GREEN BELTS AND URBAN GROWTH IN LONDON, TOKYO AND SEOUL METROPOLITAN REGIONS

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A thesis submitted for the degree of Doctor of Philosophy

in the University of London

Wye College
University of London
1991

ABSTRACT

Land available for the growth of Seoul, capital city of South Korea, has been severely limited by the designation of a Green Belt in 1972. Although the area of undeveloped land inside the Green Belt at that time seemed more than adequate, by 1985 Seoul's urban area had doubled and by the end of the 1980s the city faced a land crisis. The research for this thesis was therefore based on the hypothesis that 'Release of some of the Green Belt is an essential and practicable way to meet land demand for urban growth in Seoul'.

To examine the hypothesis, a literature review on London's, Tokyo's and Seoul's Green Belts was carried out and an empirical, map-based study was undertaken to ascertain and compare the area and pattern of post-war urban growth in these metropolitan regions. Based on this data the study then contrasted the effects on urban growth of the absolutely controlled Green Belt around Seoul and the relatively strict Belt around London with the situation around Tokyo where the proposed Green Belt policies were never implemented.

The conclusions drawn from these studies of urban growth trends and Green Belt policies were that Seoul Region will need an additional urban area of around 400 km^2 between 1985 and 2000 and that release of Seoul's Green Belt, even partially, to accommodate this large land demand would not be wise. The hypothesis was therefore considered to be incorrect.

Instead it is suggested that large urban areas should be developed beyond the Green Belt. Modifications to Unwin's dynamic idea of unlimited development areas on the background of open space, which was embodied in the 1929 Greater London Regional Planning Report and developed in the 1939 Tokyo Green Area Plan, could provide the model and should be considered as a way forward for Seoul's growth.

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42	'Howard's Garden City from 1906' should read 'Green Suburbs from 1906'
45	'(John^{S} in Coppock and Prince 1964)' should read '(Johnson in Coppock and Prince 1964)''
125	'Kunto' should read 'Kyoto'
126	'Nagasaka' should read 'Nagasaki'
132	'(see Figure 5.3)' should read '(see Figure 5.4)'
179	'extend' should read 'extends'
187	'Kunichi' should read 'Kunitachi'
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200	'assassination' should read 'attempted assassination'
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ESSAY

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Acknowledgements

During work for this research many people have given me support and encouragement. Firstly I would like to thank my supervisor Dr Margaret Anderson for her good advice.

Secondly, I have had to apply to friends for information: in South Korea and Japan, especially Mr Chun in a Tokyo office and Mr Noh in the library of the Korean Parliamentary House; staff in the Planning Office of the Department of Environment in London gave assistance in defining the boundaries of London's Green Belt; a number of staff from Planning Offices in Essex and Kent, Ordnance Survey and the Map Library of the British Museum all helped with my enquiries. My thanks also to Valerie Eden for typing the thesis.

Finally, I must thank my family : my wife and children have been very patient and given me much encouragement during our long stay in England. My eldest daughter, Hanna, has willingly helped by also correcting English and by producing skilful drawings of all the figures and maps in this thesis.

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CHAPTER ONE

INTRODUCTION

1.1 Purpose and background of the Study

The basic practical purpose of this research is to try to solve the conflict between the restrictions on the outward growth of Seoul City imposed by a strict Green Belt, and the high demand for urban land development

The author of this thesis had worked in and for Seoul City Planning Department before undertaking this study. In the early 1980s he was actively involved in the planning of a large scale suburban development including the Seoul Olympic Village and Park. It became increasingly clear to him that the city would be faced with a land crisis soon after the Games as there was very little vacant land left for further development inside Seoul's strict Green Belt.

The administrative District Area of Seoul City covers 627 km^2 but only a little more than half of this land is zoned for urban use, mainly for the following reasons. To safeguard the national security of South Korea some 20 per cent of the area to the north of Seoul is planned as unavailable for accommodating the city's rapid urban growth. Also, the city's fringe has been controlled with a strict Green Belt since 1971. The land within the inner boundary of the Green Belt, called the 'Built-up Area', covers 457 km^2 but the mountains and the area along the River Han have been excluded from the area for development. So, just about 360 km^2 or approximately 80 per cent of Seoul's Built-up Area is available to serve as living space for over ten million Seoulites. The population density, averaging about 28,000 people per km^2, demonstrates that the City is already overcrowded.

As only a small proportion of the available land in the Built-up Area now remains undeveloped, but population increase and pressure for expansion seem likely to continue unabated, two questions arise. The

first is, **how much** urban land will be required in the near future in Seoul Metropolitan Region if the city is to continue to expand its urban area; and the second is, **where** should the expansion be located in relation to the city and its Green Belt?

To answer these questions the research studies urban growth and land use change in the Metropolitan Regions and Green Belts of London and Tokyo and compares their contrasting experiences with those of Seoul.

When the first Seoul Green Belt was designated in 1971, and extended in 1972, plenty of undeveloped land was left in the outskirts between the existing developed area and the inner Green Belt boundary. Over one decade later the area of urban development had touched the inner boundary of the Green Belt and the enormously growing energy for urban growth was blocked by the protected curtain of open countryside. Extra land supply for development became increasingly difficult to find. The question 'where is land to be found for housing development in Seoul' therefore becomes one of the main concerns in this research.

The research has been carried out against a background where discussion and studies on Seoul's Green Belt had been restricted for many years under the uneasy political situation in South Korea during the time of the last two Presidents. Reliable data on land use in the Green Belt has therefore been unobtainable and the only available government information has been some reluctantly given data and a few poor researches found in South Korea. Seoul's Green Belt continues to be a sensitive subject in South Korea.

1.2 Hypothesis and outline of research

The original research scheme proposed that the Green Belt areas should be used to help to solve the land shortage in Seoul through land acquisition by public authorities or land redistribution methods which have been the most popular way of suburban expansion in South Korea. At the beginning of the author's research, he saw many possible good sites within the Green Belt area for urban development

on the edge of the fully developed area. Therefore the following hypothesis was made:

> Release of some of the Green Belt is an essential and practicable way to meet land demand for urban growth in Seoul.

However, at that time, no examination had been made of how much land would be required to meet Seoul's growth in the future, or whether there would be enough land to develop in the released Green Belt area around the Built-up Area. To test the hypothesis, not only was this information needed but it was also necessary to try to ascertain whether a policy of Green Belt land release is sensible in practice. The research therefore measures urban growth in London and Tokyo Metropolitan Regions in relation to Green Belt policies, and seeks the practical lessons to be learned from these cities' land release and protection activities for the increasingly high demand for urban growth in the expanding Seoul region.

As the literature reviews on Green Belt studies progressed, it became clear that once a Green Belt is defined, significant modification of the boundaries of Green Belt to reduce its size is not practicable. Once the Green Belt has been relaxed it not only cannot be recovered again, but it will also be very difficult to continue Green Belt policies. Therefore it was concluded that a hasty and revolutionary decision to release Green Belt land to meet the land demand would not be the best solution. It was also found that the argument of public acquisition, or a new applied method of land readjustment for Green Belt land, may not be the right approach to solve the large demand for urban land in Seoul.

It was therefore decided that Seoul's Green Belt should be thoroughly reviewed with a study of its background, land use and provisions, and that relative studies of the whole of Seoul's metropolitan growth with that of the city itself should be undertaken. The future for Seoul would then be reviewed in the light of the lessons to be learned from the experiences of the advanced Metropolitan Regions of

London and Tokyo, whose planning and Green Belt ideas were originally used to build the policy for Seoul's Green Belt.

The research concludes that Seoul will require approximately 400 km^2 of additional urban land by the end of the century. Having considered the possibility of totally or partly releasing Seoul's Green Belt, by following the experience of Tokyo, or of extending the Green Belt as has occurred around London, the author concludes that release of the Green Belt land can not meet the rapidly increasing land demand and therefore the release of Green Belt areas for urban growth is not the right answer to Seoul's growth. He therefore finally suggests the development of a distinctive alternative for the future growth of Seoul's urban areas.

1.3 Structure of the thesis

The thesis is divided into five parts and ten chapters. Part One consists of this introductory chapter on the purpose of the study and a brief outline of its direction and conclusions. Chapter Two describes the scope of the research and details the methodology for the empirical part of the work. Parts Two, Three and Four each comprise two chapters containing the case studies of London, Tokyo and Seoul, each pair of chapters consisting first of a literature review of the city's urban growth and Green Belt policies, and second a continuation of the empirical study of the growth of the urban area in each Metropolitan Region since Green Belts were introduced post World War Two. In Part Five, Chapter Nine draws together and analyses the findings of the research and the last chapter examines the hypothesis and reaches for the future planning of land for Seoul's growth.

CHAPTER TWO

METHODOLOGY OF THE RESEARCH

2.1 Introduction

In this chapter the methodological framework for the thesis is set out. It looks first at the need for methodology (2.2) and then at the spatial scope of the research defining the Metropolitan Region of each of the three cities studied, with an explanation of the subdivisions used (2.3). The empirical work was largely carried out using land use maps; section 2.4 therefore outlines the availability of suitable maps, the reasons for their choice and gives comparative details of the maps; section 2.5 discusses the definition of urban area in the different countries and on the different maps, and outlines the reconciliation of definitions used for this research; section 2.6 gives the measurement methods employed; finally section 2.7 summarises problems encountered and solved, or remaining, with respect to the data.

2.2 The need for methodology

In undertaking the research, it was recognised that it was necessary to do more than study the policies for urban growth and urban containment in the three cities under review, and their perceived outcomes, if future plans for Seoul were to be based on a firm foundation. Not only the policies and the reasons for them, but the actual outcomes, successes and failures, must be understood. To achieve this it was therefore decided to set the policies and histories of urban growth alongside related spatial information on land use change. As different countries define urban land use in different ways, and usually assemble data by administrative districts which do not necessarily coincide with the areas under study, it was necessary to create new data sets for each city, based on the same methodology and pertaining to the same spatial divisions within each city region. In this way, comparable data could be obtained for analysis and projection.

The empirical work for the research is therefore largely map-based and the main part of this chapter is concerned with the methodology employed in obtaining data from the available maps.

2.3 Spatial scope of the Metropolitan Regions and their subdivisions

The research covers the three Metropolitan Regions of London, Tokyo and Seoul. Each region is divided into three or more subdivisions.

2.3.1 London

The London Metropolitan Region forms part of the South East Standard Region (South East Study 1964; South East Economic Planning Council 1967; South East Joint Planning Team 1970, 1971) the other part being the Outer South East and comprises 11,512 km^2. The London Metropolitan Region covers Greater London and some, all or parts of eleven counties, that is the whole of Surrey and Hertfordshire and part of Kent, West and East Sussex, Hampshire, Berkshire, Oxfordshire, Buckinghamshire, Bedfordshire and Essex. The remaining parts of these counties comprise the Outer South East (see Figure 2.1a).

For the purposes of this study the London Metropolitan Region has been divided into four subregions (see Figure 2.1b). They are defined as follows:

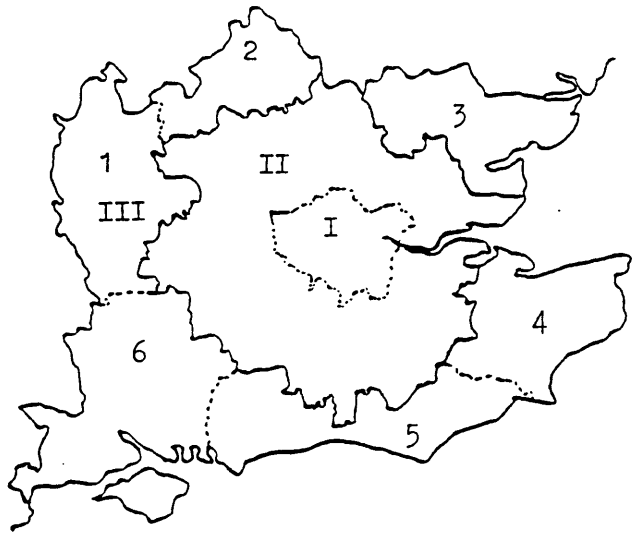
London Built-up Area : all the land inside the inner boundary of the Green Belt whether it is developed or not.

Urban Islands : all urban areas contained within the boundary of the London Green Belt as submitted or approved by 1960 or subsequently. The gradual extension of the Green Belt has resulted in two approximate rings of urban islands, an inner and an outer.

London Green Belt : The London Green Belt for this research divides into two parts; the Approved Green Belt is the area approved in the old development plans in 1960, and the Extended Green Belt is the

Figure 2-1 Subdivision of the South East and London Metropolitan Region

a. the South East



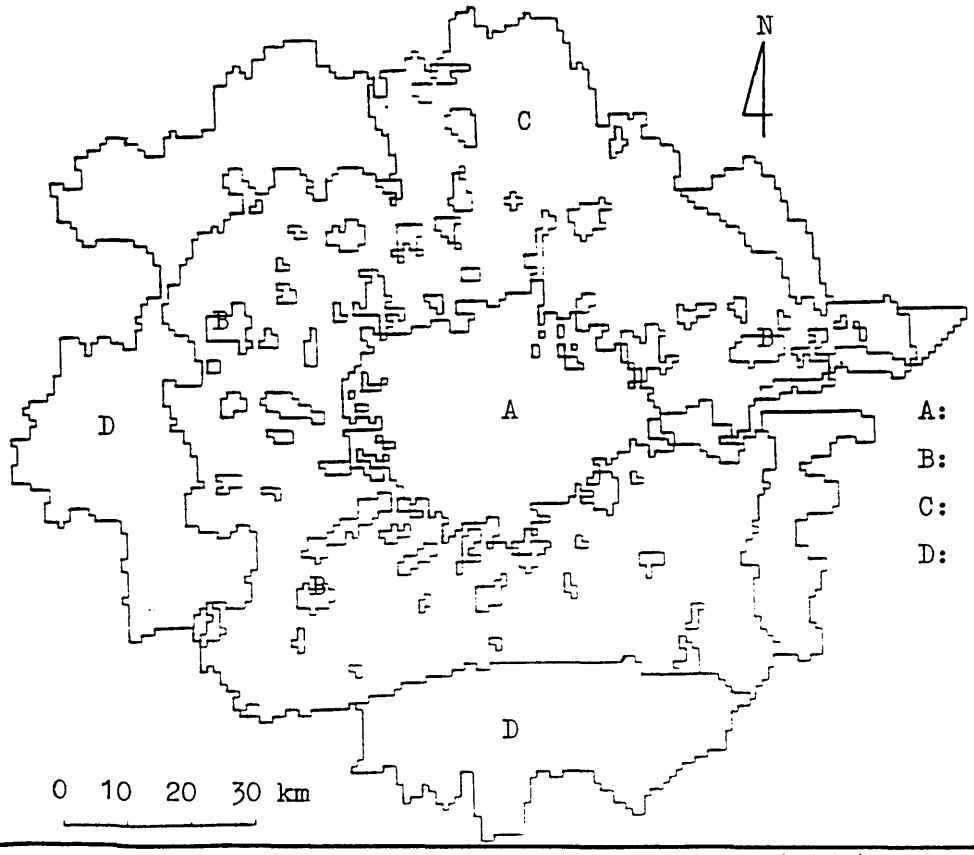
I: GREATER LONDON

II: OUTER METROPOLITAN AREA

III: OUTER SOUTH EAST

1. Berkshire and Oxfordshire
2. Bedfordshire and Buckinghamshire
3. Essex
4. Kent
5. Sussex Coast
6. Solent

b. London Metropolitan Region



A: London Built-up Area

B: Urban Islands

C: London's Green Belt

D: Rural Metropolitan Area

Sources: the South East Planning Council (1967) and DoE (1973) Metropolitan Green Belt map

land between the 1960 Approved Green Belt and the outer boundaries given on the Department of the Environment map of 1 January 1973.

Rural Metropolitan Area : The remaining area outside the London Green Belt.

2.3.2 Tokyo

Finding a definition for the metropolitan area of Tokyo that would coincide with that for London was very difficult. Various plans for Tokyo and for the surrounding area (now called the National Capital Region) were produced from the 1930s. The 'Tokyo Metropolitan Region' defined for this study is based on the Built-up Area and Suburb Development Area set out in *The Second Master Plan for NCRD (1968)*. The data for the study relates to this Region. In the same Master Plan the National Capital Region is also delineated to include Tokyo Prefecture and parts of the seven surrounding prefectures (or kens) (see Figure 2.2a).

The subdivision of the Tokyo Metropolitan Region used in this study is based on the planning boundaries of the First Master Plan for National Capital Region Development in 1958 (Figure 2.2b).

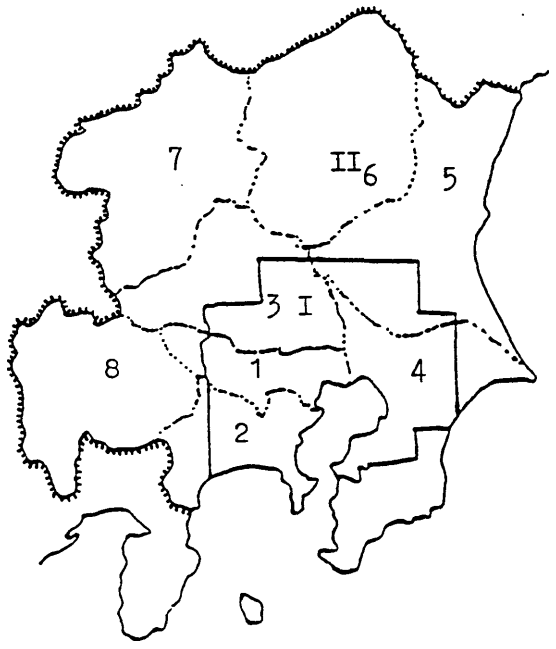
The three subregions are defined as follows, however it should be noted that as the Green Belt proposed for Tokyo in 1958 was never implemented exact delineation of its boundaries has proved to be difficult and the boundaries used in this study cannot be considered entirely accurate (see Chapter Five).

Tokyo Built-up Area : All the land enclosed by the inner boundary of the Green Belt, whether it is developed or not.

Tokyo Green Belt : approximately 10 kilometres width of Green Belt was planned to enclose the Tokyo Built-up Area. No urban islands were made for the already urbanised town areas within the Green Belt.

