

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**COLLEGE OF ARCHITECTURE AND PLANNING**

**FACULTY OF ARCHITECTURE AND BUILDING TECHNOLOGY**

**DEPARTMENT OF ARCHITECTURE**

***GREENING ACCRA: LESSONS FROM SINGAPORE,***

***The Clean and Green City-State***

A THESIS SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE OF  
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI,  
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
**MASTER OF SCIENCE (ARCHITECTURAL STUDIES)**

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**June, 2006**



DECLARATION

I hereby declare that this thesis report has been undertaken solely by me and is an original and not a duplicate or plagiarized work. It has resulted from thorough research and logical analysis and synthesis under department staff supervision.



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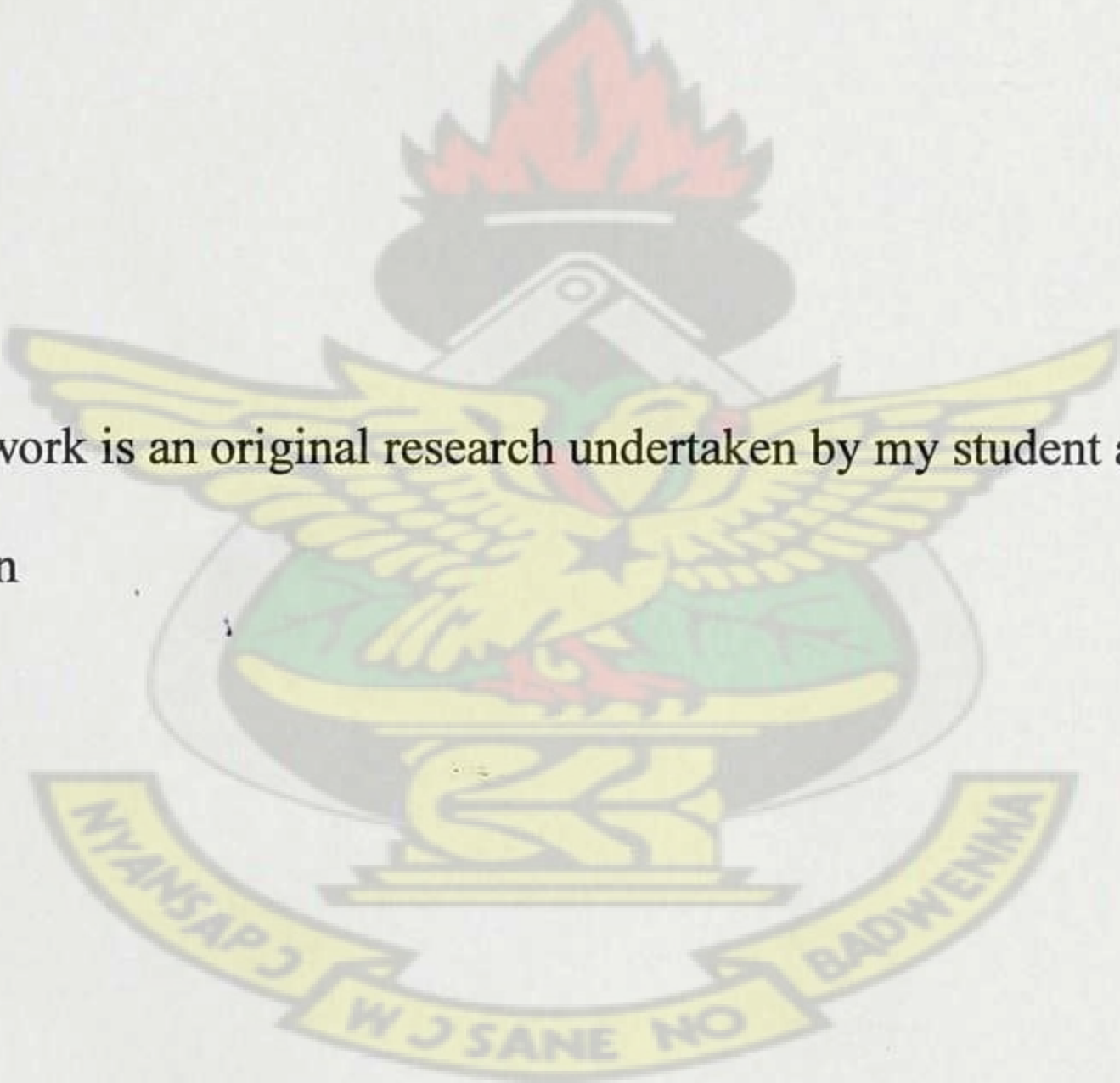
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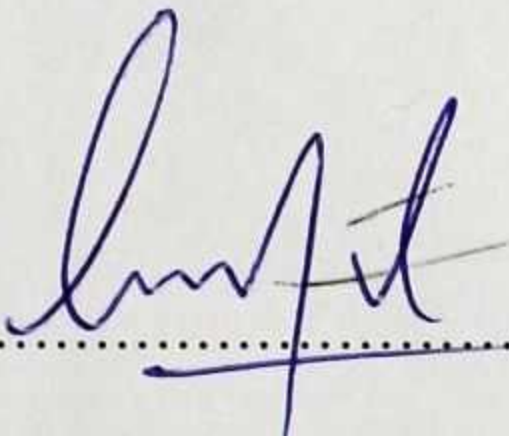
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Date

I hereby declare that this work is an original research undertaken by my student and has been done under my supervision





.....

Professor A.D.C. Hyland

20-02-13

.....

Date

## ACKNOWLEDGEMENT

I thank the Almighty God, who made me both willing and able to complete this course. I thank Him also for all the good people He placed in my path to assist me.

I am most grateful for my mother, Mrs. Shirley Sowah, for her godly counsel and my father Mr. Albert Sowah for his support.





## DEDICATION

This thesis is dedicated to my sweetheart, William Evans Halm

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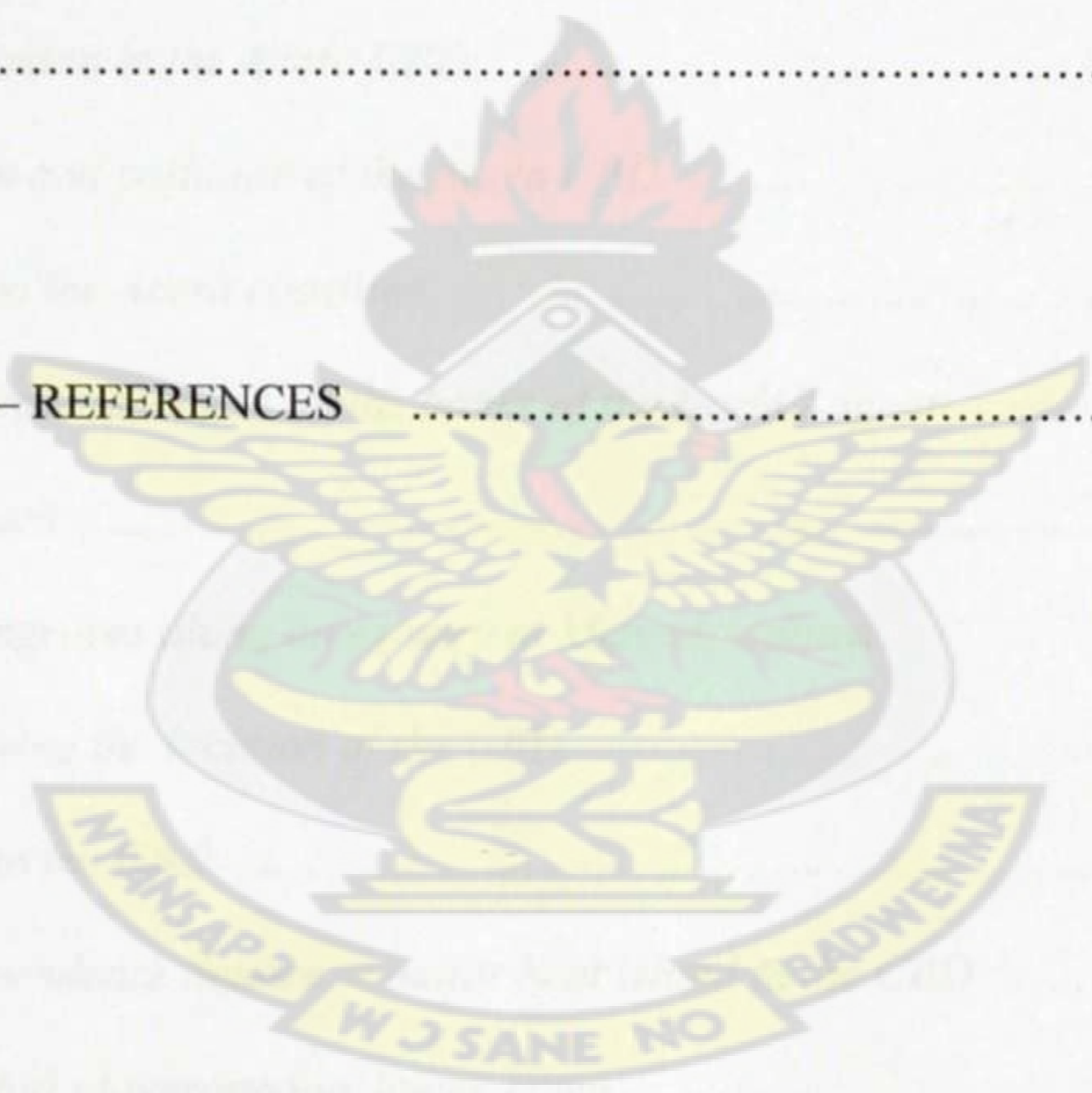
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## ABSTRACT

The city of Accra, after 50 years of Ghana's independence, has an urban landscape characterized by an increasing number of freestanding signature buildings without any attention to the design of the spaces between them. The lack of urban greenery and soft landscaping in Accra has resulted in its lack of beauty, limited open spaces, filth, stench, and excessive heat which makes walking or driving through the city very uncomfortable. If this phenomenon continues unchecked, the greenery that protects and enhances life will continue to rapidly reduce. This will result in reduced air quality, increased stress levels of urban dwellers and a rise in the "heat island" effect. Enhancement of the soft landscaping in Accra will assist in giving local identity to designated areas, providing a self-sustaining ecosystem, and maintaining a more comfortable microclimate while reducing air pollution. The scope of this study is the Central Business District (CBD) of Accra, which is, the area bordered by the Ring Road and the coastline. This study also examines how Singapore achieved a clean and green city. Though it was once faced with the problems Accra has today, Singapore, is the financial centre of South-East Asia, attracting over 7.5 million tourists per annum. Having very similar climatic conditions to Accra, one of its success secrets is its tropical, clean and green landscape which was systematically developed over the years. This project researches the role of soft landscape in a cities' development focusing on how it can be used to develop the physical environment of the CBD of Accra into a Sub-Saharan African garden-city using the time tested and efficient city greening model of Singapore. Field surveys of Accra and Singapore, literature review, interviews of relevant stakeholders, and the findings have been employed to make proposals to increase the greenery within the CBD of Accra. This will raise the greenery percentage to 23 percent as exists



in Singapore, and will serve as a contribution of ideas to help the decision makers in the beautification of the city.

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# 1 CHAPTER ONE - INTRODUCTION

## 1.1 Background

The republic of Ghana, a West African country, shares boundaries with Togo, Burkina Faso, and Ivory Coast. The country has an area of 238 000 km<sup>2</sup>, large areas of fertile land, forestry resources and significant deposits of minerals, precious metals and gemstones. It has a population of 21.7 million with an annual population growth rate of 2.1 percent (World Bank, 2006). It is rich in culture with diverse languages and religions.

A few decades ago urban planners, sociologists and even writers considered urbanisation a threat to the socio – economic development of African economies. Recent studies have however shown that urban centres are the engines of growth as they produce large amounts of a country's wealth, and that there are far more positive implications of urbanisation than has previously been conceived. Apart from the basic advantages of agglomeration of economies that urban centres present, they also provide environments enabling wider access to services, infrastructure, workers and buyers and knowledge 'spill-overs', leading to more efficient exchange of information and lower transaction costs (Urban Design Compendium, 2000).

Urban greenery plays a major role in the day to day activities of any city. The designs and types of landscapes vary and this is influenced by (but not limited to) such factors as the culture, religion, economic levels, and political ideology of government.



Accra is a modern growing city, and as such a good and effective landscape design and greenery will significantly help in solving its sanitation and environmental problems while enhancing its image in the sub-region. As of 1991, the services sector was making a net contribution of 35 percent of GDP per annum at a steady rate, and considering the overwhelming scale of dominance of Accra in the total structure of urban developments; it is likely that quite a chunk of this wealth is generated in Accra (Redevelopment and Investment Plan for Accra Central Area, 1993).

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Although the CBD has been making such tremendous contributions to the national economy, it is still operating below its full capacity. The problems confronting the CBD, that is, the acute case of traffic congestion, extremely poor sanitation, harsh environmental conditions, among others, make the district function poorly. This situation creates a drag instead of giving a boost to the businesses. This also reduces its efficiency in revenue generation, employment and investor attraction.

## **1.2 Landscape Roles in Cities**

Increase in urbanization is usually accompanied by overcrowding, air pollution, noise and lack of green spaces and parks, resulting in greater stress levels among city residents. Urban greenery, aside its beautification abilities and increasing values of land/landed property, is also used to create healthy environments for city dwellers as it offers opportunities and places for exercise, relaxation, stress relief and recreation, which in turn increases productivity (Moughtin, et. al. 2006).



Tree planting and open spaces, when added to development schemes alleviates some of the effects of pollution caused by the production and use of building materials, reduces reradiation from the ground and built up areas, while allowing good sanitation conditions, air purification and environmental and eco-systems protection.

When used in the planning of the city, greenery can be used to give character and identity to particular nodes, paths, edges, and districts. They also recondition the atmosphere thus reducing cooling costs of buildings (Hill, 1995).

### **1.3 Problem Statement**

The lack of greenery and soft landscaping in Accra has resulted in its lack of beauty, limited open spaces, filth, stench, and excessive heat which makes walking or driving through the city very uncomfortable. This greenery which also improves the comfort of urban dwellers, protects and enhances life and increases the general wellbeing of people, is quickly being taken away to make room for roads and buildings. The lack of greenery has also resulted in climate change and this is seen in the excessive heat and less rainfall.

According to the report on the Redevelopment and Investment Plan for Accra Central Area published in June, 1993, a master plan was prepared for the development of Accra from 1958 to 1980. Most of the proposals it contained have not been implemented, meanwhile Accra has expanded well beyond the scope covered by this plan, most of it by chance, following no particular design or vision.



Singapore on the other hand is the financial centre of South-East Asia attracting 7.5 million tourists per annum even though it is younger and much smaller than Ghana and with a nary of natural resources (Yew, 2000). One of the major secrets of its success is the “clean and green Singapore” concept that the first Prime Minister Lee Kuan Yew adopted as a way to distinguish themselves from third world countries (Yew, 2000).

1.4 Scope

The scope of this study is limited to the CBD of Accra. This is the area bordered by the Ring Road and the coastline, as shown in figure 1. The problems hampering the ability of the Accra CBD to live up to its “Gateway to Africa” status are so numerous and complex that it will require massive resources and a lot more time to resolve comprehensively. This study therefore focuses on the urban greenery aspects of the city’s physical environment and how it can be transformed into a sub-Saharan Africa garden city. It seeks to answer such questions as how Singapore managed to build first class standards in a third world region, the effects of a city’s image on investor attraction and what Accra can learn from Singapore in making the Accra CBD green.



Figure 1-1 map of Singapore



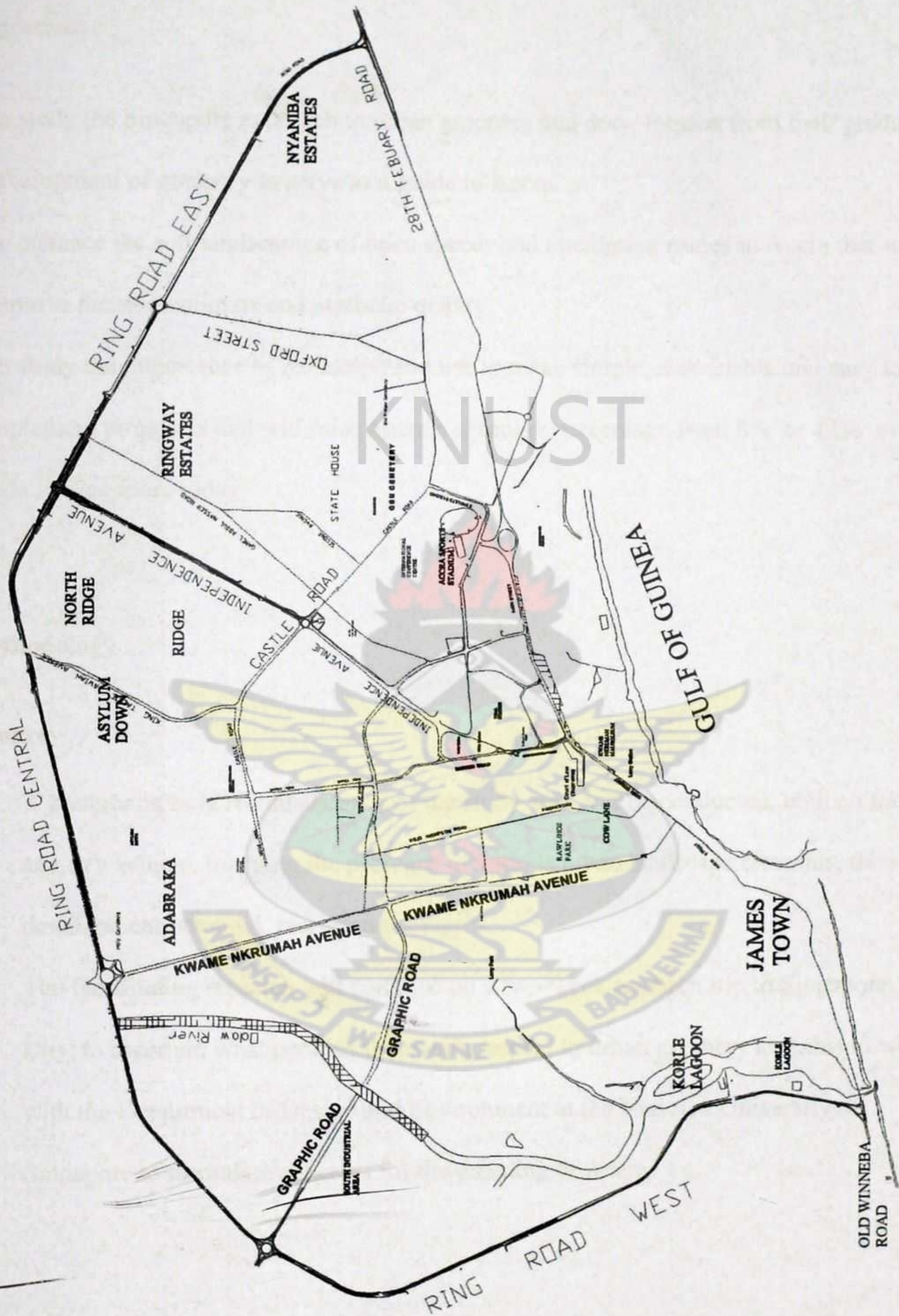


Figure 1-2

The CBD of Accra



## 1.5 Objectives

- ❖ To study the Singapore approach to urban greenery and draw lessons from their gradual development of greenery to serve as a guide to Accra.
- ❖ To enhance the soft landscaping of open spaces and circulation routes in Accra that will improve the microclimate and aesthetic quality.
- ❖ To study the importance of landscape and use to make simple, sustainable and easy to implement proposals that will raise Accra's greenery percentage from 8% to 47% as seen in Singapore today.

## 1.6 Methodology

### 1.6.1 Survey

- A systematic field reconnaissance of the study area will be conducted, both on foot and in a vehicle, mapping the presence of various urban landscape elements, their development potential, merits and demerits.
- The fact-finding research will continue on a two-week research trip to Singapore City, to ascertain what pertains there with respect to urban greenery and also to work with the Department of Design and Environment at the National University of Singapore to formulate concepts for the greening of Accra.



### 1.6.2 Interviews

A total of 24 interviews will be conducted sampling of the CBD users (six traders, six buyers, six office workers, six residents) to investigate the value placed upon urban landscape in the Ghanaian society. Six architects will also be interviewed for their professional view on the subject matter. Thus a total of thirty people will be interviewed.

Another set of interviews will be held in Singapore interviewing a total of 30 people consisting of residents, tourists, architects, informal business operators, office workers.

### 1.6.3 Literature review

Research into the various sectors of the physical urban environment such as the historical development of the greenery and physical development of the city, the natural environment and its characteristics and the factors that positively or negatively impact on the city's greenery.

Some of the literature that will be reviewed include the following:

- Study of Accra-
  - Trevallion, B.A.W. Accra A Plan for The Town
  - Final Draft Report. (1996). National Tourism Development Plan for Ghana 1996- 2014.
  - Redevelopment and Investment Plan for Accra Central Area (1993).
  - Strategic Plan for the Greater Accra Metropolitan Area. Five Year Development Plan. Volumes 1-5



○ Study of Singapore-

- Liu, G. (1999) Singapore: A Pictorial History 1819-2000. Achipelago press
- Waller, E. (2001). Landscape Planning In Singapore. Singapore University Press
- Warren, W. (2000). Singapore City of Gardens. Singapore. Periplus Editions
- Yew, K. L., (2000). From 3rd World; The Singapore Story: 1965-2000. Harper Collins publishers Inc.

○ Study of urban design and greenery theories

- Landscape and Urban Planning, Volume 63
- Battle, G. and McCarthy, C. (2001). Sustainable Ecosystems and the Built Environment. Wiley-Academy
- Hayden, D. (1995). The Power of Place: Urban Landscapes as Public History. MIT Press
- Hill, W.F. (1995). Landscape Handbook for the Tropics. Packard Publishing.



## 2 CHAPTER TWO - LITERATURE REVIEW

### 2.1 Contextual Study of Accra

#### 2.1.1 History of Accra

Located on the coast 80 km west of the Volta River, Accra is Ghana's capital city as well as its largest, founded by the Ga's in the 1500s. However prior to that the region was a major supplier of kola nuts and ivory and had the richest sources of gold in its rainforest belt. This encouraged the Portuguese, the first Europeans to arrive in Gold coast, to search for a trade route to sub – Saharan Africa.

