These are areas/zones where public buildings/offices are sited for the purposes of administering public matters and rendering services to the general public. Other facilities provided within the administrative areas include: - banks, parking, maintenance depot, entertainment, postal services, baby care units, clinics and caretakers apartment.

### **(a) Classification**

The public buildings/offices may be broadly classified on the services they render. They may therefore be categorized as follows:

- Professional e.g. lawyers, engineers, architects, planners, etc.;
- Commercial – insurance, import/export firms, utility undertakers, manufacturing firms, etc.;
- Civic offices:- central government; local authorities, parastatals, trade unions, political party offices, etc.

### **(b) Locational Factors**

Generally administrative offices are considered as part of town centre activity. This is because of the need to interact closely with

members of the general public.

For the town centre based offices their location and siting need to satisfy the following basic factors:-

- Geographical centrality
- Spatial compactness
- Public parking
- Accessibility

## 10.2 LAW AND ORDER

These include: -

- Administrative Use
- Police stations
- Law courts
- Prisons

### (a) Administrative Centres

They include D.O.'s offices, Chief's camps. They are all district centre activities. Minimum land requirements for the various offices for use by the administration are:

- |                |              |
|----------------|--------------|
| • National     | 40 hectares  |
| • Provincial   | 20 hectares  |
| • District     | 20 hectares  |
| • Division     | 10 hectares  |
| • Location     | 1 hectares   |
| • Sub-Location | 0.2 hectares |
| • Town Halls   | 1.2 hectares |
| • County Halls | 1.2 hectares |

### (b) Police Stations

The location of police stations depends on their functional requirements. If their administrative function is dominant they may

locate in district centres but generally they should locate within residential neighborhoods. There may also be need to provide police stations within large commercial/industrial areas and large institutions. Space requirements should take into account residential, remand facilities, administrative facilities at different levels, parking and open spaces for recreation and for future expansion. Proposed space requirements for the various levels of stations are:

- |                   |               |
|-------------------|---------------|
| • Police stations | <b>2 ha.</b>  |
| • Police post     | <b>0.2 ha</b> |
| Patrol base       | <b>0.1 ha</b> |

### (c) Law Courts

These are town centre activities and their location depends on their level of service. Proposed minimum space requirements at various levels of court services are:

- |                              |                   |
|------------------------------|-------------------|
| • Higher court               | <b>2 hectares</b> |
| • Lower court                | <b>1 hectares</b> |
| • District Magistrates Court | <b>1.0 ha.</b>    |

### (c) Prisons/Remand Homes

Prisons are big land consumers and therefore not suited for location in urban areas. They should be located on the urban fringes particularly in areas where urban expansion would not be unnecessarily curtailed. A minimum of **16 hectares** should be reserved for this user. Juvenile homes are also considered and a minimum of **2.0 hectares** proposed.

## 10.3 COMMUNITY CENTRES

As the name denotes these are community facilities and therefore an integral part of residential neighborhood. They include social halls, libraries and cultural museums. The size and level of the activity depends on the catchment population. The dominant use is recreation although they accommodate a small element of administrative offices. The site for a community centre must be readily accessible to the whole area it has to serve, and should if in any way possible, be in close association with the sports centre and public swimming pool, if such exist. A minimum of **1.0 hectare** is proposed

## 10.4 RELIGIOUS INSTITUTIONS

They include churches, mosques, temples and shrines. Although they are essentially places of worship they also comprise premises for other socio-cultural facilities such as schools and dispensaries. Hence when planning for them provision must be given for their possible future expansion. Due to the increased use of the church compounds during weekdays as education or health facilities, it is important to locate them within the residential neighborhoods. Some exclusive churches need to be provided on the central business district fringes while a mosque and temple may be located within the central business district to cater for the business community. A minimum of **0.1 hectares** space provision is adequate

## 10.5 FIRE STATIONS

For high-risk areas - there is need for accessibility to major road network. Land required is **0.4 hectares** minimum to include station, staff accommodation and drilling area. A small fire station would require 1 fire engine and at least 30 staff members to cover a population of between 50,000 – 100,000 depending on degree of fire risk.

## 10.6 LIBRARY

The site for a library should be chosen to give the maximum of quiet but at the same time it should be conveniently situated in relation to the population it is to serve. Good light and ample surrounding air space are essential and consequently sites congested by surrounding buildings should be avoided if possible. **0.4 hectares** should be provided for this facility.

## 10.7 POST OFFICE

Full postal facilities should be provided in any designated rural centre or estate, which serves a resident population of about 2,000 – 10,000 and rural population of 40,000 people. While a market centre that is designed to serve approximately 15,000 rural people and a resident population of less than 2,000 people should have a sub-post – office. **0.04 hectares** are adequate for a post office.

*Table 25.0 Guidelines for the Location of Infrastructural Facilities At Various Levels of Centers*

GUIDELINES FOR THE LOCATION OF INFRASTRUCTURAL FACILITIES AT VARIOUS LEVELS OF CENTRES						
Level of Centers	Administrative Services	Civic Services	Communication Services	Educational Services	Health Services	Recreational and other Social Services

**GUIDELINES FOR THE LOCATION OF INFRASTRUCTURAL FACILITIES AT VARIOUS LEVELS OF CENTRES**

National capital	Government Ministries High Court National Police Headquarter	Fire Station	International Airport International Bus Services -General post office -Telephone exchange	University Teacher training College (secondary level) Technical college	Hospital (national standard)	- Stadia with Olympic facilities - Parks - Museum, etc
Principal Town Municipalities	Provincial Administration Resident Magistrates Court	Fire Station	Served by International/National trunk road Head post office facilities Telephone(automatic exchange ) Regional bus services Airfield	Teacher training college (Primary level ) Technical School (secondary level)	Hospital (Provincial Standard)	Museum / art center
Other Urban Centres	District Administration District Court Divisional Police Headquarter		Served by National trunk primary road Airstrip	Secondary school Technical school (primary level)	Hospital (district standard)	Stadium Public Library Recreational Park Cinema Show ground

## GUIDELINES FOR THE LOCATION OF INFRASTRUCTURAL FACILITIES AT VARIOUS LEVELS OF CENTRES

Rural Centres	Divisional Administration Police Station	Sewerage Disposal Grid Water Supply Electricity	Served by primary /secondary road Departmental post office	Secondary school Youth Polytechnic	Health Centre (Maternity unit)	Mobile Library Service Sports Field Social Hall Mobile Cinema
Market and Local Centres	Locational and Sub-locational Administration Police Post	Public Water Supply	Served by secondary/minor road telephone (manual exchange) sub post office  Airstrip (only remote areas )  Local bus services	Secondary School Primary School Nursery School	Dispensary Family Planning Service	- Playgrounds
<p>Notes: 1. Private sector facilities, e.g. commercial and industrial undertakings, will be located in service centres according to the economic development potential.</p> <p>2. To the services listed against each level of centre should be added those services listed against the centres of lower levels e.g. in most cases a rural centre will also have all services existing in market and local centres.</p>						

## CHAPTER ELEVEN: COMMERCIAL LAND USE

### 11.0 Town Centre

The town centre offers commercial and other related services that are used by the population of the town or urban area as a whole including the inhabitants of its hinterland. The most important requirements for a town centre are geographical centrality, accessibility to vehicles and pedestrians, ample parking space and have four different degrees of completeness in separating pedestrians from vehicles in a town centre:-

- (a) remove through traffic by constructing a by-pass or relief road;
- (b) interrupt continuity of streets within the centre by bollards or other means;
- (c) remove vehicles from street and provide vehicular access and parking at rear of buildings;
- (d) Provide vertical separation of vehicles and pedestrians by constructing roads and pedestrians ways at different levels.

It is desirable that an area with heavier traffic volume should be converted into pedestrian area. However, numerous varieties of compromises are possible. It may, for example, be practicable to convert the shopping area itself into a pedestrian precinct. The provision of sufficient parking space within town centres is one of the most difficult planning problems. For large towns where a majority of the population own vehicles it is almost impossible to provide a central area parking at one level due to amount of space required that might be in excess of space occupied by commercial buildings. The alternative here is to encourage storeyed parking buildings. However the minimum plot size should be **0.045 hectares**. Plot length versus the width should not be more than 1:3

### 11.1 Local Centres

Local centres are designated to serve a catchment population of 3500 – 5000. The type and number of services required for high income and low-income suburban or rural areas include the following:

#### (i) Adjacent\_and Interdependent Activities

These include:-

- Market category B or C or D

- Charcoal dump
- Primary school at 3500 catchment
- A pedestrian shopper in the area should be provided with a market arrangement at 3500 population – 5000 include:-
- 2– 3 general shops
- – 2 draper/clothes/tailors shops
- 1 butchery
- 1 bar
- Telephone booths

For a catchment population of 15,000 provide the following additional facilities:

- Draper/clothes shop.
- General shop/store.

### **(ii) Parking Area**

Allow 10-12- parking spaces for 3500-5000-catchment population and approximately 45-46- spaces for 15,000 catchment in low-income suburban areas.

### **(iii) Adjacent and Interdependent Activities**

These include:-

- Charcoal dump
- Market category A, B, or C.
- Kiosks
- Primary school
- Health centre with family planning service (15,000 catchment)
- Youth polytechnic centres (15,000 catchment ).
- Secondary school (15,000 catchment ).

For rural areas, we note that a 5,000 catchment population is analogous to designated local centre and 15,000 catchment population to a designated market centre. Accordingly the above facilities should be provided in designated local and market centres in rural areas.

## **11.2 Intermediate Centre**

An Intermediate Centre is designated to serve a population of 15,000-50,000 people. It is analogous to designated rural centres in rural areas.

### **(i) Type of Shops**

Approximately 20-30 shops and include:-

- 4-5 general shops
- 2-3 butchers
- 1-2 fruit /vegetable/flower shops (suburban areas)
- drapers/tailors shops
- 1-2 stationery /book/toy/ news agents
- 1-2 bakeries/cafes
- 1-2 bars
- Banks (suburban areas)
- Petrol stations with separate access (suburban areas)
- 3-4 telephone booths
- 1-2 hairdresser/barber shops
- Commercial offices – either above shops or in separate buildings (suburban areas)

### **(ii) Adjacent and Intermediate Activities**

These include:-

- Market categories A B C and D with workshops
- Charcoal dump
- Industrial estate

- Secondary school
- Health centre
- Social hall and community centre

### **11.3 Major Centre**

These centres are designed to serve a catchment population of 100,000-150,000. They are analogous to designated urban centres in rural areas and offer a full range of services usually associated with a town. As a guide to assessing land requirements, the following services and facilities might be required:-

- 50-60 shops of general convenience goods
- 4-5 major supermarkets or departmental stores dealing in specialist and luxury goods.
- 4-5 banks
- Cinema halls
- Offices
- A library
- Fire station
- Assembly hall
- Police station
- Sports and recreation centre
- 1-2 restaurants/hotels
- Small cafes and bars near bus station
- Bus station
- Hospital

### **11.4 Market Categories**

#### **(a) Category A**

Fenced area of land with central refuse collection point. Requires **0.1 – 0.2 hectare** per 2000 low-income population in suburban areas.

#### **(b) Category B**

Fenced area of land with central refuse disposal point, central water point and water point and water closet. Requires **0.2-0.25 hectares**.

**(c) Category C**

Walled area of land. Grouped refuse collection points, hardstanding plots, central water points and water closets. Hardstanding surface, fixed stalls and divisions. Requires **0.2-0.28 hectare**

**(d) Category D:**

Walled area of land. Grouped refuse collection points, grouped water points and water closets. Hardstanding surface, fixed stalls and divisions.

Requires **0.2-0.28 hectare**

**(e) Category E:**

Covered market. **0.25-0.3 hectare**.

### **Car Parking**

Parking facilities should be related to the level of commercial activities created. For every 100m<sup>2</sup> of land in the central Business District a minimum of 1½ parking space may be provided except where basement parking is provided. However, for small centers, car park may be provided for every 500m<sup>2</sup>.

### **11.5 Kiosks**

Planning for kiosks and hawking needs to be considered as a special feature in planning. They should, preferably, be confined to markets and bus stops. Recommended minimum size of a kiosk to be 3m by 3m. Locational factors determining their siting include:

- o accessibility
- o Market demand
- o Foot loose character of hawking

## **11.6 Corner Shops**

The main purpose in the establishment of corner shops is to supplement existing shopping facilities in a given estate. The concept of corner shops at each corner plot should thus be discouraged.

### **Location**

It should be within a plot that is in a strategic corner within an estate. Corner shops should be distributed within an estate in such a way that they do not compete with the planned/existing shopping centre. A radius of a 100m. from one corner shop to another serving approximately 50 houses, is recommended. They should not be located along the major roads and/or at the junction of major/distributor roads. They should only be located on secondary and minor roads. Appropriate occasional parking should be provided.

### **Size of Corner Shops**

The corner shop may be integrated to the main house which would be the primary user, but could also be planned separately so long as the design respects the residential character of the area. Where a corner shop is integrated to the main house, the activities of the corner shop should not exceed 20% of the main use.

Corner shops should be restricted to take away retail business. No change of user should be allowed. There should be no sale of liquor or meat roasting.