Figure 2-2 Subdivision of the National Capital Region and Tokyo Metropolitan Region and the Prefectures (KENS)

a. the National Capital Region



I: TOKYO METROPOLITAN REGION

1. Tokyo Metropolis
2. Kanagawa Prefecture
3. Saitama Prefecture
4. Chiba Prefecture

II: OUTER NATIONAL CAPITAL REGION

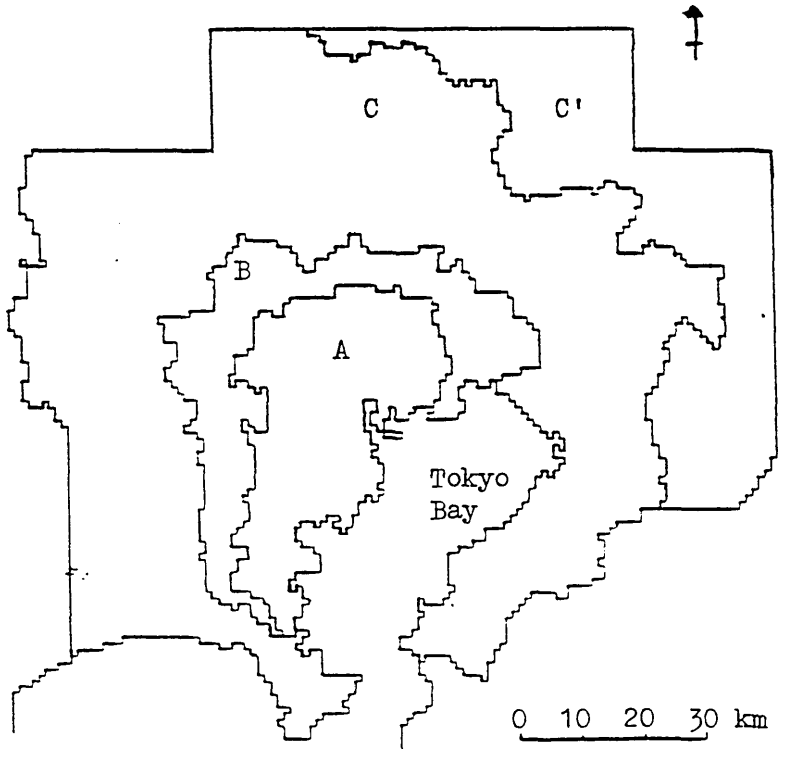
5. Ibaraki Prefecture
6. Tochigi Prefecture
7. Guma Prefecture
8. Yamanashi Prefecture

——— Survey area for Tokyo Metropolitan Region

..... Boundary of NCR in 1968

----- Prefectural boundaries

b. Tokyo Metropolitan Region



N I TOKYO METROPOLITAN REGION

A: Tokyo Built-up Area

B: Tokyo's Green Belt

C: Metropolitan Suburban Area (Tokyo Suburbs)

C': Outer Tokyo Suburbs (outside Tokyo Metropolitan Region in this study)

Metropolitan Suburban Area (Tokyo Metropolitan Suburb) : the remaining area of the Tokyo Metropolitan Region outside the Tokyo Green Belt.

2.3.3 Seoul

The Seoul Capital Region is officially reported as 11,686 km^2 which covers Seoul City (627 km^2), Incheon City (200 km^2) and Kyongki Prefecture (10,859 km^2) (KRIHS 1981; Statistical Year Book of Incheon, Kyongki 1986). However, for the purposes of this research only an area of 5121 km^2, named the Seoul Metropolitan Region, has been studied. This narrowing of the Capital Region is for political and data limitation reasons (Figure 2.3a).

The northern part of the Capital Region stretches up to the border with North Korea which at its nearest is 40 kilometres from the city. Land use maps are not allowed for much of this northern area. The only available land use survey for Seoul Capital Region dated 1972, was made for investigating possible routes for motorways and it excludes both the northern part of the region and an area to the east of Seoul which contains the Han River catchment. In both these excluded areas urban development is severely restricted for security and environmental reasons respectively. Therefore the exclusion of information on these areas is not important for this study of urban expansion.

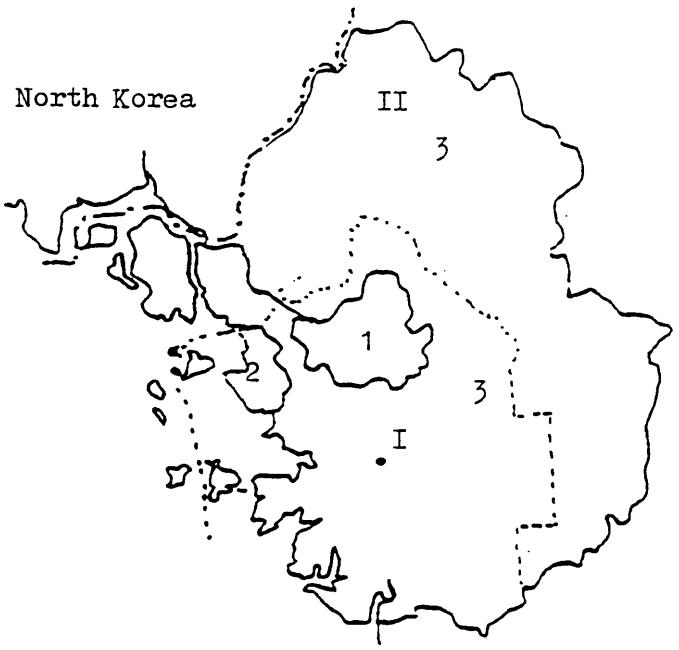
The Seoul Metropolitan Region subdivides into four subregions (Figure 2.3b) defined as follows:

Seoul Built-up Area : all the land within the inner boundary of the Green Belt, although some of the land in the area may not be developed.

Satellite towns and islands : most of these are islands contained within the Green Belt. Just over one third of the area is in the satellite town of Incheon.

Figure 2-3 Subdivision of the Capital Region and Seoul Metropolitan Region

a. the Capital Region



I: SEOUL METROPOLITAN REGION

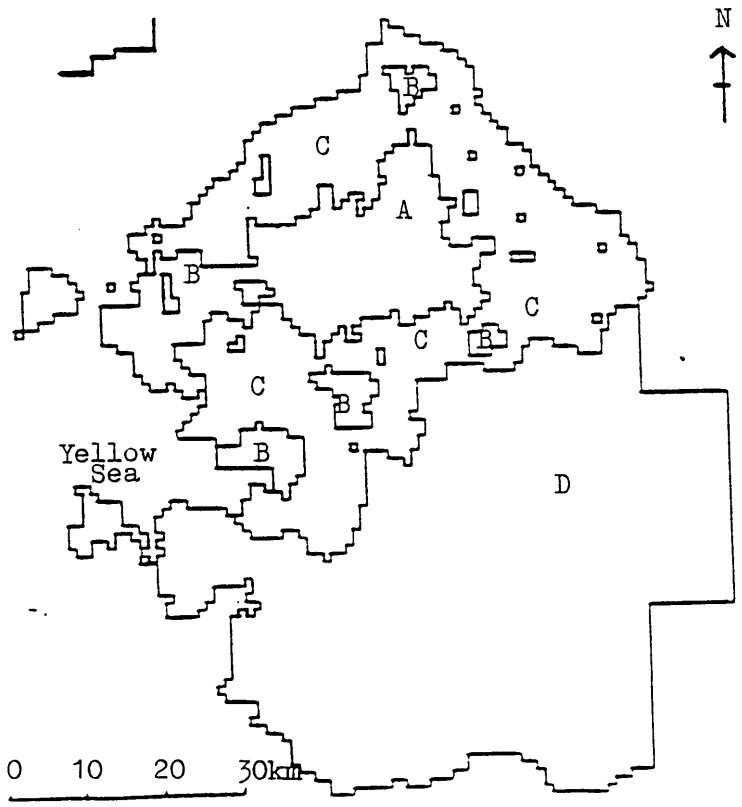
1. Seoul Metropolitan City
2. Incheon Special City
3. Kyongki Prefecture

II: OUTER CAPITAL

------- Boundary of the Seoul Metropolitan Region (study area)

-.-.-.- Boundary of Demilitarised Zone

b. Seoul METROPOLITAN REGION for the STUDY



A: Seoul Built-up Area

B: Satellite Towns and Islands

C: Seoul's Green Belt

D: Metropolitan Development and Environmental Area (Metropolitan De-En Area)

Seoul Green Belt : this was first defined in 1971, and subsequently redefined in 1972 and 1976 (Municipal Yearbook of Korea 1981). It almost completely surrounds the Built-up Area varying in width from a few up to tens of kilometres.

Metropolitan Development and Environmental Area (Metropolitan De-En Area) : the remainder of the Seoul Metropolitan Region. It consists of two parts, the Development Area in the west where further urban development can be allowed, and the Environmental Area in the east which should be protected.

A summary of the subdivisions of the three Metropolitan Regions is as follows:

(1) the central urban conglomerations are called:
- the London Built-up Area
- the Tokyo Built-up Area
- the Seoul Built-up Area

(2) each city has a Green Belt area[1]

(3) urban areas within the Green Belts are called:
- Urban Islands around London
- Satellite Towns and Islands around Seoul
(none in Tokyo)

(4) the areas outside the Green Belt are called:
- the Rural Metropolitan Area in London
- the Metropolitan Suburban Area in Tokyo
- the Metropolitan Development-Environmental Area (Metropolitan De-En Area) in Seoul

2.4 Land use maps

The purpose of the empirical work was to collect information on land used for urban growth in relation to metropolitan Green Belts, and to

[1] Within (in) Green Belt = between inner and outer boundaries of Green Belt; inside Green Belt = inside the inner boundary of Green Belt

compare the amount of growth and its spatial direction. It was considered that the best way to do this was by map-based surveys. Ideally the surveys should be based on maps to the same scale and giving the same standard information from each country over the same period of time.

Unfortunately, but not surprisingly, the same or similar approaches in each country were limited. The available maps were : in the UK Ordnance Survey one inch to one mile pre-1972 and 1:50000 new metric survey maps subsequently; in Japan 1:50000 topographic maps for the whole study area in 1955, 1966 and 1976 and 1:25,000 land use maps for west suburban Tokyo in 1972; and in South Korea 1.25,000 land use maps in 1972 and 1:25000 and 1:50000 topographic maps in 1985.

Obtaining comparable maps for the UK, Japan and South Korea for this research therefore presented considerable problems. These included the usual ones of scale, dating, purposes and definition, complicated by political and security difficulties in South Korea; black and white duplicated maps without national grids in Japan, and the lack of definition for the often changing outer boundaries of London's Green Belt. In addition the changing scales and content of maps even within one country over time present further difficulties.

It would also have been preferable to have been able to acquire the time series of maps in each country in relation to the date of the introduction of the Green Belt and at set time periods, probably decades, afterwards. Unfortunately maps have not been produced to provide such a convenient data source.

The maps chosen for study have therefore had to be the most suitable available maps, rather than those that the researcher might have considered ideal.

2.4.1 London

With regard to London's map dates it would have been preferable to have studied maps of the early 1940s before the Green Belt was really established, at the middle date around 1960, which was considered as

the date dividing the approved and the extended Green Belt in this research, and again in the 1970s. The available maps used were the Ordnance Survey Sixth Series one inch:one mile maps with national grid for the London region with a modal date around 1947 and the 1972 1:50,000 maps which were the latest series available to cover the whole study area. Some maps for the Sixth Series around 1947 were unobtainable.

No suitable maps were available for the mid-date of 1960 as the Ordnance Survey 7th edition one inch:one mile maps were issued at various dates between 1952 and 1969. It was considered that 1952 was too close to the 1947 survey and similarly 1969 too close to the new 1972 maps. Therefore a complete survey of this mid period was not carried out, only a partial survey of North West London where maps for 1960 were available. The No 161 map covering North East London and west Essex and the No 171 map of South East London and north Kent were not found in the Land Use School at Wye College or the Map Library at the British Museum. They also were unobtainable from the Planning Officer of Essex County Council (for the No 161 map) and of Kent County Council (for the No 171 map) (see Appendices 2.1, 2.2 and 2.3). Due to the inability to find the 1947 maps, the 5th edition of the 161 and 171 maps in the east area of Greater London was used. These earlier maps were fully revised in 1932, published in 1940 but later edited again with the addition of main roads in 1946. Similarly, for a missing area in the 6th edition around Canterbury and East Kent, a war revision map was used for land use study of the Outer South East.

Only the north west of London and the surrounding area could provide land use information for 1961. Therefore urban growth between 1947 and 1961 and 1961 and 1972 was compared in this limited area only in a later section of Chapter Four (see Section 4.5).

In the London Metropolitan Region, urban area was measured from one inch Ordnance Survey maps in 1947 and in 1972 from 1:50,000 Ordnance Survey maps.

2.4.2 Tokyo

For Tokyo, the aim was to measure the urban area before a Green Belt was imposed in the Tokyo Region in the Master Plan of 1958, and then to see subsequent urban sprawl in the Metropolitan Region when the Green Belt proved to be ineffective. Ideally to examine how rapidly Tokyo had grown every decade from the mid 1950s, maps of the three dates, approximately 1956, 1966 and 1976 were required. It was almost impossible to get the old post-war maps for this city region, but fortunately the author managed to obtain approximately one hundred copied sheets of 1:50,000 topographic maps of various dates around 1955, 1966 and 1976.

A major problem was presented by the earlier maps which were post-war emergency revision maps compiled between 1954 and 1956 and based on air photo and field survey data from 1947 to 1950. Maps for some areas were missing on the expanding west Tokyo suburban area and to fill this gap some later emergency maps of 1959 were used. The use of these later maps means that the extent of the urban area of 1955 was overcalculated in this study.

The map sheets used for 1966 and 1976 covered the whole of the study area and were taken from those now regularly produced by the Japanese Geographic Research Institute under the Ministry of Construction and were a great improvement. The following original maps were therefore used to help to read the duplicated maps more easily and accurately:

(a) 1:50,000 topographic maps issued in 1983 of Tokyo Ward District and the surroundings;

(b) 1:25,000 land use maps produced in 1973 covering a part of the west Tokyo suburbs;

(c) 1:200,000 land use maps compiled in 1982 of the National Capital Region, an area of some 150 kilometre radius from the centre of Tokyo.

2.4.3 Seoul

The main difficulty in finding land use maps for the Seoul region results from the problem of national security for South Korea. Seoul is located only 40 kilometres (25 miles) away from the border of the divided country. Therefore, production of maps of the northern part of Seoul City is restricted and the availability of land use maps has been controlled by the government.

Many military land use sites are hidden in the various land use notations such as fields and rural villages scattered on the maps, giving a false picture. Even the boundary of Kimpo International Airport in Seoul was not drawn properly and many rural settlements appeared to be situated on the runways.

Measurements of Seoul's urban area were taken from maps dated approximately 1972 and 1985. The base maps for land use survey in Seoul Region before Seoul's Green Belt was introduced were scaled to 1:25,000 and surveyed in 1972. The researcher had kept a file of these land use maps in the Seoul Metropolitan Region privately since 1972 and they were brought to Wye by an informal route. These maps were originally produced to study motorway routes from Seoul to Pusan southwards and to the east coastal region and, for the reasons already given, the northern part of Seoul Capital region including part of the Green Belt was not covered. The author therefore completed the Green Belt and a few large urban islands on the 1972 maps by reference to later topographic maps of the 1980s. However a large area beyond the Green Belt could not be included in the delineation of Seoul Metropolitan Region for this research. Fortunately in most of this excluded northern area development has been strongly controlled.

The later base maps used were topographic maps, surveyed in 1985 at the same scale of 1:25,000 with exact national grids. As far as measurement of urban and rural land in the study area in Seoul Metropolitan Region was concerned, it was easier and clearer than the two city regions of London and Tokyo. Overall, although the Seoul

Table 2-1 - Explanation of Map Dates and Maps Used

	Date of Introduction of Green Belt	Early Map Date	Later Map Date	Length of Survey	Type of Map
London	1950s onwards	1947	1961,1972	25 yrs	Ordnance Survey one inch:one mile (47, 61) and 1:50,000 (72)
Tokyo	1958 in master plan	1955	1966, 1976	21 yrs	topographic maps at 1:50,000 scale
Seoul	1971 for the first designation	1972	1985	13 yrs	land use maps (72) and topographic maps (85) at 1:25,000

region has experienced considerable urban development there has been less urban sprawl than in the other two cities due to the early containment by the Green Belt. Also sporadic and ribbon development has not yet taken place beyond the Green Belt.

Therefore in summary, map dates of the three study regions and the different kinds of maps used are shown in Table 2.1.

2.5 Definition of urban area

In any country the definition of 'urban area' varies according to the worker, institution, aims of the survey, different dates and places, so the three countries should inevitably have had different views on and categories for urban land usage over time. What follows in paragraphs 2.5.1 to 2.5.3 are outlines and discussion of urban land use definitions in the three countries. In paragraph 2.5.4 the author describes how he has tried to reconcile the differences and sets out the working definitions used in this study.

2.5.1 The United Kingdom

Discussion and measurement of land use this century has mainly followed from Dudley Stamp's estimate of land uses in Britain in the First Land Utilisation Survey of Britain 1931-1933 (Stamp 1948). He employed seven main categories of land use : arable; permanent grass and meadowland; rough grazing, commons, heath and moor; forest and woods; orchards (and nurseries); houses with gardens; and agriculturally unproductive land. The last two categories implied urban land. The survey result was printed on six inch to one mile Ordnance Survey maps.

The Second Land Utilisation Survey was carried out by Alice Coleman. This survey of England and Wales was started in 1958 and completed by the early 1970s. The working maps used were on the 1:25,000 scale. Detailed land uses were surveyed at thirteen main categories of land use : settlement (residential and commercial); industry; transport; derelict land; open space; grassland; arable; market gardening;

orchards; woodland; heath and rough land; water and marsh; and unvegetated land. The first five categories related to urban land. Both Land Utilisation Surveys show a markedly agricultural or rural bias although Coleman's has more detail on urban usage than Stamp's (Fordham 1974; Chapman 1974; Coppock and Gabett 1978; Best 1981).