By the 16<sup>th</sup> century, Accra's role as a fishing port spurred its urban development. The availability of large gold deposits, natural harbours, and abundance of construction materials for fortifications made the region very attractive and it became the centre for the European activities.



**Figure 2-1**     *The rocky foundation of Ussher Fort*





Figure 2-2 the fishing village of Accra today



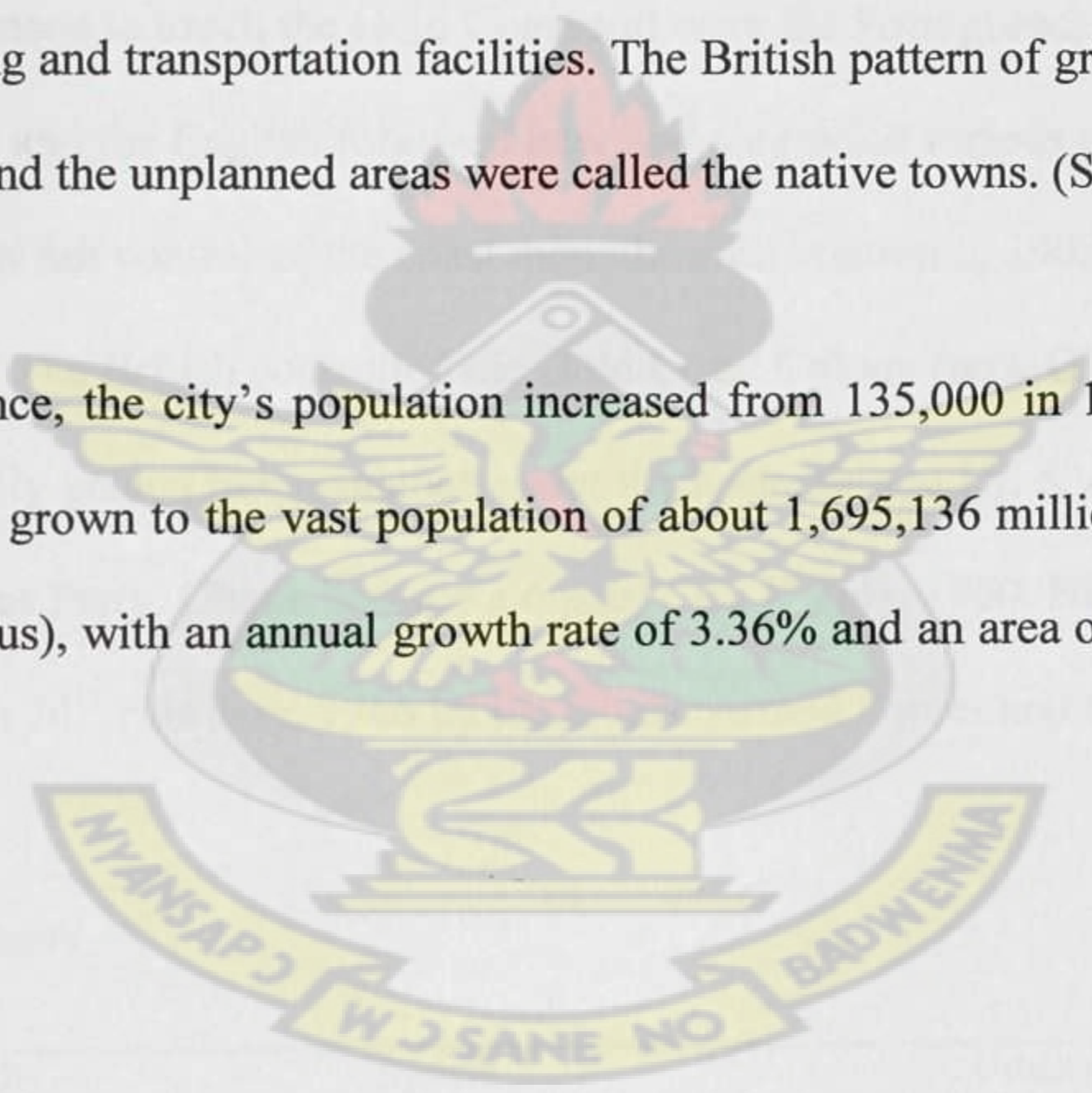
Figure 2-3 James Town today



The planning of Accra begun when an earthquake destroyed major parts of the then village including some forts in 1862. This made spatial reconfiguration easier for the British. Gold Coast was declared a British colony in 1874. Then Accra consisted of 3 towns: Ussher Town, James Town and Christiansburg (present day Osu). By 1899, Accra had developed into the busiest port with the largest number of warehouses in the Gold Coast. Trade activity was thus boosted.

The administrative, military, and other institutions that were needed to facilitate trade, storage and distribution activities were situated near the port, establishing the Central Business District (CBD) with all the banking and transportation facilities. The British pattern of grid iron planning was imposed on the city and the unplanned areas were called the native towns. (See Figure 2-4).

In 1960, after independence, the city's population increased from 135,000 in 1948 to 338,000 and the CBD has steadily grown to the vast population of about 1,695,136 million people (2000 National Population Census), with an annual growth rate of 3.36% and an area of approximately 185km<sup>2</sup>.





**Table 2-1 Population and population growth rate of 1960, 1970, 1984, 2000 and 2002**

	1960	1970	1984	2000	2002
<b>Population</b>	338,396	636,667	969,195	1,658,937	1,801,606
<b>Pop. Growth rate</b>	-	6.32%	7.51%	4.3%	4.3%

(Source: Accra Development Plan 2000-2004)

### 2.1.2 Brief Political Background

The first among the Europeans to touch the Gold Coast soil were the Portuguese. The Dutch, Danes, Swedish, Germans and the English followed later and controlled various parts of the coast until the English won full control of the coast then, the entire nation in 1902 having won the war over the Ashantis. The British controlled the Gold Coast Colony (now Ghana) until 6<sup>th</sup> March, 1957, when it finally gained independence under the leadership of Dr. Kwame Nkrumah and the Convention Peoples Party. Ghana became a republic on 1<sup>st</sup> July, 1960. Nkrumah's regime was overthrown on 24<sup>th</sup> February, 1966 by the Ghana Armed Forces and the Ghana Police<sup>1</sup>.

**Table 2-2 Ghana's political history**

No.	Year(s)	Leader	System	Urban Greenery
1	1957		British Colonialism	
2	1957 - 1966	Dr. Kwame Nkrumah	Independence, Democracy	Trevallion, 1958 Accra – a plan for the town
3	1966	General Ankrah	Coup	-
4	1969	Lt. General Afrifa	Coup	-
5	1969	Dr. Busia / Mr. E Akuffo-Addo	Democracy	

<sup>1</sup> www.ghanaweb.com



6	1972	General Acheampong	Coup	
7	1979	Dr. Liman	Election	
8	1981	J.J. Rawlings	Coup	
9	1992	J.J. Rawlings	Democracy	investment plan for Accra (1993), Greenery part of proposals
10	2000	J.A. Kuffour	Democracy	Ghana at 50 city beautification “event”, hawker clearance from CBD, Zoomlion to deal with filth, HIPC-Urban Forestation Project

### 2.1.3 The Natural Environment of Accra

The characteristics of the natural environment of Accra have been summarized in table... below

**Table 2-3 Characteristics of the natural environment**

No.	Element	Characteristics
1	Geology	Accraian series (sandstone, shale, sandstone and shale)
2	Soil	Drif materials, alluvial and mooted clays from underlying shale, residual clays and gravels, sandy clay soils
3	Erosion	General sheet erosion, Gully erosion along all major drainage channels leading to siltation and flooding
4	Climate	Tropical , Rainfall –736mm annually, Temperature - 24.7 <sup>0</sup> C - 29 <sup>0</sup> C
5	Water quality	Satisfactory
6	Air quality	Good, except for industrial areas, High odour levels due to poor sanitation
7	Constraints	Flooding, earthquake, coastal storms, high winds, occasional pollution from automobiles, endangered marine and bird life especially at aquatic areas.



6	1972	General Acheampong	Coup	
7	1979	Dr. Liman	Election	
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#### Geological Legend

##### Unconsolidated and poorly consolidated sediments (Quaternary age)

- Marine, fluvial or lacustrine sediments
- Undifferentiated quaternary rocks
- Consolidated tertiary sediments: impure calcium carbonate deposits or calcareous sandstones (beach rock)

##### Accraian Series (Devonian age)

- Sandstone
- Shale
- Interbedded sandstone and shale

##### Togo Series (Upper Precambrian age)

- Undifferentiated assemblage of phyllite, quartzite, sericitic quartz schist, and quartzose metasandstone

##### Dahomeyan System (Middle-Late Precambrian age)

- Quartz schist
- Orthogneiss and augen gneiss
- Metamicrogabbro and amphibolite
- Calcareous quartz schist

##### Birimian System (Middle Precambrian age)

- Schistose marble
- Foliated, massive or banded biotitic amphibolite

##### Granitoids (Middle Precambrian age)

- Biotite-hornblende granitoid
- Porphyritic granite

#### Coastal Stability Legend

##### Stability concerning sea erosion and flooding

HIGH

Where natural protection to the shores are provided by the exposed rock substratum or on the updrift side of coastal structures such as harbour and headlands

MEDIUM

Moderately sensitive to erosion. Mostly weak or unconsolidated material underlain by hard rocks

LOW

Highly sensitive to erosion. It is basically fine sand with gentle beaches backed by coastal lagoons.

5 m Contour

Constructional Restricted Zone

10 m Contour

No strategically important infrastructure should be build

Sand Bodies

Unconsolidated, highly dynamic and unsuitable for any type of construction such as roads, railways, etc.

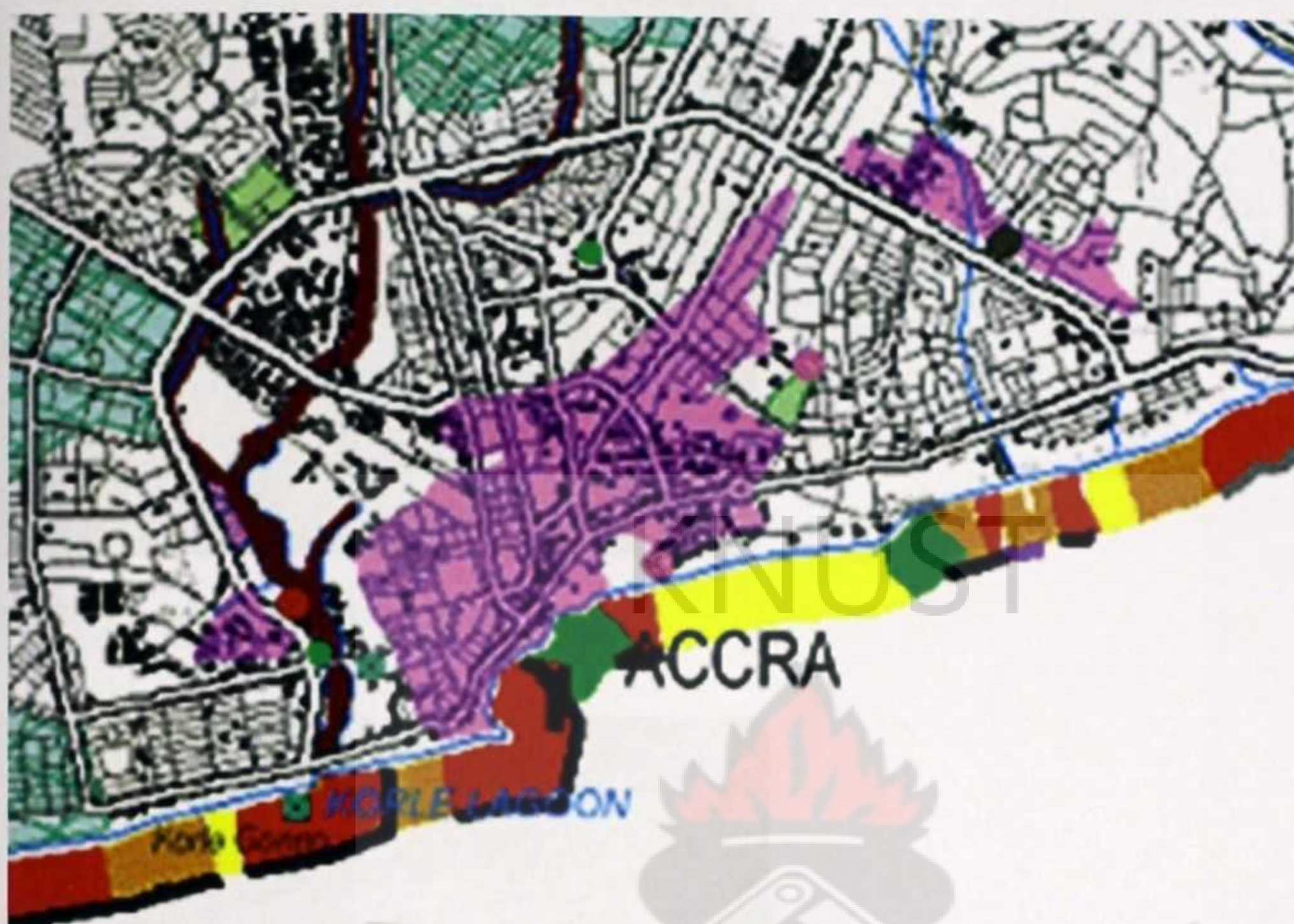
Figure 2-4 Coastal stability of the Accra CBD





**Figure 2-5** Urban erosion in the Accra CBD





### Existing environmental pollution:

#### Coastal pollution

##### Pollution intensity:

- **Major** Active waste dump and / or extreme defecation near poor and densely populated areas.
- **Medium** Occasional dumping of waste and / or frequent defecation.
- **Minor** Mainly waste washed ashore and / or occasional defecation of low intensity.
- **Slight or no pollution**

##### Type of pollution:

- Defecation
- Defecation & domestic waste
- Industrial

#### Surface water pollution

- Heavily polluted

### Sanitation Infrastructure:

#### Waste disposal

- Authorised landfill, in operation
- Authorised landfill, closed
- Unauthorised landfill, in operation

#### Sewage

- Poor sanitation area
- Area connected to sewage treatment plant

#### Sewage treatment works

- Working
- Not working
- Out of order
- Part working
- Pumping station
- Faecal treatment works

#### Possible Pollution Sources

- + Oil refinery
- Cemetery

Figure 2-6 sanitation and pollution of the Accra CBD





Figure 2-7 Erosion on the Accra coastline



Figure 2-8 Squatter encroachment at the banks of the Korle Lagoon



Figure 2-9 Filthy beach



### 2.1.3.1 Terrestrial Vegetation

There is evidence to suggest the vegetation of the metropolitan area has been altered in the more recent past century by climatic and other factors. Much of the metropolitan area was believed to have been covered by dense forest of which only a few remnant trees survive. A climatic change combined with the gradient of plains and cultivation has imposed vegetation structures similar to those of the southern shale, Sudan and Guinea Savannas all of which lie north of the Accra plains.

There are three broad vegetation zones in the metropolitan area which comprise shrub land, grassland and coastal lands. Only the shrub land occurs more commonly in the western outskirts and in the north towards the Aburi hills. It consists of dense clusters of small trees and shrubs which grow to an average height of five metres. The grass is a mixture of species found in the undergrowth of forests. They are short, and rarely grow beyond one metre. Ground herbs are found on the edge of the shrub. They include species which normally flourish after fire.

The coastal zone comprises two vegetation types, wetlands and dunes. The coastal wetland zone is highly productive and an important habitat for marine and terrestrial – mainly birdlife. Mangroves, comprising two dominant species, are found in the tidal zone of all estuaries and lagoons. Salt tolerant grass species cover substantial low lying areas surrounding the lagoons. These grasslands have an important ~~primary~~ production role in providing nutrients for prawns and juvenile fish in the lagoon systems. Protection of the coastal wetland zone is very important to the long term sustainability of the fishing industry which the Ga population of Accra depend upon.





**Figure 2-10**      *Some mangroves along an estuary at Mensah Guinea*

The dune lands have been formed by a combination of wave action and wind. They are most unstable but stretch back several hundreds of metres in places. There are several shrub and grassland species which grow and play an important role in stabilizing dunes. Coconuts and palms grow well in this zone, providing protection. They are also economic crops. Most of the coconuts were planted in the 1920's but it is estimated that over 80% of those plantations have disappeared as a result of felling, disease and coastal erosion. The loss of these trees is one of the principal reasons for the severity of erosion in some areas.

In addition to the natural vegetation zones, a number of introduced trees and shrubs thrive in the metropolitan area. Neems, mangoes, cassias and avocados and palms are prominent trees on the Accra landscape. Introduced shrubs, like bougainvillea are also very prominent.

Most of the open spaces in Accra are used for the cultivation of food crops like corn, okra, tomatoes and other vegetables. Fertilizers and insecticides are used in these areas. Constant



felling of the trees, bad farming practices and annual burning has altered the vegetation to “dry forest” and has greatly depleted the fertility of the soil.

### **2.1.3.2 Terrestrial Fauna**

Different species of antelopes, squirrels, monkeys and reptiles live in Accra. Many animals such as the Togo Hare, grasscutter, bush baby and bossman potto are found in the Achimota forest and outside the CBD area. Most animals have been pushed inland because of the rapid expansion of settlements in the metropolitan area. Many species of snakes (some venomous) and lizards are found throughout the CBD area. Apart from the above mentioned fauna a great number of domestic animals – donkey, sheep, goats and chicken are also kept domestically.

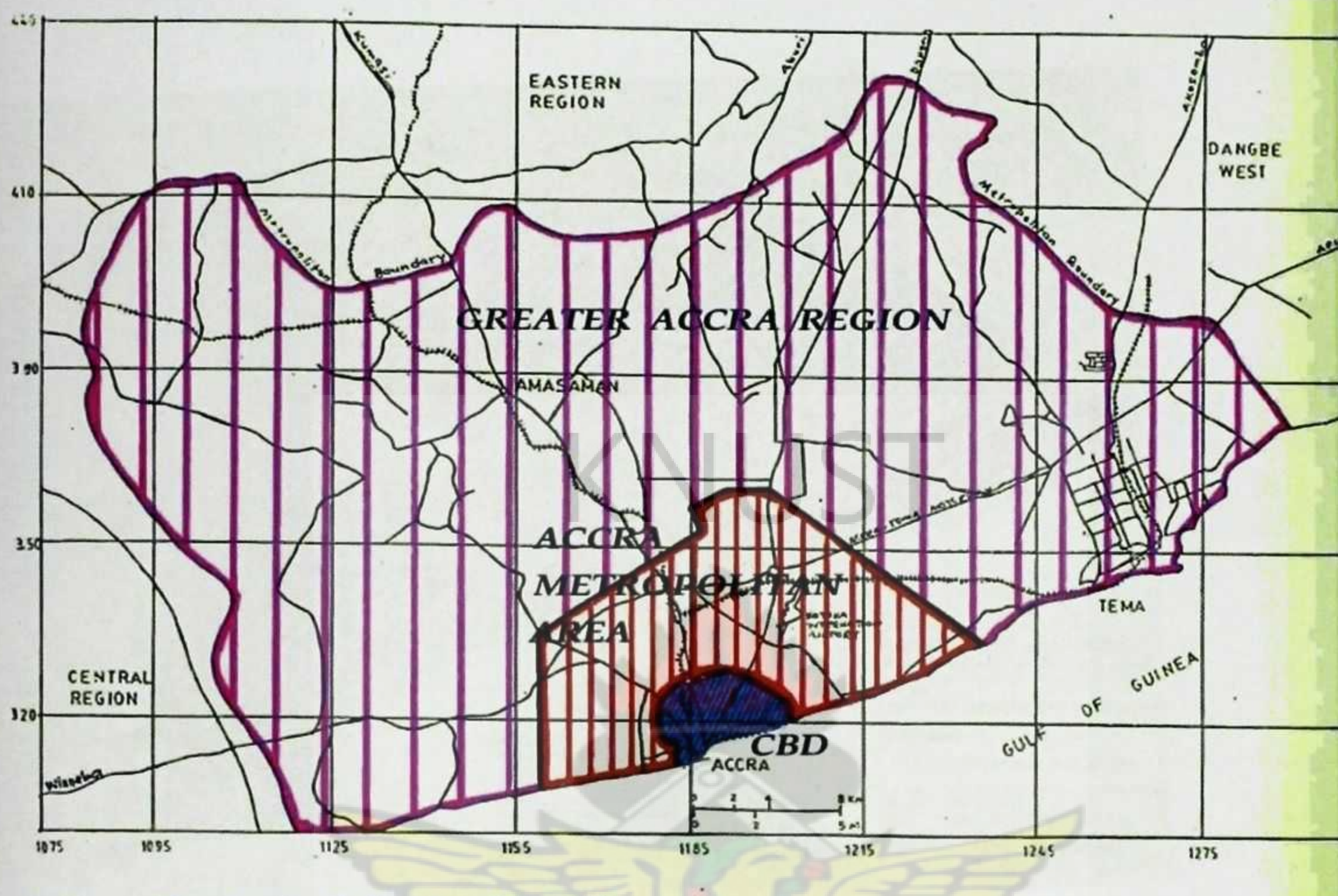
Metropolitan bird life is diverse and in spacious residential areas prolific. The many exotic trees planted in the inner city areas provide a suitable habitat for food and shelter, and the lack of predator species have enabled numbers to grow. Over 120 indigenous, migratory and exotic bird species have been counted in the metropolitan area.

### **2.1.4 The CBD**

#### **2.1.4.1 Definition of the CBD.**

The Central Business District is the area bounded by the Gulf of Guinea (i.e. to sea) and the Ring Road. It is located at the same place as the original nucleus over 200 years. As stated earlier it contains the main commercial, ministerial and public offices.