## **11.7 Commercial developments along major highways**

Building lines should be observed. Where roads range between 6-18 meters wide the building line shall be 6 m. For any roads above 18m the building line shall be **18m**. There shall be no direct access. Acceleration and deceleration lanes should be provided at a 100m stretch.

Beautification of the main highway- green area network- should be encouraged along the shopping malls and complexes which need to be located along major outlet corridors from the town. Minimum plot size to be 4 acres (2 ha); 25% plot coverage and a

minimum parking space of one and half meters car park space per every 100 sq meters plinth. The users are multi purpose and geared towards self sufficiency ( one-stop-shop).

## CHAPTER TWELVE: PUBLIC UTILITIES

### 12. 0 PUBLIC UTILITIES

Public utilities are those essential services or facilities that support human life. They include water, sewerage, garbage collection, Electricity/power, Telephone, Cattle dips. Other emerging utilities include Tree Nurseries and Agricultural produce collection centers e.g. Tea and Milk outlets.

#### 12.1 WATER SUPPLY

##### (a) Protection of Water Intakes

A protection belt (Buffer) should be provided for underground water intakes comprising both direct and indirect protection. In areas of direct protection, a belt of **10m** wide should be provided surrounding the well or group of wells and which should be fenced.

General traffic should be avoided if the distance between the wells does not exceed **50m**.

Indirect protection consists of a protection belt of a minimum **50m** wide surrounding the water intake area without any need for fencing and including along rivers. This belt will be widened proportionally according to the varying circumstances relevant to ground water source. And since this type of protection requires vast areas of land, it is possible to utilize the protection belt for agricultural irrigation. Provided, however, that this utilization is not used for the establishment of gardens, playgrounds or forests or in any other way which result in the pollution of water sources like septic tank, disposal grounds of animal stable.

Industrial standards should be applied for the protection of residential areas from pollution that may result from the desalination plants. The distance between these plants and the residential areas should not be less than **100m** in order to avoid the noise resulting from the pumps. Nearly all-public water supplies are protected against bacteriological contamination by chlorinating or other processes. Water treatment plants utilizing chlorination should be at least **300m** away from residential areas. Bore holes should be located 800m apart to avoid drawdown. Pit latrines should not be constructed where the water table is high to avoid contamination

*Table 26.0 Protection Reserves*

<b>Protection belt</b>	<b>Direct (Radius) Protection</b>	<b>Indirect (Radius) Protection</b>
Borehole	10m	50m
Well	10m	50m
River	10 – 50 m	50m

### **Commercial water points**

These should be provided for informal settlements. They should be at a distance of 500m from one another. They should preferably occupy an area of 3 x 3 m.

### **(b) Service Reservoirs:**

The provision of service reservoirs and where necessary, elevated storage tanks are recommended for all water supply utilities. In particular, hospitals, institutions and industrial plants should be provided with separate elevated storage tanks. Minimum space

requirements are **0.1 hectare**

### (c) Distribution

The distribution system, which carries the water from the reservoirs or pumping stations to users, should consist of a network of underground pipes following generally the street network. Since water is under pressure, water lines can be laid up hill and down, following topography as desired. Water lines should be laid at a depth sufficient to protect against frost damage. The minimum size of pipes is usually set by fire protection requirements. **Minimum pipe depth should be 0.5 m.**

## 12.2 SEWAGE SYSTEM

### (a) Collection and Treatment works

It is recommended that sewage collection and sewage treatment plants be considered for all settlements with a population of 3,000 or more having an urban layout. In settlements where an integrated sewage scheme is not provided provision should be made for septic tanks. Care must be taken to ensure that sewage effluent does not infiltrate ground water aquifers in a manner causing pollution of water sources. The treatment plant should be sited as far as is practicable from the boundaries of the master plan area, down wind of the prevailing wind direction. A surrounding tree belt is desirable both as protection against blows and for environmental purpose. The land requirement for **Buffer zones** for seweried areas is **75 square meters** whereas for unsewered areas are **110 square meters**.

### (b) Storm Water Drainage

Storm sewers are used to collect and carry rain or surface water to some natural water course or body of water in such way as to prevent flooding.

A storm water drainage system should be provided in built up areas where annual rainfall exceeds **200mm**. A minimum of **2 metres** should be provided for this facility. However, in smaller districts and others of dispersed housing, no storm system needs to be provided. Provision of surface drainage in low-lying areas alongside roads and concreted areas will suffice for the flow and drainage of storm water therein.

The table below gives some provisions for Way leaves for the facilities listed above.

*Table 27.0 Storm Drainage Way leave*

Facility	Preferred Wayleave
----------	--------------------

<b>Drainage Wayleaves</b>	<b>3m – 4.5m</b>
<b>Anti Malaria Wayleaves</b>	<b>4m</b>
<b>Building Clearance</b>	<b>1.5m, 2.5m, and 7.5m</b>
<b>Septic Tank Clearance</b>	<b>6m.</b>
<b>Sewerline</b>	<b>3m</b>

### **12.3. GARBAGE COLLECTION AND DISPOSAL**

Garbage collection sites must be environmentally friendly. They should be located on the leeward side and have a **100m-protection belt**.

Garbage disposal systems are of three kinds namely: -

Collect and bury (landfills)

- Recycle, reuse, reduce, repair (4R concept)
- Incineration (burning), collect., sort and transport and dump (garbage manufacture): this require a dumping site

The following table shows the information relevant to the disposal system:-

*Table 28.0 Disposal Systems*

<b>Disposal</b>	<b>No of inhabitants</b>	<b>Location</b>	<b>Protection Area</b>
Garbage collection and burial	50000 in one settlement or more within a radius of 25km	Outside residential settlement	No less than 1km for urban Areas
Incineration of Hospitals and slaughter houses, garbage disposal	Same as above	Outside settlement in Industrial zones	Industrial standards adopted
Collection	100000 or more	Same as above	Same as above

It is proposed that garbage collection points be provided with **0.1 hectare** while dumping sites are provided with **2 hectares**

## TOILETS

Public toilets should be provided at convenient sites in all types of centres.

Toilets should be provided on every street in all types of centers. In slums/informal settlements, 1 toilet/bathroom block is required for every 100m.

## 12.4 ELECTRICITY POWER LINES

The table below specifies recommended power line way leave trace

*Table 29.0 Electricity Way Leave*

Capacity Of Power Line	Way Leave
11 KV	10m
33 KV	20m
40 KV	20m
66 KV	30m
132 KV single circuit towers	50m
132 KV double circuit towers	60m

In all cases, the distance between the power line and the ground below must not be less than six (6) meters. Furthermore, high-tension lines must not be passed over buildings constructed in the path of such lines. Environmental Impact Assessment guidelines must be sought when locating power stations and high voltage power cables.

## **12.5 TELEPHONE**

Telephone lines and cables in most cases utilize the road reserve space, except for lines branching off from the road that a way leave has got to be provided. Telephone booths should be provided conveniently according to the population to be served.

In cases where utility networks are laid outside roads or public pathways and in cases where there are natural or man-made channels passing along public roads and pathways, a path should be specified for such utilities in order to protect it against damage, loss etc. Such paths should be clearly marked on maps and visible on site and no permanent or temporary establishment may lead on the same or storage of goods thereon. Plantation of trees with deep running roots capable of causing damage to the networks for channels should also be avoided.

The nature of activities involved in the transmission of information via both the telephone exchange and boosters demands that an environmental impact assessment report be done. It is recommended that location of the telephone exchange and the boosters be done in accordance with the requirements of the Communications Commission of Kenya and the National Radiation Board to ensure the safety of man and the environment. Minimum space of **0.4 hectares** and **0.25 acres** may be provided for the telephone exchange and booster respectively. NB. Satellite earth stations should have at least 5 acres.

### **Communication Masts (Radio, Telephone)**

A buffer of 60 metre radius to be reserved or as may be prescribed by the accredited authority (Communication commission of Kenya, National Environmental Management Authority-NEMA and Radiation Protection Board) from time to time

## **CHAPTER THIRTEEN: TRANSPORTATION**

### **13.0 TRANSPORTATION**

Transportation is the process of moving goods and services from one point to another using various modes and means.

#### **Modes of transportation**

These include:

1. Road,
2. Air,
3. Water
4. Railway

## **13.1 ROADS**

Roads can be classified as rural and urban.

### **13.1.1 RURAL ROAD NETWORKS**

#### **(a) International Trunk Roads (Class A)**

These are roads linking centres of international boundaries or terminating at international ports. They are provided with a road reserve of **60 metres**. The road reserves are provided to accommodate future road connections or changes in alignment, road carriage width or junction layouts. The minimum road of 40 meters should be adopted only when it is necessary for economic, financial or environmental resources in order to preserve valuable land resources or existing development or when provision of the desirable width would incur unreasonable high costs because of physical constraints. For dual carriage roads, it may be necessary to increase the road reserve width above recommended values.

#### **(b) National Trunk Roads (Class B)**

These are roads linking national important centres, such as municipalities and/or district headquarters. Since in most cases national trunk roads also constitute international trunk roads, similar road reserves as in (a) above are applicable.

#### **(c) Primary Roads (Class C)**

These roads connect or regional/provincial centres to each other or to higher classes roads. For regional development planning purposes it is recommended that all designated urban centres should progressively be linked by means of primary roads as a minimum. They are provided with a road reserve of 40 meters.

#### **(d) Secondary Roads (Class D)**

These roads link important local centres to each other or to higher classes roads. In this regard, it recommended that all

designated rural centres should progressively be lined by means of secondary roads as a minimum. They provided with a road reserve width of **25 – 30 meters**.

(e) **Minor Roads (Class E)**

These are roads linking local and market centres to higher classes roads. They range between 3 to 5 kilometers and are provided with a road reserve width of **20 – 25 meters**.

It is necessary to increase road reserve widths for sections of the above classified roads passing in urban centres. This is in order to allow for parking, segregation of traffic or for controlled accessibility to properties.

### 13.1.2 URBAN ROAD NETWORKS

(a) **Primary Distributors**

These are sometimes referred to as arterial, major or urban freeway roads. They form the primary road network for an urban area as whole. All external through traffic movement to, from and within the urban area are channeled to the primary distributors, which are intended for free flow of traffic.

(b) **District Distributors**

These are also referred to as collector or minor roads. They distribute traffic within residential, industrial and central business districts of the urban area. They form the link between primary network and various neighborhoods and localities.

(c) **Local Distributors or Feeder Roads**

These roads distribute traffic within neighborhoods and localities. They form a link between district distributors and access roads.

(d) **Access Roads**

These roads give direct access to buildings and land within neighborhoods and localities. They include:

(e) **Cul-de-Sac or Dead-end Streets:** meant to eliminate through traffic in a cluster of houses. Therefore, to retain their inherent advantage they should be short, normally up to a maximum of 60 meters.

- i) **Loop Street or Crescent:** a variation of the cul-de-sac but eliminates the necessity of dead-end and therefore provide continuous circulation in the residential cluster and ensure easy accessibility to properties without road frontage.
- ii) **Service Lane:** this is a road parallel to main access road to buildings provided for parked loading or off-loading of goods. Service lanes should be separated/screened from the main roads using buffer zones.

### **13.1.3 URBAN ROAD RESERVES**

Urban road reserves require more generous space provision because of additional street furniture and infrastructural facilities that have to be provided. In most instances, the road has to accommodate multiple functions that have to be independently provided in design. Way-leaves for trunk services such as water and sewerage, underground telephone cables and high voltage power lines, when provided along road reserves require additional provision.

Further, the role of the informal sector in job creation in urban areas has now been recognized. Most of the informal activities are footloose and heavily dependent on passing trade. They therefore require specific provision when located within road reserves.

Because of the above reasons, the following urban road reserve widths have been recommended:

#### **Primary Distributors**

- Major communication routes 60m.
- Important through – routes 30-36m.

#### **District Distributors**

- |  |      |
|--|------|
| Spine roads and roads in commercial or industrial area | 25m  |
| Bus routes   | 25m. |

#### **Local distributor roads**

- With no direct vehicular access to Individual plots. 18m

#### **Local Distributors**

- Major access road exceeding 150m in length 15m.
  - Access road not exceeding 150m in length (normal Residential Street) 12m

## Access Roads

- Cul-de-sacs or short connecting road not exceeding 60m 6m- 9m
  - Service lanes 6m
  - Cyclist lanes 3m
  - Footpaths 2m.

#### **13.1.4 DISPLAY OF ADVERTISEMENTS**

These refer especially to billboards. Though used by producers and industrialists to highlight certain qualities and properties intended to attract the attention of potential customers; they are also responsible for obstructing motorists view, cause of road accidents and generally pollute the environment. Because of these reasons and further to Rule 26 (1) of the Legal Notice no. 135 of 1998, Regulations to Physical Planning Act (Cap 286); it is required that:

- Advertisements should not be displayed within **30m** of the carriageway
  - They should not be displayed within **30m** of junctions and roundabouts
  - They should be buttressed from the road sides to avoid incidences of falling on the carriageway
  - They should not be less than **2m** from the ground and not more than **6m** from the ground
  - Bill boards should have a maximum area of 6.0 square meters

### **13.2 CARRIAGEWAY AND PARKING STANDARDS**

### (a) Carriageway Widths

The following are the recommended carriageway widths:

• Trunk and Major Roads	<b>7.5m or more</b>
• Commercial and Industrial streets	<b>7.0m or more</b>
• Spine Roads and Bus Routes	<b>7.0m</b>
• Access Roads (in residential areas)	<b>5.5m</b>
• Cul-de-Sac (not exceeding 60m)	<b>5.0m</b>

The standard provision for footpaths shall be **2m wide footway** on each side of the carriageway, subject to the following relaxations:

- For Cul-de-sac serving less than 10 plots a single footway will suffice.
- Occasional obstructions shall nowhere reduce the footway width below **1.2m**.