More detailed surveys of urban land were carried out under the 1947 Town and Country Planning Act. Local Authorities were required to produce Town Maps (at the six inch to one mile scale) for all towns with a population of more than 10,000 (Best and Rogers 1973). The Ministry of Housing and Local Government, now the Department of the Environment, stated that the urban land should have 'four main urban uses of housing (net residential area), industry, open space and education, together with the residual urban uses including railway land, waterways, principal business and shopping use and public buildings, together (where applicable) with mineral workings, derelict land, airfields, government establishments, land used by statutory undertakings and other miscellaneous uses . . . as far as they were included with the area of land enclosed by the boundaries of the town maps' (Best 1959, 1970 and 1981; Fordham 1974).

Despite this apparent clarity of definition, many problems remained particularly related to the categorisation of land in smaller settlements, recreational, military and transport land outside towns, and isolated urban uses in rural areas. Research by Best and colleagues (Best and Coppock 1962, Best and Rogers 1973, Best 1981) produced a consistent definition of urban land but not all researchers agreed with the categorisation with consequent confusion over the measurement of urban land uses and the extent of urban expansion (Fordham 1974).

Recently in the 1980s, the Department of the Environment produced a new clear-cut land use classification as the basis for detailing changes in land use recorded by the Ordnance Survey in its work on map revision in Great Britain. The two broad divisions of 'urban' and 'rural' land uses are sub-divided into twenty-four broad categories of land use as follows (DoE Statistical Bulletin 87(7).

Ordnance Survey recorders list all known land use changes to the nearest 0.1 ha (quarter acre).

Division 1 : Rural Land Uses

1.1 Agriculture
- Agricultural land
- Agricultural Building

1.2 Forestry, Open Land and Water
- Forestry/Woodland
- Rough Grassland and Bracken
- Natural and Semi-natural Land
- Water

1.3 Minerals and Landfill
- Minerals
- Landfill Waste Disposal

1.4 Outdoor Recreation
- Outdoor Recreation
- - playing fields and sports grounds, including those in schools and industrial sites, football pitches, golf courses, country parks and allotment gardens

1.5 Defence
- Defence

Division 2 : Urban Land Uses

2.1 Residential
- Residential
- Institutional and Communal Accommodation

2.2 Transport and Utilities
- Highway and Road Transport
- Transport (other)
- Utilities

2.3 Industry and Commerce
- Industry
- Offices
- Retailing
- Storage and Warehousing

2.4 Community Services
- Community Buildings
- Leisure and Recreational Buildings

2.5 Vacant
- Vacant Land previously developed
- Urban Land not previously developed
- Despoiled Land

2.5.2 Japan

Land use classification has been introduced in the National Geographical Survey Institute in Japan since the 1950s in order to make land use maps. The scale of these early maps was 1:50,000 and like the early land utilisation surveys in Britain they concentrated on agricultural usage for the establishment of a comprehensive development plan. The land uses are shown in twelve categories of paddy field, cropland, orchard, forest, pasture, other rural or semi-rural land use, urban settlements, transportation, land improvement area, conservation area, special facilities, and mining field.

However, the Japanese Government started to prepare land use maps which were based on urban land usage, rather than agricultural/rural uses. The new classification was carried out by the Japanese National Geographic Survey Institution in 1973, one of the governmental bodies under the Minister of Construction. The scale in the maps worked is 1:25,000. Table 2.2 shows land use classification in Japan.

This classification gives greater emphasis to urban land uses than previously with fifteen separate categories. Rural land uses are classified into twenty categories subdivided between agriculture and forestry.

Although the classification seems very clear there are problems for the researcher in assigning some uses between urban categories, or even between urban or rural uses. For example, open space are included in these urban categories except open agricultural land and national and regional designated natural parks. Therefore, these include playing fields, cemeteries, Japanese temples, sports grounds, palaces, city parks, country parks, riverside parks along river basins of the main rivers flowing through the Tokyo Ward District, Tokyo Bay parks, race courses and golf courses, even in open countryside on the outskirts of the Metropolitan Region, and other minor open spaces which are not listed above.

Table 2.2 : Land Use Classification in Japan

No	Division	Group	Category note
1	Urban area	Residential area	General residential area
2			Medium/high rise residential area
3		Commercial area	Commercial area
4		Business area	Business area
5		Industrial area	Industrial area
6		Public area	Public business area
7			Educational area
8			Welfare area/hospital
9			Park and green area
10		(Facilities)	Sports facility
11			Transportation facility
12			Utilities
13			Defence facility
14			Vacant land/land readjustment area
15			Land under construction Residential developing area
16	Rural area	Agricultural land	Paddy field
17			Cropland
18			Orchard
19			Mulberry field
20			Tea field
21			Nursery
22			Pasture
23			Stall
24			Glass house
25		Forest	Conifer planted
26			natural
27			Deciduous
28			Mixture
29			Bamboo
30			Palm
31			Leegida (pine)
32			Small bamboo
33			Wild land wild grass
34			Land/moor or marsh
35			Special reservation area

Sources : Legend of Land Use Map 1:25,000 in Japan; Masayoshi and Kazubibo Otake (1980) 'Thematic Maps in Japan'.

2.5.3 South Korea

Land classification for agricultural land and land use maps was first undertaken in particular areas in South Korea in the early 1960s for the purpose of establishing regional development plans (Kil 1981). Since 1972, national land use classification has been defined in order to prepare land use maps throughout the whole country to a scale of 1:25,000.

However, the Korean land use studies do not distinguish between urban and rural. Table 2.3 shows twelve groups and forty-seven categories of land classification in the Korean land use maps. This classification reflects the agricultural bias noted in earlier classifications in Britain and Japan. The listing of urban uses is very limited, particularly in relation to settlements where there is no categorisation of internal uses even into the broad divisions of residential, commercial, industrial and public land uses.

It seems that the Korean land use classification was largely based on the old Japanese classification by the Korean Institution, despite some researchers' efforts in South Korea (Son 1973; Choi 1975; Kim and Roh 1976; Kim 1978; An 1980). It is understandable that the land use classification in South Korea was biassed on traditional rural based land use classification, because in the 1970s the early urban growth was concentrated in Seoul and several other cities and their satellite towns, and the remaining area was untouched.

2.5.4 Working definition of urban area

The three different countries and different research institutes have various criteria to divide land use. For the purpose of the research, it is necessary to have the same definition of urban land uses or urban area. Table 2.4 compares the land use definition of Best's study based on the Development Plans and the Town Maps, land use classification by the Department of the Environment Bulletin published in 1987, Japanese ministerial land use division and the

Table 2.3 : Land use classification in legend of land use map in South Korea

1 Paddy field
- Fully irrigated paddy field
- Adjusted paddy field
- Partly irrigated paddy field

2 Cropland
- general crop
- special crop
- vegetable
- seeding
- poplar
- bamboo
- mulberry

3 Perennial crop
- apple
- pear
- peach
- grape
- chestnut
- persimmon
- orange

4 Pasture

5 Forest
- dense forest
- open forest
- cut-over land
- unproductive land

6 Settlement
- city
- village

7 Industrial area

8 Others
- cemetery
- waste land
- reclaimed land
- miscellaneous

9 Transportation facilities
- railway (single, double)
- highway
- paved surface
- loose surface

10 Industrial facilities
- salt field
- fish farm
- breeding farm
- mine
- quarry
- market
- irrigation well
- water pumping station

11 Recreation area
- sightseeing area
- hot spring
- boating area
- golf courses

12 Protected area
- national and provincial park
- protection area for historical heritage

Source : Legend of Land Use Map in South Korea 1973

Korean Geographic Survey Institute. The working definition decided upon for this research is based on this table.

The working definition chosen for some of the land uses requires explanation, particularly the assignment of 'vacant land under construction' to the rural category. The reasons for this are: firstly the purpose of this research is to compare urban growth in the expanding fringe of developed areas in the three different Metropolitan Regions, so it is important to see how the urban area is growing outwards. Secondly, in Tokyo and Seoul a long period of time is taken to carry out urban projects for suburban expansion. Sometimes these developments can take ten years or more to complete the infrastructure and furthermore time was required to build houses and community buildings. Therefore, during the long period of development process, land under construction can be regarded as being rural areas until buildings and houses are built.

The category on open space has some rather controversial points. Playing fields and sports grounds usually exist in town areas, whereas many golf courses in London are on the edge of developed area, where they may or may not be included in London's Green Belt. Some British researchers argue that golf courses and recreational land closely related with urban development, should be classified under urban land, against the recent land classification of the DoE which classifies golf courses under rural areas (Best and Rogers 1973; Elson 1986; Scotsman February 1990).

Most of the golf courses in Tokyo and Seoul are located in open countryside at the edge of Metropolitan Regions. But with rapid urban sprawl in Tokyo existing golf courses have become surrounded by developed areas nearby. Japanese land classification classifies extensive golf courses as urban areas. Therefore for the working definition golf courses come under the urban area category.

Country parks have rural characteristics and the boundaries are difficult to distinguish from the surrounding area in the maps of the three regions. Consequently they were regarded as rural areas.

Cemeteries are categorised as park or park grave and developed on a large scale in Tokyo and Seoul. In London, cemeteries are found in churchyards or other provided sites which are usually located in urban areas. Therefore cemeteries come under the urban area.

The locations of military industry, airbases and military barracks were determined when preparing for war. The wartime cabinet ordered that those facilities should be located within the safer area protected by the anti-air raid network, 30 to 40 kilometres from central Tokyo. These sites were linked closely with railways and surrounding towns. Tachikawa, Yokota and Atsugi airbases were developed near suburban towns, and military bases in north-west suburban areas were located near surrounding town areas. As the surrounding towns merged increasingly into Tokyo, the military sites inevitably became part of the central areas of the suburbs. There is no reason to define military land into rural areas in Tokyo. Therefore it was decided that military land should be classified under urban area.

As summarised in the UK, large numbers of studies were carried out to define the definition of urban area. However, it seems that British experiences did not particularly affect other counterpart countries, while the old Japanese land use classification based on agricultural land use survey directly influenced South Korea. As land use patterns between Britain and the oriental countries are different, it was very difficult to compromise to make the same classification. Even in the UK the definition of urban area varies in many categories. Therefore, as shown in Table 2.4, the Japanese governmental classification, which shows clear divisions and can easily apply to land use in South Korea, has been largely accepted as a working definition for this research, the exceptions being in the classification of vacant land under construction and country parks.

Table 2-4 - Comparison of Contents of Urban Area

0 = Urban X = Rural

	UK		Japan	S Korea	Working Definition
	Best	DoE (1985)			
Developed land:					
Residential/commercial	0	0	0	Settlement	0
Industrial	0	0	0	Industry	0
Transport/utilities	0	0	0	Transport	0
Public/community services	0	0	0	Settlement	0
Vacant land under construction	0	0	0	Reclaimed	X
Open space:					
Playing field/sport ground	0	X	0	Settlement	0
Golf courses	0	X	0	Recreational	0
Country park	X	X	0	"	X
Palace/temple/church	0	0	0	Settlement	0
Cemetery	X	0	0	Other	0
River/water	X	X	X	River	X
Others:					
Military/airbase	X(a)	X	0	Settlement/ transport	0
Mineral workings	X(a)	X	X	Forest	X

(a) Best points out they are in practice in rural areas

Sources: Best (1970, 1981); Fordham (1974); DoE (1987)
MoC in Japan (1976, 1981); MoC in S. Korea (1974, 1984)

2.6 Measurement method

2.6.1 Introduction to the method used

The research employed the one kilometre square method, as a basic method to measure urban area in the three Metropolitan Regions. This method examined land uses in each grid of one kilometre square on the maps and divided land use into the two divisions of urban and rural areas. When urban land uses occupied more than half of each square, it was counted as urban, otherwise it was considered to be rural. Each one kilometre square was independently measured for each study period and the results were drawn on graph paper. The measurement of the urban area by km^2 units is not suitable when a high level of accuracy at a local level is required but the resulting graphic maps had the characteristic advantage that they showed visually the direction and dimension of urban expansion and its growth patterns such as ribbon, rounding off, sporadic or contained.

The method has previously been used by the South East Joint Planning Team to evaluate urban influence into the countryside and urban-rural interaction in the South East of England. In each kilometre square of national grid the number and distribution of structures and urban uses was counted and classified into the six categories : remote countryside, open countryside, countryside, intruded countryside, urbanised countryside and urban land (Strategic Plan for the South East 1971).

However, sampling methods have been more commonly used for land-use measurement. For example, line sampling was used by Thomas on Ordnance Survey 1:25000 maps for land use studies of London's Green Belt (Thomas 1970), and point sampling was employed to measure land use structure and changes in National Parks and Areas of Outstanding Natural Beauty in England and Wales by Anderson (Anderson 1979). She pointed out that point sampling reflected reliable accuracy in choosing approximately 3000 points irrespective of sizes of area sampled.

A pilot survey using both the point counting and the kilometre square method was carried out on the maps for the Seoul Metropolitan Region. Seoul was chosen because clear maps at the same scale over time were not available for other cities. The pilot study is discussed in the next section.

2.6.2 Difference between the two methods

Table 2.5 shows the results of the pilot study using the kilometre square and point counting methods. Data for the kilometre square method gives the number of squares counted as urban for each area; in brackets is this number of kilometre squares given as a percentage of the total for each area. Data for the point sampling method gives a percentage of the total number of points for each area that was counted as urban; in brackets is the area (in km^2) represented by this percentage.

It can be seen that the results of the two methods vary widely. The main difference is that the one kilometre square method counted more urban area than the point sampling method in the more developed land and less urban area in the less developed subregions of the Green Belt and the De-En Area. However, when the ratio of urban area to rural became around 50 per cent in the Satellite Towns in 1985 the two results became close.

This indicates that point sampling is more effective in rural areas where it tends to pick up the random scatter of urban development which is largely missed by the kilometre square method because the settlements are either too small or, when larger, may not fall entirely within one grid square. this variation in results is shown very clearly in the measurement of Seoul's Green Belt in 1972 where the urban area is measured at $12km^2$ by the kilometre square method and $66km^2$ by point counting. It is interesting to note, however, that the urban increase measured between 1972 and 1985 shows much less variation at + $9km^2$ and + $14km^2$ respectively. This is because the urban development in the Green Belt during this period was largely in major projects, such as a freight terminal, Olympic facilities and a

Table 2-5 - Comparison of Two Measurement Methods of One Kilometre Square and Point Counting

Subregions (Total Area)	Kilometre Square		Point Counting	
	1972	1985	1972	1985
Seoul Built-up Area (457 km^2)	172 km^2 (37.6%	343 km^2 75.1%)	(137 km^2 30.0%	305 km^2) 66.7%
Satellite Towns (354 km^2)	37 km^2 (10.5%	177 km^2 50.0%)	(60 km^2 17.0%	170 km^2) 48.0%
Seoul Green Belt (1566 km^2)	12 km^2 (0.8%	21 km^2 1.3%)	(66 km^2 4.2%	80 km^2) 5.1%
Metropolitan De-En Area (2934 km^2)	23 km^2 (0.8%	58 km^2 2.0%	(135 km^2 4.6%	200 km^2) 6.8%

Notes: ( ) shows calculated values from the original measurement to compare two methods;

eg: using Kilometre Square:

172 km^2 of Seoul Built-up Area = 37.6% $(\frac{172}{457} \times 100)$

using Point Counting:

30% of Seoul Built-up Area = 137 km^2 $(457 \times \frac{30}{100})$

Sources: Kilometre Square and Point Counting Methods

government buildings complex, which were sufficiently concentrated and large enough to be measured by the kilometre square method.

Conversely when measuring by the one kilometre square method in the Built-up Areas where urban uses are dominant in the squares small amounts of rural area are ignored. For this reason the one kilometre square method can overestimate the urban area in the Built-up Areas. The data again shows a much greater similarity when considering the measurement of change in the urban area over time. The figures for growth are + 171km^2 and + 178km^2 by the kilometre square and point sampling methods respectively, again indicating greater precision where accretion is taking place.

2.6.3 Choice of method of measurement

Despite the existence of well-developed sampling methods to measure urban land uses and the drawbacks of the one kilometre square method mentioned in section 2.6.2, the author decided to use the one kilometre method to measure urban area, employing the simple classification of urban and rural divisions. Many researchers have used sampling methods and argued that they produce very accurate results of area measurement. However, the author did not consider that such a high level of accuracy was required in this research. The reason for this was because the purpose of the research was to study the location, direction and dimension of urban growth in metropolitan regions at the macro level in relation to the employment of a Green Belt, rather than with the exact study of land use change in the region and within a Green Belt. Much previous research has studied land use change and related subjects but nobody, as far as the author knows, has attempted to study with an empirical approach how suburban growth in a Metropolitan Region has been interrupted, controlled or unrestricted by the employment or otherwise of a Metropolitan Green Belt. At a macro aspect, trends and relationships between urban growth and a Metropolitan Green Belt have not yet been examined. The one kilometre square method enables the patterns of urban growth in the absence of a Green Belt (Tokyo) and where a Green Belt has been introduced (London and Seoul) to be visualised. The

one kilometre square method illustrates on maps how greatly urban growth has been influenced by a Green Belt.

2.6.4 Counting by the kilometre square method

The use of the kilometre square method was not without problems. The London maps showed clear lines of the national grid on the maps used. On Seoul's maps the national grid lines were marked only as dots marking each kilometre at the side. Tokyo's maps did not give a national grid. Therefore, the author produced a one kilometre square transparent grid overlay placed over the areas to be measured on the Tokyo maps.

To calculate the urban area in each kilometre square for all these Regions, the square was usually divided into four sections. Its classification was decided as urban when it had more than three quarters in urban use. If it had two parts urban and two parts rural, the one kilometre square was divided into sixteen parts. The square was then attributed to urban area if more than eight parts were in urban use. However, if the parts were divided equally between urban and rural, it was decided as rural area.

Measurement of the urban area was a rough estimation. The urban areas of London and Seoul showed rather more clearly than Tokyo because these regions had had their urban growth contained. Tokyo region posed great problems in how to decide whether to assign each grid of one kilometre square to urban or rural area because Tokyo had grown as a sporadic mixture of rural and urban uses. Going outside the city subcentres, suburban development areas coexisted with small pieces of farmland.