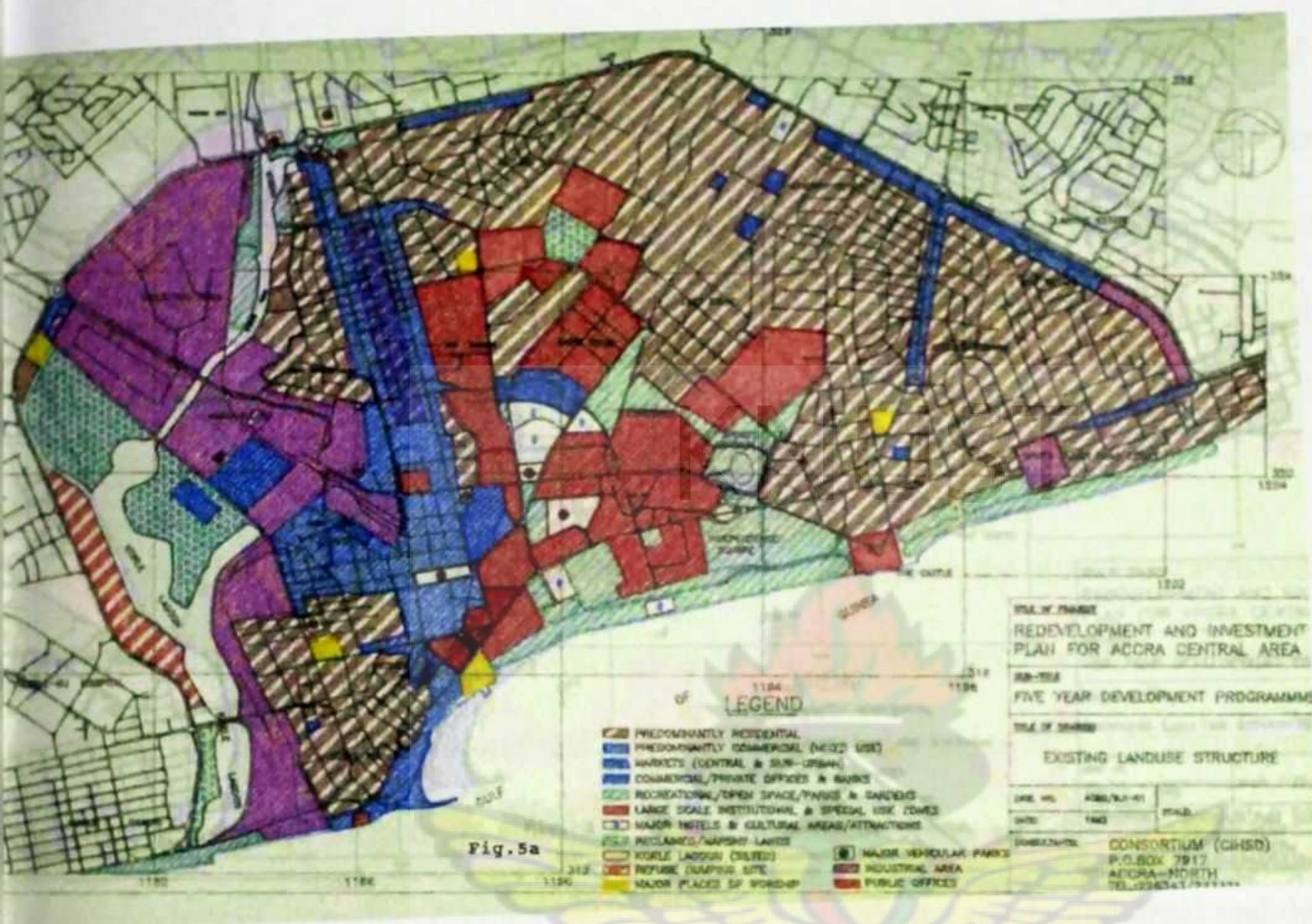


**Figure 2-11** Map showing the location of the CBD

(Source: Redevelopment and Investment Plan for Accra Central Area. June, 1993)

The area is a complex mixed-use development consisting of both high density of indigenous residential areas and low density old residential areas. It also contains some of the largest traditional markets in the metropolitan area.





**Figure 2-12** *Landuse in the CBD* (Source: strategic plan for the greater Accra metropolitan area, vol. 1)

#### 2.1.4.2 Historical Changes of Greenery in Accra

Open space provision is extremely important to the micro-climate of a town/city. A lack of it results in the progressive rise of the average temperature of the city within as it grows. This is accompanied by restricted air movement making the whole environment highly uncomfortable as in the case of Accra today.

A town which lacks open space near its CBD may look impressive with regards to its buildings but it will definitely be lacking in those human qualities such as the provision of contrast to and



relief from the busy built up centre of the city. It will also be lacking in the visual relief from the glare and the mental refreshment that city greenery gives. Trevallion (1958) thought that Accra was fortunate in terms of existing and potential open spaces. This was because most of the undeveloped land was owned by the government and they had reserved extensive expanse of building-free zones which the government could take advantage of for greenery. Also the Town and Country Planning Department had been very efficient in their operations in the 1940's making sure that the planning and development regulations had been adhered to.

There was and still is however a shortage of local open space in the already established residential towns, like Usher Town and James Town. And the purchase and responsibility for the ear-marked ones in the developing residential areas proved problematic. The major open spaces included the Coastal Strip from Mamprobi (west) to Labadi (east), undeveloped land endangered by encroachment, corridors ("green wedges") between existing residential areas and the Independence Avenue Park (which extends from the sea to the Castle Road.) the cricket oval, stadium and race course formed the private ones. Open air recreation was to the east of the CBD- football, cricket, tennis, polo, golf, and athletics. "Make shift" football pitches were created by residents on undeveloped land. Attractively laid out gardens in the CBD were owned by the stool, - those surrounding the Supreme Court and the war memorial, grounds of the ministerial buildings on Rowe Road ( now Starlet ` 91 Avenue) and Cathedral gardens. There were also smaller ornamental gardens on traffic Islands. There were no parks in Accra (Travellion, 1958).

With the exception of the local recreational open spaces distributed throughout the residential areas which cater for both adults and children within reasonable reach of their homes, there was



a need for recreational centres where special athletic and sports facilities were concerned. Town gardens in the centre of Accra where shoppers and visitors could rest for a while and workers could spend their lunch hour were also absent.

Presently, the number and variety of leisure and recreational activities and facilities are still limited even though there has been an improvement. According to the Draft final report of the Strategic Plan for the Greater Accra Metropolitan Area published in 1992, concerning the private and commercially operated recreational facilities and open spaces, there are a number of hotels with swimming pools, serviced beaches and tennis courts. Most of these are however outside the CBD. They include the Tesano Sports Club, the Accra, Adabraka, and Korle Bu Tennis clubs, Achimota Golf Club, Labadi Beach Hotel, La Palm Royal Beach Resort and Novotel Hotel all in the GAMA. There are 3 sports stadia in Accra with only the Accra Sports Stadium with tennis, boxing, swimming, soccer, athletics, basketball, volleyball, table tennis and other minor sports. The Kaneshie Sports Complex, which has similar facilities and the Dansoman Community Sports field which is the smallest. These are public open spaces operated by the government.





**Figure 2-13**      *The Independence Square, a major heat island in the CBD*



**Figure 2-14**      *A make-shift playground in James Town*



**Figure 2-15**      *The only open space in James Town*



There are also some parks and gardens that provide non-sporting recreational activities. They include the Efua Sutherland Park, the Rotary Gardens, and the Kwame Nkrumah Mausoleum opposite the old Parliament House. There are also private ones like the Kinbu and Afrikiko gardens located in the CBD. The only zoo has been temporarily closed for refurbishment. It was located at the Flagstaff House in the Kanda Estates. (Strategic Plan for the Greater Accra Metropolitan Area. Volume 1)

#### 2.1.4.2.1 The Accra Master Plans

The plan envisaged a redeveloped C.B.D area, spacious with *“well designed buildings, open spaces in the form of public squares, gardens and boulevards, fountains, ornamentals pools and statues ...”* The objective was to *“secure buildings of a lively and graceful design set in landscaped spaces and tree-lined roads”*.

The proposals made by B.A.W. Trevallion and Alan G. Hood in their report to the Ministry of Housing in 1958, were based on the recommendation of the then Armature Sport Council on the assumption that school would have their separate playing fields and the standards were as follows:

❖ community of 1 000 person	—	5 acres
❖ over 3 000 of person	—	7 acres
❖ over 5 000 of person	—	11 acres
❖ over 10 000 of person	—	14 acres



These standards however related to minimum standards therefore the proposals made were based on slightly higher standards of 3 acres of local recreational open space per 1000 person minus school playing fields since it was difficult to determine future demand on open space

Local recreational open spaces were proposed to be a maximum of a quarter mile walking distance for children and half a mile for adults. The 1958 Accra town plan covered both major and special open space:

**The Coastal Strip and Green Wedges:** These were to form the basis of the open space system in the CBD the coastal strip was and still is considered one of Accra's greatest assets. This strip as covered by the plan stretches from Manprobi, on the west of the CBD to La, on the east and is included the old Winneba Road, 28<sup>th</sup> February Road, High Street and the Ada Road. It was suggested that dense development along the strip should be avoided as it would reduce the air flow to city and therefore any physical development should be limited to carefully designed and sited restaurants, clubs and other facilities for sport activities and other recreational activities.

The proposed "Marine Drive" which was supposed to extend from the Legion Hall to the Christiansburg Castle, has been an area zoned for public open space since the first draft in 1944 but none of it has been implemented (See figure 2-16).

The '*green wedges*' as described by Trevallion were the patches of open space or greenery left between developments to separate residential areas from each other thus breaking the monotony



of vast unbroken areas were also to offer the opportunity to accommodate recreational activities and safe pedestrian ways.



**Figure 2-16**     *The proposed Marine Drive area (Travellion, 1958)*



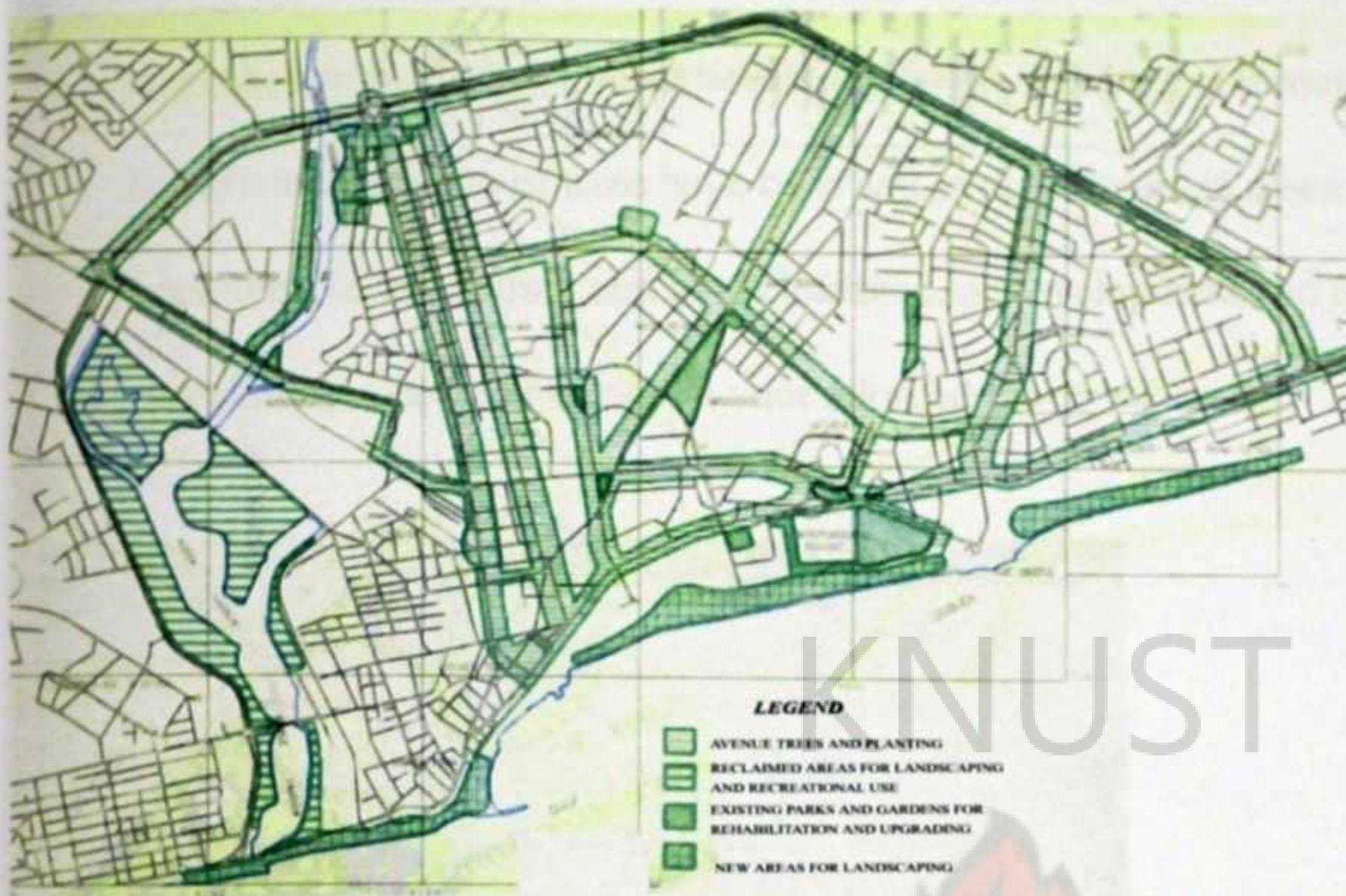
**Figure 2-17**     *The proposed green network showing the “green wedges” and the coastal strip area (Travellion, 1958)*



These green wedges were protected from development until they were gradually encroached upon until now that the Accra C.B.D has no nature reserves. The 1958 plan made provision for four parks and an Accra Woods, a replica of the Bois de Boulogne in France. This was to be located in the flat, low-lying land which sees flooding from the Odaw River yearly. Special open spaces proposed included the Accra Turf Club (race-course), Stadium and Cricket grounds (only the stadium is beneficial today). The Supreme Court gardens, Church street gardens, Cathedral gardens, New Marine gardens, Cow Lane gardens and other town gardens were catered for by the plan with a tree planting and management programme that was supposed to be sustainable.

Thirty years on however, many of the proposals contained in this sound proposal, which was to cater for development until 1980, had not been implemented. Meanwhile Accra kept growing without the plan deepening the mess the city was already in. This inspired the Accra Metropolitan Authority, through the Department of Town and Country Planning with the assistance from UNDP and UNCHS (HABITAT), to draw up a 5 – year Development Programme in June 1993. This period has also elapsed and the Accra C.B.D has seen little change.





**Figure 2-18**      *The 1993 greenery proposal for the CBD (Source: redevelopment and investment plan for accra central area, 1993)*

#### 2.1.4.3 Factors Affecting Greenery in the CBD

Issues affecting greenery and landscape in the CBD include:

1. Land and land – related problems. Due to the long process involved in land acquisition, high land values and the complicated system of land ownership, it is very difficult to get land for greenery or any other recreational activities such as parks and gardens. Another land related issue is the diversion of land zoned for greenery for other uses. This is seen in the tendency to perceive land zoned for open space and greenery purposes, as reserved undeveloped land which can be drawn upon wherever there is a difficulty in finding land for a particular project. Open space sites are therefore “nibbled” away until there is none left.



2. Weak efforts at implementation of legislature. Legislation for the protection of landscape is weak, leading to trees being needlessly felled or damaged through improper pruning.
3. Significant numbers of trees have been lost over the years to disease, old-age, irresponsible tree felling and land clearance for development and natural process especially the coconut trees that once adorned the coastline.



**Figure 2-19** *Tree felling activities in the CBD*

4. There is lack of funding from government for recreational facilities due to other “more prioritized developments”.
5. An over emphasis on sports as the major form of recreation, is detrimental to the development of parks and gardens, promenades, zoos, bird sanctuaries, etcetera which are all diverse means of recreation.
6. The misuse and lack of maintenance are issues that seriously affect existing landscape and open space. When the open space is not maintained, it is most likely to attract



unauthorized uses, but where gardens and parks are regularly tended, trespassers like hawkers, and madmen generally respect it, allowing the targeted users to enjoy the space.

7. The absence of guidelines for landscaping formal areas, road edges and corridors, trees and shrubs planted are either unsuitable or grow to interfere with engineering works, buildings and motorists' visibility, eventually leading to their clearance.

#### 2.1.4.4 The Image of the City

*"Like a piece of architecture, the city is a construction in space, but of a vast scale, a thing perceived only in the course of long spans of time" – Kevin Lynch, The Image Of The City.*

A city's image is the mental picture and the memories possessed by its citizens and the meanings they read into them. What they remember, feel and imagine at the mention of the particular city's name. Nothing in a city is experienced in isolation; its elements – paths, edges, nodes, landmarks and districts – are always experienced in relation to each other. For the purpose of this study however, the image of Accra will be discussed only in terms of its paths and edges.

#### ❖ The paths in the CBD

Paths, which can also be described as the 'veins' of the city, according to Kevin Lynch, are the channels along which the observer moves through the city as a motorist or a pedestrian. Paths include streets, walkways, footpaths, transit lines, railroads and canals. The CBD of Accra has no canals. Its paths are mainly streets, walkways and a railroad. These paths will be discussed in terms of accessibility, safety, comfort, meaning and delight.



The High Street will be used as a representative of the major paths. It stretches from the Independence Arch to James Town. It marks the entry to the commercial core from the east and the exit to the west. Its width varied along its almost 3000m length. At its entry it is 6m wide; it gradually opens up to 13m and closes out again at 6m.

The High Street is easy to find and can be accessed from several other streets. This street as compared to other streets presents the pedestrian with a higher level of safety. Since the street is flanked by relatively wide edges, there is no pedestrian vehicular conflict (except for the James Town area), and it is well lit at light. Comfort through, as seen in most of the streets in the CBD is absent as the observer is exposed to the full glare of the sun.

The streets and roads in the CBD are not places that encourage participation. People are always in a hurry to transit the streets within the shortest possible time as they present no features that will entice them to stop and talk, sit and watch, and so on. The streets in the commercial core have been an extension of the market with hawkers taking over any paved walkways available leaving pedestrians to keenly compete with vehicles. Comfort is experienced more in the Ridge residential area where the streets are well shaded with mature trees. The exact opposite can be said of the streets in the James Town and Ussher Town areas.

Apart from the fact of it being an entry and exit to the commercial core, the High street also has a number of significant buildings and landmarks. The High and Supreme Courts, Old Parliament House, Kwame Nkrumah Mausoleum, Polo Grounds (where Dr. Kwame Nkrumah proclaimed Ghana's Independence), the Ministries, banks and other state buildings and organizations give



his street its significance. Other streets are characterized by heavy trading activities. Delight is not to be remembered or imagined at the mention of the CBD of Accra.

The Railway is a pre-independence path and the only one in the CBD. It transports commuters (often traders) from the northern parts outside Accra to the CBD. It is characterized by heavy commercial activity at its terminal with an over – spill of the Salaga Market, chaos and filth.

Walkways are usually very narrow and also serve as the edges of the streets, and extension to the shops in the commercial core area. None is however covered.

#### ❖ Edges

Edges, by definition are “the linear elements not used or considered as paths by the observer.”

They include fence walls, shore lines, edges of development, railroad cuts, topography, green belts etc. The street edges in the commercial core of the CBD are either used as exhibition space for shops or taken over by “table –top” sellers and hawkers. The edges outside the commercial core are relatively wider but mostly unpaved or bare, with roots jutting out in the areas with some amount of tree planting especially in the Ridge Area.

The coastal front and the Korle Lagoon edges are the most significant of the edges in the CBD.

The seashore is virtually vacant in terms of land use except for the James Town fishing harbour and the Osu canoe landing site. Most of it is burdened with indiscriminate disposal of excreta and refuse. Sections of it also attract drug peddlers and lunatics making it a dangerous place for the CBD user to be. There are virtually no trees and ground cover is very scanty. Coastal erosion



has destroyed parts of this edge with an annual erosion rate of 1.5m (source: National Tourism Development Plan, 1996 – 2010; Final Report, February 1996).

The Korle Lagoon is heavily silted and has become a receptacle for both domestic and non-domestic waste far beyond the CBD. This has destroyed all the aquatic life in the lagoon. Even though it has quite wide edges the stench that emanates from it makes it very unattractive for any recreational activity. Squatters have started settling on the banks. The city's image is therefore that of harsh discomfort and unsafe for pedestrians. The atmosphere is very chaotic with the vehicular traffic congestion making it unbearable for motorists as well. The glass and concrete buildings cause glare and their reflected heat combined with the sun's direct heat.

**2.2 Contextual Study of Singapore**

**2.2.1 Why Singapore?**

Below is Table 2-4, a comparative study of the similarities between Accra and Singapore which informed the choice of the city-state:



Table 2-4 Accra – Singapore Similarities

Accra	Singapore
founded as a port city	founded as a port city
British Colonial Masters	British Colonial Masters
Independence 1957	Independence 1959
Climatic: temperatures $24.7^{\circ}\text{C} - 28^{\circ}\text{C}$	Climatic: temperatures $24-32^{\circ}\text{C}$ .
Once covered with forest	Once covered with forest
Environmental problems: poor sanitation, unemployment, hawkers, indiscipline, depleting greenery	Once faced with similar environmental and social problems

### 2.2.2 Background and brief history

Singapore was founded in 1819 (Sien, et al., 1991), by the British as a trading post led by Sir Stamford Raffles. It became a major port – of – call for steamships plying between Europe and East Asia in the mid – 1860s as the Suez Canal was opened in 1869. Before the close of the 19<sup>th</sup> century, Singapore enjoyed unprecedented prosperity and trade expanded eight fold between



Lee Kuan Yew wrote in his book; from Third World to First, that Singapore never had one common language and was a polyglot community during the period of colonialism. When he formed the government in 1959, Malay was decided upon as the language, to pave the way for a merger with Malaya, it was soon realised however that Singapore will not survive as an international trading community if Malay, Tamil, or Chinese was chosen. Therefore in order not to satisfy any particular tribe with the others feeling marginalised, the government chose four official languages: Chinese (Mandarin), Tamil, Malay and English each of equal importance. The government finally decided on English as the first and administrative language and mandarin as the second by 1987 after several years of opposition and campaigning.

The religious aspect of Singapore is as diverse as its people. The religious society of Singapore consists of Buddhism31.9%, Taoism21.9%, Islam14.9%; Christianity12.9%, Hinduism 3.3%, other religions0.6% and those without any religion make up 14.5%.