Pedestrians shall be physically separated from moving vehicles by a barrier such as an upstand kerb, open drain or wide verge.

### (b) Car Parking Space

Public parking spaces should be provided in urban areas within residential areas, industrial zones, commercial zones and social facilities, recreation and sports areas. In the central commercial and business zones, multi-storey car parking should be considered as a long-term prospect. In residential areas, where on-street parking is not practicable, public car parks should be provided.

The maximum distance between a dwelling and its associated parking area should be 50m. A standard of 15-35 square meters parking space per car is recommended. The dimensions recommended are:

#### (a) Flush Parking

- 5.0-6.5m by 2.5m for cars
- 10.0m by 3.3m for buses
- 30.0m by 4.0m for trailers and trucks.

**(b) Angle Parking**

5.0-6.5m by 2.5m for cars

10.0m by 3.3m for buses

40.0m by 2.5m for trailers and trucks at an angle of 30 degrees.

Angle parking has an advantage of concentrating more vehicles within a given location but demand wider road reserves than flush parking.

The following are recommended standards for car parking requirements:-

*Table 30.0 Standards for Car Parking Requirements*

<b>Usage</b>	<b>One Car space for every usage</b>
Housing	2 houses or lodgings
Specialized market place	50 to 60sq. m of covered area
Market	30 to 50 sq. of covered area
Office and Administration	50 to 60 sq. m of covered area
Hotel	5 to 8 beds
School	(a) 0.5 classroom/secondary school and above (b) 1.0 classroom/ below secondary school level
Restaurant, Cinema and Theatre	12 seats
Mosque / churches	10 to 12 worshipers
Hospital	5 to 10 beds
Sports field	10 to 20 seats or spectators
Industrial establishment and workshops	6 to 10 workers