Due to the fragmented nature of development in the one kilometre square in the Tokyo suburbs, the estimation of urban area was difficult and varied according to how the measurement was made. When a square containing such fragmented, sporadic development was assigned to urban area, the total extent of urban area was probably overestimated. As a result, these squares were resurveyed, this time

being assigned to rural area. This caused the total extent of urban area to be underestimated. Therefore, the author had to find a more accurate way to measure the urban area in such squares to give a more realistic measurement of the total urban area. With this in mind two west Tokyo suburban town areas, Ichikawa and Hino, approximately 30 and 40 kilometres away from Tokyo station, were re-examined using 1:25,000 land use maps issued in 1973. These maps had clear land use boundaries so that it was possible to obtain a more accurate determination of the extent of urban land in each region.

After examining the 1973 land use maps and comparing them with the 1:50000 maps it was possible to judge with some degree of accuracy where land use boundaries might lie on the old 1:50000 maps. Using this more accurate approach to measure the ambiguous suburban squares the entire Tokyo Metropolitan Region was remeasured using 1955, 1966 and 1976 maps.

2.7 Key problems in the comparative research

The author was faced with three main problems whilst carrying out the comparative studies between the three countries.

They were (i) collection of data (ii) employment of empirical study and measurement method and (iii) the relationship between London's, Tokyo's and Seoul's Green Belts and their patterns of urban growth and control.

2.7.1 Collection of data

At the beginning of this study a literature review was carried out in the four great capital cities of London, Moscow, Seoul and Tokyo. The first three cities have had Metropolitan Green Belts around large Built-up Areas and Tokyo had once considered a Green Belt. It became clear that a shortage of data and other information was going to present difficulties.

Information written in English on Japanese planning and Tokyo metropolitan planning was very limited. Only a few books and articles introduced Japanese planning systems in general terms, and none of them dealt with Tokyo's Green Belt and the National Capital Regional Development Plans of the 1950s and 1960s in sufficient detail for this research. Seoul's Green Belt had not been studied in great detail and not much data was available in the UK. Data on Moscow's planning and Green Belt were very limited. Only a few books and articles introduced the communist country's planning systems and the planning of Moscow (Simon 1937, 1945; Frolic 1963/64; French 1973; Hamilton 1973; Shaw 1973; Ivanov 1975; Richardson 1977; Huzinec 1978; Ekkel 1980; White 1980; Hall 1984; Pryde 1985).

In light of the poor availability of data and achievement of the research to date, the researcher began to doubt whether the question of Seoul's land crisis could get an answer from the poor literature review of metropolitan regional planning. However he was determined that he should carry on to study the matter of Green Belts and urban growth because Seoul has had and will face serious land problems as its biggest socio-economic and political issue. These land problems have much association with the initiation of Seoul's Green Belt. It was felt that despite the shortage of data and the problems inherent in international comparative studies, the research had to be carried out for the purpose of solving the land crisis in future Seoul. Even though Munton (1986) referred to London's Green Belt as 'the end of an era', referring to the fact that the Green Belt issue was no longer a matter for much debate, the author felt that the Green Belt was at the centre of Seoul's planning issues. It was therefore decided to put aside Moscow's Green Belt and continue with the comparative work in London, Tokyo and Seoul Metropolitan Regions. London's Green Belt became a symbolic example of the best urban containment. Tokyo's Green Belt was an excellent example of unrestricted sprawl without a Green Belt. Seoul's Green Belt had been influenced by both London and Tokyo and further lessons would be provided by the three-way comparison.

To further the work the researcher went to Seoul to collect data. The Ministry of Construction which was in charge of planning works, refused to release Green Belt data. The public servants informed the researcher that statistics concerning the Green Belt area could be found in the Municipal Yearbooks, which were very inaccurate reports produced in the 1970s, although better editions appeared in the 1980s. The National Central Library, Graduate School of Environmental Studies of Seoul National University, Korea Research Institute for Human Settlement, Korea Planners' Association, Korea Parliament House Library and other institutions were visited to search for the incomplete data on Seoul's Green Belt, and attempts were made to collect other relevant information. Many town planning reports were found which referred to Seoul Metropolitan City and most of the Satellite Towns (Korean Government 1971, 1982; MOC and Korea Industrial Site Development Corporation 1977, 1986; Seoul City Government 1977, 1980, 1984b, 1988; MOC and Korea National Housing Corporation 1979; Korea Research Institute for Human Settlements 1981, 1983; Sungnam City 1984; Suwon City 1984; Anyang City 1985; Incheon City Government 1986; Ministry of Construction, South Korea 1986). A report regarding a large development project in the west coastal area of Shiwa District and the Seoul Capital Regional Development Plan were gathered. The Construction Code covered most of the planning laws and those relevant to development and conservation. In addition some Japanese town and regional planning reports, Acts and other articles were found, in many cases in the Parliamentary Library and in private research institutions in South Korea (Japanese Tourist Association 1969; Department of National Land 1977; National Land Committee 1984; Tokyo Metropolitan Government 1984; National Capital Region Development Association 1985; Japanese Construction Law Code 1986).

Many Japanese data were collected from Tokyo with the great help of a friend of the author who sent to the UK the old town planning reports from 1932 and 1937 to the 1950s, 1960s and 1980s. The researcher went to Tokyo in November 1988 for field survey and collection of further data on Tokyo's Green Belt. Data searching by correspondence with Tokyo, through personal and official channels,

was not satisfactory. However, in Tokyo the researcher failed to find the correct boundary of Tokyo's Green Belt in the First Master Plan of National Capital Region Development of 1958.

The collection of maps of Seoul and Tokyo was difficult. Red tape in the South Korean Government blocked the taking overseas of Korean maps because of reasons of national security. Fortunately the old land use maps of 1972 were kept in the author's study room and he was able to bring them to the UK. Large parts of north Seoul did not issue land use maps in the early 1970s and they were unavailable for the research. Similar red tape was encountered in Japan regarding obtaining Japanese maps. However, the author obtained approximately one hundred maps of Tokyo Metropolitan Region dated 1955, 1966 and 1976 and these could be read in Wye although visually the maps were not of good quality. Most of London's maps were available in Wye College Map Room. Some maps were surveyed in the British Museum Map Library but a few could not be found, especially those for the south east London Built-up Area in 1947.

2.7.2 The empirical study

After comprehensively reviewing the available literature on the planning policies of the three Metropolitan Regions the changing reality of urban growth and conflicts between Green Belts and regional growth in the Metropolitan Regions was not revealed. Studying the planning background of Metropolitan development policies and Green Belts seemed inadequate for analysis of how much or where metropolitan growth had occurred or how it had been controlled or contained in Metropolitan Regions as well as in Green Belts. The books and articles did not reveal much about the land use situation before the Green Belt and how the area had been changed after the employment of Green Belts. Therefore the author undertook a large amount of work actually to survey urban growth in the regions, using map based information.

The survey raised three problems : which method should be used to measure urban area; how the urban area should be defined; and where

the various boundaries lay within each region. The first two of these difficulties have been discussed in Sections 2.6 and 2.5. The definition of boundaries was largely dependent on the availability of maps and on decisions relating to changing official boundaries (see Figure 3.8). The resolution of these problems is further discussed in the relevant Chapters, Three, Five, Six and Seven.

2.7.3 Urban growth and control in London, Tokyo and Seoul

With regard to the third problem a critical question bothered the author once a large amount of information from the literature review and empirical studies had been gathered.

This was how to make a meaningful comparison between city regions, each with its own history and performance produced by a different culture and society and at a different stage of urban growth. The three countries had different characteristics and problems and their own ways of finding solutions.

London's Green Belt has been consistently expanded, with all the complications of changing boundaries. Studies of land uses in the Green Belt have shown considerable change over time and questions over the use and abuse of the Green Belt, of public land ownership and of the purposes of preservation continue to be asked. Tokyo, on the other hand, learned from the Greater London Plan 1944 and produced a Green Belt in 1958 but it never existed except on paper. Instead, expanding Tokyo developed a dynamic view of urban development in the 1960s to rationalise the existing urban sprawl. Finally, Seoul has expanded to the edge of its Built-up Area but cannot continue to expand because of the strict enforcement of the Green Belt that allows neither for boundary change nor urban development within the boundaries.

Each situation was interesting in itself and contained some lessons for the future of Seoul, but a crucial relationship between the three seemed lacking. In the absence of an obvious relationship the author

considered the possibility of the research forming three separate, less related metropolitan studies.

However, in pursuing the literature review on the early history of London's Green Belt the author discovered the full extent of Raymond Unwin's work for the Greater London Regional Planning Committee (1931) at the time of a greatly expanding London. Unwin seemed to cope with the rapid growth in the London region but although his influence over the development of the British planning system was considerable his dynamic growth model for the growing capital region was not fully followed. Contemporary Japanese planners however developed a similar idea to Unwin's for the Tokyo Metropolitan Region in the 1930s which has subsequently been evaluated as being one of the best plans for the city (Sato 1977).

The author pondered over the attraction of Unwin's dynamic idea for the resolution of Seoul's problems and concluded that although Seoul has not learnt directly from Unwin in the past its future can draw lessons from his positive approach in the light of the experiences of London and Tokyo. The author has therefore taken the ideas of Unwin as the connecting theme between the three metropolitan studies.

In Chapter Three Unwin's work and planning principles are discussed and the post-Unwin planning of London's Green Belt outlined. Similarly Chapter Five deals with the development of Unwin's dynamic idea in Tokyo and describes Tokyo's more recent metropolitan policies. The lessons for Seoul from the Green Belt and urban growth policies of the other two Metropolitan Regions are considered in Chapter Nine. Chapter Nine also rebuilds a new dynamic model from the lessons of Unwin's original idea and Tokyo's expansion of the idea.

PART TWO

LONDON METROPOLITAN REGION

CHAPTER THREE

LONDON'S GREEN BELT

This chapter is a review of the literature concerning London's Green Belt, its background, planning, implementation and conflicts. The first section (3.1) introduces Unwin's dynamic approach to urban growth and open space to meet London's expansion and the Greater London Regional Planning Committee. The second section (3.2) describes how urban growth in the London region was limited in both principle and practice during the Second World War. Preparation, extension and delayed designation of the Metropolitan Green Belt are introduced in section 3.3. Section 3.4 points out conflicts between the highly growing demand for housing land and the maintenance of the Green Belt in the prosperous London Metropolitan Region, and gives the background to the Green Belt Circular in 1984, as a political solution to the conflicts between urban growth and Green Belts. Section 3.5 summarises the literature review on London's Green Belt.

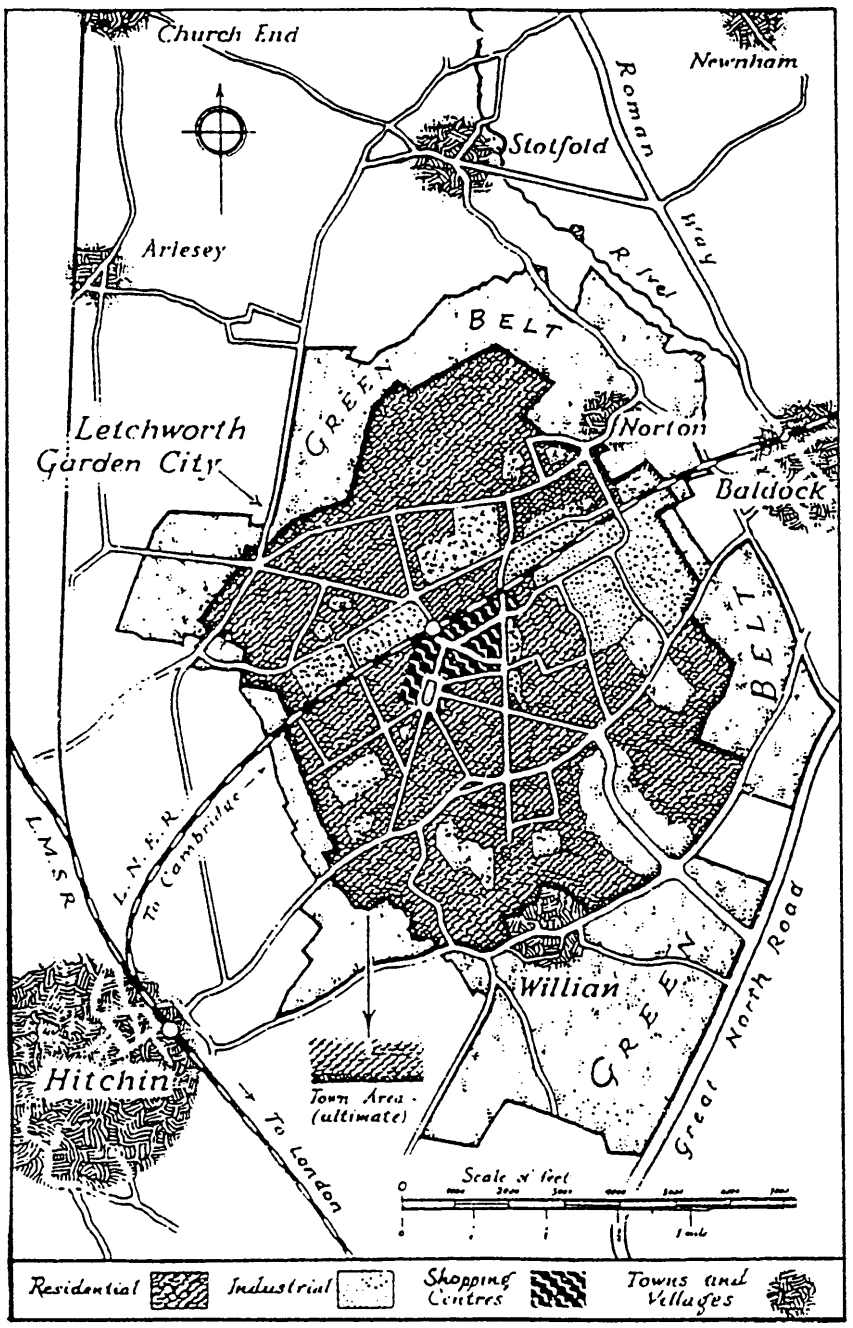
3.1 London's growth and Unwin's Green Girdle

The literature review on London's Green Belts emphasises the importance of Raymond Unwin in that the 'first official regional plan' designed to deal with London's growth and subsequent requirement of open space was produced by the Greater London Regional Planning Committee (GLRPC), for which Unwin worked as the Technical Adviser and where he established a fundamental planning structure for the London region (Rasmussen 1963, Thomas 1970, Miller 1988).

3.1.1 Raymond Unwin

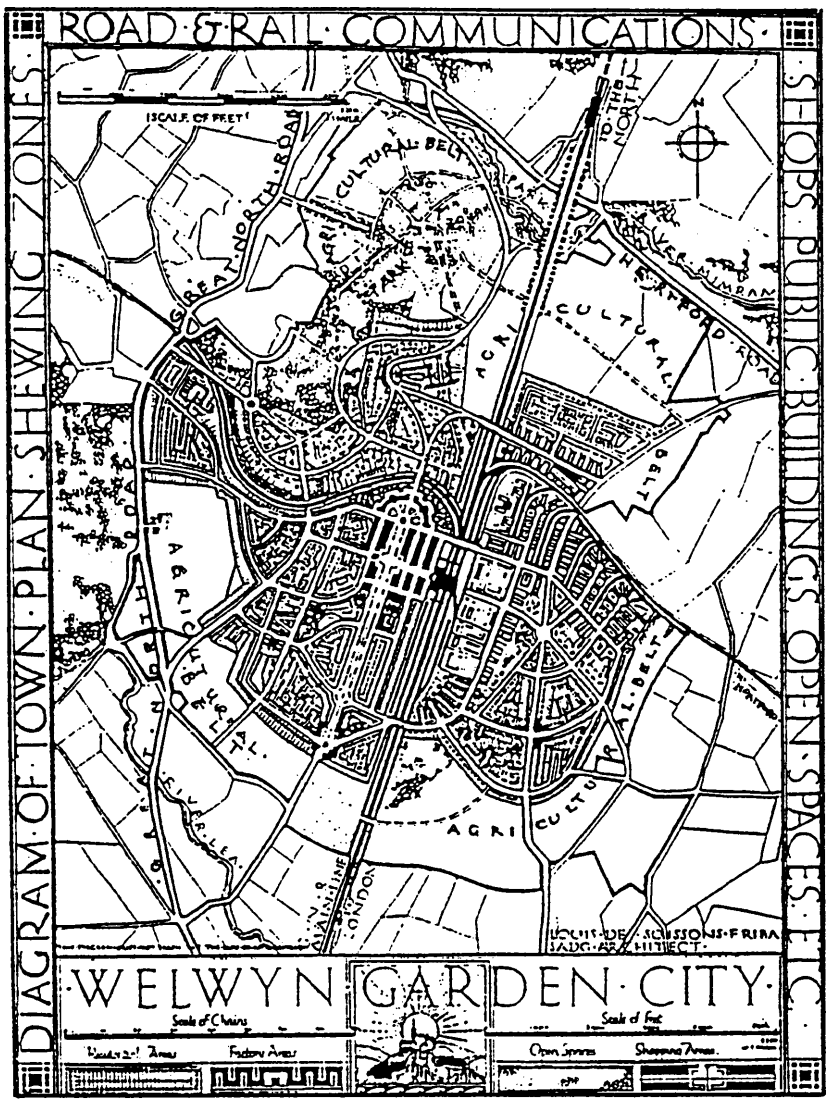
Raymond Unwin, born in 1863, was an architect, but his interests spread wider than just the design of buildings. In 1904 he was invited to design the first garden city of Letchworth with his partner Mr Barry Parker, a brother-in-law. Letchworth was based on the ideas of Ebenezer Howard, with the town area set in the middle of open countryside and enclosed by a Green Belt (see Figure 3.1).

Figure 3-1 Plan of Letchworth and the Green Belt, 1904



Source: (ed) Evans (1972) New Towns: the British Experience

Figure 3-2 An Early Plan of Welwyn Garden City and the Agricultural Belt, 1925



Source: (ed) Evans (1972) New Towns: the British Experience

Ebenezer Howard introduced the idea of the garden city as a planned and self-contained new town in the healthier environment outwith large cities, in his book 'Tomorrow : A Peaceful Path to Real Reform' in 1898. The second edition,'Garden Cities of Tomorrow' was published in 1902 (Howard, reprinted in 1902). He advocated the garden city movement through the Garden City Association founded in 1899 (now the Town and Country Planning Association, to solve urban problems in large towns. Howard promoted Letchworth as the first example 50 kilometres (30 miles) away from the centre of London. The second example, Welwyn Garden City, was built in 1920 as an attempt to remedy the post Great War housing shortage (see Figure 3.2).