**2.2.4 The physical environment of Singapore**

The characteristics of the natural environment of Accra has been summarized in table... below

*Table 2-5      Characteristics of the natural environment*

No.	Element	Characteristics
1	humidity	84.4%
2	Rainfall	736mm annually; December is usually the wettest month of the year
3	Soil	Originally too acidic, enriched regularly with compost and lime
4	Geology	Three major rock formations: Palaeozoic rocks, granites and the



Jurong Formations. More than 60% of the land surface is below 30m. The highest point of the island is Bukit Timah (166 m/545 ft)

5	Climate	Tropical, Temperature - 24 <sup>0</sup> C - 32 <sup>0</sup> C
6	Flora	Extensive mangrove swamps along the coast

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### 2.2.5 Singapore before The 1960s

In the pre-historic era, settlers on any piece of land were mainly hunters and food gathers, and Singapore was no exception. They were very few and in temporal habitats, therefore their effect on the vegetation could be ignored. (Corlette, 1992). The process of primary vegetation replacement began at the advent of the agriculture when more and more land was cleared for farming. The little “temporary” structures also increased in number and soon turned to hamlets, then villages.

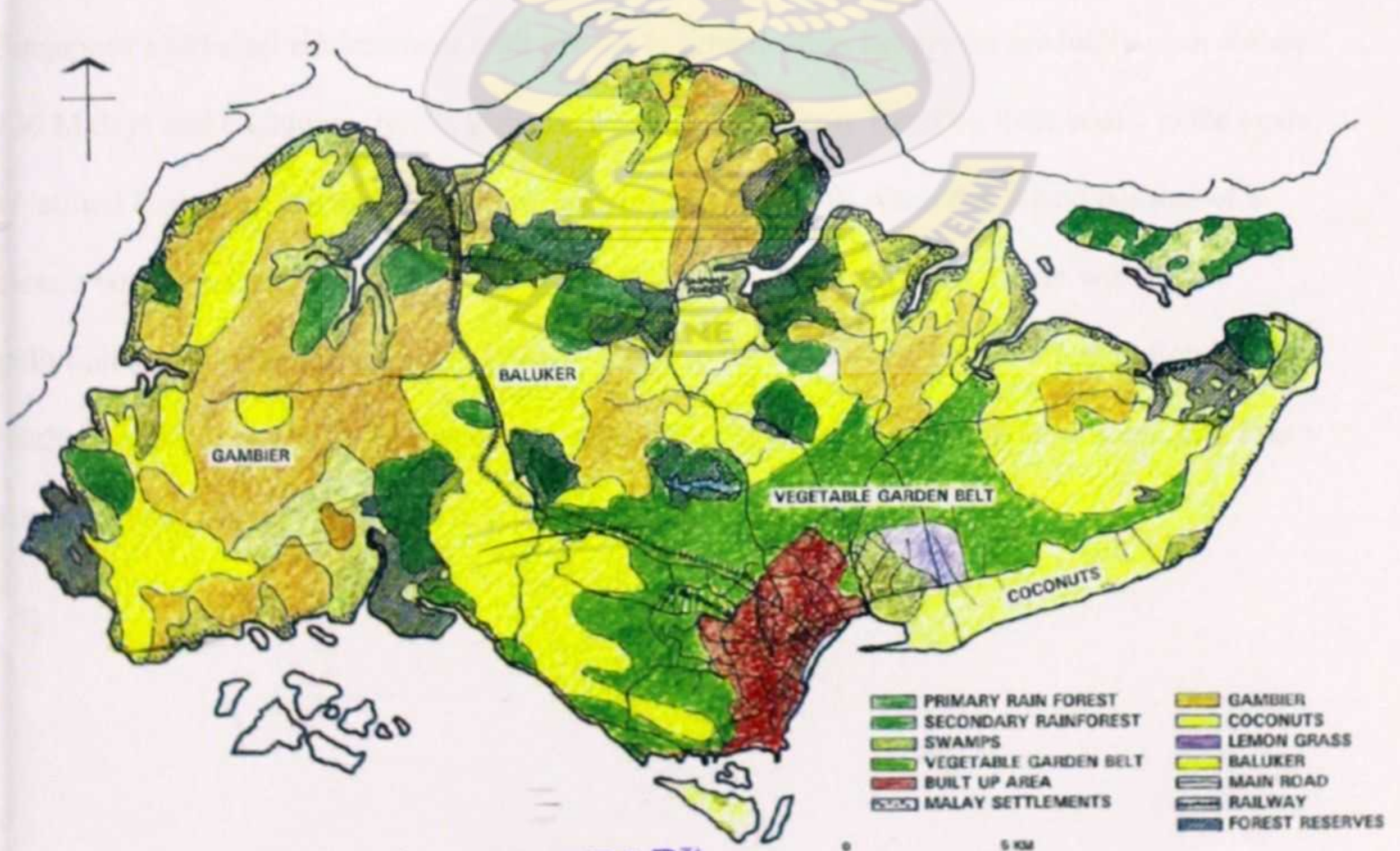
When the Europeans arrived on the land, in the 1800s, the natural environment was still close to its original condition, covered with rich tropical rainforest filled with various species of flora and fauna, including tigers. (Waller, 2001). Mangrove flora covered river estuary banks and also grew further inland. By the mid-19<sup>th</sup> century, plantations of Gambier - (a cash crop for tanning leather and dyeing cotton which required virgin soil for maximum yield and an equal amount of firewood to boil the harvested crops) - and pepper immensely accelerated the clearance of the primary vegetation. Canalization of rivers and streams was also carried out in an attempt to widen and deepen them. Large tracts of land were also cleared for experimental crop production which failed (Lui, 2000).





Figure 2-20 Plantations of gambier and pepper. (Source: Lui G. Singapore a pictorial history 1819-2000)

Figure 2-21 Below, map showing the spread of various uses of cleared forests (Source: Landscape planning in Singapore, 2001)





By 1883, according to the then Superintendent of Singapore Botanic Garden, Nathaniel Canthey, only about 7% of the original vegetation remained with about 50% of the island under cultivation. (Waller,2001). After the world war in 1947, more land was cleared for military installations and small family farms out numbered the plantations. Severe compaction of the soil and the impervious nature of ground covering especially in the urban areas coupled with industrialization, damaged aeration in the soil, its drainage and increased air pollution. Consequently, the climate of Singapore changed – humidity reduced while temperatures, air movement and light intensities increased. The over-cultivation and repeated cycles of construction gradually reduced the soil's quality and capacity to sustain plant life. Plantation agriculture was not the only cause for the depletion of Singapore's original greenery. Urbanization played a very active role in this phenomenon (Liu, 1999).

Singapore's physical environment with respect to urbanization has grown gradually from a mere 130 Malays and 6 Chinese, living at the banks of the Singapore River on their boats, to the years of stilted timber houses with thatch roofing, through the 1880s when the island boasted of 8 classic hotels and people gradually moving out of the over-crowded city centre with all the pollution and diseases between the 1900s – 1940s to the outskirts (Singapore Urban Renewal Authority, 2004) to the 100% urban city –state full of skyscrapers and condominiums, and four – six lane purely asphalted streets.





**Figure 2-23**      *Chinese “boat-house”*  
(Source: the ultimate postcard, Singapore)



**Figure 2-22**    *stilted Malay houses in a coconut plantation* (Source: the ultimate postcard, Singapore)



**Figure 2-24** *view of Raffles Hotel*  
(Source: the ultimate postcard, Singapore)

Manufacturing industries, telecommunication installations, oil refineries, trading out-posts and more docks also meant more forest clearing. This is seen in the 1823 plan by Sir Stanford Raffles as Drawn by surveyor L.T Jackson. The reduction in the “tiger – infestation” (killing 200-300 people annually) of the island quickened Singapore’s urbanization process.





**Figure 2-25**      *A coloured lithograph showing tiger attack, 1840s*

*(Source: Lui G. Singapore a pictorial history 1819-2000)*

## **2.3 An Ecological Approach to Urban Greening**

### **2.3.1 Sustainable Development and the City as an eco-system**

A city is a “complex mesh of people, lifestyles, machines, buildings, politics and power.”<sup>2</sup> A sustainable one, which is that which according to Cliff Moughtin, 1996, is non-damaging to the environment and which contributes to the city’s ability to sustain its social and economic structure, can be designed only if the way it works is fully understood.

A lot of literature has been written on sustainable development and they mostly stem from Brundtland Commission’s definition in AGENDA 21 which says that, “a sustainable

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<sup>2</sup> Sustainable Ecosystem and Built Environment, Battle G, McCarthy C, 2001



development in that which meets the needs of the present generation without compromising the ability of future generations to meet their own needs.” (Earth summit 2002, briefing paper),

Immense importance is ascribed to the conservation of landscapes as plants, especially trees and planted spaces, have the greatest influence on a city’s sustainability. They help conserve wildlife and changeable environmental elements like air temperature acoustics, wind speeds, natural ventilation and other natural resources. Their shade helps reduce the *heat-island effect* and the cooling load of buildings. They minimize flood frequency and control its degree of damage as the plants and planted spaces capture rain and reduce runoff. Plants increase the value of landed property and humanize the tall glass and concrete buildings characteristic of cities. They are also the source of food, clothing, shelter and medicine for both humans and animals.

A city works by receiving a lot of input of raw materials (e.g. oxygen, carbon dioxide, etc.), digesting them and releasing lots of products including waste. A city’s sustainability is determined by the ratio of useable products to waste products. If the latter supersedes the former then it is bound to grind to an ecological halt. This Guy Battle et al (2001), referred to as a city’s *metabolism*, which consists of six different cycles with each affecting the other. They include, materials, building and construction; transportation; landscape and ecology; energy; water; waste and micro-climate. For sustainability, the waste produced by one cycle should be capable of serving as raw material for another cycle (it should be sufficient and not in overly excessive quantities). It is the recycling of resources between animals, and plants that has kept the planet in its relative ecological balance, and a high level of biodiversity is required to maintain this equilibrium.



This implies that for a development or city to be described as sustainable, materials for construction, for example, should be recyclable, low in energy consumption, with high albedo or reflective index, and wastes from transportation systems should be appropriate as raw material for another cycle to begin, and so on. Depletion supersedes sustainability because the planet which is the capital input is being threatened by over-production, i.e. mankind is consuming at an alarming rate the earth's resources without replacement, thus threatening its life supporting capacity (Moughtin, 1996).

Sustainable development / landscape can be created if methods of assessment, design and planning that depends not only on physical appearance but also on the degree of its closeness to nature, can be developed. An example is the Green Plot Ratio (GPR) which is a new architectural and planning metric for greening in cities based on the Leaf Area Index of plants. This theory according to Ong Boon Lay, 2002 (abstract), allows more precise regulation of greening on site and in cities protecting the green quota in its design.

### **2.3.2 GREENING – UP CITIES**

#### **2.3.2.1 The Greenways Approach**

In the greenways approach to urban greening the city is treated as an extension to the natural world and is quickly becoming a very important theory for the conservation of nature and humanization of cities. Greenways, also called landscape linkages, environmental corridors, wildlife corridors and riparian buffers are linear open spaces and corridors composed of environments suitable for fauna habitation in densely built – up areas. This approach ensures an ecological balance in the city since animals move along green routes (Hill, 1995).



They can be established along streams, stream valleys and riverfronts (riparian), ridgelines and ridge tops, abandoned rail lines and canal towpaths or scenic roads, by the development of soft landscaped routes as far away from vehicles as possible, using road verges for planting, trees for shading avenues instead of constructed covering and use of hedges for barriers instead of fence walls. They can include trails, bike paths, streams suitable for canoeing and city sidewalks especially where recreational needs of the people also have to be met.

Greenways give protection to waterways by maintaining high water quality, prevention of non-source pollution and reduction of evaporation. Fauna is also protected by the reduction of the impact of habitat fragmentation, allowing animals to move freely within and between developed habitats. They create a connected network of open spaces and communities, help maintain ecological integrity in cities, and create opportunities for recreation and exercise in urban centres while making people appreciate nature (Smith, et al, 1993). They can also act as green belts to control the sprawl of development.

### **Planning and Design of Greenways**

- ❖ They must be connected to larger reserves
- ❖ Their location, size, shape, types of habitats contained, and nature of human activity in and around it must be favourable as this greatly determines its success.
- ❖ Less space is required and therefore less costly to implement.
- ❖ The context should be studied very well paying attention to the pattern of elements and mapping of land-cover and land-ownership.



- ❖ The reasons for their establishment should also be clearly defined: recreation, heritage, aesthetics, education, conservation.
- ❖ Where it is a riparian corridor, impact of surrounding land uses must be identified and understood and the width should cover the natural meandering span of the stream including its flood plains, the riparian forest and of the water body's shallow ground water system and wetlands (these form its ecosystem). Livestock should be excluded from riparian greenways as they feed on vegetation that is meant for the protection of the water.
- ❖ Where recreation is needed in the greenway, facilities like trails, access points, photograph areas, visitor centres, etc. should be provided and off-trail use by visitors should be discouraged, locating centres of activity at the edge or outside the greenway.

### **Riparian Greenways**

Riparian greenways are natural corridors with running water, moist and fertile soils, and well developed vegetation. They are the interface between land and water and are important for both conservation and human use. They moderate in- stream flow, reduces bank and flood plain erosion by slowing the stream and reducing its erosive energy. The trees and shrubs produce shade and control water temperature which is essential for aquatic life. Humans use them for transportation and agricultural purposes; however, waste disposal into the water bodies, canalization for flood control and power generation, diversion of water for agricultural needs, leads to decline in riparian vegetation and aquatic life thus destroying it. The widths of riparian greenways should vary in proportion to the impacts of adjacent land uses. For example, dense



housing developments require wider corridors and the width should be increased where recreation is an object in the design (Smith et al, 1998).

#### **2.3.2.2 The Ecological Approach**

This concept is also called “wilderness” or “informal” gardens approach. They are usually applied to degraded land that needs reclamation. For example, deforested woodlands, derelict buildings, abandoned farms, disused railroads, mines wastes. the crux of this approach is the ability to replace lost nutrients and keep it in the soil until the natural life/ecological cycle begins to take over (Hill, 1995).

Wilderness gardens are cheap to install and relatively more economical to manage and can be used also as an ecological buffer against plant specific disease. Land refill is often necessary, during implementation, to restore original landform and counter erosion, where the site has suffered from over-compaction, the soil ought to be loosened and infertile soil should be covered with a layer of soil rich in seeds and humus, protecting it from direct sunlight and rain via mulching. The succession process can be quickened by to introduction of fast growing trees and shrubs. This will create strata typical to the natural vegetation area. Human intervention is needed however to prevent the over-breeding of particular species once the succession process has been established.



### **2.3.2.3 The Culture – Aesthetic Approach**

In this approach, the overall concept and symbolism are more important than anything else therefore planting is done carefully using plants as the elements, and they are chosen according to their position in the overall design. The only fauna introduced are those that will enhance the beauty of the landscape, e.g., peacocks, pigeons, doves. Spontaneous ones are vehemently kept out even with chemicals where necessary. Cultural –aesthetic landscapes are used in formal settings like ceremonial streets, civic buildings (courthouses, parliamentary buildings), and historical gardens. They require very high level of maintenance and this is very expensive. Where maintenance is available, these gardens are very beautiful and apt for cities since various colours, heights, shapes, textures can be created.

### **2.3.2.4 Nurtured Landscapes and Planting for Produce.**

Natured landscapes are not ecological entities in themselves; however, they mediate between the urban/industrial environment and the natural ecosystem. They provide a basis for the development of new ecological technology using landscape to ameliorate the polluting effects of the urban/industrial neighbourhoods. Since they are man-made they support human activities easily (Boon Lay, 2004).

Irrespective of how advanced a city could be, there will be some city-dwellers who depend on subsistence farming so long as there are a few strips of un-built land, and this will be done legally or illegally. Therefore such narrow strips of land that are flood prone and therefore unsuitable for building and too small for commercial agriculture are allocated to them. Where



land is available planting can be done for commercial crop production as seen in urban agriculture and horticulture.

#### 2.3.2.5 Feng Shui Approach (The Basic Principles)

Feng Shui is one of the spiritual ways to approach landscape design. It is considered in this project because the overall outcome of any garden /open space based on this concept is pleasant, both to the eye and the other senses. The term 'Feng Shui' means 'wind' and 'water' (cosmic energy) and it is the "ancient Chinese art of harmonizing your surroundings to influence your health, success and happiness" (Jay, 1998). The Chinese believe that cosmic energy is contained in everything and it flows like the wind and water through them. This process can either be enhanced or impeded with each having its own results on the lives of the users. Even though Feng Shui is presently used in the design of buildings and interiors, it was originally used for the design of gardens. The design of the garden – its element plants, paths, edges, water, lighting, shelter, sculpture – is based on the four main directions of the compass and eight secondary coordinates with each coordinate giving a kind of energy that influences a particular aspect of the users' lives.

*The North*, symbolized by the *Black Tortoise*, is the part of the garden / landscape design where children can play as it brings in a lot of nurturing energy, which is very caring and protective. This part governs the relationships of the users of the space. The design of this part of the open space should therefore encourage interaction among the users. *The South* is symbolized by the *Red Phoenix*. This is believed to be the best direction for a garden or open space to face. The energy from the south is 'bright, lucky, happy and full of energy. This part (also called fame)



governs reputation and it's a good place for users to enter a landscaped open space (for "first impressions"). This area of the open space should not have any quiet areas or 'private' niches.

*The West* is the coordinate for the *White Tiger* and this brings unpredictable and sometimes dangerous energy with it, too much of this energy is advised to be avoided in the open space. This governs pleasure and indulgence and it's the part of the garden for having fan – food joints, space for parties, and other social gatherings. *The East* stands for the '*Green Dragon*.' This gives energy full of wisdom, kindness and growth. An overdose of this energy will cause the greenery in the open space to overgrow. This part of the open space design should be for quiet niches for reading or other "private areas." The north – east governs children and family, south – east governs material wealth, south west controls health and happiness (will be and excellent part to have excersice areas) and the part can use the seedlings or seed bet for raising young plants ( Craze et al, 1998).

#### ❖ Massaging The Elements

The various elements in a landscape design can be modified to either encourage or deter any of the energies discussed above. In the urban setting this is particularly useful when used by landscape designers and planners in collaboration with the city authorities to achieve certain positive goals in the users. For example, the boundaries which are the first elements that control the entry of any energy can have their heights, thickness or density can be adapted to suit any requirement.



### 2.3.3 GREENERY VERSUS HARD LANDSCAPE

Greenery, also soft landscape, includes all the planted areas, grass, trees, soil and sand. Hard landscape encompasses hard surfaces, structures, planters and seats.

#### 2.3.3.1 Soft Landscape

The factors to consider when choosing plants include:

- ❖ their aesthetic qualities
- ❖ physiology and growth habits
- ❖ planting and maintenance needs
- ❖ a knowledge of the characteristics of the species
- ❖ underground services location or routes
- ❖ overhead cable routes and heights above the ground
- ❖ drainage systems (foliage shed could clog drains leading to flooding)

In the arrangement of plants, the possibilities range as wide as the human imagination stretches. Arrangements are not rigid neither are there rules cast in concrete. However, the following can be used as guidelines when designing the plant arrangement:

- ❖ Continuous low planting can be used to provide links between focal elements.
- ❖ Planting scale should be proportional to the area size
- ❖ Tall plants should be behind shorter ones so that they can all be enjoyed by the observer
- ❖ Tall fragrant plants and fine blossoms should be closer to the observer because they are better enjoyed at close range.



Since urban areas require large areas of hard landscape, heat islands are inevitably created and this effect can be reduced by:

- ❖ Using pergolas with well-tended plants.
- ❖ Using avenues of flowering and fragrant trees to enhance the city
- ❖ Using plant barriers like shrubs, hedges or trees instead of walls.

### **Plant Maintenance**

- ❖ Trees, shrubs and ground covering perennials require less maintenance than annuals.

Where annuals are used there must be steady maintenance with potting sheds, shade houses and a team of gardeners to keep up the cycle of planting as any neglect will render an annuals bed a weed patch or refuse dump look.

- ❖ Ground covering should be in large patches instead of small bits to make it easier and less time consuming to mow.
- ❖ Shape of the plant containers should not conflict with the natural shape of plants.
- ❖ It is noteworthy that the more extricate to design, the more time-consuming and costly it is to maintain.

### **Some Recommended Plants for the City of Accra**

The following are some plant recommendations for Accra. These are tropical plants and thus are suitable for the climate.



Medians

❖ trees

- Ficus benjamina
- Casuarinas equisetifolia
- (Topiary shaped)
- Cordeas sebestina



Figure 2-26 *Ficus benjamina*

- Polyalthia longifolia
- Veitchia Palms
- Cane Palms
- Bauhinia
- Acacia auriculaformis



Figure 2-27 *Cane Palms*



Figure 2-28 *Veitchia Palms*



❖ Shrubs

- *Lagerstroemia indica*
- *Lagerstroemia alba*
- *Nerium arleander*
- *Allamanda catrtica*



Figure 2-29 *some types of Lagerstroemia indica*

- *Ixora red& yellow*
- *Bougainvillea sp*
- *Cassia floribunda*
- *Calliandra caracasana*



Figure 2-30 *Cassia floribunda*



Figure 2-31 *Ixora red*



## houlders

### ❖ trees

- Lagerstroemia speciosa
- Millingtonia hortensis
- Albizzia lebbek
- Cassia fistula
- Peltophorum pterocarpum



Figure 2-32 *Lagerstroemia speciosa*

- Terminalia montalis
- Blighia sapida
- Gmelina arborea
- Acacia auriculaformis
- Tabeibua rosea



Figure 2-33 *Acacia auriculaformis*

## Marine Tolerant Trees

- Thespesia sp.
- Cocoloba uvifera
- Calophyllum inophyllum
- Acacia auriculaformis
- Tabeibua rosea
- Casuarina equisetifolia



Figure 2-34 *Thespesia sp.*



### 2.3.3.2 Hard Landscape

Hard landscapes provide safe, low maintenance passage routes for vehicles and pedestrians, indicating the routes and patronizing usage whether for pedestrians, vehicles, bicycles etc. hard landscape also indicates ownership. Factors that affect the choice of the hard landscape include safety and comfort, cost of implementation, appearance and subsoil condition, durability and maintenance.