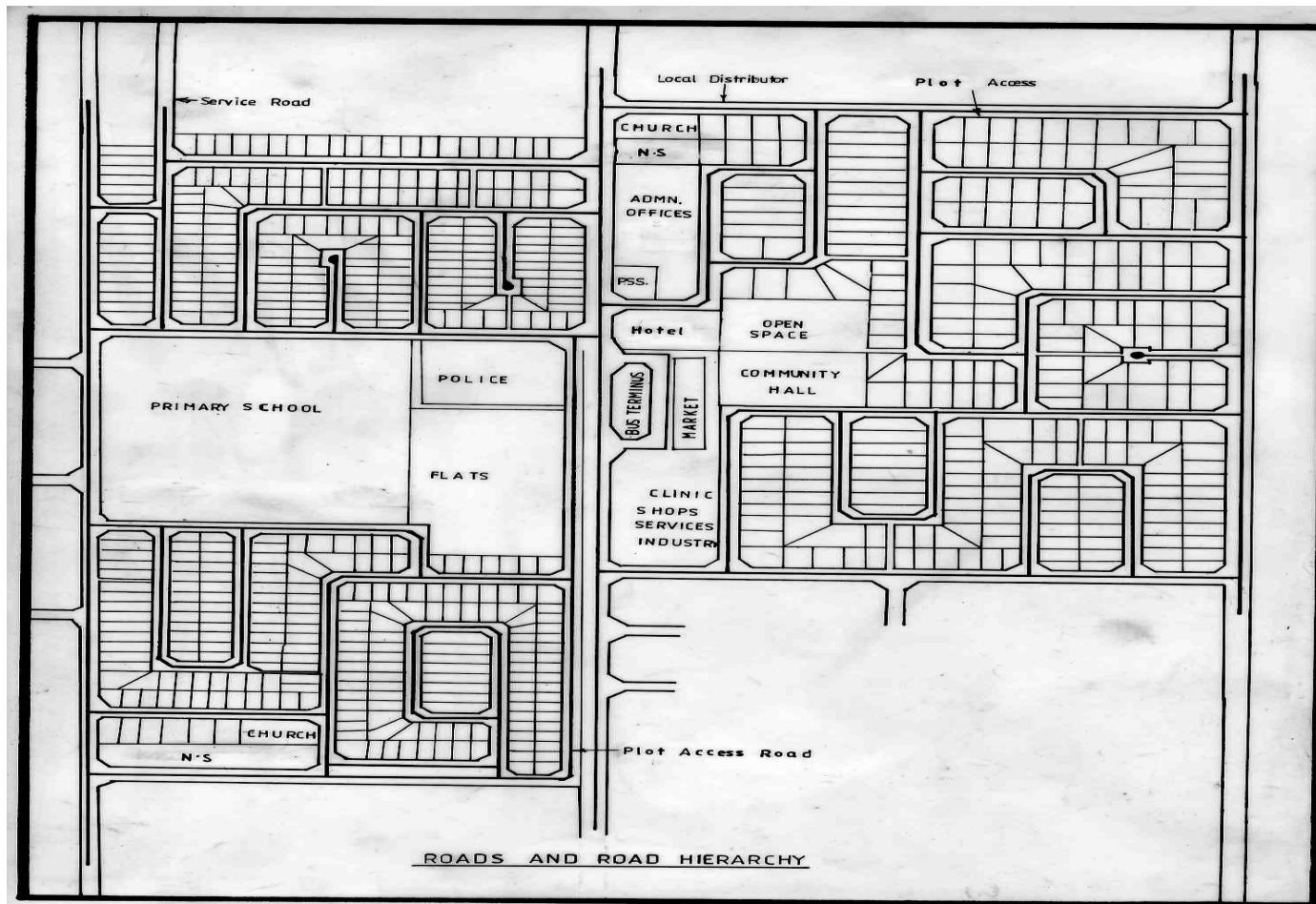


Figure 9.0: Roads and Road Hierarchy

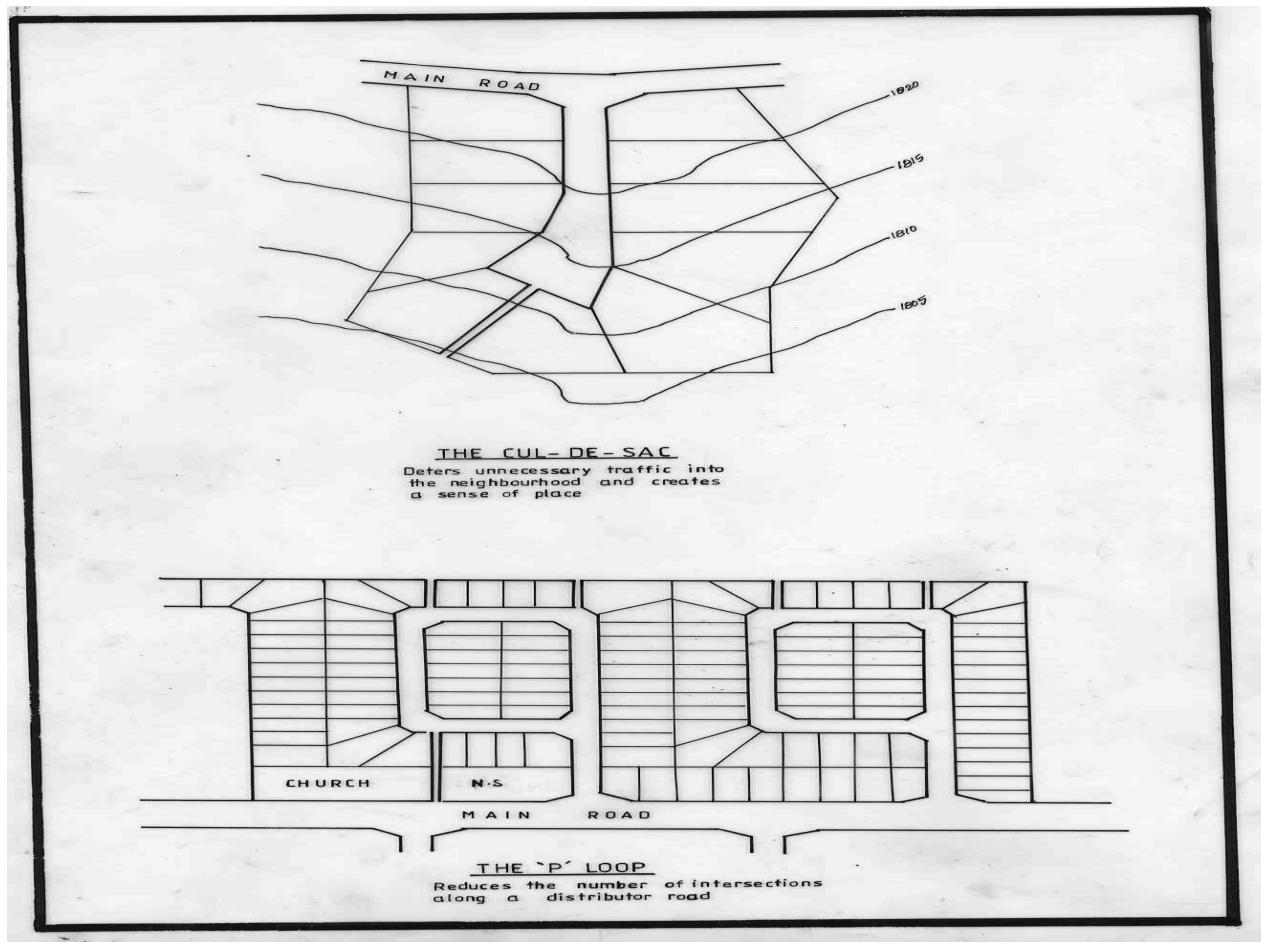


Figure 10.0: Neighbourhood designs

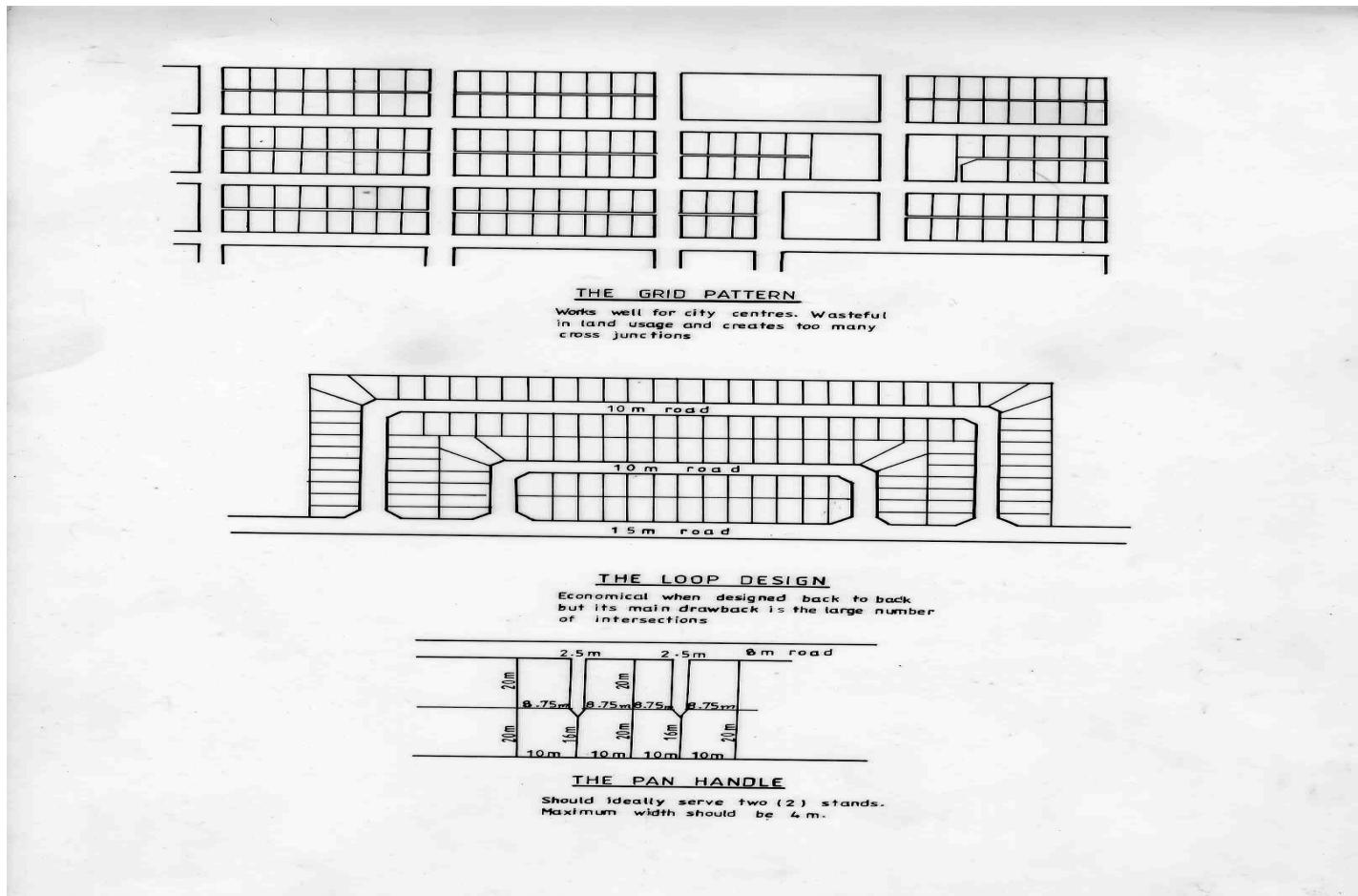


Figure 11.0: Alternative designs

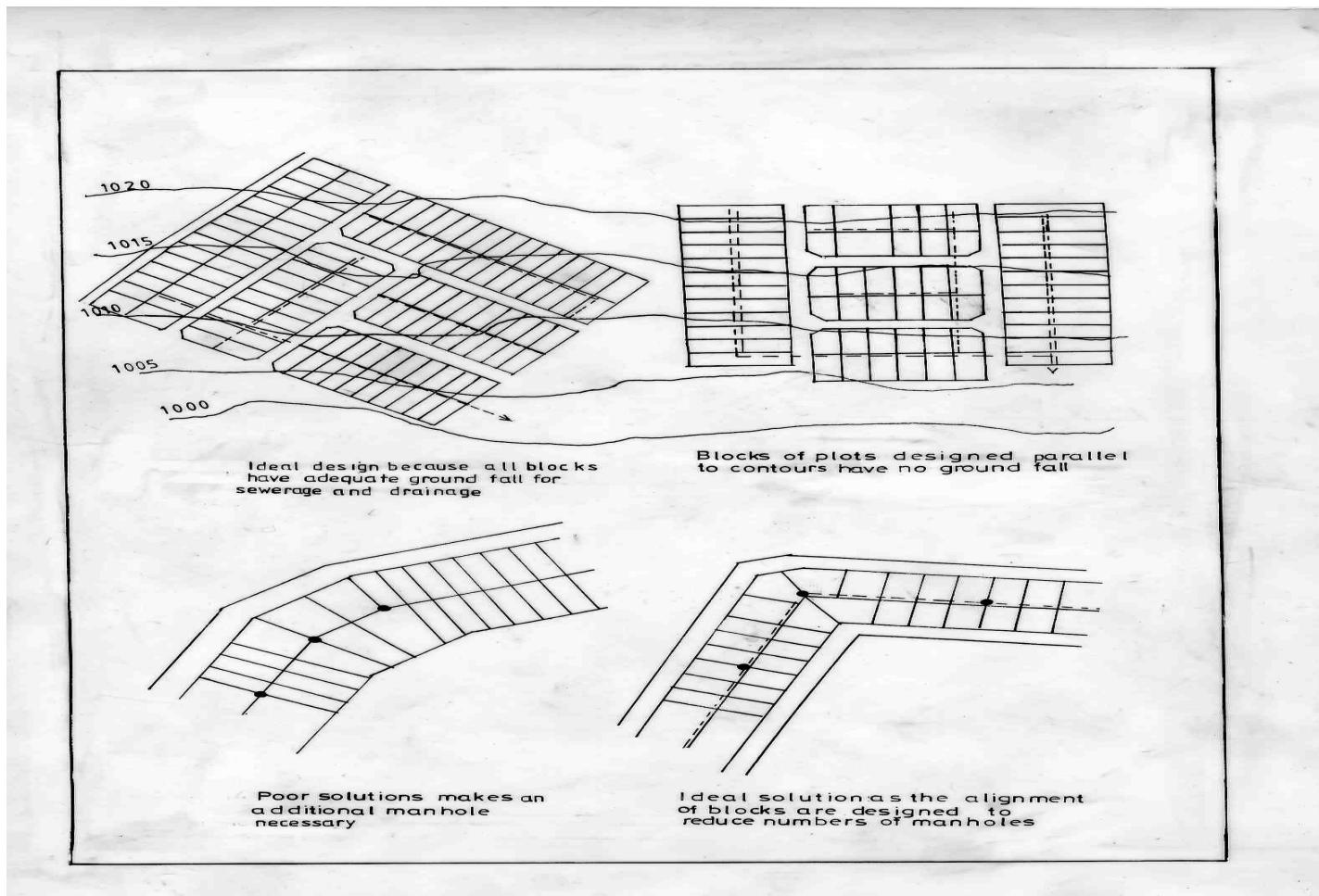


Figure 12.0: Contour-aided design

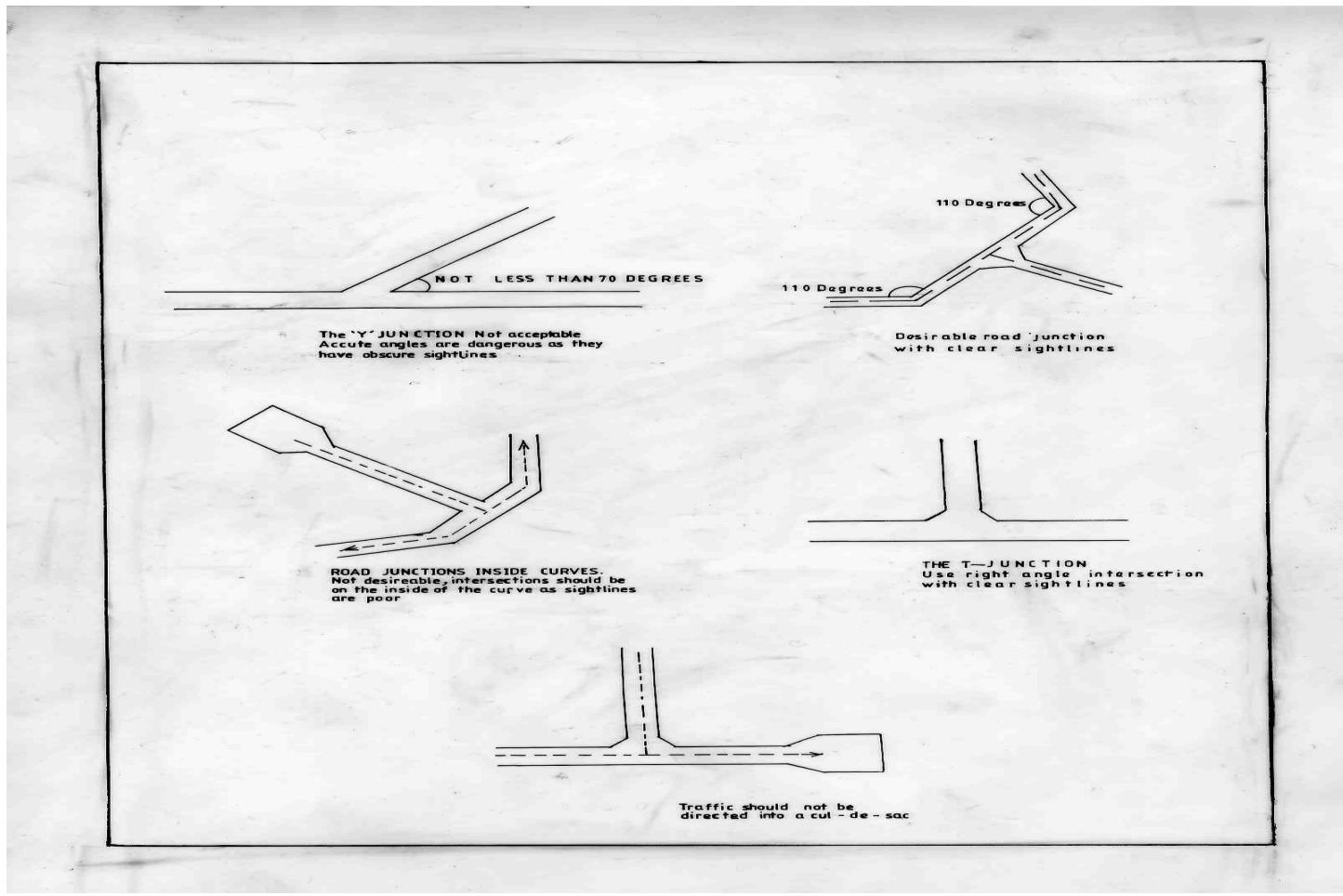


Figure 13.0: Various road junctions

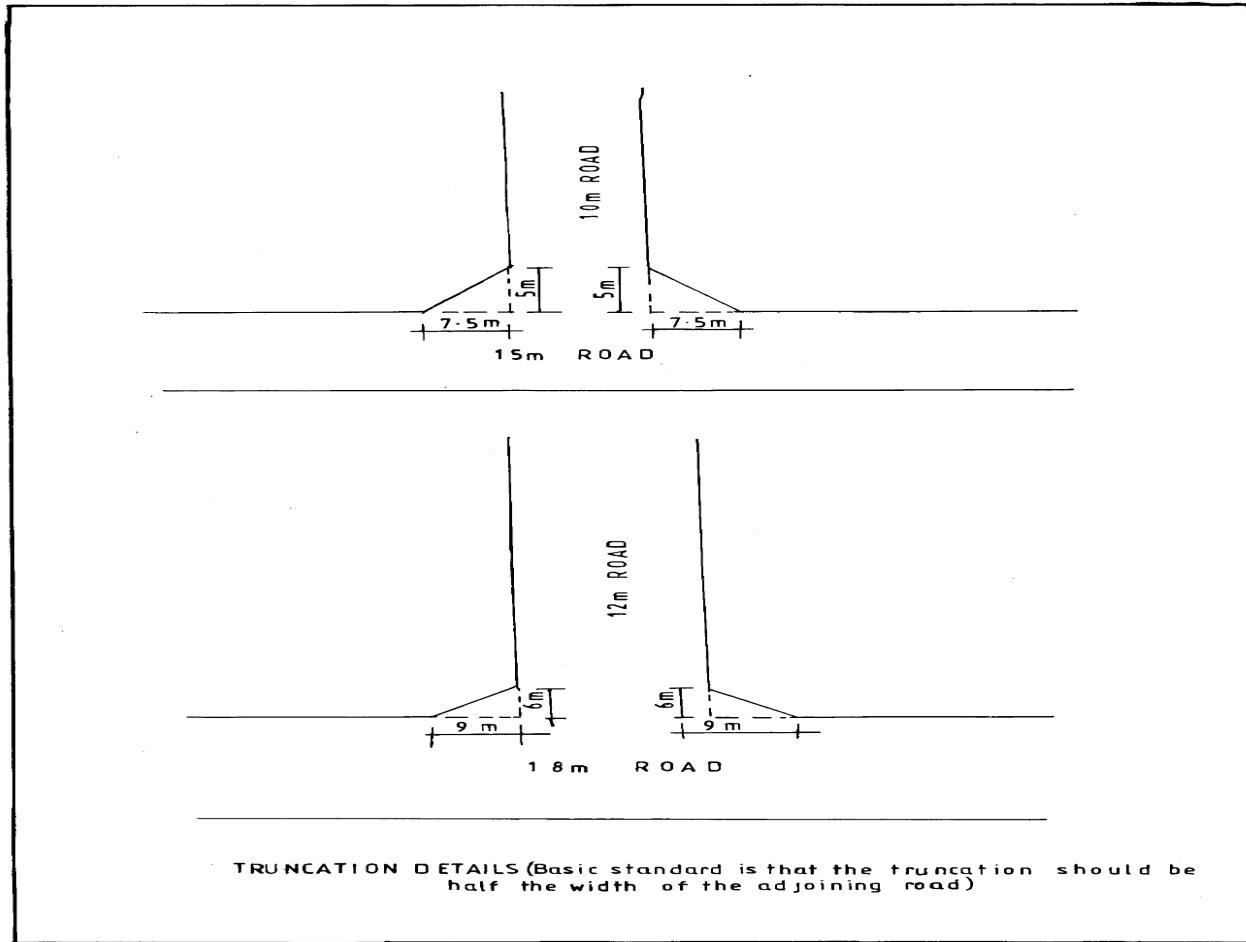


Figure 14.0: Truncations

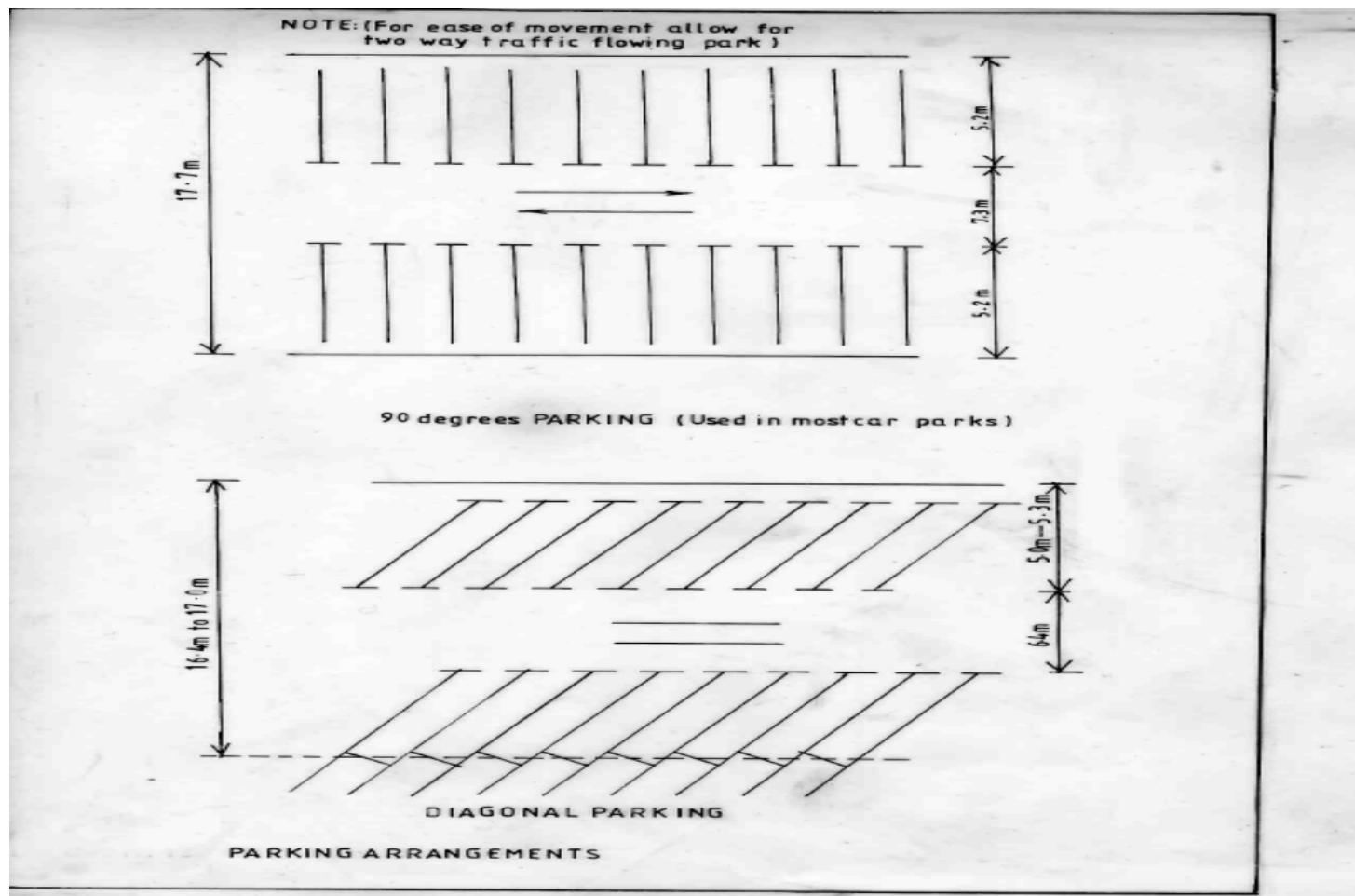


Figure 15.0: Parking arrangements

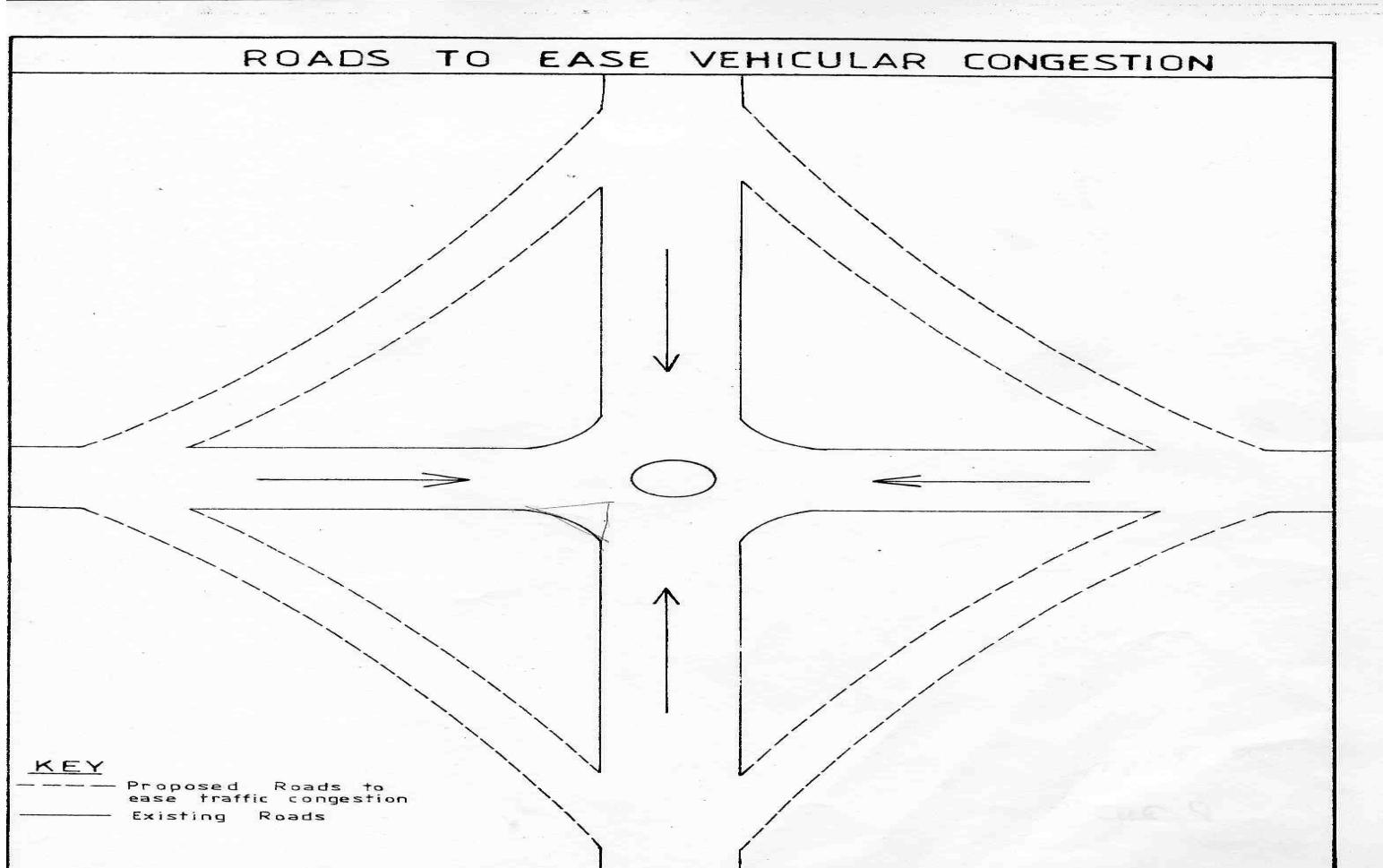


Figure 16.0: Easing Vehicular congestion

### 13.3 AIRPORT PLANNING

The compatibility of an airport with its environs is made possible by proper planning of the airport, control of pollution generating sources and land use planning of the area surrounding the airport. The aim is to provide the best possible conditions for the needs

of the airport, community in the surrounding area and the ecology of the environment.

Airport planning must be recognized as an integral part of an area wide comprehensive planning programme. The location, size and configuration of the airport need to be coordinated with patterns of residential, industrial, commercial, agricultural and other land uses of the area, taking into account the effects of the airport on the people, flora, fauna, the atmosphere, water courses and other facets of the environment.

### **13.3.1 Need for Land Use Planning**

There is need to control land in the vicinity of the airports in order to ensure that possible height hazards or obstructions to flight into or out of airports are minimized. Experiences on non-conforming purposes or land uses have indicated the need for control. Experiences such as:

- Uses which may cause electrical interference with radio communications and navigational aids
- Lights which might confuse pilots in the clear interpretation of aeronautical lights and
- Smoke which reduces visibility.

Land use planning in the vicinity of the airport provides for:

- Airport needs, for example, obstacle limitation areas future airport development
- Ensures minimal interference to the environment and the public, for example by locating residential areas away from zones subject to excessive noise or other pollution, by preserving parklands, etc.

### **13.3.2 Considerations in Airport Planning**

- A number of considerations need to be taken when planning for airports. They are **Atmospheric pollution:** Emissions from aircraft and ground vehicle engines, incinerators, terminal buildings and other sources contribute to the air pollution in the vicinity of airports.

- **Flora and Fauna:** Utilization of land for airport purposes inevitably creates disturbances to flora and fauna. Airport development works frequently entails clearing and cutting back of trees and other vegetation; changes to the topography of the land and interference with watershed patterns. The airports may destroy the natural habitat and feeding grounds of wildlife and may eradicate or deplete certain flora important to the ecological balance of the area. Another important consideration is the prevalence and habits of birds in the area and the associated risk of aircraft bird strikes. Bird hazards at proposed new airports can be minimized by careful selection of the site to avoid established bird migration routes and areas naturally attractive to bird and by using the land surrounding the airport for purposes that will not attract concentrations of birds to the area.
- **Soil Erosion:** As a consequence of vegetation clearing and interference with watershed pattern, land on an airport, or within its vicinity, may be vulnerable to soil erosion by the natural elements and to a limited degree by aircraft jet blast. This can mostly be prevented by replanting. In arid areas it may be necessary to take artificial erosion protection measures such as facing of escarpments, paving of taxiway flanks and lining of drains.
- **Streams, lakes and the sea:** Contaminants may enter streams or waterways from airport drainage systems and eventually run into lakes or the sea. These contaminants originate from ground vehicles and airport washing, terminal services, aircraft servicing, pavement cleaning and airport maintenance and construction work. Particular consideration should be given to possible water pollution during construction phase. Activities such as clearing of vegetation causes an increase in the amount of soil carried into streams. Pest control which involves the use of sprays introduces long life toxic chemicals into the water. Fuel spillage from equipment and chemicals employed in building and pavement construction work can also contribute to upset the hydrological balance of waterways in the area. Changes to the natural drainage patterns of an area may occur due to construction of an airport. This may in turn overtax certain streams and give rise to flooding. In other cases due to diversion of