Unwin applied the principle of Howard's garden city in the design of Letchworth and Welwyn Garden Cities. He employed an agricultural belt or Green Belt as a continuous strip or narrow belt of open space around the town development areas in order to control overgrowth of a garden city and to keep an optimum size of new community. This type of planning involving a strip of Green Belt was different from Howard's original introduction of an agricultural belt. He had envisaged a city development area of a central 1000 acres (4km^2) and extensive surrounding agricultural land of 5000 (20km^2) acres in the outskirts which was represented in his book of 1902. Unwin was aware of this function and role of Green Belts which were designed to control a new town's overgrowth beyond an optimum size of population. Carrying out the planning of Letchworth, he altered Howard's original ideas of high residential density in the town centre and decreasing outwards to a more even density of ten to twelve houses per acre (30 per ha) and redesigned the layout of open space and streets in order to provide gardens for each house (Mumford 1961). He practised the ideal of the English cottage into the real community (Unwin 1909) whereas Howard's ideas had been influenced by the layout of French towns.

Following his experiences at Letchworth, Unwin moved on to Hampstead where he was involved in the development of Howard's Garden City from 1906. Thus he applied the ideas of Howard's Garden City, and the planning principles of a new town, to the development and extension

of suburban areas around the great city of London (Purdon 1963; Rasmussen 1963).

Although the activists of the Garden City movement regretted the building of Garden Suburbs, such as Hampstead, suburban growth found more favour with the public than the idea of complete new towns (Ashworth 1954, Prudon 1963, Ward 1989). For example, Geddes, a great researcher on early town planning, studied the reality of urban growth in a city region in his book 'Cities in Evolution' and introduced the term 'conurbation' to describe the new urban phenomenon (Geddes 1915). He was more concerned with the expansion of existing large towns while Howard and other followers had progressed in an opposite direction (Stretton 1978). Geddes pointed out that the Hampstead Garden Suburb was 'the most conspicuous and successful of existing town expansion' and stated that 'the emergence of Mr Raymond Unwin as one of the most constructive of our leaders, and the growing national recognition of the practicability of such Utopias elsewhere are thus of no small encouragement' (Geddes 1915).

Unwin also seriously examined the German experiences on suburban expansion in large areas of the outskirts of large and small cities. He was very impressed by these German lessons while visiting with a hundred British members of the National Housing Reform Council in 1909 (Geddes 1915, Ashworth 1954, Cherry 1974). He described German town planning maps by land redistribution, German legislation and Cologne's Green Belts which were provided without financial help from local authorities (Unwin 1909, GLRPC 1929).

Unwin's previous experience on Green Belts around Letchworth and Welwyn Garden City in the UK and of other cities on the continent, had probably helped him to develop the idea of a Green Belt for Greater London to control outgrown urban sprawl. At the same time he conceived that, as long as sufficient open space was provided or reserved against urban encroachment and communications were well organised, suburban expansion was not unpleasant.

From 1912 to 1919 Unwin participated in the Greater London survey team of the London Society and worked on a survey of open spaces and a study of road networks. During this work he had a broad regional approach to tackle the metropolitan urban problems on planning of new roads and reservation of public open space in the area outside London development area (Thomas 1970), relieving overcrowding in the central city (Unwin 1912).

In 1919 Raymond Unwin went to work for the Ministry of Health as Principal Officer in the Town Planning Department. He is believed to have been instrumental in the setting up of the Greater London Regional Planning Committee by the Minister of Health in 1927 and in 1929 he was appointed as Technical Adviser to the Committee. Much of the background work for that Committee was undertaken by Unwin and during this period he laid the foundation for two aspects of the post-war British planning system - new town development and Green Belts.

It was largely believed that America learned much from Unwin about the design of suburbs (Unwin 1940; Feiss 1963). Also, although it has not been very much studied, he influenced the preparation of Tokyo's Metropolitan Green Area in the 1930s. His work has substantially influenced the conclusion of this thesis.

3.1.2 The growth of London and establishment of the Greater London Regional Planning Committee (GLRPC)

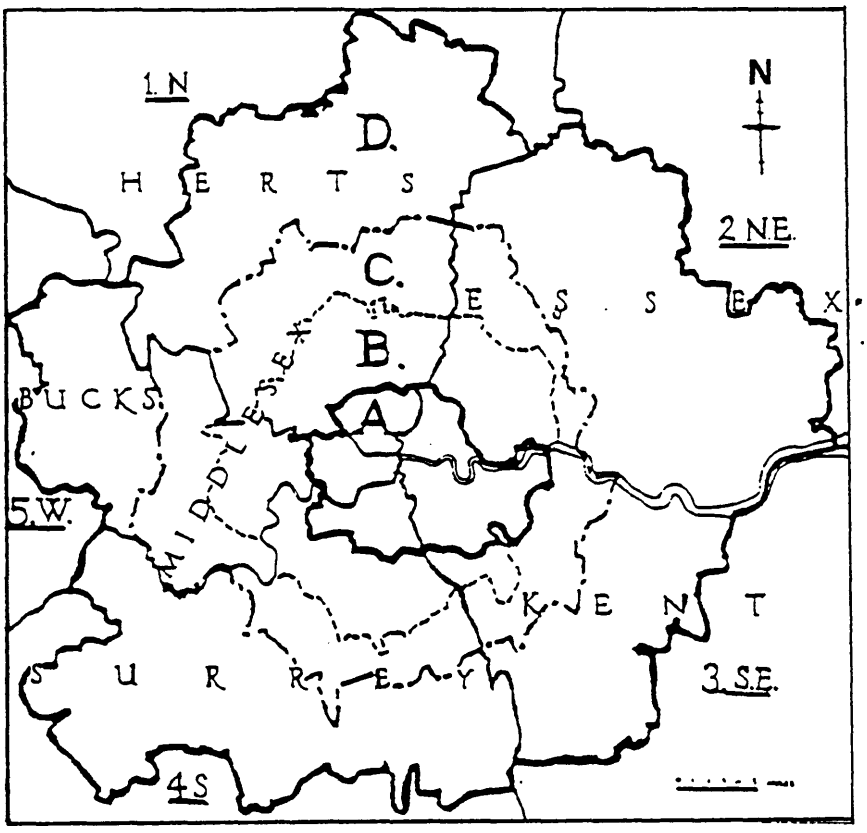
London expanded rapidly from the 19th century. For example the population of London grew from one million people within a radius of 3 kilometres in 1801 to two million within a 5 kilometres radius by 1850. By 1914 the population had further increased to six and a half million and again to eight and a half million by 1939 (Hall 1975), and the city had inevitably continued to expand physically to accommodate these people. Growth was particularly fast between the two World Wars when speculative development and 'garden suburbs' spread the peripheral area of London to reach a radius of 20 - 25 kilometres by the end of the interwar period. More than half the

population of Greater London was accommodated outside the London County Council (LCC) area in 1931 (GLRPC 1933).

It has been estimated that the developed area in the London region more than doubled during the inter-war period (John in Coppock and Prince 1964, Thomas 1970, Hall 1975). This rapid expansion was largely the result of suburban development in the city edge, around railway stations, and of ribbon development along arterial roads. This ruthless encroachment of speculative suburban development into the countryside resulted in a great shortage of open spaces available at the city edge for recreation and similar activities. Other consequences were ribbon and sporadic outward growth; and severe traffic problems with delays in the outskirts and heavy congestion in the centre of London. These metropolitan urban problems required control at a regional level, they could not be handled within a single local authority's administrative boundaries. The Housing, Town Planning etc Act of 1919 provided the legal background to establish a joint planning team and a joint plan between neighbouring authorities. Unwin argued that to deal with planning schemes for Greater London as a whole a new regional planning committee was urgently required.

In 1927 the Greater London Regional Planning Committee was established to try to co-ordinate efforts to control the growth of London and plan for the needs of people in the London region, within and beyond the boundaries of the LCC. The GLRPC consisted of 45 members representing the LCC, the City Corporation, six County Councils, the Standing Joint Committee of the Metropolitan Boroughs, the County Borough Councils of Croydon, East Ham and West Ham, and 126 other Borough, Urban and Rural District Councils. The regional planning area covered 4727 km^2 (1846 square miles) within a radius of 40 kilometres (25 miles) from Charing Cross and was subdivided into four areas. The centre Zone (A) was the area of London County Council (LCC). Zone B covered the area used for the LCC Open Space Survey to ensure urgent provision of open space on the outskirts of Zone A. Zone C extended to the boundary of the Metropolitan Police District and the outer Zone (D) extended to the boundary of the

Figure 3-3 Subdivision of the Greater London Region, 1929



A: The County of London

B: The belt up to the boundary of the Area used for the LCC Open Spaces Survey

C: The belt to the boundary of the Metropolitan Police District

D: That to the boundary of the Region

Source: The Reports of the GLRPC (1929, 1933)

London traffic zone (established in the London traffic Act of 1924) which was taken as the outer boundary of the London Region, as shown in Figure 3.3.

The three main concerns of the GLRPC were firstly, decentralisation of population and industries out of the congested city area (Zone A), secondly reservation of sufficient open space in the rapidly developing suburban areas, and thirdly control of ribbon or other development spreading out from London in any direction. The Committee formed four sub-committees; General Purposes, Decentralisation, Open Spaces and Traffic.

The expenses of the Greater London Regional Planning Committee were met by the local authorities in the Region in proportion to the rateable value of the areas and mainly through the contribution of LCC, totalling £3000 per year (GLRPC 1933).

As Technical Adviser to the GLRPC Unwin was given the task of creating an effective development plan for the Metropolitan Region of Greater London.

3.1.3 The work of the GLRPC

Mr Neville Chamberlain, Minister of Health, was asked to address the first meeting of the Planning Committee. He gave two suggestions of new town development and a Green Belt around London to deal with London's growth. Unwin describes his address in the first report of the GLRPC as follows:

> He asked the Committee to consider in regard to the enormous growth of London 'how far and in what direction it is possible to direct that growth' and 'how far there would be advantage in trying to concentrate the development in particular spots and areas by the establishment of deliberately planned new towns, satellite towns, as the phase sometimes goes, where you get sufficient concentration of population to conduce to

> effective government, to economy in services, and probably also to some reduction in the traffic problem.' Following this, he put the further question 'Should London be provided with something which might be called an agricultural belt, as has often been suggested, so that it would form a dividing line between Greater London as it is and the satellites or fresh developments that might take place at a greater distance?' (GLRPC 1929).

The first Report of the Greater London Regional Planning Committee was produced in 1929, followed by interim reports on open spaces and decentralisation in 1931 and a second and final report in 1933 which contained a revised version of Unwin's now famous 'Green Girdle'.

In addition, Unwin, the Technical Adviser, wrote many memoranda on the matters of open spaces, ribbon development, the additional town planning powers which were required and a regional planning authority for Greater London.

3.1.3(a) The First Report in 1929

The first Report clearly set out the area covered by the Region and its population distribution; these are given here as Figure 3.3 and Table 3.1. The two central sub-regions A and B covered 359 square miles (920km^2) of the total planning area of 1846.7 square miles (4727km^2) and extended to a radius of approximately ten miles (17km) from Charing Cross. The population of 8.7 million was unevenly distributed through the four sub-regions with the majority (80 per cent) living in sub-regions A and B at densities of 152p/hectare and 43p/hectare respectively. This is in sharp contrast to the outer sub-regions D and C where the remaining 80 per cent of the land was occupied at densities of seven persons and three persons per hectare respectively. These data help to reveal the reasons behind the concern of the GLRPC for overcrowding and congestion in A and B and for the rapid outward spread of suburbia at a relatively much lower density that would engulf large parts of the rural outer areas if allowed to continue to grow at its current rate.

Table 3-1 - The Extent Area, Population and Density in the Greater London Region, 1927

Area or Ring	Estimated Population in 1927	Area in sq miles (km^2)	Average Radius of Miles (km)	Average Density Persons Per Acre
A. County of London	4,550,000	117.0 (300)	$6\frac{1}{8}$ (10)	59.57 (152 persons/ha)
B. Ring to area used in LCC Report on Open Space	2,677,000	242.2 (620)	$10\frac{3}{4}$ (17)	17.92 (43 persons/ha)
Totals of A and B	7,217,000	359.2 (920)		(78 persons/ha)
C. To Metropolitan Police District	592,963	333.7 (854)	15 (24)	2.89 (7 persons/ha)
Totals of A, B and C	7,809,963	692.9 (1774)		
D. To Greater London Region	843,596	1153.7 (2953)	$24\frac{1}{4}$ (40)	1.22 (3 persons/ha)
Totals of A, B, C and D	8,653,559	1846.6 (4727)		

Source: GLPC, The First Report 1929. Metric units of area and radius and average density per ha, were calculated by author

The GLRPC had therefore carried out the examination of many other city region's urban problems, in particular with regard to open spaces and a Green Belt or Belts around London, ribbon development along main roads and the decentralisation of industries. Much of this work was in line with the Technical Advisor's preparatory memoranda which are contained in the Report.

Unwin's memorandum on Open Spaces was a great contribution to the Committee. He accepted the urgency of the large requirement for open spaces in London, which was being surveyed by LCC. He estimated that the total area of open space required was 205.87 square miles (527km^2). This was to consist of 62.99 square miles (161km^2) of playing fields, in line with the standard of seven acres (2.8 ha) per 1000 persons as recommended by the National Playing Field Association, and 142.88 square miles (366km^2) of other extensive open space. Unwin allocated this requirement of open spaces in the Greater London Region

It was in this memorandum that Unwin formalised his ideas on ample tracts of building development on a background of open lands. This dynamic point of view foresaw a large area of potential building land of over 1000 square miles (2560km^2) within the Greater London Region for the accommodation of further urban growth. To preserve open space for recreation and amenity within the developable land he proposed a series of Green Girdles around London. It was intended that these large reservations would be purchased or under agreement with the landowners. He argued for the transference of value from developed land, in the form of compensation for loss of potential development in open land, in order to find a practical way of reserving this open space.

On ribbon development Unwin pointed out that this form of urban growth was undesirable in terms of securing the amenity of the countryside, avoiding injuries on the roads and increasing transport efficiency. Therefore, he recommended the control of development of road frontages along the new arterial roads through the purchase of sufficient strips of land, the making of planning schemes or suitable

agreement with the relevant landowners, or by a combination of these methods.

Unwin's third memorandum recommended the creation of an effective Regional Planning Authority, empowered to acquire the urgently needed open lands, to function together on matters of regional concern with local authorities, and to deal with the fair and effective redistribution of the increase or loss of land value. The latter was politically a very controversial issue. However, the new regional Planning Authority was not established at that time as Unwin had recommended.

The very complicated subject of decentralisation was not addressed in the First Report of 1929 although much information had been collected in relation to the existing situation and the possible development of future industrial areas. The advantages and disadvantages of decentralisation of industries from the central districts to new sites and the creation of new satellite developments were analysed. This issue was expected to be discussed in the next Report.

3.1.3(b) The Interim Reports in 1931

Two Interim Reports on Open Spaces and Decentralisation were produced in 1931. The first, the Open Spaces Report, was prepared to update the open spaces survey data produced by LCC, which was reported in July 1930. This survey noticed that a large area suitable for playing fields, as much as 8.15 square miles (21.3km^2) was being rapidly occupied by building development. Therefore the GLRPC pressed for the securing of these open spaces as an urgent matter. According to the estimation of needs of playing field to meet the demand of the growing population, Unwin suggested that approximately 31 square miles 20,000 acres (78.1km^2) of the most suitable available land should be selected in 29,439 sites and reserved from further building development immediately. He recommended that these reserved areas could better be formed as an inner chain or Green Girdle of open spaces and playing fields around the densely developed parts of London. The Green Girdle was proposed to be situated between six to

thirteen miles (10 to 20 km) radius from Charing Cross, mostly at about 16 kilometres (10 miles) radius. In order to secure the selected open lands as quickly as possible the GLRPC urged the LCC to convene a Conference of the Councils of the Counties and County Boroughs within the Greater London Region for immediate voluntary associated action. However, the sub-committee's efforts were not able to succeed because of the financial difficulties of local authorities.

The Interim Report of Decentralisation examined movement of population and industry in the Greater London Region and the possibilities for co-ordinated decentralisation along the lines of self-contained units. The second Report discussed the advantages and disadvantages of three different types of new development. The possibilities for a growing town were: a continuous mass; a star shape; and a central mass with satellite units growing at a distance, ultimately to coalesce with the central mass through their mutual growth. Unwin recommended the third method of growth as the most satisfactory development in the Region. The self-contained units could be prevented from coalescing with each other by the employment of a permanent reservation of belts of open spaces. This would encourage pleasant living with close work and accommodation and plenty of open spaces for recreation. It would reduce unnecessary movement, and minimise traffic congestion.

Unwin estimated that since 1919 the increase in population was about 500,000. He suggested that this number of people could be accommodated in sixteen complete towns of about 30,000 people, ten towns of 50,000 people or 5 cities of 100,000 residents. Letchworth and Welwyn provided good practicable examples of the creation of units of self-contained development. After examination of elements affecting industrial location such as labour movement, space for expansion and site, transport and market, Unwin concluded that large industrial expansion could be located within the belt extending around London 15 miles (25km) from Charing Cross. These industrial areas were to include planned suburban units on the outskirts of London's developed area, possibly self-contained, satellite

communities up to 12 miles away (20 km) and more industrial garden cities between 12 and 25 miles away (20 to 40 km).

3.1.3(c) The Second Report in 1933

At the time of publishing the second Report of the GLRPC, the Committee was faced with a serious financial crisis due to the reduction of the LCC's contribution of no more than a sum of £500 in the year 1932-33, which was less than one fifth of the previous years' annual expenditure. Unwin had to continue the completion of the last Report under a financial shortage of a reduced fee with smaller office room and a less trained staff. He carried out the investigation of the problems of regional planning and kept previous data and plans up to date in accordance with the 1931 census.

According to the new census of 1931 Unwin provided much analysis of population increase, decrease, immigration and population movement in smaller areas as well as in the four sub-regions of the Greater London Region. The Census reported that the number of people in the area covered by the LCC (Area A) decreased by over 326,000 between 1921 and 1931 but the population of the outer three sub-regions was increased by more than 747,000 as people migrated towards the periphery. The area of greatest ingress among the outer sub-regions was the suburban area of the Metropolitan Police Area (Areas B and C), which accounted for an additional 600,000 persons. As a result the housing shortage in the whole Region became worse but the central area had less housing problems in terms of number of dwellings.