#### ❖ Landscape Furniture Structures and Works of Art

“Landscape furniture” includes seating, lights, signs, litter bins, planters, bollards, play structures, shelters, and other structures.

##### *Seating and Tables*

These can be incorporated in low walls, steps, pool / and flower bed surroundings, planters, bollards and other existing element as this is more economical and unobtrusive. They can also be free-standing, in which case they form directional foci. The Seats should be easily accessible from pedestrian routes with a minimum of 2m allowance left in front of seating that has paths going by in order not be intrusive. route junctions should have seating and the needs of different users should be considered -passers -by, picnic Groups, onlookers, the elderly, disabled and children. The surfaces should be self- cleansing, smooth, non-porous, and the design should be without crevices as they collect dirt.

##### *Litter Bins*

The number and size of litter bins provided depends on frequency of use. large bins are more expensive and difficult to maintain but require less attention compared to smaller ones. They



should be made from durable, fire-resistant, non-corrosive and washable material and their location should be easily seen - attachment / incorporation into lamp-posts, signage, etc. enhance this.

### *Lighting*

Lights can be programmed to respond to daylight, turning on and off correspondingly, change color, intensity, etc. depending on what the designer intends to achieve with them. Landscape lights should be protected against vandalism and theft as they often fall prey to this. They are categorized into highway lights, footpath and amenity lights, and lights for areas of interest, decorative lights, and illuminated signs.

❖ Highway lights – safety is principal aim for their provision.

- avoid glare by placing far above driver's line of vision
- The lamps can be attached to existing structures if their visual impact is to be reduced.

❖ Footpath and amenity lighting

- They should be illuminated with evenly distributed lights and not pools of light.
- Steps and ramps must be very well lit
- Unlike highways lights can be set close to the ground and should be strongly protected from vandalism.

❖ Areas of interest

They include plantings, ~~sculpture~~, buildings and water features. They can be used to reveal features that go unnoticed during the day and also to change structures' colour,



in which case the three - dimensional forms of buildings and sculptures should be carefully studied before lighting design as even distribution will make the object flat. Moving water is better appreciated when back- lit, with water droplets acting as prisms and lenses, making droplets appear as miniature light sources especially when indirect. If the water body is a reflecting pool, the pool itself should be left unlit, while the object to be reflected is highly illuminated, this will cause the reflection to shine from the water giving it a “trompe l’oeil” effect.

#### ❖ Decorative lights

- Thin neon tubes are very malleable and can give any colour. They are used as ‘light sculpture’, and to decorate other landscape features.
- Intense laser beams can be used to illuminate moving particles in the air.
- If fittings of decorative lights are visible during the day, then they should look good.

#### ❖ Illuminated signs

These are either self-illuminating or dependent on exterior source of lighting.

#### *Signs*

Any landscape that is over- populated with signs is an indication of its poor design. A well- designed one should naturally make the use of paved areas by pedestrians the preferred option rather than walking on the grass, for example. Information and guidance therefore should be very clear with the font size, type face, and colour of lettering versus the background being very legible, from a distance.

Urban areas are enhanced by signs where they are numerous and each competes for attention. This adds liveliness to the area. Signs for emergency facilities should be prominent, for example,



using colours like red, while map sign should be easily located of the public route. On the contrary, signs for identification on plants and monuments can be quite small since an interested pedestrian will usually draw close to read the information neither should street and other path names be so prominent as the pedestrian will usually make a conscious effort to find them - a standardization of the display mode, colour, lettering and lighting above ground will make them quicker to locate. Signs and their supports should not be obtrusive or hazardous. Where many signs are needed they can all be designed into one with single supports, they could also be attaché to other structures like furniture and walls thus eliminating the need for support. They should be maintenance-free, durable and self- cleansing - Wood, concrete, treated cast iron or plastic can be used as backing material.

### *Planters*

Planters cover all types of plant containers and the advantages derived from their usage include the following:

- ❖ soil type can be controlled therefore plant species which otherwise would not grow can be planted
- ❖ soil can be nourished against specific plant diseases
- ❖ weeding is easy
- ❖ can be used to provide temporary & mobile greenery where needed
- ❖ they are the most flexible landscape feature allowing for more creativity& pleasure as these can be moved at will.
- ❖ Can be used to raise specimen
- ❖ Can be used as bollards, windbreaks, direct pedestrian eyes to a focal point.
- ❖ contain growth medium
- ❖ good drainage



- ❖ durable
- ❖ good-looking
- ❖ low maintenance, needs only clearing

### *Bollards*

They are used to restrict vehicular access. Spacing should however allow wheelchair passage and provide protection. They are located along edges of narrow paths and beside large windows near traffic.

### *Shelters & Other Structures*

The metal and timber used for the construction of shelters should be treated and protected against corrosion and rot. They shelters which include, pergolas, gazebo/ summer huts, trellises, tool shed, greenhouse, can be obtained already-made or constructed from scratch (Hill, 1995).

## **2.3.3.3 Open Spaces**

### Types of Open Spaces

The type and hierarchy of open space provision is determined by an assessment of the quality of existing provision, the climatic conditions and the needs that have to be met. Open space types include:

- ❖ *Greenways*: A network of spaces encompassing cycle and footpath routes, while acting as “wildlife corridors” – enabling wildlife to move through the urban areas.
- ❖ *Woodland / Nature Reserve*: A coppice of trees left in the natural state and designated as a reserve with restricted access due to its richness in wildlife.
- ❖ *Waterway*: This includes lakes, ponds, rivers, canals and streams which provide rich wildlife habitats, offer recreational value and can be used as movement corridors.



- ❖ *Meadow*: This is a public space for informal recreation, located on the edge of a neighbourhood and often part of a floodplain with natural grasses and wild flowers.
- ❖ *Playing Field*: This is an open space formally laid out for active recreation such as: football fields or golf courses. Their ownership and management can be shared by schools, clubs or communities. Some are also state-owned.
- ❖ *Church Yard*: This is often located adjacent to the church building, providing a green oasis at the heart of a community and used for various outdoor activities.
- ❖ *Allotments*: These are semi-public agglomeration of gardening plots rented to individuals by the local authority. Tracts of land which are too small for commercial farming and inappropriate for construction are often used for this purpose.
- ❖ *Green*: This is an informal grassed public space, rural in nature and sometimes incorporated with a football or cricket pitch.
- ❖ *Square*: A formal public space located at the focal points of civic importance fronted by key buildings. They are usually hard-landscaped.
- ❖ *Plaza*: A public place associated with extended pre-court of commercial buildings, with formal landscaping.
- ❖ *gardens*
  - *Communal Garden*: This is a semi-private space not accessible to the general public, usually located within the interior of a perimeter block, providing a centrally managed green open space for residents only.
  - *Private Garden*: This is very common. It is a private space located within the plot of an adjacent building.



- ❖ *Playground*: This is a small area dedicated for children's play, which is fenced and located within close walking distance to nearby houses, overlooked by residents.
- ❖ *Courtyard and Atrium*: A courtyard is a private space for outdoor living, (in Africa) and for vehicular servicing or parking, while the atrium is a glass covered semi-public or private space serving as a thoroughfare, seating area and sun trap for building occupants or visitors (English Partnerships, 2000).

Open spaces also include parks, streets, footpaths and other circulation routes in the city.





### 3 CHAPTER THREE – THE SINGAPORE STORY



*Figure 3-1 City Hall built in 1926 - 29*

Literature on the greening of Singapore shows that their colonial masters, represented by Sir S. Raffles had some respect for nature. He established the Singapore Botanical Gardens (SGB) in 1819 on Fort Canning Hill (then Government Hill), for both botanical and experimental purposes (NParks, 2005). When the adverse effects of the extensive cash crop farming was realized, nurseries were established in 1869 for the cultivation of useful ornamental trees and shrubs. This was followed 16 years later, by planting of timber trees along roads giving Singapore 5,626 trees, of 38 different species on 63 roads by 1924 (Corlette, 1992). By the 1950s most of the European



residential areas were well planted but the CBD was still hard, harsh and grey. Sir Raffles' Botanical Gardens had been abandoned in 1846.



**Figure 3-2** *Singapore Botanic Gardens on Fort Canning Hill (Source: the ultimate postcard, Singapore)*

The garden city that Singapore has today is a result of Prime Minister Lee Kuan Yew, who envisaged a “clean- and- green” Singapore to be the key to distinguish the Island from the other South-East Asian countries and to attract tourists and business people. The ‘Garden-City’ campaign, which targeted 10,000 trees per year started in July 1963. To achieve this ‘clean and green’ goal the prime minister had to work on the physical environment as well as the people. He used various techniques and they form the lessons for this research (Yew, 2000).



### 3.1 Executive Intervention

Apart from the Botanical Gardens which was renovated, other government institutions were formed to help achieve the goal. They include the following:

- The Parks Division of the City Council- they planted a lot of trees in the city with the Botanical Gardens giving advice and some planting materials.
- Parks and Trees Division (PTD) of the Public Works Department (PWD) were formed in 1968, including a new working committee.
- The PTD was merged with the Botanical Gardens to form Parks and Recreation Department (PRD) in 1976; this was under the Ministry of National Development.
- The National Parks Board (NParks) was formed in 1990. This was however merged with the PRD in 1996.
- In 1995, Senior Minister Lee Kuan Yew, opened the 3- hectare National Orchid Garden and a more recent government body that has been formed is the urban Greening Unit of the SBG, to promote sky rise and vertical Greening.
- The Annual Tree Planting Day was launched by Prime Minister Lee Kuan Yew in November, 1971 (as the rainy season started in that month) and this involved all members of parliament, community centres and their leaders (Yew, 2000).



### 3.2 Physical Intervention



Figure 3-3 *P.M Lee Kuan Yew celebrates Tree Planting Day, 1876*



Figure 3-4 *P.M Lee Kuan Yew leads in the clean and green campaign, November, 1959*

#### 3.2.1 Planning

The excellent efficiency of Singapore's physical environment today is a result of intense planning. There are two tiers of planning in Singapore; concept plans which deal with strategic / policy planning of the whole, and master plans which translate the vision and broad planning strategies of the concept plan into detailed achievable proposals at the local level (Urban Renewal Authority, 2006). These plans cover among others land-use detailing ideas and action



plans for main land transportation network, housing, agriculture, commercial, industry, business, parks, infrastructure, institution, special use and open space / recreation (NParks, 2005).

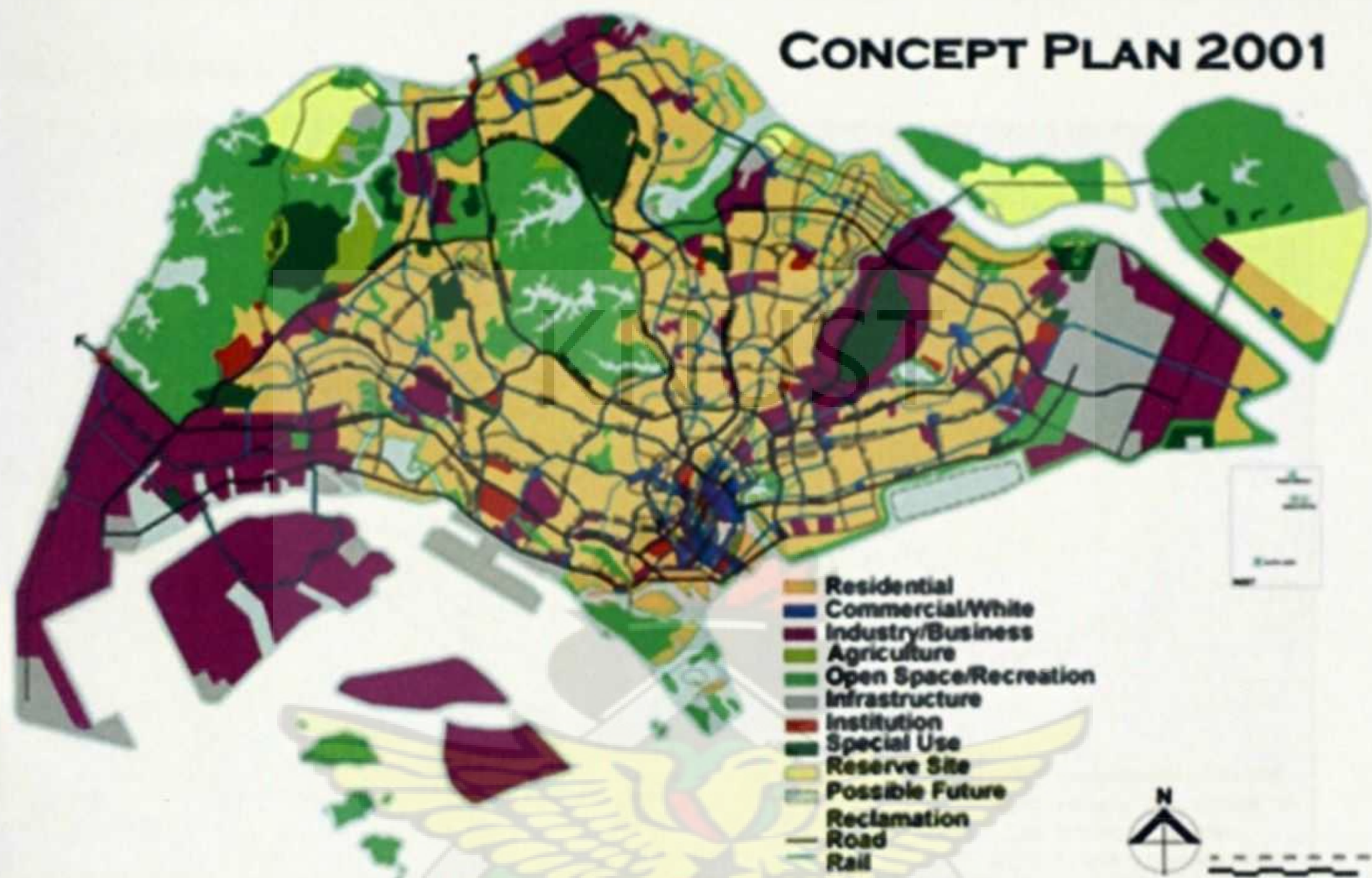


Figure 3-5 Concept Plan of Singapore (source: Urban Renewal Authority, 2001)



Figure 3-6 Model of the Master Plan in the URA gallery



○ The Parks and Waterbodies Plan

This is also called the Blue and Green Plan. This was drawn up together by the Urban Renewal Authority (URA) and National Parks (NParks) in 2002 as a guide for park development for the next 10 to 20 years.



Figure 3-7 the blue & green plan(source: Urban Renewal Authority, 2002)



Figure 3-8 Model of the Blue and Green plan in the city gallery



This plan seeks to create a variety of streetscapes, increase accessibility to areas of natural beauty, parks, create an additional 1,200 ha of new parks and extend the 40km park connectors to 170km by 2015. More water-fronts will also be opened up, and vertical greening improved. A Streetscape Greening Master Plan was developed by the Singapore Institute of Landscape Architects (SILA), to guide the greening and landscaping of the streets. The street types they created include rural, coastal, forest, gateway and parkway.

### 3.2.2 Greenery Strategies

The approach to the transformation of Singapore's landscape was systematic. Each of the 4 decades had its set of targets and achievements. Having launched the whole greening concept in the 1960s, 8000 different varieties of plants were brought in from Africa, the Caribbean, and other Asian countries but only 2000 varieties survived (Yew, 2000), of which some took too long to grow, while others that flowered beautifully at their place of origin simply produced no flowers at all. Another approach was therefore tried using stems of the Agsana tree. They were fast growing and tolerant of the poor soil conditions.

In the 1970s, the attention was driven to the quality of smells and colours of the trees as the numbers had been attained. Prime Minister Lee Kuan Yew had invited soil experts from Australia and New Zealand to study the soil in 1928. Upon their advice, fertilizers had been applied regularly, as well as lime due to the acidity of the soil. Having succeeded on the Prime Minister's lawn, it was replicated on school sports fields and then onto road edges. With the soil improved, flowering plants such as bougainvillea and *tabebuia rosea* were successfully cultivated and road codes were developed to ensure adequate plant areas along roads.





Figure 3-9 Some exotic flowers in Singapore (left – right), frangipani sp., heliconia,

Figure 3-10 Bougainvillea ixora sp. (below)



Figure 3-11 flowers at the Mac Ritchie Reservoir Park (Source: The ultimate postcard, Singapore)

Planting was also introduced into car parks to attenuate the heat generated by the extensive asphaltting. Other concrete surfaces such as flyovers, retaining walls, lamp posts, etc. were



covered with creeping plants or concealed with shrubs to provide visual relief. This period also saw the creation of more recreational facilities, example, swings and see-saws (NParks, 2005).



**Figure 3-12**      *Carpark*



**Figure 3-13**      *Greenery in the CBD*

In the 1980s, more colourful and fragrant plant species were introduced, example, chempaka and canon ball tree. Fruit trees such as mangoes were planted and maintenance activities such as grass-cutting were mechanized.



The 1990s saw more varied theme parks, example, historical, children’s play grounds and coastal parks. These were classified into regional, neighbourhood, city parks and park connector networks. The old parks were upgraded and the walkways were shaded. Adventure recreational facilities such as West Coast Park were created and ecological balance in these parks was deliberately worked at.



Figure 3-14      *A promenade in the city*



Figure 3-15      *The War Memorial Park in the city*



This new millennium has its own set of goals and strategy. Without resting on their laurels, Singaporeans are now aiming at a translation of the horizontal greenery onto the vertical axis as well. This is seen in roof-top greening, balconies and sides of high-rise buildings. The parks and recreational facilities are being improved upon to cater for the needs of the people and not just be infrastructure provision.

Various schemes have been designed to help maintain the environment. These include the Heritage Road Scheme, which is aimed at preserving roadside landscapes, whilst the Heritage Tree Scheme is to conserve the mature trees. Incentive programmes have also been introduced to encourage developers to green-up their high-rise projects. These include:

- An additional 10% area, over and above the site development limit is allowed for developers who provide balconies.
- Covered sky terraces are not calculated as part of the gross floor area (GFA).

The theme for this decade is *"let's make Singapore our Garden"* (NParks, 2005).

These decades of active landscaping were not without problems. People walked over young trees, breaking them. They spat everywhere in the market place, public and at out of car windows. Even though the people had been moved from their shanty huts, as the government replaced family farms with agro-technology parks and aquaculture business into high-rise Housing Development Board (HDB) flats, their mannerisms were still the same.

There was much littering, noise nuisance and rudeness to deal with. Thousands sold cooked food on the pavements and streets in total disregard of health and traffic consequences leaving pedestrians to compete with vehicles for circulation space. "Pirate taxes" stopped without



signalling to pick-up or drop passengers at will. Indian cowherds brought their cows to graze on the roadsides in the city even on the Esplanade! Many parts of the city were turned into slums with layers of litter, filth and the stench of rotting food.

The Singapore River smelt so bad that "a blind telephone operator... knew when his bus was approaching the river by its distinctive stench". Half of its pollution as well as that of the Kallang Basin were a result of trade effluents...they were open sewers (Yew, 2000).

All these problems had solutions and they were aptly applied:

- School children were educated on greening in schools by getting them to plant trees and care for them and they in turn took the message to their parents thus solving the problem of indifference to greening. All factories also had to landscape their grounds and plant trees before production commencement was permitted.
- Anti-spitting campaign was introduced by Prime Minister Lee Kuan Yew in 1960. He used schools and the media to disseminate the dangerous contribution of public spitting to the spread of diseases like tuberculosis.
- People who had been re-housed in the flats were allowed to have only "poodles and two new-born chicks." (Grupta, et. al. 1992).
- In mid-January 1971, a country campaign was launched encouraging all taxi drivers, shop keepers, hotel and restaurant workers to be friendly and courteous to visitors as well as their fellow Singaporeans.
- Having met with public health offices, an action plan was spelt out giving cow herders and goat herders a deadline of 31<sup>st</sup> January, 1965, after which any stray animal was



seized, slaughtered and the meat given to welfare homes. By December the same year 53 cows had been slaughtered and this quickly cleared all stray animals from the streets. Pig rearing was faced-out and subsistence fish-farming was abolished. The affected farmers were relocated and dully compensated.

- The whole Island was laid with underground sewers and people from 3000 cottage industries were moved to industrial estates with sullage traps for oil wastes. 5000 vendors were also relocated into well designed stalls. The boatyards along the Kallang River were relocated at Tuas and Jurong River. The clean Singapore River and Kallang Basin were finally out-doored in November 1987, 10 years after the proposal in February 1977 (Yew, 2000).

### 3.3 Legislative Intervention

A comprehensive legal framework was established to give the legal basis and structure for the effective implementation of the government's "greening" policies and programmes.

These include both statutes and regulations with the constitutional rights and responsibilities of National Parks and other environmental bodies well spelt out .i.e. the National Parks Board Act.

There is also the Parks and Trees Act 2005, which focuses on greening regulations. The road codes, greenery regulation provisions in building plans, and heavy fines were set up and are still used to maintain a "clean and green" Singapore.



### 3.4 SINGAPORE TODAY

Singapore today maintains a total of 314 parks. This consists of 52 regional parks, 243 neighbourhood parks and 19 parks connectors. The total area of these green areas is 9534.6 ha making up about 47% of total land area. Nature reserves alone are 3,326.2 ha, and roadside gardens cover 2,480.2 ha of land (Singapore Botanical Gardens, 2006).

The government has successfully used this concept to attract tourists who bring in much needed foreign exchange. The Singapore Botanical Garden alone attracts at least 3 million tourists annually. The country also boasts of the best bird park in the world- The Jurong bird park which was opened in 1971. The Sentosa Resort Island is another park that tourists never miss while in Singapore. The urban environment has enhanced the aesthetic and economic value of the city. This attracts a lot of business and a lot of investors. Socially Singaporeans are very proud of their environment and recreation choices are limitless. In spite of the keen competition for land, the government has set aside land for more parks, trees and greening considering the major role the green ambience has played in its socio-economic development. Under the concept plan 2001, 4,400 ha of park land will be set aside for a projected population of 5.5 million. Nparks is also in the process of developing the streetscape greening master plan. This is aimed at accentuating and providing distinctive landmarks for future landscapes.