flow, streams may be dried up.

- **Noise:** The intensity and nature of aircraft engine noise is quite variable depending on the engine type and the nature of the operation being undertaken. Noise nuisance associated with an airport is also closely related to frequency of aircraft operations and their diurnal distribution i.e. noise at night is more a nuisance than in the daytime. High levels of noise are most undesirable.

Noise is a particular health hazard to employees who because of their duties, are subjected to long durations of intense aircraft noise. Strict precautionary measures are necessary for these people, such as mandatory usage of acoustical protective devices. The repercussions of excessive airport noise in residential areas are primarily of a social and behavioral nature. Table 2.15 indicates the types of uses which may be allowed within the vicinity of airports.

Trees may be planted to screen certain areas from some airport noise. Good protection against ground run up noise might be expected from judiciously planted trees. When proposing trees to be used for the development of a sound insulating forest consideration should be given to species which:

- (a) Are suitable to the climatic conditions of the airport site
- (b) Have effective sound insulation properties (e.g. do not shed their leaves or needles grow rapidly and densely, etc)
- (c) Do not generate a bird hazard and
- (d) Are easy to care for after their growth (e.g. normally healthy and not readily affected by blight or noxious insects etc.)

- **Environmental Impact Assessment (EIA):** Detailed study of the impact of airport development on the environment is an essential part of the assessment for any major project. Social ecological impacts should be investigated fully before work is undertaken or, in the case of a new airport, when its site is being undertaken or in the case of a new airport, when its site is being selected. Environmental impact studies, depending on the nature of the project, take into account the following considerations:
  - o Compatibility with community including health, transport and social implications
  - o Influence on ecology including effects of pollution, preservation of flora and fauna and
  - o Means of overcoming any problems.

*Table 31 .0 Typical Compatibles Land Use Around Airports*

<i>Examples of compatible land uses or developments</i>	ZONE		
	A Unrestricted land uses and developments	B Some restrictions on land uses and developments	C Most land uses and developments not permitted
agricultural			
Crop farming			
Industrial			
Machine shop			
Commercial			
- Warehousing and shipping			
- Office and banking			
Residential			
- Low density housing			
Public facilities			
- Schools			

**Notes**

- (a) The length of the bar indicates where the uses might be permitted without restriction in relation to aircraft noise exposure only, and excluding other planning considerations. With respect to certain uses, e.g. housing, commercial a development might be allowed in a zone of higher restriction when other planning considerations indicate a need and where suitable building techniques, sound insulation, etc., can reduce the aircraft noise exposure to an acceptable level
- (b) In the special cases of activities dependent on speech communication, e.g. schools or requiring more stringent standards,

e.g. certain hospital activities, additional restrictions may be required to take account of absolute noise levels as well as building construction. The zones will require to be defined against a noise exposure scale and in their application will need to take account of local and national needs.

## **13.4 Non-motorized Transport**

For a roadway network to serve the transportation needs of a community, it must serve all users. Bikeway and walkway planning addresses how existing and future roads can meet bicycle and pedestrian needs. It is physically, financially and politically impractical to provide a new and separate network in built-up urban environments. In planning new developments, it may be possible to incorporate a separate system of pathways, but the street system will link all destinations together.