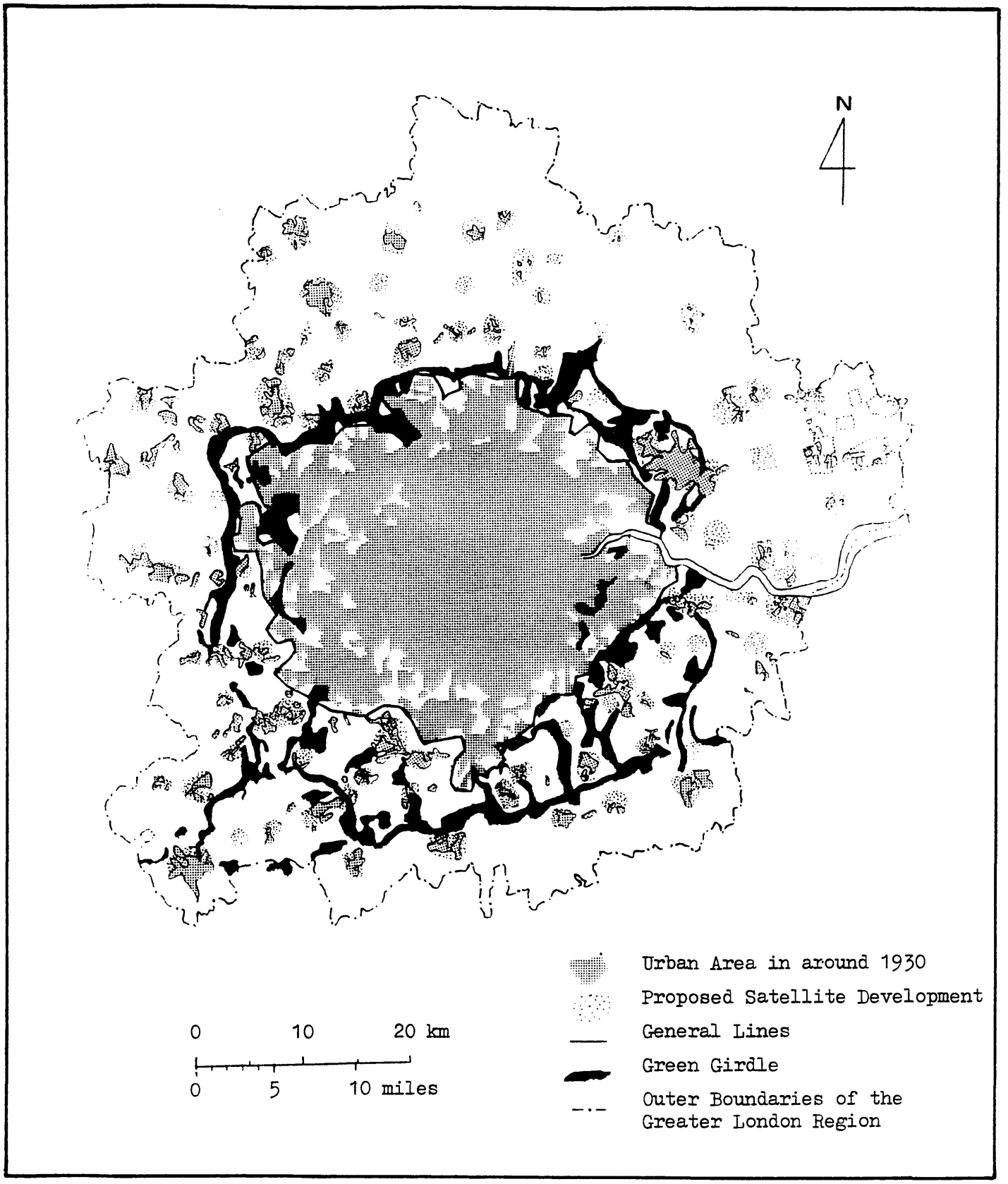
The second Report laid emphasis on the planned distribution of population and industry as well as on the planning of open spaces to provide sufficient playing fields close to communities and a Green Girdle around London. In Chapter Seven of the Second report Unwin reconfirmed '(a) that the further expansion of London by the continued accretion of building round the fringe of the central Built-up Area is undesirable, and if continued threatens to create insoluble problems of traffic and other congestion; (b) that the existing tendency towards sporadic development should be controlled

by all available powers; (c) that the future growth of London should be guided by planning, and induced by the timely provision of services, to take the form of defined units of development as self-contained as possible, and that this form of distribution should be attained as rapidly and completely as may prove practicable' (GLRPC 1933).

Unwin analysed the problems of road traffic in respect of service roads in residential areas and of through traffic. He suggested a suitable design of road types to be situated in different areas. He showed the existing system of main roads and proposed improved communication by new road connections, parkway treatment etc. Unwin also stressed the need for a new system of planning residential areas and the principle of a social mix of the well off and less well off for a new development area as he had established in the district design of the Hampstead Garden Suburb.

For the provision of open spaces, he proposed a Green Girdle to secure almost continuous tracts of open space around the London conurbation and suggested practical ways of achieving this through land acquisition or reservation. Figure 3.4 shows the mass of London's urban development, surrounded by what Unwin called 'general lines' at a distance of 12 - 20 miles (20 - 30km) from Charing Cross and also his Green Girdle. Suburban towns of South Croydon, Epsom, Uxbridge, Harrow, Enfield, Barking and Bexley were included in the London conurbation inside the general line. However, beyond the general lines in the outer London Region approximately a hundred satellites or new towns were shown on a background of open land in line with a conception of Garden Cities. Towns such as Dartford, Watford and Romford-Havering, mainly located outside the general lines but inside the Green Girdle were to be expanded by further satellite developments. Dartford and Romford-Havering for example were located outside the general line. These outer towns were to be expanded by further satellite developments, largely between the general line and encircling Green Girdles. Outside the Green Girdles many new development units and expanded towns were also suggested in the Map of the Greater London Region (GLRPC 1933).

Figure 3-4 General Lines, Green Girdle and Satellite Units of Development, 1933



Source: The 2nd Report of the GLRPC, 1933

This plan for the control of urban growth by dispersal from large cities into satellite developments of new and existing towns is different from Unwin's earlier memorandum in the first Report where he formalised his ideas on accommodating growth in a large area of potential building plans. These two concepts are discussed in the next Section (3.1.4).

Unwin categorised the kind of land which would comprise the Green Girdle: public and private playing fields; other open spaces such as public parks, footpaths and river banks, and private open spaces subject to restrictions against building; special open spaces for allotment gardens, nursery gardens, orchards, aerodromes and cemeteries etc, and various institutions standing in extensive grounds such as hospitals, schools, golf clubs or country hotels (see Appendix 3).

Unwin urged regional responsibility for the acquisition or control of Green Belt land and other open spaces as opposed to that of local authorities. A pooling system of betterment and compensation in relation to planning and land values was discussed in the last chapter of the Second report, comparing the 1932 Act with the earlier Town Planning Act of 1919.

Unwin's proposal of a Green Girdle appeared as 1935 London County Council scheme with financial support from Central Government to provide open spaces for recreational uses in and around the London region. To promote effective land acquisition of the reserved land, the 1938 Green Belt (London and Home Counties) Act was enacted. Under the powers of the 1938 Act large areas of Green Belt land were acquired until 1944, and by 1956 about 10,731 ha were preserved in London and the Home Counties (Elson 1986).

After the Greater London Regional Planning Committee was concluded in 1933 and a Standing Conference on London Regional Planning was constituted, instead of the establishment of a new empowered Regional Authority as urged in Unwin's Memorandum in the reports of the GLRPC. The first meeting of the Standing Conference was held in October

1937. A technical committee was appointed for the conference to deal with the various matters referred to it. Just before the outbreak of war, the committee reported on '(a) ways and means of preparing a Regional or Master Plan for the London Region and (b) the possibility of establishing an agricultural belt around London' (The Greater London Plan 1944).

The Minister of Works and Buildings asked for a plan to the London County Council in 1941 and an Outline Plan and Report for Greater London to the Standing Conference in 1942.

3.1.4 Unwin's dynamism on urban growth and open spaces

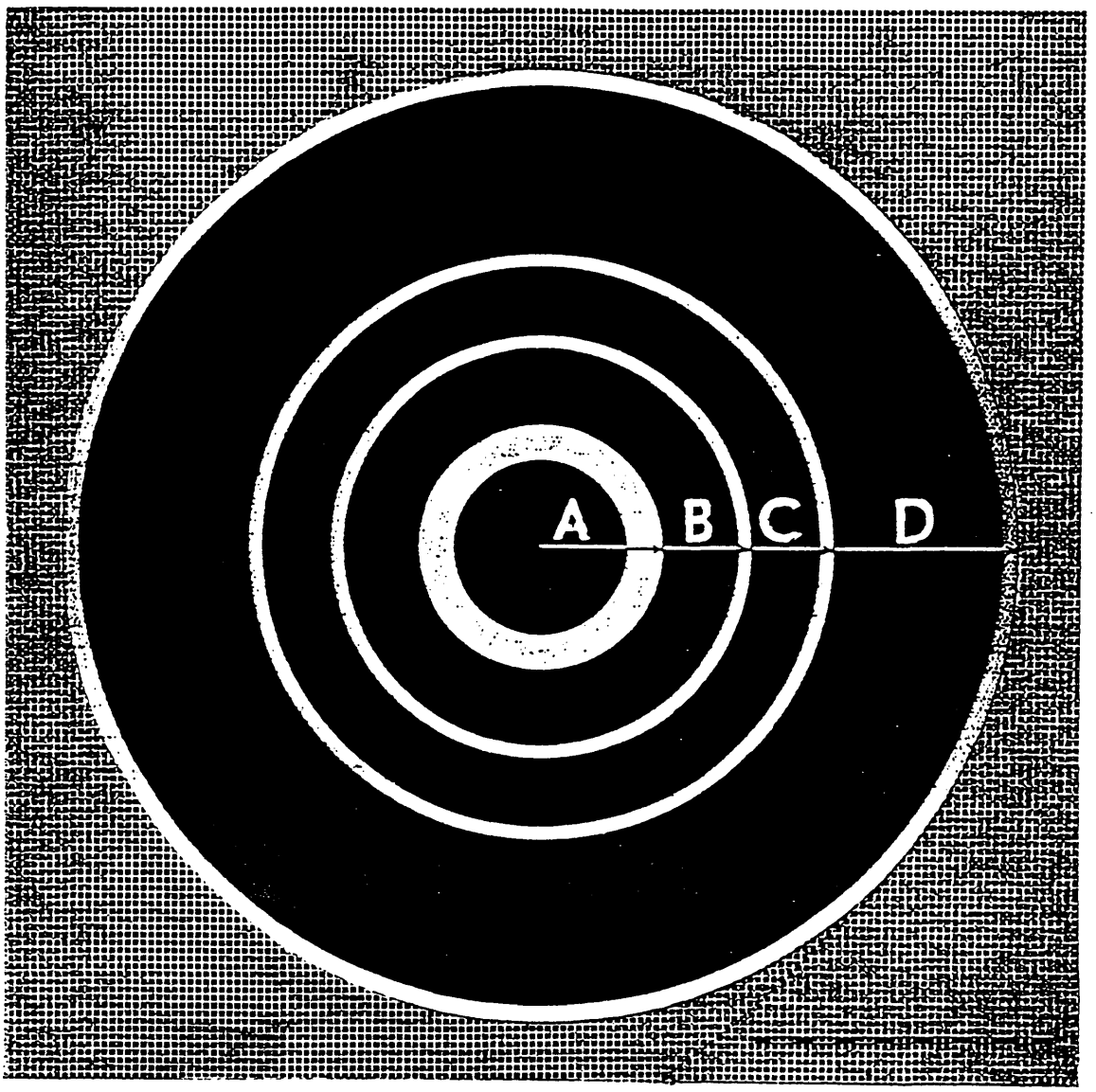
Unwin has been considered a pioneer in the establishment of the post-war British town planning system, especially with respect to Green Belts and New Towns. British researchers have placed emphasis on his concept of the 'Green Girdle' and the development of satellite towns but the author has realised during his researches that Unwin also had other, positive views on the encouragement of suburban growth. Little discussion has occurred on these binary concepts of Unwin's as his earlier thoughts on urban dynamism as a means of coping with the expansion of London were largely superseded by the outcome of his later ideas in the 1933 GLRPC Report. The author however believes that both concepts still have relevance today.

In the 1933 GLRPC Reports Unwin accepted strong demand for the planned distribution of population and industry out of the large cities and into new towns under the principle of the Garden City movement and agreed to the control of the overgrowth of the London conurbation. However, this negative attitude appeared to come from his early career and the contemporary idealists' propaganda of new town development in the garden city style. He largely intended to apply the principle of maintaining an optimum size of a garden city by employment of an agricultural or Green Belt to the great city of London. He decided to establish a development strategy of a Green Belt around London and the development of planned satellite units beyond the Green Belt.

This main stream was continuously studied in the first, interim and the second Reports of the GLRPC, focussing on the two issues of decentralisation and open spaces. In consequence, Unwin's Green Girdle was produced to provide sufficient open space in the rapidly changing urban fringe and satellite units were to develop under the planned expansion in the existing and new development areas. Unwin's work was transformed by the more fashionable design of a wider Green Belt and fewer new towns beyond the Green Belt in the 1944 Greater London Plan by Abercrombie. The post-war planners have followed regional development strategies largely within Unwin's establishment.

The unrevealed concept of metropolitan growth stemmed from Unwin's other vocational background. He evolved the planning concept of the Garden City into the extension of suburban London as a desirable alternative to unrestricted sprawl. He changed his work from garden city designs to a governmental office in charge of town planning under the Ministry of Health. Therefore, he had to face the daily work of planning in respect of a real society rather than the ideal building of a Garden City. He had to accept the reality of London's growth and acknowledge that suburban growth in the great city was to be allowed. He could not always join in with the idealists' loud criticisms of suburban extension. He felt that suburban growth *per se* was not so bad but the overwhelming ruin of open space near to communities by extensive sporadic development in the countryside had to be controlled and that the reservation of open space for recreation and other open space was a matter of urgency. The evolution of Unwin's idea was to be different from that of the New Town Group. They promoted the building of new towns out of the London Region in principle but Unwin believed that extension should be carried out mainly within the Region. His idea embodied unlimited potential suburban growth in the Greater London Region as well as the reservation of a large proportion of open space in the background of each of the subregions. Figure 3.5 shows the fundamental design of his dynamic approach to regional growth. The four subregions A, B, C and D consist of rings of extensive potential building land shown in black and, at the rear of each subregion, a narrow ring of open space shown in white. The arrow in each of the subregions shows the

Figure 3-5 Diagram of Unlimited Potential Building Land and Open Space Belts within the Four Subregions of the Greater London Region



0 10 20 km

A: County of London

B: Ring to area used LCC Report on Open Spaces

C: Ring to Metropolitan Police District

D: Ring to Greater London Region

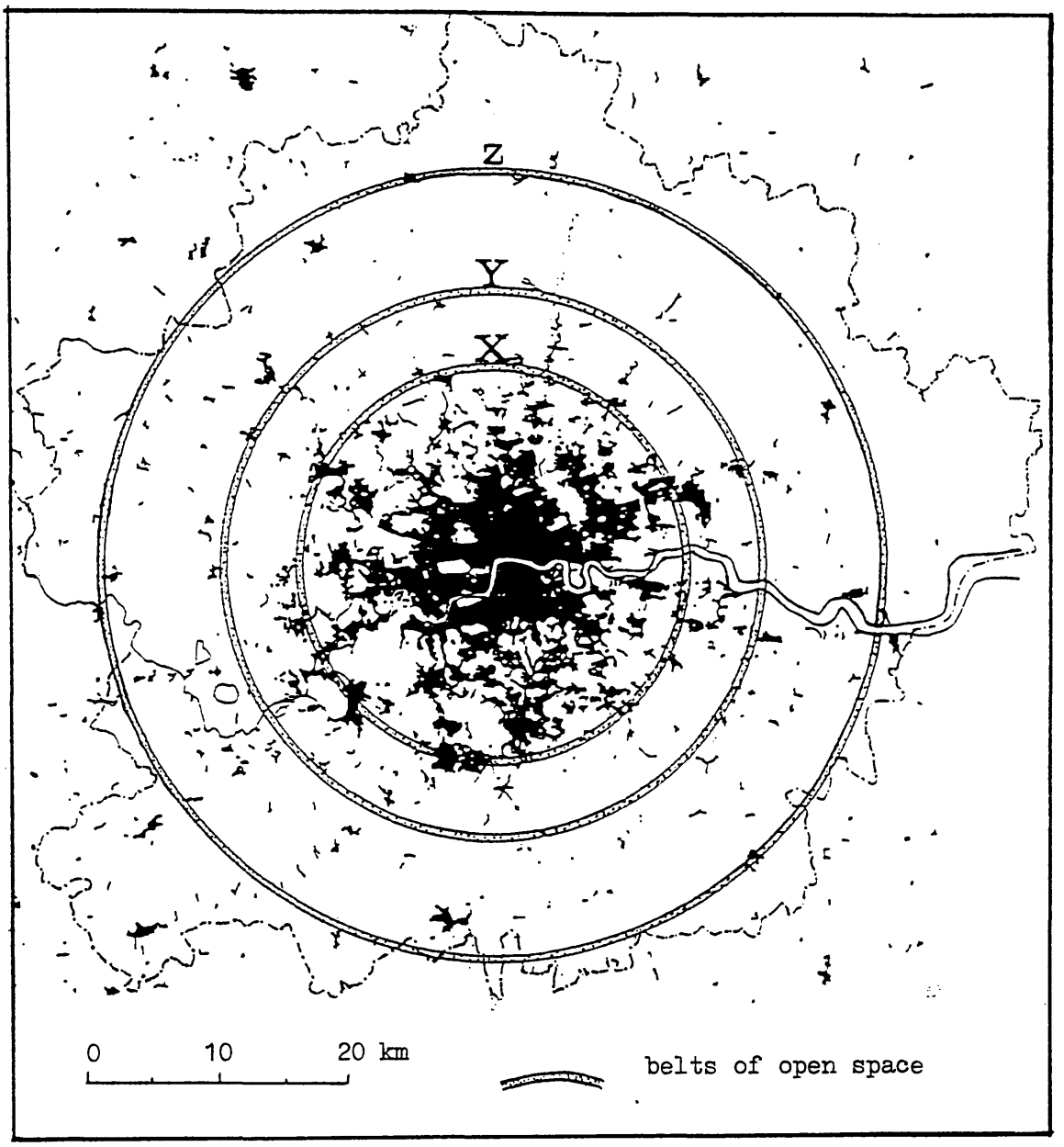
Source: The 1st Report of the GLRPC, 1929

extent of the subregion and its corresponding open space ring. As the Greater London Region was divided into four areas, so the open space rings are also shown as four to punctuate the unlimited suburban growth of each subregion. He had imagined extensive developable land as unlimited Potential Building Land on the background of open space throughout the Region. Therefore he thought

> there would be well over 1000 square miles (2560 km^2) within the Greater London Region available for further building. This area would allow the present rate of growth to continue undiminished for over 200 years. At only five houses to the acre (0.41ha) and four persons per house, this would represent an additional population of 12,800,000 (GLRPC 1929).