## 4 CHAPTER FOUR - ANALYSIS OF THE STUDY AREA

Below are the merits and demerits that were observed upon studying the Central Business District of Accra.

### 4.1 Merits

- ❖ The vast stretch of the coast is excellent for recreation and other landscape creations.
- ❖ Most of the roofs in the CBD are pitched and these could be used to harvest rainwater to serve as watering source during the dry season.
- ❖ The fishing port of Old Accra (now James Town) could be developed into a tourist attraction.
- ❖ The already existing open spaces could be reclaimed and refurbished.
- ❖ Existing fence walls and others to be erected could be covered with greenery.
- ❖ A greenway could be created along the Korle Lagoon and Odaw River.
- ❖ Palms and coconuts grow along the coastal belt, other thriving plants like, mangoes, cassias, avocados, bougainvillea grow in other parts of the city.
- ❖ The soil in Accra is generally absorbent and water quality is satisfactory for watering.
- ❖ The area is blessed with over 120 bird species and with the enhancement of the greenery percentage this could be increased.
- ❖ The tropical climate is favourable for soft landscaping.

### 4.2 Demerits

- ❖ Difficulties in land acquisition
- ❖ Lack of funds for greenery projects.
- ❖ Over emphasis on sport – related open spaces.



- ❖ Misuse and lack of maintenance of existing open spaces.
- ❖ Lack of guidelines for protection of greenery.
- ❖ There is a lack of spaces in the old settlement.
- ❖ Localized pollution at the industrial area. The Odaw River and Korle Lagoon are highly silted and polluted by residential waste. The coast is “dying” with deification.
- ❖ The streets offer no comfort at all to pedestrians and they have been overtaken by hawkers.
- ❖ There are occasional floods during the May - July rainy season and this is worsened by the general flatness of the terrain.
- ❖ The coast is subject to severe erosion with a rapid rate of depletion.
- ❖ Accra lies in an Earthquake prone zone.
- ❖ There is constant indiscriminate tree felling as well as sand-wining and stone quarrying at some portion and this destroys the fertile top soil.
- ❖ The rains during the drying season cause the grass and other smaller greens to dry up.
- ❖ The use of the natural water bodies as waste receptacles.
- ❖ There may be a lack of political will to implement plans, for example, demolishing of buildings within flood zones of water bodies.
- ❖ The lack of water during the dry season.
- ❖ Poor maintenance culture.
- ❖ Theft of seedlings and other landscape elements.
- ❖ Inability of the Accra Metropolitan Assembly to keep up with the requirements for maintaining a clean city.
- ❖ Lack of pedestrian discipline.
- ❖ Apart from the coastal erosion, Accra CBD is also prone to general sheet erosion therefore.



### 4.3 Executive Agencies Responsible For the Greenery in Accra

#### 4.3.1 The AMA

The Accra Metropolitan Assembly (AMA), was inaugurated on 18<sup>th</sup> March, 1989 during the PNDC era and it was to replace the Accra City Council. The AMA, among other several functions is also responsible for the overall development of the Metropolis, establish and cultivate parks and gardens and other such facilities for relaxation and recreation, provision of sanitary facilities, naming and numbering of all streets and houses, provision of mass transportation, maintaining security and public safety and a host of others.

#### *Some Constraints of the AMA*

The assembly has not been very successful with execution of its responsibilities and understandably so as “it has been assigned first line responsibilities for functions.

It is clearly not structured or equipped to handle.” (Mensah, et al, 1992). Some of the inadequacies are stated below.

- Scope of responsibilities is too wide.
- Semi-illiterates and stark illiterates were engaged as revenue collectors.
- No clear and practical guidelines have been established as a matter of policy for the performance of the role of the sub-structures.
- A persistent liquidity crisis, due to its inability to mobilize enough revenue to service its budget and provide services. (with central government paying 100% of salaries)
- Low calibre of staff and their correspondingly low levels of remuneration.
- The problem of indiscipline in the city.



### **4.3.2 Parks and Garden Department**

The Department of Parks and Gardens, was established in 1988 for the development of the nation's landscape and the preservation and beautification of the environment. Though there are branches in all ten regions, the department is gradually becoming extinct due to similar problems as the AMA. The lack of logistics, qualified personnel, low staff strength and inadequate funding has made the department ineffective.

### **4.3.3 Traffic and Sanitation Improvement Task Force**

The traffic and sanitation improvement task force (TASIT), was originally conceived to stem the deterioration in the environmental sanitation and traffic congestion in the city by enforcing a programme designed to engender discipline, a sense of responsibility and voluntarism in the people concerning environmental issues. Launched on 29<sup>th</sup> January, 1988, the programme was heralded with fanfare and the general public joined in city council's special beautification campaign to give Accra a much desired and an unprecedented face-lift with individuals painting their buildings, most of which had not seen any maintenance in years (Mensah et.al., 2005). The strong-arm tactics, though it worked, later became unpopular and coupled with the AMA's own internal problems of inadequacies and complete lack of resources for the prompt performance of their work, apathy and lack of commitment among some sections of the public developed and only a shadow of TASIT remains today in the form of a phenomenon code-named "aaba ei", meaning "they are coming".



4.4 The State of Open Spaces in the CBD

4.4.1 National Parks

These include the Kwame Nkrumah Memorial Park (see plates 4-1 to 4-4) and the Efua Sutherland Park. The former is located opposite the Old Parliament House, occupying only a portion of the parkland propose by BAW Trevallion in 1958 to serve the east of Accra. It is currently used by groups of all ages, for picnics, educational trips (as it has a museum attached) and also for such informal activities as wedding photographs. It receives the most attention of all the non-sporting open spaces even though more attention is needed especially for the grassed areas.



Figure 4-1 The Kwame Nkrumah Mausoleum



Figure 4-2 Eating area at the mausoleum



Figure 4-3 Lawn at the mausoleum



Figure 4-4 Walkway at the mausoleum

*The Kwame Nkrumah National Park : in a relatively good condition and in use, but requires maintenance.*



The Efua Sutherland Park (see figures 4-5 and 4-6), once a vibrant children's public park is now operated as though it were privately owned where all the gates are locked with tight security so that interested groups have to seek permission form the Ministry Of Women And Children Affairs before access may be granted. The facilities are grossly inadequate and gradually depreciating due to lack of maintenance and lighting in and around the park is very poor.



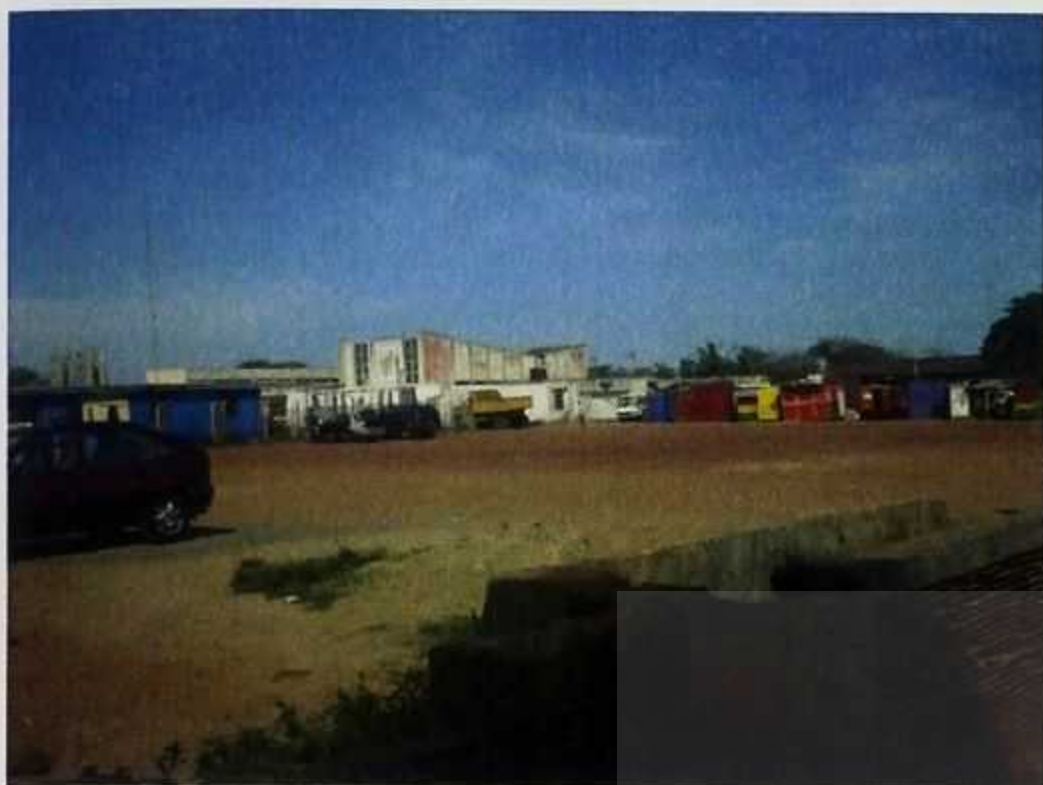
**Figure 4-5 Summer huts at theEfua Sutherland Children's' Park**



**Figure 4-6 Efua Sutherland Children's' Park**

*The Efua Sutherland Children's' Park: needs more maintenance work and improvement on the security and lighting. This will encourage more patronage from children and parents.*





**Figure 4-7 Polo Grounds**

*The old Polo Grounds, where Kwame Nkrumah declared Ghana's independence. Completely dilapidated. Could be developed into a historical park.*



**Figure 4-8 Polo Grounds, now a site for broken down vehicles**

#### **4.4.2 The Sporting Open Spaces.**

These presently include the Ohene Gyan Sports Stadium (Formally Accra Sports Stadium), the National Hockey pitch and the Accra Race Course. The Ohene Gyan Sports Stadium has always been under heavy patronage due to the nation's passion for football. After years of neglect, it was refurbished around 1998, however after the Stadium disaster, major demand was done for the football area. It has however undergone another upgrading pending the CAN 2008 match.

Through hockey is not as patronized, the National Hockey Pitch is also used quite often but its greenery needs more attention and more maintenance will greatly improve upon the facility (See figures 4-9 and 4-10).



The Accra Race course is in a deplorable state. Even though some horses are still kept there, with a friendly race once in a while, a walk towards the facility pre-empt its dilapidated nature. It needs a major refurbishment. (See figures 4-11 to 4-14).



Figure 4-9 The national hockey pitch..Figure 4-10 The national hockey pitch Still in use but needs refurbishment



Figure 4-11 The national race course in a dilapidated. Figure 4-12



Figure 4-13 Entrance to the national race course. Figure 4-14 Completely dilapidated entrance



### 4.4.3 Town Gardens

There are only 2 town gardens in the whole of CBD area, i.e. the Supreme Court / Old Parliament gardens and the Kinbu Gardens. The latter is well patronized as it is privately operated and has an eatery attached. It however lacks enough planting. (See figure 4-15). The former needs maintenance and even if it cannot be opened to the public, due to national security reasons, it will add beauty to its vicinity. (See figure 4-16).

❖ District parks



**Figure 4-15**      *Kinbu Gardens in the heart of the economic zone, still patronised and privately operated.*

❖ Civic spaces



**Figure 4-16**      *The forecourts of the Supreme Court of Justice.*



❖ Car parks and lorry stations



**Figure 4-17** *Tema Station, a major bus terminal with a very dirty and harsh environment. An opportunity for greenery.*



**Figure 4-18** *Metro Mass Transit bus terminal*

#### 4.4.4 Others

Street medians are mostly unplanted and finished with asphalt or concrete. The pedestrian walkways and shop corridors have all been overtaken by hawkers and are not shaded (See figures 4-19). A few road edge and triangle have been grassed and fenced with chain link to prevent public walking on the grass (See figure 4-20 and 4 - 23).



❖ Paths and Edges



Figure 4-19 Walkways taken over by hawkers



Figure 4-20 Fencing of green area in the CBD



Figure 4-21 Youths making use of walkway along Independence Square



Figure 4-22 Inner lane along Ring Road East.





**Figure 4-23** *Some good effort by local authorities at greenery.*

See:	Appendix I	Pedestrian Level Analysis (with blow-ups)
	Appendix II	Conservation (with blow-ups)
	Appendix III	Greenery Opportunities (with blow-ups)

#### **4.5 LESSONS FROM SINGAPORE**

1. The “Greening Singapore” vision was a government agenda which they supported fully with great political will.
2. Tree Planting Day was institutionalised, Anti Spitting Campaign, and major clean ups.
3. Institutions set up were mobilised and empowered with legislature to implement the vision.
4. Detailed planning of the city and adherence to the plans and regulations for the city development.
5. Over all land use plan including ample space for parks and open space.



6. Detailed layout of parks and water bodies conserving the existing ones and creating new ones.
7. Street greenery was also detailed out using road codes to simplify the process.
8. Greenery was attained systematically and patiently.
9. Various schemes were designed to protect the greenery.
10. Incentive programmes were created to encourage developers and architects to incorporate greenery in their projects.
11. The government institutions have control of the physical development of the city.
12. All sewages were closed and surface drainages were converted into underground drains.
13. The city was cleaned up of the filth, slums were cleared and all the water bodies were distilled redirecting the waste from them.
14. Singapore is clean and green today because the people were also educated and made to embrace the vision as their own and a national heritage.

In spite of the fact that Accra has over a hundred species of birds, the lack of greenery has pushed most of them and other fauna outside the CBD area, therefore relaxing activities like bird watching cannot be enjoyed in the city centre (Consortium, 1993).

Some structures especially those of little significance (refer to the coastal stability map) would have to be replaced by greenery due to their proximity to fresh water bodies, the nature of the shale soil on which they have been built, earth quake, erosion and flood risk.



## 5 CHAPTER FIVE - CONTRIBUTIONS

The objective of the proposals described below is to raise the greenery percentage from the existing 8% to between 36%, which was the percentage of greenery in Singapore as of 1986 when she gained recognition for her greenery, to 47% which is the percentage of green coverage in Singapore today. The various means of urban greening as discussed in chapter two, the observations and lessons drawn from Singapore, will be used to achieve this aim having considered both the merits and demerits of Accra's CBD. Some of the urban landscape theories that will also be employed in the proposals include: greenways, park connectors and planted streets, planted fence walls, promenade and esplanade, replanting of trees along entire coastline to check erosion, and Provision trees for shading in all lorry stations. The proposal relating to Accra's greenery and open spaces are further described below:

### 5.1 The Coastal Strip

This is an almost continuous strip of open land along Accra's coast stretching from the beach of south La Estates in the East to the Korle Lagoon in the West. This potentially very attractive coast will not merely be part of the open space system but constitute the forecourt of Accra, and its development is to serve central Accra, (including old Accra) Christiansburg residential area of La. This stretch has been divided into sections from west to east for the purpose of easy identification and planning.



### 5.1.1 Section I - Korle Lagoon

This section is approximately 500m long and 35m to 2cm wide (9 acres). It forms the seaward portion of the sand bar between the lagoon and the sea. It is currently used as waste disposal grounds for the waste discharging tankers. It is recommended that the whole area be treated as public open space, with the effluent outlet relocated or deep water discharging system used so that the stench will be cleared up. This section is also to be planted with palms and coconuts to serve as an extension to the Korle Woods (discussed below), and also to check erosion. (See figure 6 - 2).

### 5.1.2 Section II - The Old Oil Depot To Usher Fort

This stretch of about 1800m has varying width ranging between 185m to 60m. It includes the James Town Fishing Port, James Fort, Customs Building, the Ghana Canoes Fishermen Association building and other very poor housing developments. This area is presently commercial in nature with many of the James Town indigenes as fishermen.



Figure 5-1 Schematic representation of the Old Oil Depot to Usher Fort area



It is recommended that this area remains as such and further developed unto a fishing village tourist attraction together with the conservation of the James Town itself. The degraded housing should be cleared. Considering the acute shortage of open space in the town, it is recommended that this fishing village attraction should be well designed with sheds and pockets of recreational open spaces that meet the needs of the people (See figures 5 – 2 and 5 - 3) and the palace open forecourt presently used as a multi-purpose open space should be improved and made more user friendly. (See figure 5- 4).

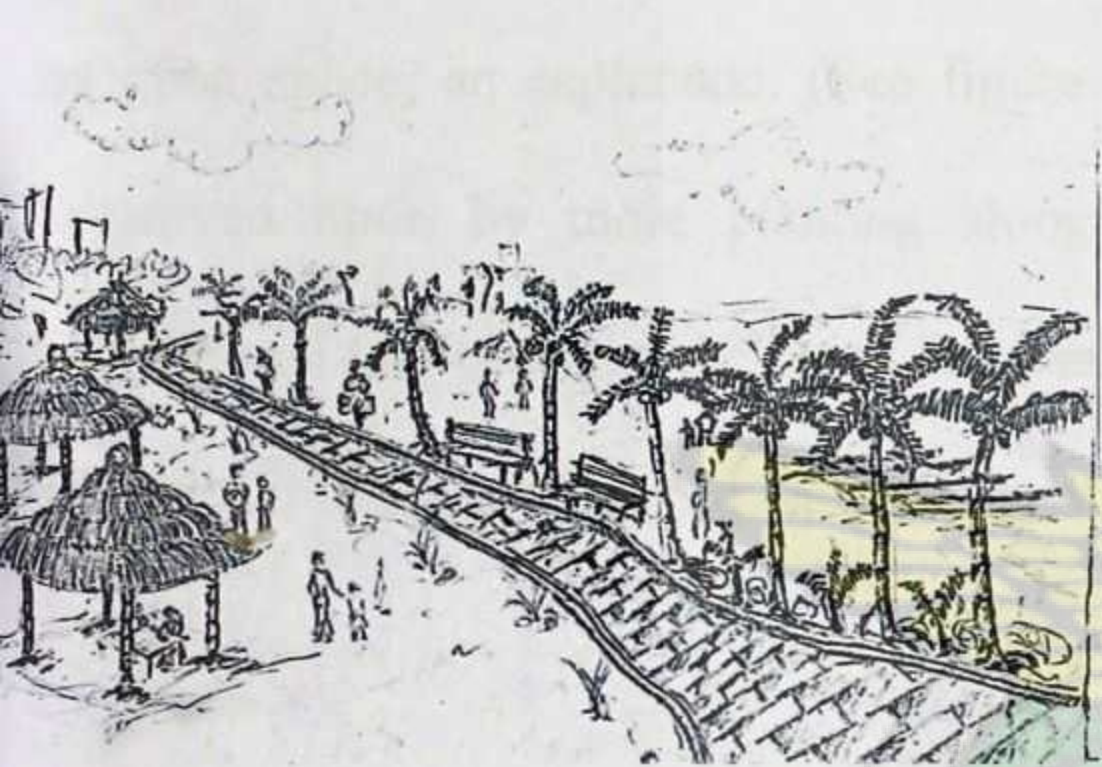


Figure 5-2



Figure 5-3



Figure 5-4



**5.1.3 Section III - Usher Fort to Castle Round About**

This is very long stretch of beach front consisting of Mensah Guinea, a very poor housing development recommended for clearing, extending into the "Valley" between the Arts Centre and the government office building meant to be temporary structures eastwards, the stretch behind the independence square and then the undeveloped land up to the castle roundabout. The incomplete Marine Drive is also within this stretch.

It is recommended that the Mensah Guinea settlement be cleared and the beach front be treated as open space, an esplanade. (See figure 6-5). The mangroves at the stream area should be improved upon by more planting along the full stretch of the stream. The dilapidated recreational facilities like the Hotel Riviera should be refurbished with more of such recreational facilities introduced be it government / privately owned and operated.



**Figure 5-5**      *schematic presentation of the esplanade for the Usher Fort to Castle Round About area*



The narrow coastal strip from the Usher Fort to the Anglican Cathedral should be widened and areas with the rugged cliffs made more accessible creating areas for coastal viewing and esplanades. The Marine Drive should be completed to join the High Street at the old pole grounds junction.

#### **5.1.4 Section IV - Castle Round About to the Castle Area**

The castle is the seat of Government. Security therefore is of utmost importance. It is therefore recommended that this stretch be developed as "private" open space for the Castle with all the security measures needed to keep the presidency safe.

#### **5.1.5 Section V - From Castle Area to South La Estates**

This stretch is to be treated as public open space serving the Osu and la residential areas. Football pitches, volley ball courts and other sporting facilities should be made available within this stretch including sea swimming pools. The full stretch of the coastal strip (where undeveloped) should be replanted with shelter belts of coconuts and palms to help control erosion, serve as wind and also as amenity.

### **5.2 Parks**

#### **5.2.1 Existing Parks**

A general uplift and refurbishment is recommended, considering the state of the various existing parks. Recreational facilities should be provided adequately and appropriately with good lighting to ensure user safety.



It is recommended that the grounds of the independent square which is completely hard landscaped should be interspersed with some grassing as this would reduce the amount of heat generated by the large expanse of concrete surface. Its periphery should also be planted with trees to soften the entire outlook of the facility.



**Figure 5-6** *A schematic presentation of the independence avenue parking lot with shading trees*

Car parks and lorry stations, (see Figures 4-17 to 4-18 and Figure 5-6) which are presently either unpaved or fully paved from boundary to boundary, should be planted with trees as a means of providing shading for the parked vehicles. It is also suggested that the Rawlings Parks car park should be converted into a multi-storey parking facility as this will help ease the amount of on-street parking needed.





Figure 5-7      The Tema Station now



Figure 5-8 Tema Station proposed; *Plant incorporation into paved areas at commercial lorry stations*

### 5.2.2 Proposed Parks

Some areas have been suggested as public parks. This was based on the availability of undeveloped land and the catchment areas. *(See appendix IV – greenery proposals).*



The Old Polo grounds (7 866 m<sup>2</sup> or 2.2 acres) should developed into a historical park as it was the venue for the declaration of Ghana's Independence. This may be joined with the Kwame Nkrumah Memorial Park as one National Park.

A theme park is suggested for the area between the Kwame Nkrumah Mausoleum and the government offices area off High Street. This site, 112 206 m<sup>2</sup> or 31 acres, is currently used as a refuse dump site. Its slope could be terraced and planted with trees and shrubs and the stream could be cleaned up and used as a feature improving upon the mangroves.