A comprehensive concept should be adopted in designing bikeway and walkway systems, based on the premise that the public right-of-way should serve all users; people riding bicycles or walking need to use the same facilities that provide access and mobility to motorists.

By designing roads for all travel modes, in a safe, attractive and convenient manner, bicycle and pedestrian systems can gradually evolve. Often, only minor improvements are needed to accommodate bicyclists and pedestrians.

### **13.4.1 The Principles of Bikeway & Walkway Planning**

Effective bikeway and walkway networks depend on:

1. Accommodating bicyclists and pedestrians on arterial and collector streets;
2. Providing appropriate facilities;
3. Creating and maintaining a system of closely spaced, interconnected local streets; and
4. Overcoming barriers such as freeway crossings, intersections, rivers and canyons.

#### **a) Arterial and Collector Streets**

Arterials and collectors can be made more bicycle and pedestrian friendly by:

- Including bikeways and walkways when roads are built or reconstructed;

- Renovating roads with bikeways and walkways;
- Improving pedestrian crossing opportunities; and
- Improving and better maintaining existing, but inadequate, facilities.

#### **b) Expressways**

Along limited access expressways with no destinations directly on the roadway, it is appropriate to accommodate bicycle and pedestrian traffic on parallel streets or frontage roads. These should be direct, convenient routes that serve local and longer trips. Ideally, a frontage road should be provided on each side of an expressway, as well as crossing opportunities, either at-grade or with grade-separation.

#### **c) Other Arterials**

When it is not feasible or practical to provide bikeways and walkways on an arterial, or if an arterial does not serve the mobility and access needs of bicyclists and pedestrians, other options may be explored on a parallel and adjacent street. To determine if it is better to provide facilities on a parallel street, the following guidelines should be used:

1. There are compelling safety, economic or environmental reasons that preclude providing adequate bikeways and walkways on the arterial;
2. The arterial does not provide adequate access to destination points within reasonable walking or bicycling distances;
3. Parallel streets provide continuity and convenient access to facilities served by the arterial;
4. The costs to improve parallel streets are no greater than the costs to improve the arterial; and
5. The proposed facilities on parallel streets can be built to proper bikeway and walkway standards.

#### **d) Appropriate facilities**

Making urban streets more inviting to bicyclists and pedestrians also requires that adjacent land use, traffic speeds, transit access and street connectivity be considered in urban designs.

### **e) Rural Bikeways**

On most rural roadways, shoulder bikeways are appropriate, accommodating cyclists with few conflicts with motor vehicles. In general, the shoulder widths recommended by AASHTO for rural highways are adequate for bicycle travel. These standards take into account traffic volumes and other considerations.

Shared roadways are adequate on low-volume rural roads, where motor vehicle drivers can safely pass bicyclists due to the low likelihood of encountering on-coming traffic.

Shoulder bikeways can be added to roads with high bicycle use, such as in semi-rural residential areas or close to urban areas. It may be appropriate to stripe and mark shoulders as bike lanes near schools or other areas of high use.

Even adding minimal-width shoulders can improve conditions for bicyclists on roads with moderate traffic volumes. On roads with high use, it may be necessary to add full-width shoulders in areas of poor visibility due to topography.

### **f) Rural Walkways**

In sparsely populated areas, the shoulders of rural roads usually accommodate pedestrians. There are, however, roadways outside urban areas where the urban character creates a need for sidewalks, such as on highly developed commercial strips or in residential clusters along county roads or state highways. Where sidewalks are not provided, shoulders should be wide enough to accommodate both pedestrians and bicyclists.

Paths provided on one or both sides of a roadway in a rural community may be appropriate for providing access to schools. These paths will also serve the needs of young bicycle riders.

### **g) Urban Bikeways**

In urban areas, the need to provide special facilities for bicycle use is determined by the speed and volume of motor vehicle traffic.

### **i) Arterials and Major Collectors**

The appropriate facilities are bike lanes, which:

- Help define the road space;
- Provide bicyclists with a path free of obstructions;
- Decrease the stress level of bicyclists riding in traffic; and
- Signal to motorists that cyclists have a right to the road.

Bike lanes also provide advantages for other users: they help buffer pedestrians from traffic, and increase motorist safety by improving sight distance.

Effectively reducing running (actual) speeds to less than 40 km/h (25 MPH) creates a more comfortable environment for bicycling where there is insufficient width for bike lanes. This may be appropriate for Central Business Districts.

## **ii) Minor Collectors and Local Streets**

The appropriate facilities for bicyclists are shared roadways, as low traffic speeds and volumes allow bicyclists and motorists to safely share the road.

Bike lanes are appropriate on minor collectors with high average running speeds (above 40 km/h [25 MPH]) or high traffic volumes (ADT over 3000). These numbers reflect practices in cities where bike lanes are common. Local conditions may dictate different thresholds. Bike lanes on minor collectors are also appropriate to connect up with other bike lanes or to extend bike lanes to destination points that generate high bicycle use, such as schools, parks and multi-family housing units.

## **h) Urban Walkways**

The appropriate facilities for pedestrians are sidewalks. A sidewalk provides positive separation from traffic, an all-weather surface and access for the disabled. They are readily identifiable by both pedestrians and motorists. Planting strips are desirable to buffer pedestrians from traffic, increasing their sense of comfort and safety, and to provide better access for the disabled at driveways.

## **i) Arterials and Major Collectors**

Sidewalks must be provided on both sides of all arterial and collector streets, unless there are physical limitations and land use characteristics that render a sidewalk unsuitable on one side. In these situations, safe and convenient crossing opportunities must be provided to allow pedestrians to proceed on the side with sidewalks.

## **ii) Minor Collectors and Local Streets**

Sidewalks on both sides of the street are the appropriate facility. There is a point below which sidewalks on both sides of a local street may not be critical: e.g. on short dead-end streets with few potential residences and with no access to other facilities.

## **13.5 Other Planning Considerations**

### **Multi-Use Paths**

Multi-use paths can enhance bicycle and pedestrian travel in urban areas where the existing road system does not serve bicyclists and pedestrians well or where abandoned railroads or other open spaces provide a corridor free of obstacles. Discontinuous street systems benefit from paths to reduce out-of-direction travel. Paths function best where street crossings can be eliminated or minimized.

The following guidelines ensure that a path system is an effective component of a walkway and bikeway network:

1. Neighboring jurisdictions should coordinate planning to link elements when paths cross jurisdictional boundaries (state, county or city rights-of-way or parks; and private property, including railroads,
2. Paths must connect to the street system in a safe and convenient manner - busy streets should accommodate bicyclists and pedestrians, with bike lanes and sidewalks,
3. Connections should be well-signed with destination and directional signing,

4. Paths should not substitute for a good system of on-street facilities,
5. Paths must be located in corridors that serve origin and destination points, such as residential areas, schools, etc.; they should not lead to nowhere,
6. Paths should be built in locations that are visible and easily accessible, for the personal safety of users,
7. Paths should be located where motor vehicle crossings can be eliminated or minimized; paths rarely function well when placed adjacent to a roadway, because of conflicts at intersections,
8. Crossings must be well-designed,
9. Paths should be built to high standards, with sufficient width and clearance to allow users to proceed at reasonable speeds, and constructed so they are durable, with low long-term maintenance requirements, and
10. Paths should be maintained in a usable condition year-round, including snow removal in areas of heavy snowfall. Maintenance.

## METROPOLITAN PLANNING

Metropolitan area is an area comprising of a dominant city and including smaller urban centers (satellite towns) showing strong linkages and functionality.

### Characteristics

- One major dominant city.
- Main arteries joining them e.g. interlinking highways.
- The satellite towns are mainly dormitory centers of the dominant one.
- Continuous interaction of these centers in terms of goods and services.
- The separate centers have different management systems (administration/ local authority/statutes)

- Although major urban, there are areas with rural characteristics
- Metropolis portrays serious urban sprawl and ribbon developments.

### **Guidelines**

- Delineate the area (external boundary) of the metropolis using physiographic, administrative or other parameter.
- Develop an institutional framework to spearhead the management and development of the metropolis.
- Prepare an inventory of challenges and opportunities of the entire metropolis.
- Identify and engage (involve) the key stakeholders in the process of planning and implementation.
- Develop a growth strategy for the metropolis.

## **CHAPTER FOURTEEN – URBAN AGRICULTURE**

### **14.0 URBAN AGRICULTURE**

**Definition:** This is the agricultural practices within urban areas and other market centres and peri-urban areas and includes crop cultivation, horticulture, livestock rearing and poultry keeping.

#### **Characteristics**

- It is small scale and practiced on plot less than 2 acres
- It is intensive
- It is primarily for domestic consumption, but surplus can be sold to supplement household income

- Mainly practiced in or near residential and peri-urban areas.

Urban agriculture is important because it is a supplementary source of livelihood of food and fuel for many households. The Mazingira Institute established that in mid 1980's, 29% of all households grew food within the urban area where they lived and 17% kept livestock. The majority of them were poor women.

Agriculture in towns, cities and metropolitan areas can convert urban waste into resources, put vacant and underutilized areas into productive use, and conserve natural resources outside cities while improving the environment for urban living.

Urban agriculture is made of up of the following:-

1. Aquaculture in tanks, ponds, rivers, and coastal bays
2. Livestock (especially micro-livestock) raised in backyards, along roadsides, within utility right -of-way, in poultry sheds and piggeries.
3. Orchards, including vineyards, street trees and backyard trees.
4. Vegetables and other crops grown ops, in backyards, in vacant lots of industrial estates, along canals on grounds of institutions, on roadsides and in many suburban small farms.

#### **14.1.1 Benefits of Urban Agriculture**

- 1) Management of solid and liquid wastes
- 2) Provision of food supplements. Generation of incomes and employment
- 3) Cleaning of environment through recycling.
- 4) Use of land of land not easily used for any other purposes e.g. land under electricity power lines and land liable to flooding.
- 5) Makes use of vacant land.
- 6) Reduction of energy used to get food elsewhere by producing it within towns.

- 7) Compensation for agricultural land lost through urbanization.
- 8) Provision of fuel wood, fodder, fruits, timber etc. from urban forestry.
- 9) Provision of carbon sink, greening of towns and aesthetics.
- 10) Controls urban sprawl in the peri-urban areas

#### **14.1.2 Planning Standards**

In order to promote urban agriculture in a regulated manner and to avoid nuisances.

The following recommendations are suggested: -

- In a residential area, 5% of the same may be covered by agriculture
- Buffer zones: to be used as greening zones
- Only short crops should be grown

### **14.2 Peri-urban agriculture**

Most towns in the country have had their boundaries extended to cover areas that are under agricultural use. Urbanization is slowly extending into these areas while in other cases it has gone beyond. There is need to promote agriculture in these areas and protect them from urban sprawl.

#### **14.2.1 Guidelines**

- Agriculture be practiced in the backyard of the plot
- Practiced on minimum land size of not less than 1/8 of an acre
- Should be practiced in single holdings and restricted number and species of animals per land holding
- Should establish an adequate waste management system

- Should be restricted within enclosed boundaries
  - Crops should not be above one meter in height.
  - Should not be practiced in ecologically fragile areas e.g. riparian reserves, sewerage lines or ponds, cemeteries, dumping sites not slaughter houses, but seek formal approval from the local authority.
  - Continuous environmental audit either through the neighbourhood association or government, NEMA office or local authority
1. Where the plan takes more of urban characteristic then urban standards should apply.
  2. Generally, 50% of coverage of land should be used for agriculture.

## CHAPTER FIFTEEN: INFORMAL SETTLEMENTS

**15.0 Definition:** Unplanned settlements growing/developing on private/or public land. Informal settlements or slums are characterized by, among others:

1. Lack of security of tenure
2. Lack of access roads and other public amenities.

3. Inadequate access to clean and running water, sanitation and electricity
4. Congestion
5. Temporary structures usually prone to fires
6. Informal land markets
7. Informal market economy
8. Mixed developments
9. Unstandardized plot sizes of irregular shapes
10. They are usually dormitories to commercial and industrial zones

Informal settlements have become an integral part of the urban scene and can no longer be ignored. In 1999 Kenya had a population of 28.7m people. The total urban population was 9.9m constituting about 34.5% of the total population. Of the Nairobi's population of 2.1m in the same period 1.2m lived in the informal settlements constituting about 57% of the total population.

### **15.1 UPGRADING OF INFORMAL SETTLEMENTS**

The following are the challenges of informal settlements upgrading.

- Informal settlements are normally located in places where land values are very high and therefore relocation of the overspill to the neighborhood becomes expensive.
- Acceptability of the relocation or upgrading programme by the beneficiaries,
- Disruption of social order or pattern in the community,
- Inadequate finance to relocate and upgrade the informal settlements,
- Suitability of the relocating sites in relation to the employment areas and transport routes,
- Scarcity of land,
- Possible infiltration of people from outside the informal settlements being upgraded, and

- Professional squatters.

Upgrading of informal settlements must therefore address these issues.