Unwin imagined over 1000 square miles (2560 km^2) for further growth out of a total planning area of 1846.7 square miles (4727 km^2). Although satellite units were to be separated at a distance from the central mass of the London Built-up Area, he believed that the central urban mass and surrounding satellite settlements would ultimately coalesce either side of the Green Girdle throughout the Greater London Region (the Interim Report on Decentralisation 1931). Therefore it was possible that suburban growth might fill the whole region whenever it could but the very low average population density envisaged indicated that the design and layout of development would be along extensive Garden Suburb lines as experiences by Unwin in Hampstead. If this was to be the case, rings of open space would be necessary to break up the large suburban mass. Based on the past trend of urban growth during the inter-war period he estimated that there would be four square miles (10km^2) of urban expansion per year and expected it to be over 200 years before the whole Region was filled with urban land. To secure open space suitable for playing fields and other recreational purposes, Unwin stressed that open space should be reserved before urban growth swallowed up all the suitable open land.

Figure 3-6 Unwin's Three Imaginary Belts of Open Space in the Greater London Region



Source: The 1st Report of the GLRPC, 1929

Unwin suggested that about 12.8 per cent of total area should be reserved as open space in the Greater London Region. Three imaginary Green Belts, X, Y and Z, each a half-mile wide, at the rough edges of B, C and D subregions are illustrated in Figure 3.6. This diagram provided an example to the cost of land acquisition to preserve the 206 square miles of open space. He urged that the land be purchased immediately at the present land price.

As the final layout of the Greater London Regional plan, Unwin employed a Green Girdle beyond the general lines which was to encircle the mass of London's development area. The Green Girdle was to be composed of almost continuous strips of Green Belt and many green wedges based on topographic features. However, large tracts of 'white land' were formed within the Green Girdle or between the general lines and the Girdle, and outside the Green Girdle. These large areas of 'white land' were defined as allocated for future building development in the Second report of the GLRPC.

Unwin's dynamic idea of extensive suburban growth in relation to the Green Girdle had been more positively developed for the expanding city of Tokyo in the 1930s by the contemporary Japanese planners. They prepared large areas for further building development beyond Tokyo's Green Girdle and within the metropolitan green area network. The regional green area consisted of Tokyo's Green Girdle inside the city planning area and a regional green area known as the landscape area outside the new-born Tokyo Ward District, which was designated as the town planning area in the 1930s. It was proposed that Tokyo was to receive unlimited growth beyond the Green Girdle but the enormous space for future development was punctuated by the reservation of a large area of open space on a regional scale (see Chapter 5 and Figures 5.3 and 5.4). These ideas of Unwin's were not pursued in the same way in subsequent plans for London.

3.2 Limits of urban growth and Abercrombie's Green Belt

Enormous urban growth around London during the interwar period brought serious dispute over the overconcentration of population and

industry in Greater London. The Royal Commission on the Distribution of the Industrial Population, the Barlow Report, completed their work in August 1939 just before the outbreak of war. This Report pointed out that employment was overconcentrated in London and the surrounding regions (Royal Commission on the Distribution of the Industrial Population, Cmd 6153, 1940) They estimated that employment in Greater London and the Home Counties had increased by 42.7 per cent between 1923 and 1937, while in England and Wales it was shown to increase by only 22.3 per cent. In particular, employment in the six industries of engineering, vehicle production, building, distributive trades, administration and professional services continued to increase in the London region, benefiting by the proximity to the large London market. So it was recommended that industrial growth in Greater London and the Home counties should be restricted by the following means.

(a) continued and further redevelopment of congested urban areas where necessary

(b) decentralisation or dispersal both of industries and industrial population from such areas

(c) encouragement of a reasonable balance of industrial development as far as possible throughout the various divisions or regions of Great Britain

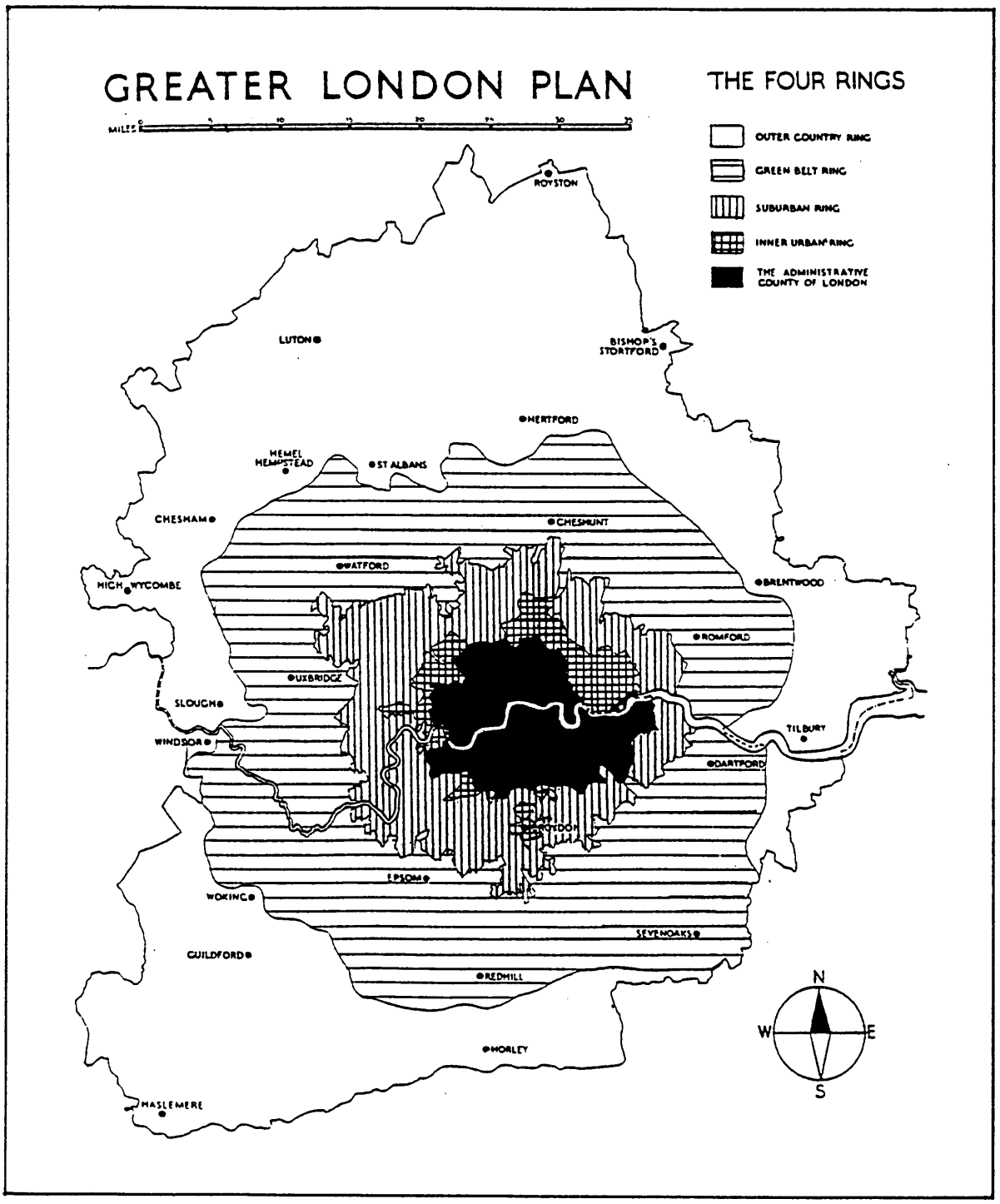
These recommendations, which were broadly accepted by government, supported the decentralisation movement and the idea of the Garden City, through which people and workplaces were planned to be moved from the congested urban areas and dispersed to smaller towns. On the other hand, Patrick Abercrombie, one of a strong minority against the general recommendation of the Barlow Report, urged stronger planning authority and land use control to deal with the problems of the present and immediate future. The Royal Commission strongly recommended that further growth in London and the Home Counties should be checked.

The technical committee of the Standing Conference on London Regional Planning in 1942 considered the relocation of the industrial population, the improvement of transport, and the maintenance of an optimum size for London after the end of the war. Abercrombie, who was preparing a city plan for the London County Council, was asked to produce a plan and report on London and the surrounding regions for the Standing Conference. At the same time the Ministry of Works and Planning was established, and took over the job of town and country planning from the Ministry of Health. Abercrombie's Greater London Plan was completed in 1944 (Greater London Plan 1944). It covered the Metropolitan area to a radius of 30 miles (50 km) and an area of 2599 square miles (6653 km^2) covering the administrative districts of the LCC and the 143 local authorities (County Boroughs, Boroughs, Urban Districts and Rural Districts (Greater London Plan 1944). The planning area of the 1944 plan, like Unwin's plan of 1929, was subdivided into four rings: Inner Urban ring, Suburban ring, Green Belt ring and Outer Country ring (see Figures 3.3 and 3.7).

Briefly the Greater London Plan could be summarised in terms of its plans for decentralisation. The Urban Inner ring was to be relieved of overstress by dispersal of its excess population; the Suburban ring was to be a static zone; the Green Belt ring was to be safeguarded to prevent the coalescence of neighbouring communities with the London built-up area; lastly, the Outer Countryside ring was to be the chief reception area of the decentralisation, with dispersal into 8 planned new towns and the expansion of the existing satellite towns, while still keeping open land and farming uses.

The population planned for dispersal consisted of approximately one million people, of which about three quarters of a million were to be relocated within the Region (see Table 3.2). Most of the resettlement was to be achieved by moving people from the congested inner area; 261,000 persons would be housed in the expanded existing towns outside the continuously built-up area and largely in the Outer country ring; 383,250 people, the largest proportion, were scheduled to settle in the garden city styled new towns outside the Green Belt ring. These 644,250 persons were therefore to be regrouped largely

Figure 3-7



Source: Greater London Plan, 1944

Table 3-2 - Decentralisation of Population in Greater London, 1944

		persons	persons
(a)	Decentralisation In and Near the Region		
	(i) Addition to existing towns in the largely outer Countryside Ring	261,000	
	(ii) 8 new satellite towns outside the Green Belt Ring	383,250	
	(iii) Quasi Satellites (LCC and Croydon) by immediate post-war housing programmes	125,000	
			769,250
(b)	Dispersal Outside the Region		
	(iv) Addition to towns within 40-50 mile radius	163,750	
	(v) Beyond the Metropolitan Influence	100,000	
			263,750
Total number of regrouped population			1,033,000

Note: 1,232,750 persons would be the total figure for the regrouped population if the lower density of 100 persons per acre were adopted for the central area

Sources: The Greater London Plan, 1944, HMSO London, p32-33

in the Outer ring. A further 125,000 persons were scheduled to be housed by immediate post-war housing programmes in the area of the London County Council and the County Borough of Croydon where many homes had been badly damaged during the war. In addition another 163,750 people were expected to be moved to existing towns outside the Greater London Plan boundaries, mostly between 40 and 50 miles (64 - 80 km) from Charing Cross. Finally, up to 100,000 persons would be dispersed to areas beyond the Metropolitan Influence.

Despite Abercrombie's famous reputation for the establishment of London's Green Belt and new town planning, he was greatly indebted to Unwin's works. During the depressing circumstances of the war, Abercrombie was given the responsibility to put into practice the recommendations of the GLRPC for decentralisation of population and industry, and employ tight physical control on London's growth. The inner boundaries of Abercrombie's Green Belt were located mostly inside the general lines drawn by Unwin, which excluded the already developed suburban towns of Epsom, Uxbridge, Dartford and others.

Abercrombie drew a Green Belt ring 5 miles (8 km) wide to control further urban growth on the edge of the suburban area, thus to maintain broad open countryside. The concept of the Green Belt was not clearly defined in the 1944 plan. It comprised much open land and therein most of the land which had been acquired under the 1938 Green Belt (London and Home Counties) Act was included in the Green Belt ring.

While Unwin's Green Girdle proposed providing open spaces for recreational uses on the background of unlimited development building land, Abercrombie's Green Belt revealed very negative planning attitudes against urban expansion. Unwin's earlier, narrower green strip was considered to be more practical in terms of the need to purchase the most suitable available land to be reserved as open space under the terms of the contemporary legal provisions on compensation of the 1932 Town Planning Act. But it was hoped to reserve the wider Green Belt of Abercrombie's Plan without payment of compensation as had been recommended by the studies of the Uthwatt

Report of the Expert Committee on Compensation and Betterment (Ministry of Works and Planning 1942a) and the Scott Report of the Committee on Land Utilisation in Rural Areas (Ministry of Works and Planning 1942b). After the war a new Town and Country Planning Act 1947 accepted the principle of non-compensation to the land use control on Green Belts.

3.3 Implementation, extension and delay of the Metropolitan Green Belt

3.3.1 Old Development Plan and the 1947 Act

The Home Counties of Middlesex, Essex, Kent, Surrey, Berkshire, Buckinghamshire and Hertfordshire prepared development plans to meet the new planning provision of the Town and Country Planning Act of 1947. The 1947 Act brought in two measures which ensured that Green Belts could be effective without the need to purchase land. These measures were: development plans which had to be prepared by each county and specified on a map basis where land would or would not be available for development for the next ten to fifteen years; and development control which effectively transferred the right to develop land from the land owner to the nation, thereby requiring all development to receive permission from government before it could proceed. Development Plans were prepared by Counties and County Boroughs but were subject to approval by central government; development control was largely in the hands of Counties and County Boroughs but permissions were expected to conform to the approved Development Plan.

The Ministry officials recommended that the Metropolitan Green Belt suggested by Abercrombie be adopted as a part of the development plans. Abercrombie's Green Belt inner boundaries could not be accepted by the local authorities exactly because of already developed suburban towns such as Uxbridge, Dartford and Epsom which were now to be excluded from the Green Belt. The outer boundaries were also changed by being extended outwards and widened to the areas of background of Dorking, Slough and Brentwood. The width of the

Metropolitan Green Belt varied from 7 to 10 (11-15 km) when the development plans in the Home Counties were approved between 1954 and 1959.

3.3.2 The Circulars in 1955 and 1957

The Right Honourable Duncan Sandys MP, Minister of Housing and Local Government made a statement on the preservation of the countryside and restriction of further sprawl of great cities in the House of Commons on 26 April 1955. He announced the submission of a Green Belt by the Home Counties 'Some 7 to 10 miles deep, all around the built-up area of Greater London. No further urban expansion' could be allowed in the Belt, apart from some exceptions in the limited rounding-off of small towns and villages (MHLG 1955).

Green Belt Circular 42/55 followed upon his statement on 3 August in the same year (MHLG 1955). The aims of a Green Belt were emphasised, firstly checking the unrestricted sprawl of the built-up areas, secondly safeguarding the surrounding countryside against further encroachment and thirdly, preserving the special characteristics of a town.

Thus a Green Belt was aimed to keep permanent open countryside in the urban fringe. The construction of new buildings was only to be permitted in specified circumstances of buildings for sports or recreation such as playgrounds, golf courses and club houses, cemeteries, hospitals, schools, research institutes, staff colleges and other study centres or institutes in extensive grounds may be allowed. Agricultural activities and the necessary building construction permitted under general provisions may be accepted in general, and other uses appropriate to a rural area may also be possible (see Appendix 4, Control over Development in Green Belt). Change of existing use of the buildings was designed to be controlled to prevent the need arising for new building construction or extension of existing building space. Residential, industrial and commercial buildings which would bring new employment were therefore fundamentally prohibited. A strictly limited amount of infilling and

rounding-off of rural villages may be allowed within a Green Belt but further development on the adjoining land to the villages was not permitted (see Green Belt Circular No 50/57 in Appendix 4.2).

The principal concept of land use control in a Green Belt implies no further building except in very exceptional circumstances. Therefore land use which does not affect the open character of the Green Belt may however be permissible. The original London Green Belts were submitted by 1953 in Development Plans and they were approved by 1959 (Department of the Environment 1984). The Development Plans were inspected by the Ministry planners and were approved after the Green Belts Circular was issued. The Green Belt Circular of 1955 invited a local planning authority which wished to establish or extend a Green Belt in its area to submit a sketch plan. The preparatory plan could indicate approximate boundaries of the proposed belt on one inch:one mile maps. The planners were advised to consult with neighbouring authorities before officially submitting the plan to the Minister. This invitation delayed the establishment of London's Green Belt and helped the extension of Green Belts. Six sketch plans for extensions to the London Green Belts were subsequently proposed in 1956 covering a wide area of extension exceeding 1600 square kilometres (4100km^2). A circular, 50/57, advised Local Authorities on the preparation of formal submissions for the alteration of their Development Plans, based on their sketch plans to take account of the Green Belt (MHLG 1957). A deferred time zone of 'white land' was introduced in the 1957 Green Belt Circular, which was to be controlled by Green Belt policy. This land may be very attractive to developers and the authority's policy for such areas was to be set out in a written statement in order to make it clear that it was not available for development at present.