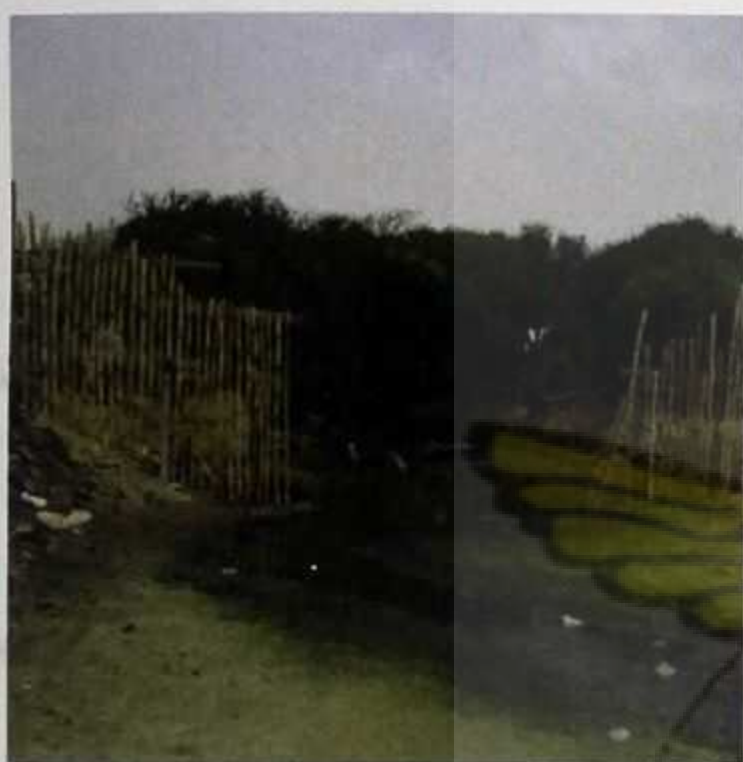


Figure 5-9 Mangroove at Mensah Guinea now



Figure 5-10 A schematic representation of a cleaned up mangrove at Mensah Guinea



The slum Sodom and Gomorrah is strongly recommended for clearance. (*See appendix II - conservation*). This site should then be developed into public open space that will serve the James Town and Usher Town residential areas.

The Holy Gardens (7 213 m<sup>2</sup> or 2 acres) which was once public open space for various events have now been turned into a lorry station. It is recommended that this area be reclaimed and redeveloped as public open space it is meant to be. This will serve Kokomlemle and parts of the Adabraka residential / commercial areas.

The Museum of Science and Technology situated at the northward junction between the Barnes Road and Liberia Road, has a large tract of undeveloped land around it, about 32 000 m<sup>2</sup> or 8.9 acres. It is recommended that the museum itself be refurbished and upgraded and the site developed into a science park. This will serve the Accra Polytechnic and its environs, and the offices and residences in the lower belt of Adabraka.

The area north of the Castle Road between the Ridge Hospital and Mental Hospital and next to Accra High School, suitably landscape will be extremely attractive. The steep ground, 41 791 m<sup>2</sup> or 11.6 acres, could be terraced and planted with trees, shrubs and flowers and with other landscape features. This land is ideally located for a park to serve North Ridge, west Ridge and parts of Asylum down. This will also be suitable in relation to the two adjoining hospitals.

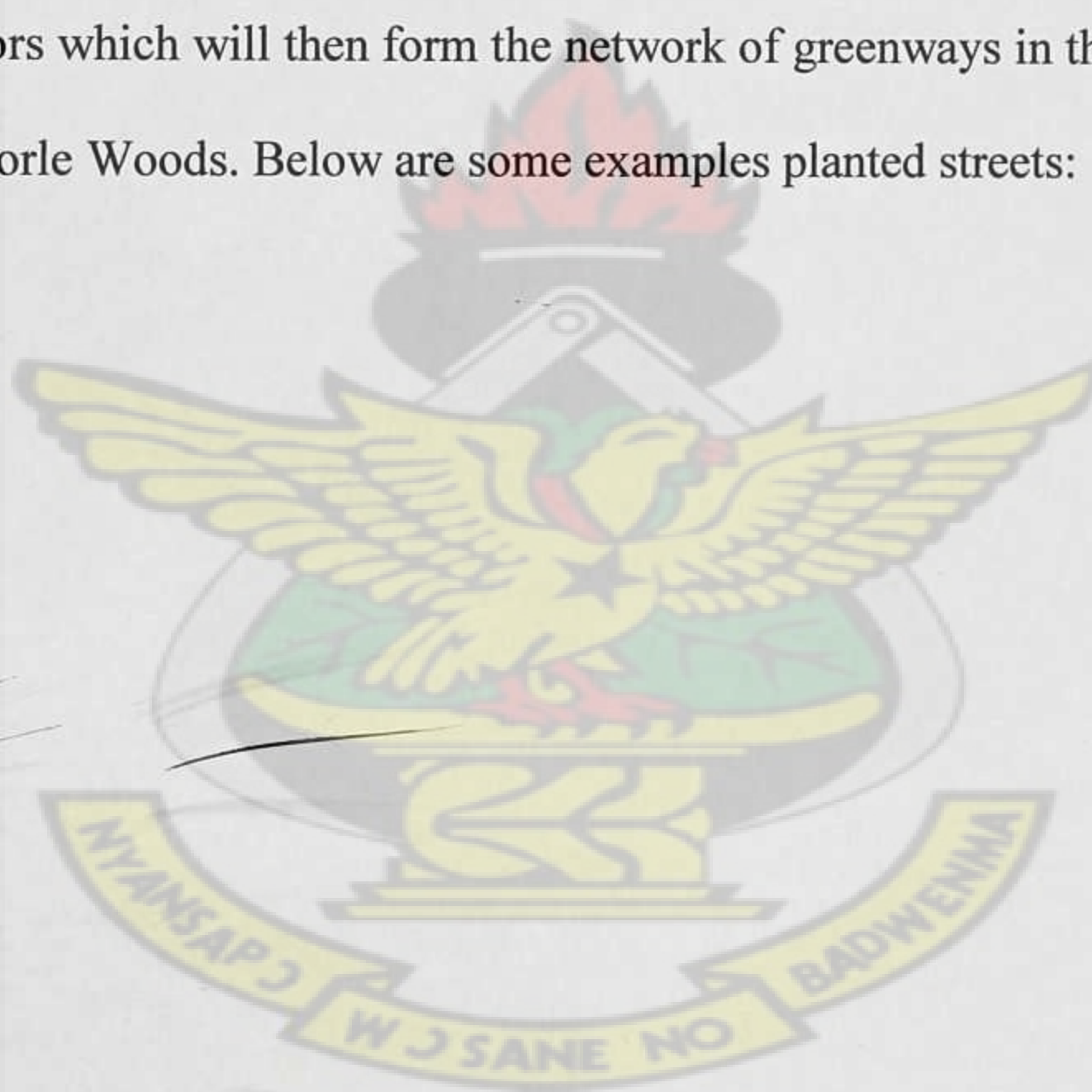
The Accra International Conference Centre and the State House opposite it along the Castle Road, have 13 773 m<sup>2</sup> or 4 acres and 27 994m<sup>2</sup> 7.8 acres respectively, of land asphalted for



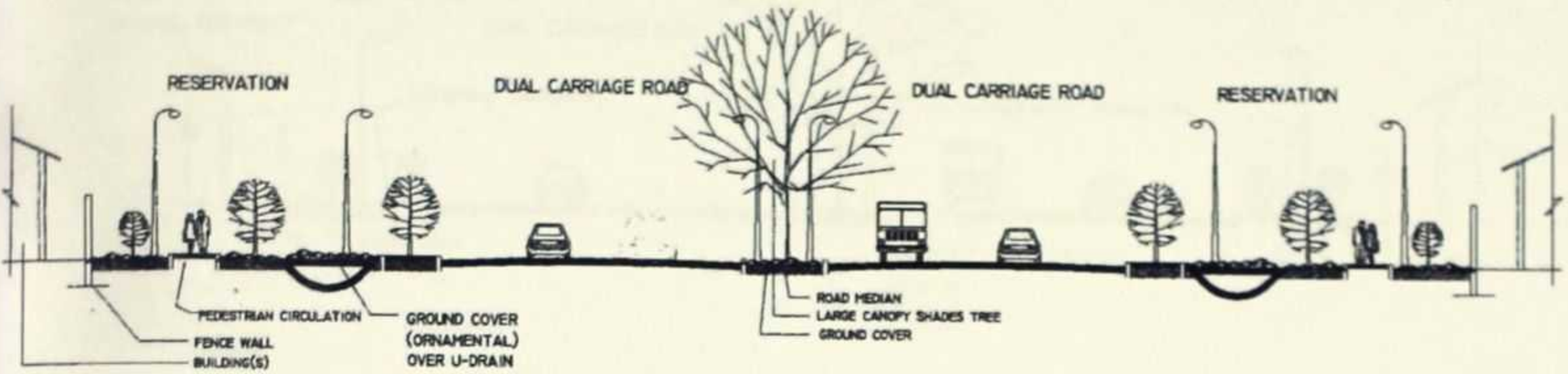
parking. These huge unshaded car parks could be planted with shade trees and interspersed with planters to soften both premises and provide shade for parked cars during programme. Garden parking is recommended for these facilities.

### 5.3 Park Connectors

These are green routes that link up open spaces. They could be in the form promenades, planted streets or linear gardens. It is suggested that all these parks (existing and proposed) be connected with these park connectors which will then form the network of greenways in the city. These are to be connected to the Korle Woods. Below are some examples planted streets:







**Figure 5-11**      *Schematic section of proposed greenery for the major circulation areas (not to scale). Dual carriage with vast road reservation before building line. This is mainly the Ring Road, the boundary of the CBD*



**Figure 5-12**      *Schematic representation of proposed greenery for the major circulation areas*



**Figure 5-13**      *Schematic representation of proposed greenery for the major circulation areas (night impression).*



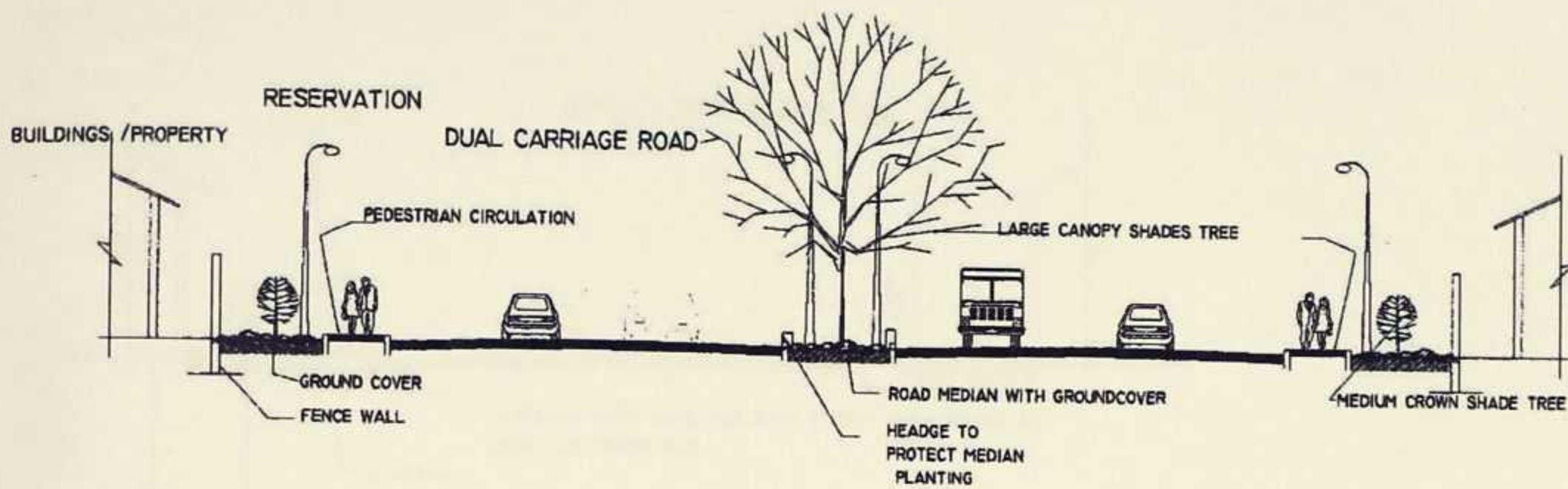


Figure 5-14      *Schematic section of proposed greenery for the medium circulation areas (not to scale): dual carriage with median and ample reservation before building line. These include the Independence Avenue, Barnes Road, Amusudai Road, Kwame Nkrumah Avenue and the Castle Road (see 3ds below)*

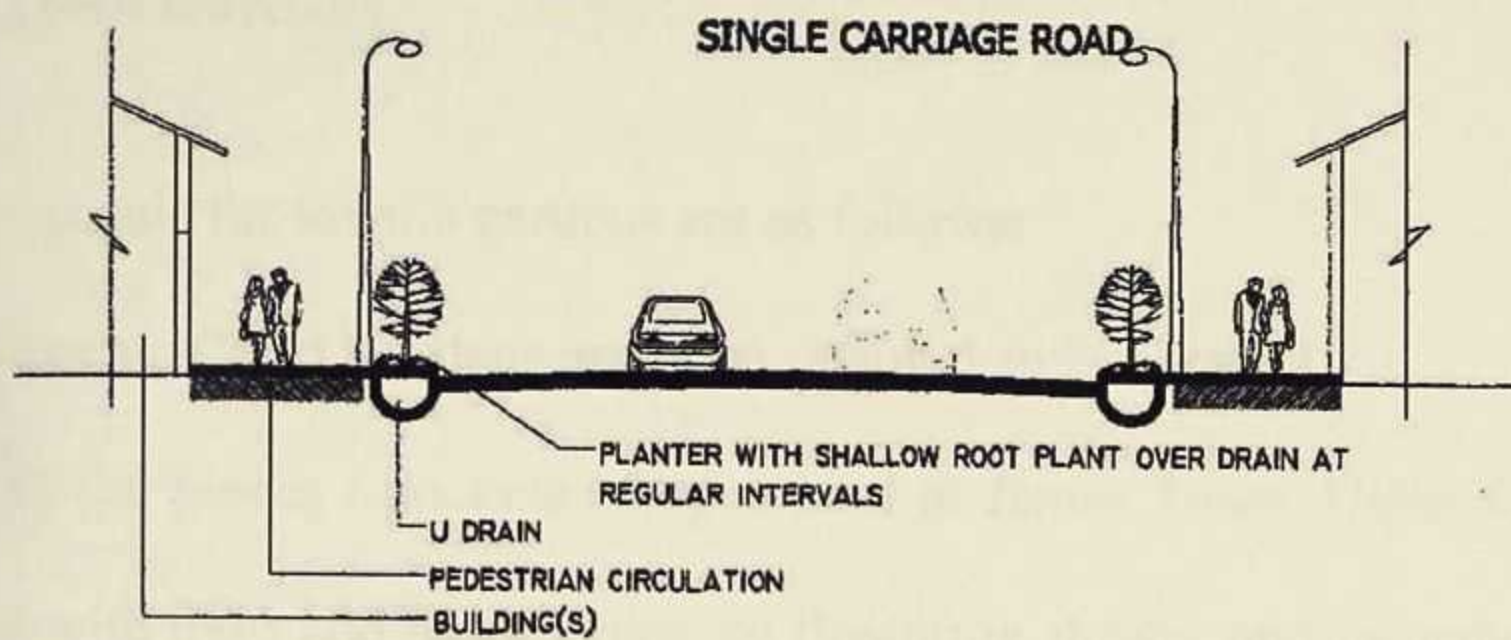


Figure 5-15      *Schematic representation of proposed greenery for the medium circulation areas.*



Figure 5-16      *Schematic representation of proposed greenery for the medium circulation areas. ((Night impression))*





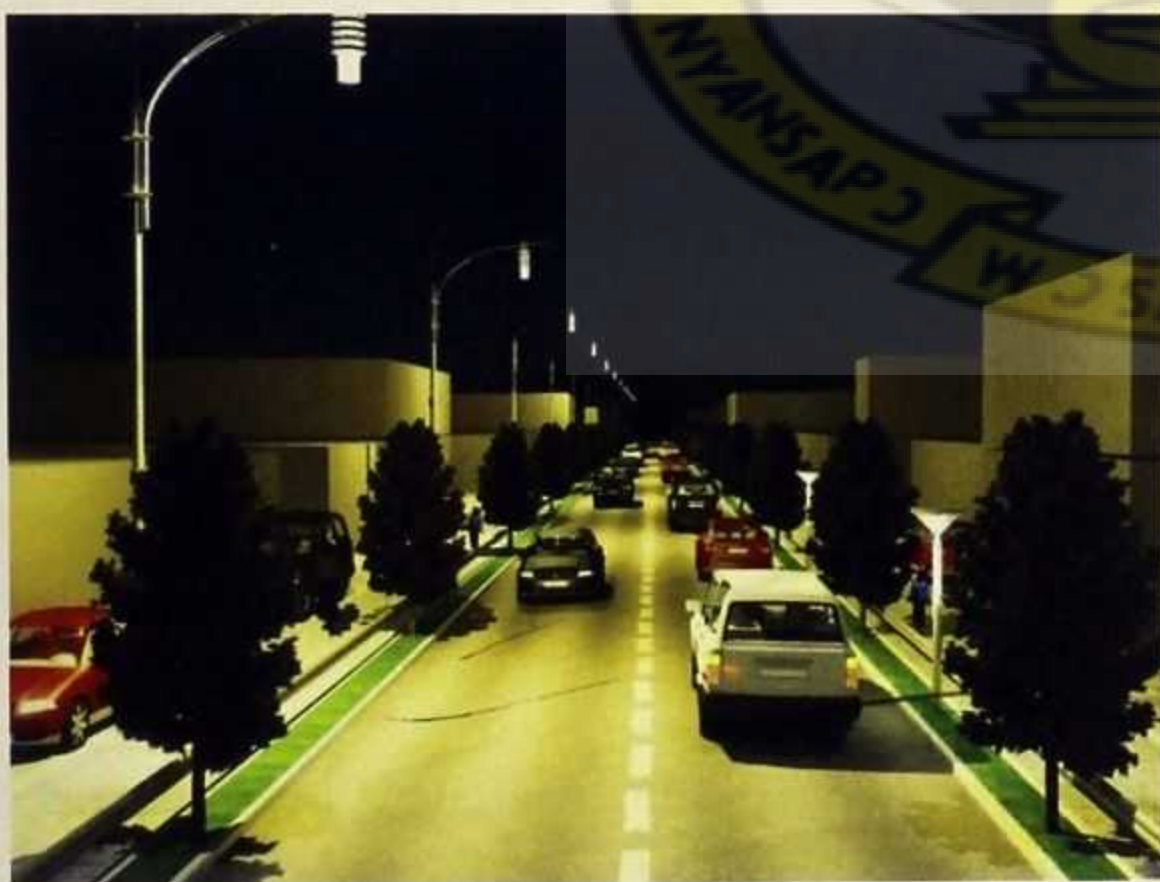
**Figure 5-17**      *Schematic section of proposed greenery for the minor circulation areas. (Not to scale). Single carriage road with enough reservation on either or both sides. These include Oxford Street, 28<sup>th</sup> February Road, Gamel Abdul Nassar Road, Second Avenue, Kojo Thompson Road, Pagan Avenue and portions of the High Street.(see 3ds below)*



**Figure 5-18**      *Osu Oxford Street, now*



**Figure 5-19**      *Schematic proposal of greenery for Oxford Street, Osu*



**Figure 5-20**      *Schematic representation of proposed greenery for the minor circulation areas. (Night impression)*



## 5.4 Town Gardens

The proposals for town's gardens are as follows:

The Supreme Court Gardens are to be retained and upgraded.

Some of the pieces / pockets of open land in James Town, Usher town and Adabraka could be planted with trees and bright coloured flowering shrubs, and furnished with a few garden seating and adequately lighting. This greenery would add to these scenes.

The fore courts of churches such as Holy Trinity Cathedral, High street, Presbyterian Churches, Osu and Freeman Memorial Chapel, are suggested to be developed into town gardens. The playing fields of some schools like the Adabraka Cluster of schools, between the Watson Avenue and Amugi Avenue, the Osu Salem Secondary School fields could be upgraded to be able to serve to general public when school are out of session. The Kinbu Gardens, though thriving should be upgraded into a public town garden.

## 5.5 The Korle Woods (Riparian Greenway)

The threats to the Korle lagoon have already been discussed in the previous chapter. After works necessary for dredging and cleaning of the lagoon have done, Accra will be presented with a good opportunity for greenway.

It is suggested that the land be reclaimed as an open space, never to be built up. This Korle Woods should commence from the Odaw River concrete drain (as a linear garden park connector), bounded in the north by the Ring Road, extending southwards the coast. It will join



with the proposed palms and coconut plantation (*refer to coastal strip section I*). On the west it will be bounded by the Ring Road west and on the East by the area occupied by Sodom and Gomorrah. It is recommended that this low-lying area be planted all over with mangroves, palms and coconuts that starts as a narrow strip form the Odaw River - Ring Road intersection widening up towards the Korle Lagoon Area. The Korle Woods, a riparian greenway would have all other parks connected to it using the park connectors (greenways) and itself be a green corridor that can serve as a recreational facility for the city. (See figure 5-21 to 5-23).



**Figure 5-21**      *A schematic representation of bank trail in the greenway*



**Figure 5-22**      *A schematic representation of plants along the banks of the lagoon protecting it from transpo-evaporation in the greenway*





**Figure 5-23**      *A schematic representation of a portion of the Odaw River linear garden*

These will transform the desolate waste land into one of the most attractive factures of Accra, teeming with fauna.

## 5.6 Special Projects

❖ ***Fence Walls:*** Almost every property in the CBD has a fence wall (*see appendix III Greenery Opportunities*). It is recommended that these be enlivened by planting of creeping plants on them. This would not only reduces the areas of reflected heat surfaces, but also grant opportunity for uniformity covering up ugly unpainted fence walls.

### ❖ ***Street Tree planting***

Tree planting is to be done along all the streets with enough edges and medians. The value of this suggestion goes without mention. Aside the beauty of the trees themselves, the glare



reduction and the improvement to the setting of building, there is also priceless shading which makes all the difference between comfort and acute discomfort.



**Figure 5-24**      *A planted street*

All new road network developments should have tree planted areas as part of the design and the service departments like Environmental Protection Agency (EPA) should ensure that already established planted areas are not unduly damaged. Concerning the existing roads without enough edges for tree planting, another form of shading could be provided - covered walk ways (where possible).