Broad considerations in planning informal settlements

- Historical perspective of the settlement
- History of previous attempts to plan the settlements
- The push factors necessitating the development of the settlement
- Understand the tenure system and existing land operating systems
- Understand the existing land sizes
- Inventory of the settlers
- Understand the social/cultural background.
- Formal and informal institutional systems.
- The existing/operating Government policies.
- Reviewed attempts to plan settlements in other areas.
- Understanding existing formal standards.
- Understand/study the neighboring development.
- Appropriate and applicable planning standards

## CHAPTER SIXTEEN: DEVELOPMENT CONTROL

### 16.1 Definition

Development control is the process of ensuring that development applications comply with policy guidelines, planning regulations and standards, approved physical development plans, Local Authority By-Laws, as well as other relevant statutes. This also involves enforcement and implementation of the approved plans to guarantee sustainable development.

The Physical Planning Act Cap 286, Section 29-33 provides for Development Control process. These Sections together with the Regulations, prescribes the authorities involved, the procedures, penalties and the various forms to be used in administering Development Control matters.

## **16.2 Objectives of Development Control**

The general objectives of development control are: -

- (a) To ensure that implementation of physical development projects conform with approved physical development plan
- (b) To recommend enforcement actions in case of contraventions against plan proposals and/or development standards
- (c) To evaluate development applications that may have injurious implications to man, the physical and biological environment and socio-economic activities
- (d) To ensure that planning regulations, standards, and procedures are reviewed from time to time in order to manage emerging concerns and resolve conflicts
- (e) To secure optimal use of land and ensure that planning decisions are rational.

### **16.3 Principles of Development Control**

Development control is a tool of physical planning that ensures:

- Access
- Aesthetics
- Conformity
- Convenience
- Conservation
- Efficiency
- Safety
- Suitability
- economy

### **16.4 Guidelines for Consideration of Development Permission**

#### **16.4.1 Guidelines for Change of user, Extension Lease and Extension User**

The main objective of these is to allow for flexibility in planning due changing circumstances. The following factors should be considered before a change user, extension lease, extension of user is approved:

- A physical development plan of the area
- Land Reference and title where applicable
- Defined location and size of the land
- Current user of the land
- Proposed/intended user

- Area zoning regulation
- Compatibility with adjacent developments
- Public interest

### **Planning Brief**

- Planning policy/Zoning policy
- Location plan
- Situational/site analysis
- Neighborhood analysis/Compatibility with existing developments.
- Infrastructural and social services
- Landownership
- Size of property/user
- Existence of an approved plan
- Environmental Impact Assessment
- Advertisement in a daily with a wide circulation
- Justification for proposal made

### **Development conditions on the title:**

- Note whether the proposed use is suitable for the site
- Note whether there is some other site more suitable for the proposed use to which it should perhaps be directed
- Note whether the disposition of roads, buildings, open spaces, etc, including buildings density shown in the proposal is satisfactory
- If none of the above considerations apply, note what public interest or what private interest which ought to be protected

by means of development control powers will be served by refusal of development proposal

#### **16.4.2 Guidelines for Subdivisions and Consolidations**

##### **a) The objectives of controlling subdivision plans include:**

- Ensuring that resultant subplots are accessible
- Ensuring that proposed population density is in accordance with available services, e.g. water, sewer, roads and drainage Ensuring that there is planned and coordinated developments
- Ensuring that proposed user is compatible with surrounding user
- Preservation of aesthetic/beauty
- Environmental quality
- Convenience, circulation, and safety,

##### **b) Factors considered in determining subdivision and consolidations proposals:**

Physical planning sub-division regulations 1998 – Legal Notice No. 140 that spells, among others;

- The layout plan of the area under consideration
  - o The location plan/an inset
  - o Subject property should be in a block form
  - o Scheme plan to show subplots and access
  - o Means of access to the property and the neighborhood
  - o The legend should be set on the right
  - o The immediate neighborhood drawn to scale clearly indicated.
  - o The legend should contain property reference

- o The subdivision procedure
- o Format of subdivision plans
- o Requirement/conditions of subdivision schemes
- o Building density
- Size of the property
  - o The owner of the property, name, signature and post office number
  - o The prepare (consultant) should indicate his title, registration number and seal
  - o The plan title
  - o The certification should be included for signature
  - o The approval section
  - o The Scale, Date and the Northing
- Linkage and indication of classified roads to enhance adequate accessibility
- Surrender of land for public utilities
- Provision for adequate truncations
- Appropriate size and shape, plots at right angle with the road where at most
- Change of user considering the minimum size of sub-plots
- Zoning regulations

#### **16.4.3 Guidelines for Approval of Building Plans**

The guidelines are stipulated in the Legal Notice No. 135, Physical Planning Regulations 1998, which spells, among others:

- Siting of the building
- Building lines

- Plot coverage and frontages
- Accesses
- Advertisements
- Conformity to physical development plan
- Approval process
- Density
- Service area
- Canopies and projections
- Zoning regulations
- Existing Physical Development Plan
- Building lines
- Set backs
- Plinth area
- Canopies
- Height of buildings
- Access and parking
- Loading bay
- Density
- Plot coverage and
- Provision for rainwater harvesting facilities and water storage tanks in every building should be encouraged.

#### **16.4.4 Guidelines for Preparation of Planning Report**

##### **a) Planning Report format**

The following applications require a planning report (brief). These should be prepared by the Director of Physical Planning or registered physical planner:

- Change of user
- Extension of lease
- Subdivision
- Extension of users
- Matters coming to liaison committee for determination

##### **b) Content of the planning Report**

- Introduction
- Legal framework
- Terms of reference
- Scope
- Situation analysis: The existing condition
- Justification/Planning considerations
- Conclusion
- Recommendations
- Appendices, if any

#### **16.4.5 Graphical Presentation of Plans**

These are guidelines to ensure quality control on preparation of maps and plans:

- Plan to show abutting land uses
- Location relationship in national and regional context
- A detailed hierarchical road and or railway network (existing and proposed) indicate carriageway and reserves
- Indicate existing and proposed land users
- Drainage
- Riparian reserves as in regulations
- Fragile and environmentally significant areas
- Historical and or heritage, archeological, cultural sites
- Wildlife migration corridors where applicable
- Grid lines with their values
- North point
- Quality draughtsmanship
- Contours
- Legend

#### **16.5 Guidelines for the Approval of Plans**

##### **16.5.1 Physical Development Plans**

- Should comply with the Physical Planning Act (Cap 286)
- Notice of intention to plan, Notice of completion of plan (Kenya Gazette and two dailies – English and Kiswahili)

- Copies of advertisements, Publication in the Kenya gazette
- Signed certificate by physical planner
- Current name of the Ministry
- A planning report/brief
- At least 4 prints of the scheme plan must officially be forwarded to the Director of Physical Planning

## **16.6 Guidelines and Standards for Special Concerns**

### **16.6.1 Infrastructure Services**

#### **a) Classification of Roads**

##### *International Trunk Roads (Class A)*

These are roads linking international boundaries or terminating at international terminals. They are provided with a road reserve of **60-110meters**

- No direct access of a property to a Class A road
- Buffer zones of 10 meters should be provided all along giving access abutting properties
- Developments should come after the buffer zone and should be provided with acceleration and deceleration lanes
- Cross junction should
- The junctions should be at minimum of 300meters
- Petrol Service Station can be planned with acceleration and decelerations of 80-100meters after the 10metre buffer

#### ***ii) Reserve of main conventional sewer line***

It must be 1.5meters on either side of the edge of the pipe. No developments are allowed on this reserve.

#### ***iii) Sewer ponds***

These are sewer lagoons or developed as wetlands to help in bio-degradation of wastes in a series of ponds before discharging

effluent into the water courses.

- A buffer zone of 75 meters away from the ponds should be observed
- Planted tree line around the ponds to reduce the odour and to act as windbreaks
- Minimum and maximum land requirement

The following table shows the information relevant to the disposal system:-

*Table 32.0 Disposal Systems*

Disposal	No of Inhabitants	Location	Protection Area
Garbage collection and burial	50000 in one settlement or more within a radius of 25km	Outside residential settlement	Not less than 1km for urban Areas
Incinerators within the Hospitals Slaughter houses, garbage disposal	Same as above	Outside settlement in Industrial zones	Industrial standards adopted affective or heavy
Collection	100000 or more	Same as above	Same as above

It is proposed that garbage collection points be provided with 0.1 hectare while dumping sites are provided with 2 hectares

#### **d) Water lines and Storm Water Drainage**

Storm sewers are used to collect and carry rain or surface water to some natural watercourse or body of water in such way as to prevent flooding. In a sense storm sewers are artificial watercourses. A system; should provide for the drainage of storm water in major residential areas where annual rainfall exceeds 200mm. A minimum of 2 hectares should be provided for this facility.

However, in smaller districts and others of dispersed housing, no storm system needs to be provided. In dry areas where annual rainfall does not exceed 100mm. Provision of surface drainage in low-lying areas alongside roads and concreted areas will suffice for the flow and drainage of storm water therein. The table below gives some provisions for way leaves for the facilities listed above (Table 33.0).

*Table 33.0 Storm Drainage Way Leave*

<b>Facility</b>	<b>Way leave</b>
Drainage Way leaves	3m – 4.5m
Anti-Malarial Way leaves	4m
Building Clearance	1.5m, 2.5m, and 7.5m
Septic Tank Clearance	6m

#### **(e) Oil Tanks and Pipelines**

##### *Oil pipeline*

30-meter reserve on either sides of the pipeline must be kept. Proposed oil tanks should be 10meters away from any settlements. For existing oil tanks/terminals a buffer of 50 meters must be provided:

- Oil depots are considered heavy industry
- Oil pump stations (pipeline) require 10 acres.
- Commercial liquefied petroleum gas storage requires 0.5 acres.
- Petrol service stations.

#### **f) Railway reserve**

A buffer of 30m to be reserved on either side of the railway line

#### **g) Communication Masts (Radio, Telephone)**

A buffer of 60metre radius to be reserved or as may be prescribed by the accredited authority (Communication Commission of Kenya, National Environmental Management Authority-NEMA and Radiation Protection Board) from time to time.

### **h) Electric Way leaves And Generating Plants**

A buffer of 2 km should be provided for power generating plant. A power wayleave of 30 meters on both sides on the National Grid and 50 meters all round for sub-stations. No developments should be allowed on the reserve. The table below specifies recommended power line way leave trace (Table 34.0 )

*Table 34.0 Electricity Way Leave*

<b>Capacity Of Power Line</b>	<b>Way Leave</b>
11 KV	10m
33 KV	20m
40 KV	20m
66 KV	30m
132 KV single circuit towers	50m
132 KV double circuit towers	60m

In all cases, the distance between the power line and the ground below must not be less than six (6)meters. Furthermore, high-tension lines must not be passed over buildings constructed in the path of such lines. Environmental Impact Assessment guidelines must be sought when locating power stations.

#### **16.6.2 International Boundaries**

They should have a 100m buffer zone (No mans land).

#### **16.6.3 Major Water Bodies**

##### **a) Coastal Development**

- It is recommended that a 30-meter buffer zone be adopted for new developments from the average high water mark at the

time of development application.

- Beach developments should be subjected to guidelines provided by relevant authorities (Coast Development Authority, Maritime Authority, Kenya Ports Authority and NEMA)
- Around navigational Aid beacons, a radius of 700metre buffer zone should be adopted.
- Developments should be avoided in high-risk areas such as erosion prone areas, hilly areas, slopes and conservation areas.
- To provide sufficient buffer zone between developments and present shoreline Entry and service roads to be provided and maintained in coastal reserve along beaches.
- Minimize the effect of air circulation with height control, design and location of buildings (does not exceed the natural canopy of surrounding trees).
- Coastal dunes must be preserved in all development proposals (Conditions).
- Usage of all vehicle type on beaches and dunes is not allowed.
- Permanent development along the shoreline that blocks tidal movement e.g. sea walls is not allowed unless by allowed specification of the relevant construction authority.
- Sand excavation in the active zone which is within a distance of 1km from the low tide is not allowed.
- It is not encouraged to undertake beach reclamation activity because its impacts the natural beach processes. However, for any development e.g. beach reclamation one must obtain Environmental Impact Assessment license. It should also fulfill criteria on safety, preservation, productive and pollution free.
- The sewerage and drainage system of all developments at the beach should be directed to an interior system and not discharged into the sea.
- Fishing will not be allowed on artesian waters about 1km to the sea from the low water mark, as these are the shallow fauna

breeding grounds and the activity destroys marine biodiversity.

**b) Lakes**

As per the planning regulations of 1998

**c) Rivers**

A 30m reserve on either side should be adopted

**d) Earth Dams and Ponds**

Around earth dams a riparian reserve of 100 meters should be provided.

#### **16.6.4 Guidelines for the Development of Commercial activities**

**a) Shopping Malls/Centre/Villages**

Persons with special needs should provide with the following facilities:

**Ramps**-Each ramp must connect the disabled in a continuous and barrier free manner. Maximum slope is 1:15 with a minimum width of 1800mm. Surface of ramp to be smooth and non-slip.

**Handrails and Grab bars**- The handrail (diameter 40mm x 50mm) prepared together with ramp. Handrail height is 2.4 feet (700mm) and 900 mm.

***Other considerations include:***

- Layout and design of the area.
- Loading bay.
- Space for trolleys
- Pedestrian walkways and trolley lanes
- Adequate provision of parking: Car parking for visitors and customers (parking for staff, parking for loading and off loading,

parking space for non motorized e.g. bicycles, handcarts)

**b) Mines and Quarries**

Appropriate buffer with settlements should be maintained.

## APPENDICES

**Appendix 1: Environmental Impact Assessment/Audit Guidelines**

**Appendix 2: Physical Planning Forms PPA**

**Appendix 3: Guidelines for data collection**

**Appendix 4: Land use colours, codes and draughting standards**

## **Appendix 1: Environmental Impact Assessment/Audit Guidelines**

### *What is EIA?*

Environmental Impact assessment (EIA) is a critical examination of the effects of a project on the environment. An EIA identifies both negative and positive impacts of any development activity or project, how it affects people, their property and the environment. EIA also identifies measures to mitigate the negative impacts, while maximizing on the positive ones.

EIA is basically a preventive process. It seeks to maximize adverse impacts on the environment and reduces risks. If a proper EIA is carried out, then the safety of the environment can be properly managed at all stages of a project-planning, design construction, operation, monitoring and evaluation as well as decommissioning.

### *EIA what for?*

The goal of an EIA is to ensure that decisions on proposed projects and activities are environmentally sustainable.

### *Why an EIA?*

EIA is conducted in order to:

Identify impacts of a project on the environment.

- Predict likely changes on the environment as a result of the development.
- Evaluate the impacts of the various alternatives on the project
- Propose mitigation measures for the significant negative impacts of the project on the environment.
- Generate baseline date for monitoring and evaluate impacts including mitigation measures during the project cycle.
- Highlight environment issues with a view to guiding policy makers, planners, stakeholders and government agencies to make environmentally and economically sustainable decisions.

### *Which projects require EIA?*

The projects to be subjected to EIA are specified in the second schedule of Environmental Management and Coordination Act (EMCA) and include:

1. General

- An activity out of character with its surrounding.
- Any structure of a scale not in keeping with its surrounding
- Major changes in land use.

2. *Urban Development including:*

- Designation of new townships
- Establishment of industrial estates
- Establishment or expansion of recreational areas
- Establishment or expansion of recreational townships in mountain areas, national parks and game reserves.
- Shopping centers and complexes.

3. *Transportation including:*

- All major roads.
- All roads in scenic, wooded or mountainous areas and wetlands
- Railway lines
- Airports and airfields
- Oil and gas pipelines
- Water transport

4. *Dams, rivers and water resources including:*

- Storage dams, barrages and piers
- River diversions and water transfer between catchments,
- Flood control schemes
- Drilling for the purpose of utilizing ground water resources including geothermal energy.

5. *Aerial spraying*

6. *Mining, including quarrying and open-cast extraction of:*

- Precious metals
- Gemstone
- Metalliferous ores
- Coal

- Phosphates
- Limestone and dolomite
- Stone and slate
- Aggregate, sand and gravel
- Clay
- Exploitation for the production of petroleum in any form
- Extraction alluvial gold with use of mercury

7. *Forestry related activities including:*

- Timber harvesting
- Clearance of forest areas
- Reforestation and afforestation

8. *Agriculture including:*

- Large scale agriculture
- Use of pesticides
- Introduction of new crops and animals
- Use of fertilizers
- Irrigation

9. *Processing and manufacturing industries including:*

- Mineral processing, reduction of ores and minerals
- Smelting and refining of ores and minerals
- Foundries
- Brick and earth ware manufacture
- Cement works and lime [processing
- Glass works
- Fertilizer manufacture or processing
- Explosive plants

- Oil refineries and petrol-chemical works
- Tanning and dressing of hides and skins
- Abattoirs and meat-processing plants
- Chemical; works and process plants
- Brewing and malting
- Bulk grain processing plants
- Fish-processing plants
- Pulp and paper mills
- Food processing plants
- Plants for manufacture or assembly of motor vehicles
- Plants for the construction or repair of aircraft or railway equipment
- Plants for the manufacture of tanks, reservoirs and sheet metal containers
- Plants for manufacturing batteries.

*10. Electrical infrastructure including:*

- Electricity generation plants
- Electricity transmission lines
- Electrical sub-stations
- Pumped storage schemes.

*11. Management of hydrocarbons including:*

The storage of natural gas and combustible or explosive fuels

*12. Waste disposal including:*

- Sites for hazardous waste disposal
- Sewage disposal works
- Works involving major atmospheric emissions
- Works emitting offensive odour
- Sites for solid waste disposal

*13. Natural conservation areas including:*

- Creation of national parks, game reserves and buffer zones
- Establishment of wilderness areas
- Formulation or modification of water catchment policies
- Formulation or modification of water catchment management policies
- Policies for the management of ecosystems, especially by use of fire
- Commercial exploitation of natural fauna and flora
- Introduction of alien species of fauna and flora into ecosystem

*14. Nuclear reactors*

*15. Major developments in biotechnology*

Including the introduction and testing of genetically modified organisms.

*When should an EIA be done?*

EIA is part of the project development process and is usually done at the initial stages of the project development. It is a decision making tool and should guide whether a project should be implemented, abandoned or modified prior to implementation.

*EIA as a legal requirement:* A proponent or investor shall not implement a project likely to have a negative environmental impact, or for which an EIA is required by the Environment Management and Coordination Act or regulations issued it unless an EIA has been concluded and approved in accordance with the law.

- a) No licensing authority under any law in force in Kenya shall issue a trading, commercial or development permit or license for any project for which an EIA is required or for a project/ activity likely to have a cumulative significant negative environmental impacts unless the applicant produces an EIA license issued by the authority.

**Issues to be considered in EIA**

1. *Ecological considerations including:*

- a) Biological diversity
- b) Sustainable use
- c) Ecosystem maintenance

*2. Social considerations*

- a) Economic impacts
- b) Social cohesion or disruption
- c) Effect on human health
- d) Immigration or emigration
- e) Communication-roads opened up, closed, rerouted
- f) Effect on culture and objects of cultural value

*3. Landscape*

- a) Views opened up or closed
- b) Visual impacts
- c) Compatibility with surrounding area
- d) Amenity opened up or closed e.g. recreation possibilities

*4. Land uses including:*

- a) Effect of proposal on current land uses and land use potentials in the project area
- b) Effects of proposal on surrounding land uses and land use potentials
- c) Possibility of multiple uses.

*5. Water*

- a) Water sources (quality and quantity) - rivers, springs, lakes, underground water and oceans.
- b) Drainage patterns/drainage systems

*Issues Considered by the Director in an EIA Report submitted:*

- The project conforms to approved plan and zoning regulations
- Field inspection report

*Who Administers EIA*

The National Environment Management Authority (NEMA) is mandated by the Environment Management and Coordination Act (EMCA ) no 8 of 1999 to administer the EIA.

### *Who Pays for The EIA?*

The project proponent pays for the entire EIA process. The fee payable to NEMA is 0.1% of the project cost.

### *Who Qualifies To Carry Out an EIA?*

Only individual Experts or a firm of Experts registered by NEMA can carry out an EIA. A register of the EIA experts is available at the NEMA headquarters, District and Provincial Environment offices. This can be accessed upon payment of a fee of Kshs 200.

### *How Does the Public Participate In EIA?*

The law requires that during the EIA process a proponent shall in consultation with the Authority seek the views of persons who may be affected by the project or activity through posters, newspapers and radio; hold at least three public meetings with the affected parties and communities.

The public participates by either submitting written or by making oral comments. Such comments are considered in viewing the EIA study report.

### *EIA Process: What Steps Are Involved In EIA*

1. The key elements in the EIA process include: Development and submission of a project report for projects or activities which are not likely to have significant environmental impacts or those for which no EIA study is required. However, if the Authority considers that an EIA study is required then the ensuing EIA process is as follows:
  - a) Scoping and drawing-up of Terms of Reference (TOR) for the study for approval by the Authority.
  - b) Gathering of baseline information through investigation/research and subsequent submission of EIA study report to the Authority.
  - c) Review of EIA study report by the Authority and relevant lead agencies.
2. Decision on the EIA study report includes approval, approval with conditions or rejection
3. Appeals
4. Implementation of the project
5. Monitoring the project
6. Auditing the project

*Upon completion of the project what next?*

Thereafter an Annual Environmental audit (EA) study report will be done on the project.

*It is your responsibility to implement Environmental Impact Assessment (EIA)*

Notwithstanding any license, permit or approval granted under any written law, any person who commences, proceeds with, executes or conducts any project without approval granted under the Act (EMCA) or regulations issued under the Act commits an offence and on conviction is liable to the penalty prescribed under the Act.

*Fees Relating To EIA*

1. **Lead Experts**-Registration - Kshs 3,000 and annual practicing license fee of Kshs 5,000. Kshs 9,000 and Kshs 15,000 for non-citizens respectively.
2. **Associate Experts**- Registration-Kshs 2,000 and annual practicing license fee Kshs 3,000. Kshs 6,000 and Kshs 9,000 for non-citizens respectively
3. **Firm of Experts**- Registration- Kshs 5,000 and annual practicing license fee Kshs 20,000
4. **EIA Licence**-0.1% of the total cost of the project
5. **EIA License surrender, Transfer or variation**: Kshs 5000

**EIA** Environmental Impact Assessments

**EA** Environmental Audit

**SEA** Strategic Environmental Assessment

**CEA** Cumulative Environmental Assessments

## **Appendix 2: Physical Planning Forms PPA**

- PPA 1 – Application for development application
- PPA 2 – Notification of approval/refusal/deferral of development permission
- PPA 3 – Notice of approval of development plans
- PPA 4 – Notice of approval of development plans

- PPA 5- Certificate of Compliance
- PPA 6- Notification of intention to subdivide.
- PPA 7 – Enforcement Notice
- PPA 8 – Appeals against development planning (District/Municipal/Physical Planning)
- PPA 9 – Appeals against development planning decisions

### **Appendix 3: Guidelines for data collection**

#### **Data and Research**

Principle guideline

- To develop practicing guideline for planning, and data collection and storage

#### **Data gathering standards**

Categorization of secondary data

- Officially sanctioned data
- Untested data from other sources like NGO, s, CBO, s
- The source of the data must always be mentioned in the brief
- Data collected should have a lot of spatial dimensions
- Other data should be to back up the spatial data
- Emphasis should be laid on digital data presentation.
- The analogue plans should be prepared in a system easy to convert to digital.
- They should be clearly geo-referenced

#### **Data Collection Checklist**

Data, which may be gathered (checklist)

- |                   |  |
|-------------------|--|
| <b>Population</b> | <ul style="list-style-type: none"> <li>- Distribution</li> <li>- Age groups</li> </ul> |
|-------------------|--|

- Land**
- Tenure systems
  - Land uses
  - Existing Government policy

- Institutions**
- Type of institutions
  - Function (Roles)
  - Institutional linkages
  - Capacities/ distribution

### **Infrastructure**

- Physical Infrastructure
- Roads
  - Communication
  - Drainage
  - Sewerage
  - Electricity
  - Water

- Social Infrastructure
- Schools
  - Religious institutions
  - Traditional Institutions
  - Health

- Economic Infrastructure
- Banks
  - Micro-finance institutions

- Social /Economic characteristics**
- Income levels
  - Existing economic activities
  - Distribution of economic activities
  - Cultural values
  - Income base

<b>Environmental Characteristics</b>	<ul style="list-style-type: none"> <li>- Pollution</li> <li>- Wetlands</li> <li>- Riparian reserve</li> <li>- Vegetation cover</li> <li>- Environmental fragility</li> </ul>
<b>Governance</b>	<ul style="list-style-type: none"> <li>- Existing legal framework</li> <li>- Governance issues</li> </ul>

#### **Appendix 4: Land use colours, codes and draughting standards**

a) All land uses are classified into ten groups, each of which is represented by a use class code number and colours as follows:

No.	User	Colour
0	Residential	Brown
1	Industrial	Purple
2	Educational	Orange
3	Recreational	Green
4	Public Purpose	Yellow
5	Commercial	Red
6	Public Utilities	Blue
7	Transportation	Grey
8	Undeveloped land	Pale Yellow
9	Agricultural	Pale Yellow
10	National parks, Conservation areas, Game reserves, Conservancies/ Game sanctuaries and Forest reserves	Bright green

**b) Appropriate NIB and Stencil Sizes**

- Plan margin and zone boundaries                            1.0
- Contours and grid lines with values                    0.18
- Certificate    0.25
- Zone classification                                        0.7 or 0.5
- Zone Reference numbers                                  0.25 or 0.35
- Plot/parcel numbers                                        0.18 or 0.25
- Proposed boundaries                                        0.35

c) Content of a Base Map

- Describe/delineate the planning area (external boundary)
- Should be drawn to scale and indicated on the map
- Show contours
- Show gridlines with their values
- Show north point
- Show physiographic features e.g. hills, rivers and other water bodies
- All infrastructure services should be appropriately shown e.g roads, railways, electricity
- Show all market and other centers appropriately
- The base map should be in digital format where possible.