#### ❖ *Rain Water harvesting*

Accra has a lot of rain during the rainy season and some harvesting is done in some of the households. These however does not last due to the capacities of the storage facilities. As a long term project, it is recommended that all the pitched roofs in the CBD be filled with roof gutters channelled into underground storage tanks which will be located at vantage points in each vicinity. This water can be uses to water the planted areas ensuring sustainability.



## 5.7 Proposal Summarized

1. Upgrading of existing parks. This will help maintain the existing greenery coverage of 8%.
2. Open spaces and planted streets
  - ❖ Preservation of coastal strip as open space to create a tourist attraction out of the James Town fishing Port.
  - ❖ Creating of the riparian greenway - Korley Woods.
  - ❖ Tree planting and shade provision on all streets in the CBD.
  - ❖ Provision of new public parks and other recreational open space.
  - ❖ Conversion of lorry stations and car parks into green parking areas
  - ❖ Provision of town gardens.

These will add another 24% to the existing greenery bringing the percentage greenery to 34%

3. Enliven fence walls. This will add a total of 17% to the greenery cover.
4. Public rainwater harvesting.
5. Conversion of the Rawlings Park into a multi-storey car park.
6. Clearance of slums and other unauthorized development.





Figure 5-25

Existing Green Cover : 8%

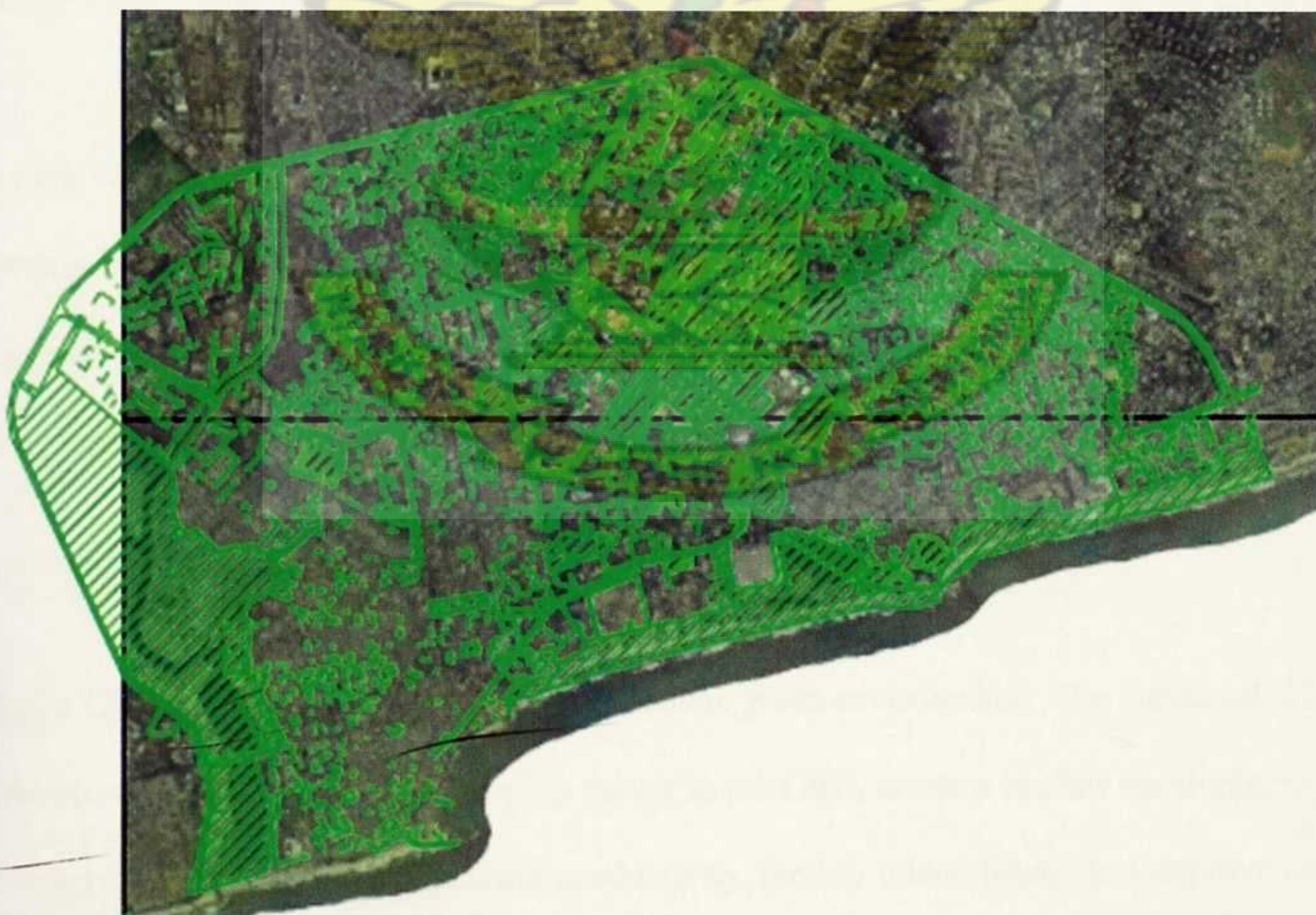


Figure 5-26

Proposed Green Cover: 49%



## 5.8 Implementation

The implementation of the proposals stated above should be done in stages as this would increase the effectiveness. The government service departments responsible for the environment and beautification of the city like the Department of Parks and Gardens should be mobilized and upgraded to enable them carry out their duties. The stages of implementation are stated below:

Stage I:	Education and Cleaning up of the CBD	--- 4 years
Stage II:	protection and improvement on existing greenery	--- 8 years
Stage III :	new greening and Institutional Partnership	--- 4 years
Stage V:	Coastal redevelopment and reclamation, James and Ussher Town	--- 10 years
Stage VI:	Korle Woods and parks connectors	--- 10 years
Stage VII:	Vertical greenery	--- on-going

It took Singapore about 35 years to achieve their current greenery coverage. The number of years proposed for the various stages were influenced by both the culture and amount of time available for each government per term based on Ghana's political system and the number of years it took Singapore to achieve each stage of their urban greenery.

## 5.9 CONCLUSIONS

Accra CBD does possess the potential for a clean green environment. The enhanced urban greenery in Accra's CBD will clean up the air in the CBD, create a healthy environment for city dwellers, which will in turn increase productivity, modify microclimate and improve rainfall reduce ambient temperature, reduce cooling costs and increase comfort mitigate the harsh



concrete urban environment, improve quality of life as urban dwellers will be less stressed, improve sanitation, enhance Accra's attractiveness as a destination for foreign, businesses as seen in Singapore today and Improve biodiversity.

*A clean and green Accra is achievable.*

KNUST





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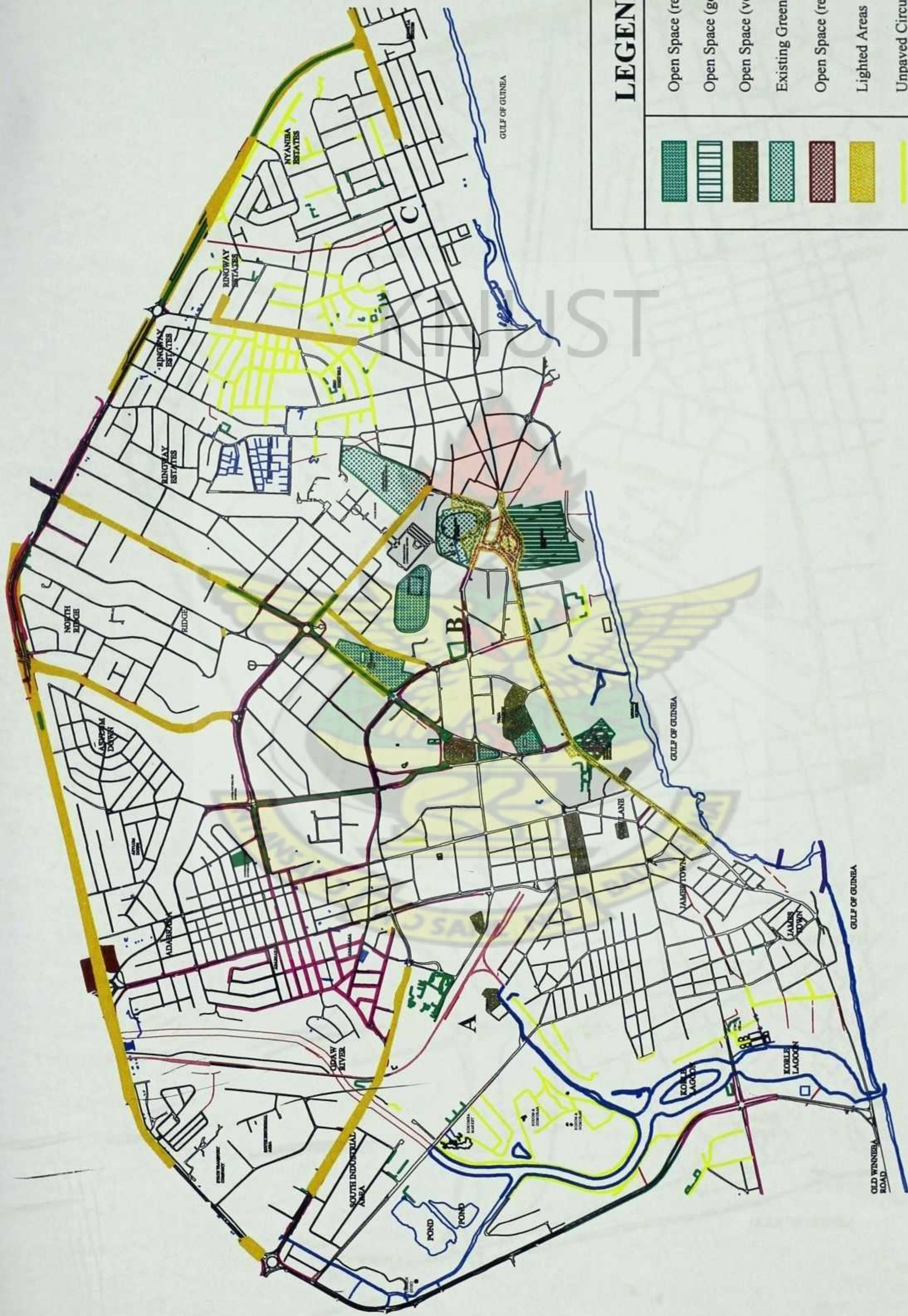
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## LEGEND

	Open Space (refurbish)
	Open Space (good condition)
	Open Space (vehicles)
	Existing Greens
	Open Space (reclaim)
	Lighted Areas
	Unpaved Circulation
	Paved Walkway
	Storm Drains
	Waterbody
	Planted Median



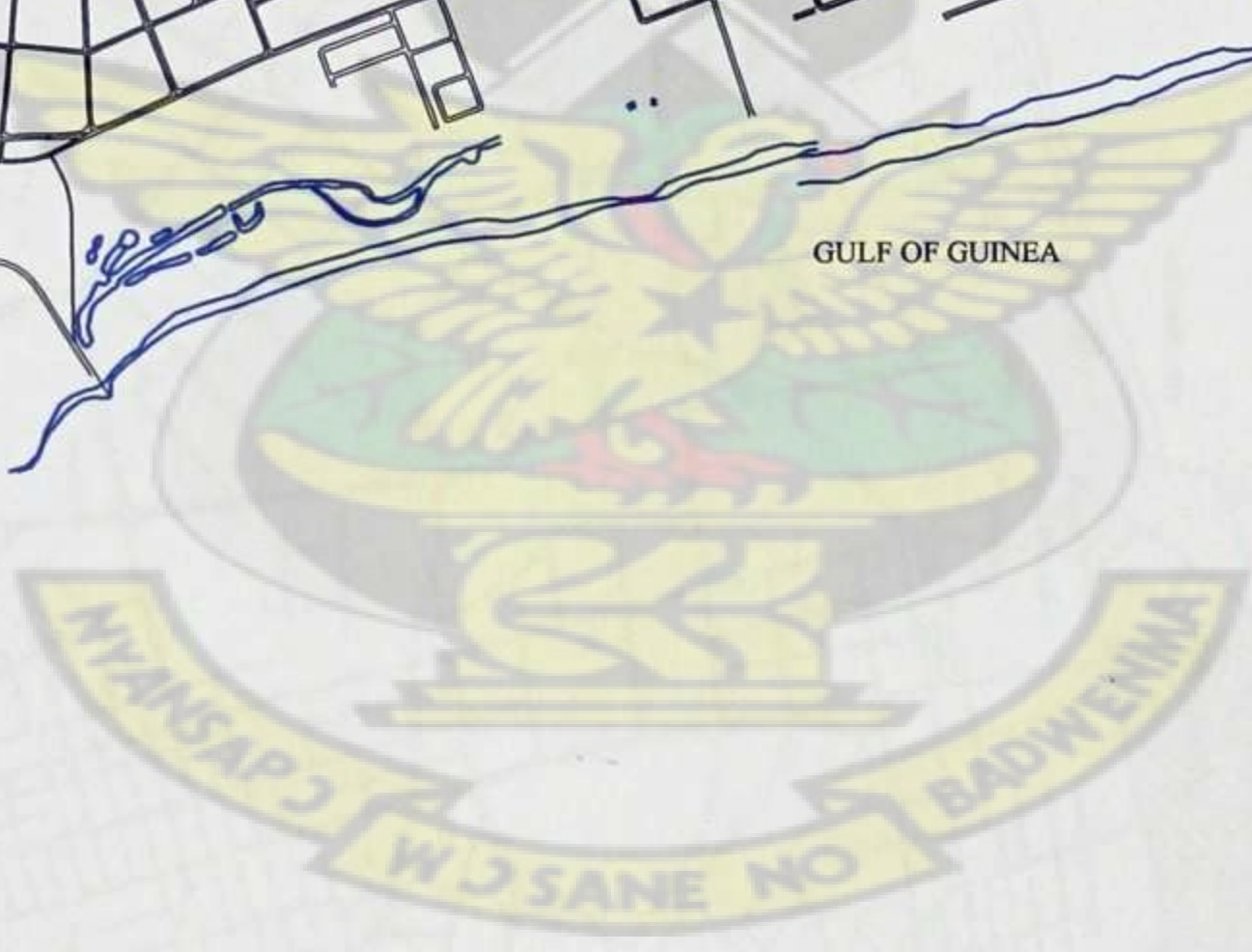


PEDESTRIAN LEVEL ANALYSIS  
DETAIL A











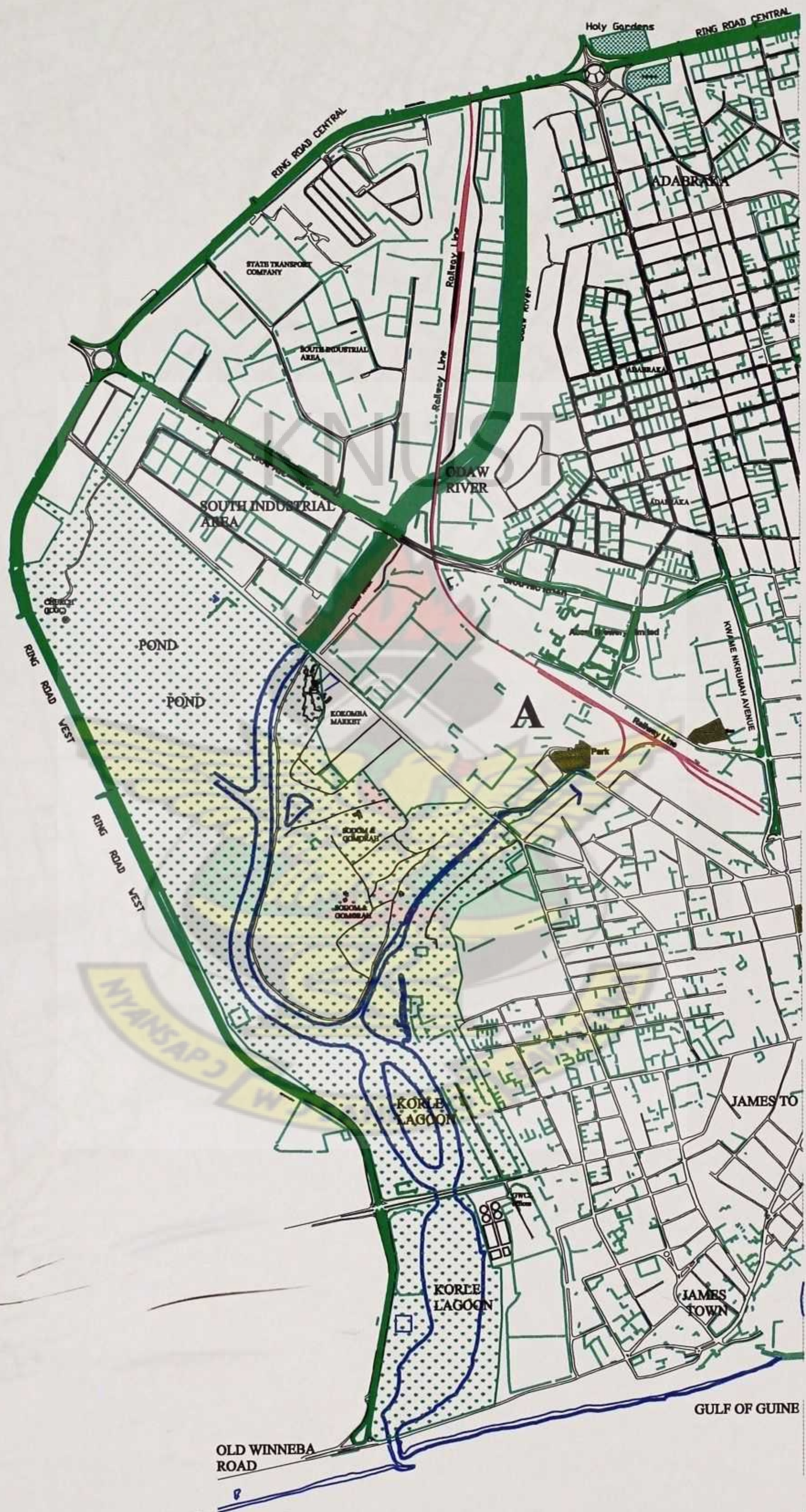






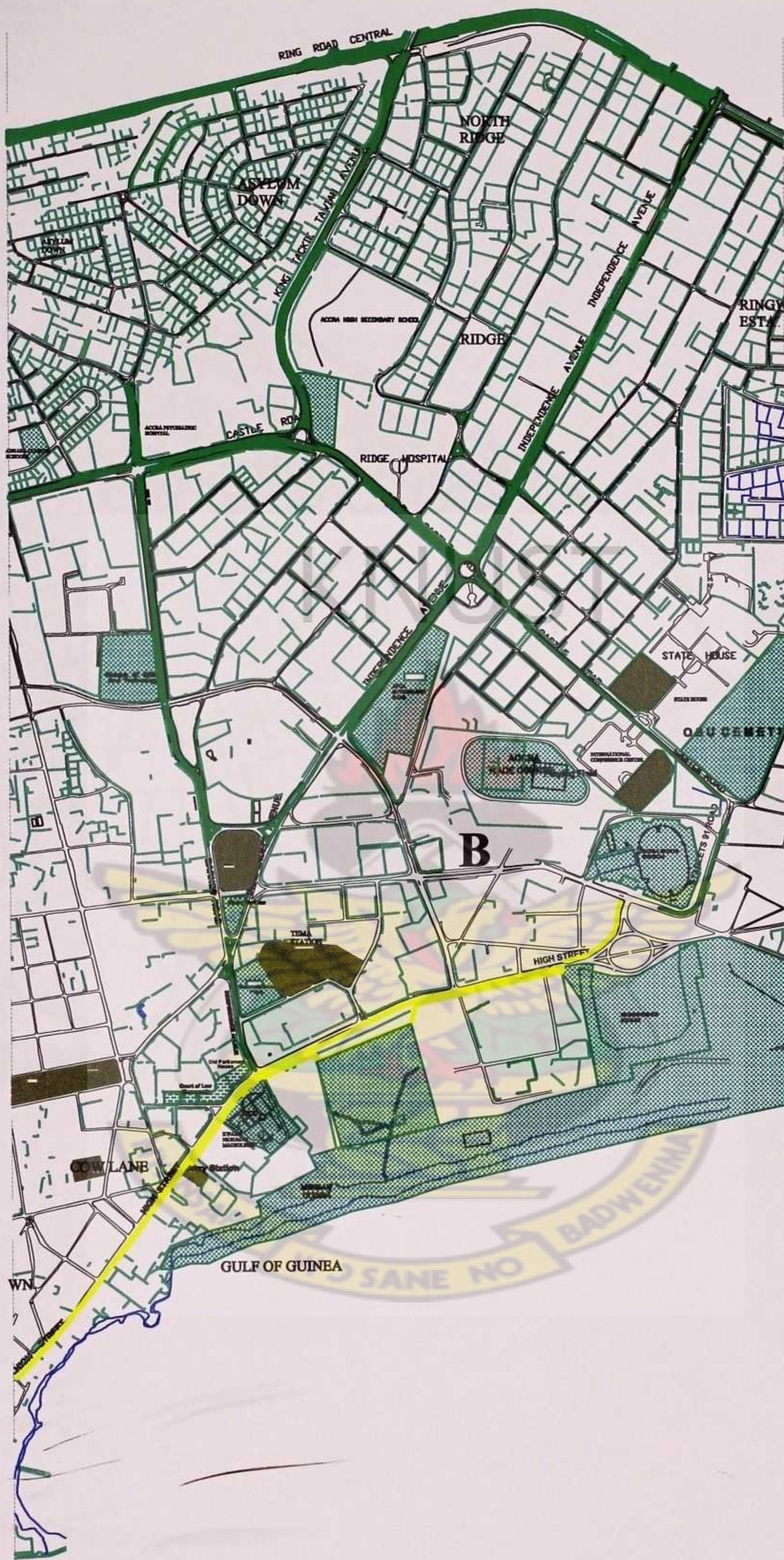
Appendix III  
GREENERY PROPOSALS





GREENERY PROPOSALS  
DETAIL A





GREENERY PROPOSALS  
DETAIL B