3.3.3 Structure Plans and the 1968 Act

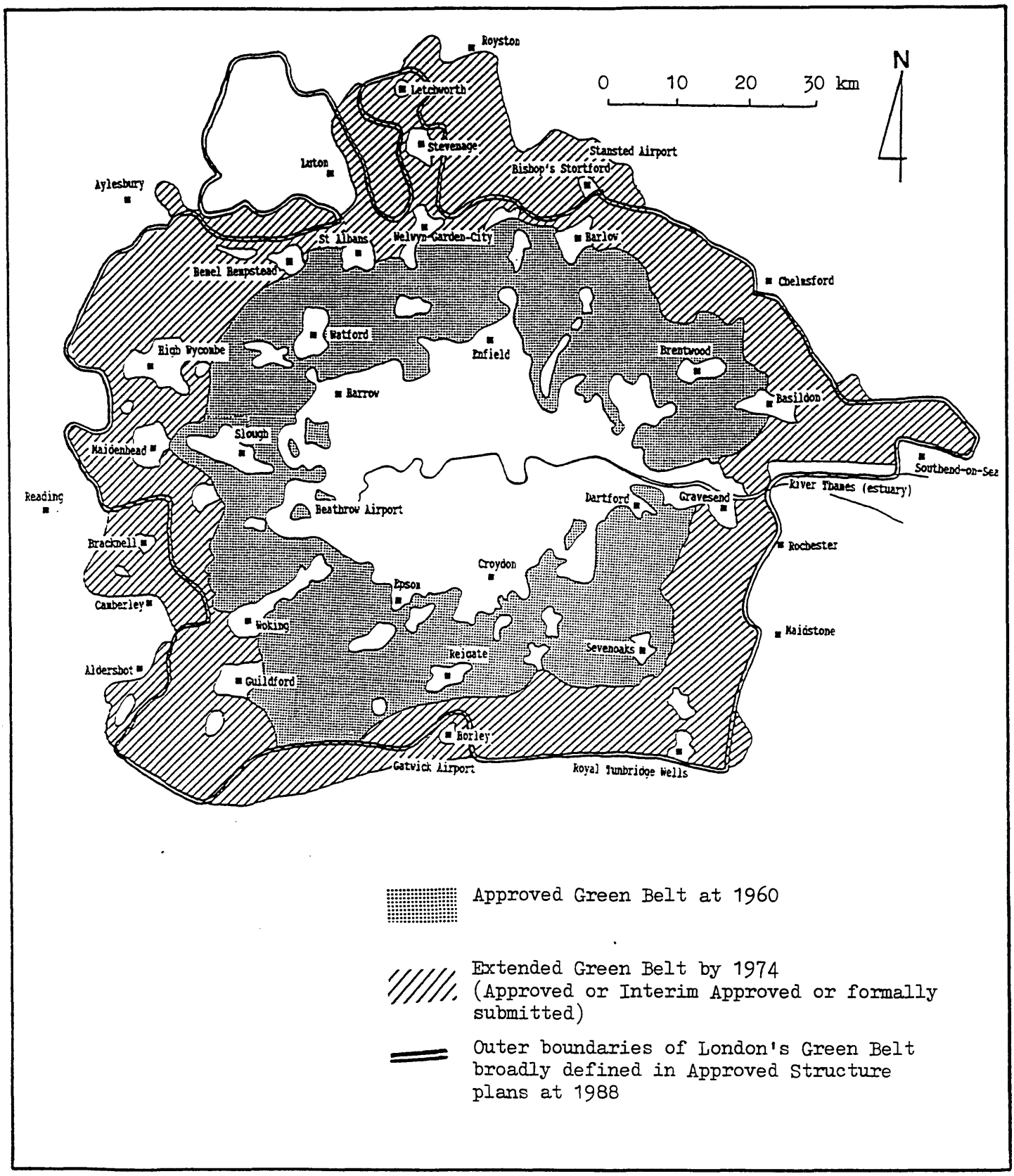
A new planning system which was introduced by the Town and Country Planning Act 1968 replaced the old Development Plans by structure plans which would cope with broad issues on land use and development, and detailed local plans designed for the implementing of these

policies.The Structure Plans which are prepared by counties and have to be approved by the Minister are strategic policy documents, with any illustrative maps being diagrammatic. Thus the exact definition of Green Belt boundaries does not appear on Structure Plans. Local Plans are usually prepared by Districts. They must conform to the relevant Structure Plan will show Green Belt boundaries on a map base. However up to the present there is no requirement for Local Plans to be produced for all areas, so Green Belt boundaries may be difficult to ascertain at the local level. The introduction of the new system therefore caused the procedure for confirming Green Belts to become more complicated. The concept of a Green Belt had to be reviewed whether it was approved, interim approved, and formally submitted to the State or local Green Belt. In some Home Counties' Structure Plans, some parts of the London Metropolitan Green Belt were proposed to be expanded further to include areas around Luton in Bedfordshire, Buckinghamshire, Berkshire and Hampshire, and the area of Cambridgeshire County was intended to merge into the Cambridge Green Belt during the 1970s and 1980s (Elson 1986).

However, the new planning scheme from the 1968 Act was largely delayed until after the establishment of a new local government structure in 1974 (Ravetz 1980). Consequently the appearance of structure plans and confirmation of boundaries of Green Belt were delayed. When the Green Belts approved in the Structure Plans were translated into local plans, the boundaries of the Structure Plan Green Belt were defined to be slightly enlarged outwards along physical constraints or other boundaries such as rivers, waterways, roads, railways etc. These works have continued for some time.

Figure 3.8 shows different kinds of complicated London Green Belt areas which have either been changed or enlarged their boundaries from time to time. The inner Green Belt which was approved in 1960 largely follows the Abercrombie Green Belt of the 1944 plan. The outer Green Belt was extended mainly by the invitation of the Circular 42/55 and the approval of central government has been long delayed.

Figure 3.8 - Extension and Status of London's Green Belt



3.4 Conflicts between urban growth and Green Belt

The negative planning of the Green Belt has caused conflicts with the growing demand for housing development, which local planners regarded as 'unwanted growth' to be controlled. The South-East studies in the 1960s and 1970s stressed a serious shortage of housing inventories in the region and the housing problem, especially in Greater London, became an enormous social problem. In 1966 the crude shortage of dwellings numbered 243,000 in Greater London and 164,000 dwellings in the south east (South East Study 1964, South East Economic Planning Council 1967). The study emphasised the problem of the shortage of houses in the South East region, especially the Greater London area. However, the rest of the region did not suffer such great difficulty and in fact a surplus of dwellings was shown. The pressure to develop housing has been concentrated in Greater London and its metropolitan shadow area.

The White Paper 'Widening the choice - the next steps in housing' in 1973 and a study on 'The Green Belt - current problems' for the Standing Conference on London and South East Regional Planning (SCLSERP) in 1974 argued the requirement for over 2000 acres (81km^2) to be released for housing within the Green Belt. Land use surveys and the calculation of the extent of underused and derelict land within Green Belt were carried out by a working group of the Greater London and the Green Belt authorities. They reported that over 20,000 acres (81km^2) was derelict land or mineral working used, in use or to be used in the future (SCLSERP 1975). Some studies have estimated that around 40 per cent of London's Green Belt, 480,000 acres (1950 km^2), has been damaged (Adam Smith Institute 1988, ARC Properties Ltd 1989).

The House Builders' Federation, set up in the mid 1970s, challenged structure plan provisions for housing and called for the review of Green Belt policies disputing the estimated requirement of land for housing (Ackerman 1985; Elson 1986). After the arrival of the Thatcher government in 1979, a more liberal attitude towards land use produced Circular 9/80 Land for Private Housebuilding, which implied

that suitable sites could be freed easily from planning constraints in places where people wanted to live. Many sites were surveyed on the inner edge of the London Metropolitan Green Belt for new village development by a group of leading building companies, Consortium Developments Limited. It proposed some new towns in the London Metropolitan Region in and outside the Green Belt (Bennett 1984; Smith 1985; Tirbutt 1985; Healey 1988). One of those, Tillingham Hall, was planned to house 15,000 in a new country town in the Green Belt in the mid 1980s (Gray 1985; Milne 1985; Shorstak and Lock 1985). Some sites for proposed shopping centres were planned within the Green Belt in areas easily accessible from the M25 motorway (Simmons 1985; Potter 1986; Young 1987; Hall 1989).

To review the strict Green Belt policy and to modify inner boundaries where some Green Belt land had been kept 'unnecessarily' for the purposes of Green Belt, two draft Circulars on Green Belt and Land for Housing were produced in 1983 (Hall 1983; Herington 1983; Johnston 1983; MacDonald 1983; McKenzie 1983; Ackerman 1985).

This reassessment of Green Belt policy brought about a furious public reaction. Public opinion, the backbench of the Conservative Party, especially the shire MPs, the Council for the Protection of Rural England, Green Belt residents and others in the South East attacked the intention to tamper with the Green Belts, perceived as a great heritage of the English countryside. The draft circulars of 1983 were eventually withdrawn. The Environment Committee in the House of Commons investigated the twin questions of Green Belt and Land for Housing (Elson 1986) and advised on new circulars on Green Belt and Land for Housing prepared in 1984. The Select Committee recommended that once a Green Belt was defined it should be sacrosanct and that the boundaries could not be altered even where the land was underused or derelict. Therefore the Green Belt Circular of 1984 reaffirmed the Circular of 1955 and put an end to the dispute between conservation and development within the Green Belt, at least for the time being. The conflict was concluded with the addition of a fourth purpose for Green Belts, which may help inner city regeneration at the expense of outer growth into green metropolitan fringe (see

Circulars of Green Belt and Land for Housing 1984, House of Commons Environment Committee 1983-84, 275-I, 275-II, 275-III). The effectiveness of the fourth purpose of Green Belts, urban regeneration, is doubtful because it is uncertain whether sufficient amount of land for housing can be supplied from the inner city development in London, while in the Midlands and the North and West this would meet the demand for housing land (Hall 1983, Herington 1983, ENDS Report 113 June 1984, Adam Smith Institute 1988).

The reaffirmation of the Green Belt has reinforced the negative approach of the Green Belt policies and the continuing demand for urban growth around London has not yet found its way to full satisfaction.

3.5 Summary

Chapter Three of the literature review of London's Green Belt falls broadly into two parts : regional planning for London 1904-1933; the role played by Raymond Unwin and the development of his ideas on control and dispersal of urban growth; and the development of the London Metropolitan Green Belt after Unwin, the later 1930s to the present.

The first part explains Unwin's background in designing the first garden city at Letchworth and Hampstead Garden Suburb, and has important work for the Greater London Regional Planning Committee. These experiences gave Unwin two different and essentially incompatible views on how to plan for urban expansion. It seems that personally he preferred the idea of planned suburban growth, using the principles of garden city design as he had practised them at Hampstead Garden Suburb. Open spaces would then be properly preserved near the developing suburbs as part of the whole design. Under this vision he saw the Greater London Region as providing unlimited building land with the provision of pre-planned open space in a series of rings. This philosophy was presented in the First GLRPC Report in 1929 but in the Second report (1933) he presented the alternative view based on population dispersal. In this scheme

London would be surrounded by a Green Girdle of open space beyond which a series of contained satellite communities, designed on garden city lines, would be developed. This vision proved to be generally more acceptable at that time.

The second part of the chapter looks at this regional framework developed by Unwin and its transformation by Patrick Abercrombie into the Greater London Plan of 1944. Abercrombie planned to contain London's growth with a wide Green Belt and disperse population to new or expanded settlements beyond it. The continued expansion of Greater London was considered one of the most serious problems for national security during the Second World War so it is understandable that planning for London in the 1940s adopted a negative attitude to further growth.

The original Metropolitan Green Belt was only 11 to 15 kilometres wide but in the 1950s and 1960s, a time of expanding economy and pressures for urban growth, ministerial guidelines in the form of the 1955 and 1957 Circulars encouraged the extension of the Belt. The mechanisms for government approval of Green Belt boundaries tended to be time-consuming and, combined with a new system of development plans (from 1968) and a re-structuring of local government in 1974, led to considerable delay in decisions on the definition of boundaries for the extended Green Belt.

As a result of severe controls over development in the Greater London fringe and in the Green Belt satellites there have been a number of regional studies of housing shortage in the South East and the lack of developable land. The house builders in particular have argued the case for more land to be made available by changes in Green Belt boundaries or relaxation of restrictions. Despite heated argument the Government decided that there should be no change, confirming this policy in Circular 14/84.

Following the Circular most areas of Green Belt boundary were defined in Local Plans along the lines shown in approved Structure Plans. As a result, London's Green Belt boundaries were largely settled in the

late 1980s after long studies, delays and conflicts. Figure 3.8 shows the Green Belt boundary area at May 1988. However, some boundaries in Essex and Bedfordshire, particularly around the newly designated satellite island of Luton/Dunstable were still not fully defined in Local Plans in 1988.

CHAPTER FOUR

URBAN GROWTH IN THE LONDON METROPOLITAN REGION

4.1 Introduction

This chapter examines whether London's Green Belt has acted as a curb to urban growth by means of empirical measurement of the urban area in 1947, before the introduction of the Green Belt and again in 1972. The effect of new town building following the New Town Act of 1946 is also studied. All the measurements given in this chapter were carried out using the methodology described in Chapter Two. The acknowledged limitations on the detailed accuracy of the measurement method used, which provided standardisation across the three cities of London, Tokyo and Seoul, should be borne in mind by the reader.

The first section (4.2) gives an overview of the results of the study discussing urban growth in the whole region and in each subregion. Maps illustrate this growth. Section 4.3 explains and details urban growth in the four Areas, especially the urban areas within the Green Belt. Section 4.4 outlines the urban growth in the Outer South and East. Section 4.5 describes urban growth in two time periods 1960 and 1960-1972, using the example of urban area data for North West London in 1961 in order to contrast urban growth during the 1950s and 1960s. Section 4.6 discusses previous studies of urban land measurement and land use change in the Green Belt. The last section (4.7) gives conclusions on the effects of the London Green Belt on urban growth and new towns development around London.

4.1.1 Definition of the London Metropolitan Region and its Sub-regions

The London Metropolitan Region consists of London itself and parts or total of the nine Home Counties of Essex, Hertfordshire, Bedfordshire, Buckinghamshire, Surrey, West and East Sussex and Kent. The boundaries of the Region are those defined in Figure 2.1.

The London Green Belt is divided into two sections. The Approved Green Belt is that area defined in Development Plans and approved by the Minister in the period up to January 1960. These boundaries are delineated on the 1973 Department of the Environment Maps. The Extended Green Belt is the area subsequently proposed for Green Belt status outside the Approved Green Belt (from 1960). These boundaries are also those shown on the 1973 maps. It should be noted that all areas proposed for Green Belt status are normally subjected to strict controls over development during the discussion period.

The London Built-up Area is the area within the inner boundaries of the Approved Green Belt; the Rural Metropolitan Area is the land between the outer boundaries of the Extended Green Belt and the edge of the London Metropolitan Region; and the Outer South East consists of the remaining parts of the Home Counties.

For the purposes of the basic work for this study the Green Belt boundaries as delineated on the 1973 maps have been superimposed on all maps used for measurement.

This study is concerned with the pattern of urban growth and control between the two chosen dates of 1947 and 1972. Some changes have occurred outside these dates to Green Belt boundaries and, following local government reorganisation in 1974, to county boundaries but these have not been taken into account in the measurements, though they may be mentioned as of interest.

4.2 Overview : Urban growth in the London Metropolitan Region 1947-1972

Table 4.1 summarises the urban area and its growth between 1947 and 1972 in the four subregions. In 1947, before the Metropolitan Green Belt was defined London covered 1090 km^2. During the following twenty-five years when the Green Belt controlled urban outgrowth in the fringe, the London Built-up Area expanded by only 140 km^2, a net increase of 13 per cent. The remaining rural land of 80 km^2 is mainly to be found in the estuary of the River Thames.

Table 4-1 - Summary of Urban Area in Four Subregions of the London Metropolitan Region, 1947-72

Area : km^2 Rate : %

Subregion	Total Area	Urban Area and Increase			Growth Rate (47-72/1947)
		1947	1972	47-72	
	km^2	km^2	km^2	km^2	%
London Built-up Area	1310	1090	1230	140	13
Urban Islands	831	282	645	363	129
(Inner Islands Ring	246	97	220	123)	
(Outer Islands Ring	585	185	425	240)	
London Green Belt	5851	67	108	41	61
(Approved Green Belt	2274	50	74	24)	
(Extended Green Belt	3577	17	34	17)	
Rural Metropolitan Area	3520	110	312	202	184
London Metropolitan Region	11,512	1549	2295	746	48

Source: The author measured from Tables 4-3, 4-4 and 4-7

Urban areas in the Urban Islands shows more active growth, from 282 km^2 in 1947 to 645 km^2 in 1972 with a net growth of 363 km^2 in the twenty-five years. The net increase is 129 per cent.

Post-war urban growth shows relatively very little change inside the Green Belt. There was a net gain of 41 km^2 in the urban area in the twenty-five years from 67 km^2 in 1947 to 108 km^2 in 1972. The rate of net growth is seen as 61 per cent for the period.

The Rural Metropolitan Area shows the most active development among the four subregions. Urban growth between 1947 and 1972 almost tripled the existing area from 110 km^2 in 1947 to 312 km^2 in 1972, calculating a 184 per cent net increase.

Therefore urban area of the whole London Metropolitan Region grew from 1549 km^2 in 1947 to 2295 km^2 in 1972, an addition of 746 km^2 over the twenty-five years, making a net increase for the Region of 48 per cent. Almost 50 per cent of this growth occurred in the Urban Islands within the Green Belt. The Outer Islands grew particularly strongly accounting for nearly one-third of the region's growth. The Rural Metropolitan Area beyond the Green Belt showed the highest percentage internal growth of the four sub-regions (202km^2) making a 27 per cent contribution to urban expansion in the Region. The lowest contribution to the Region's urban growth came from the Green Belt, with 41 km^2 or 5 per cent of the total.

In 1972 the remaining rural area counted only 80 km^2 in the central Built-up Area, 186 km^2 in the Urban Islands, 5743 km^2 in the Green Belt and 3208 km^2 in the Rural Metropolitan Area. Most of the land in the Green Belt and the Rural Metropolitan Area therefore remains rural (see Table 4.1). Taking the London Metropolitan Region as a whole, in 1972 the urban area occupied 20 per cent of the land, the other 80 per cent being in rural uses.

Table 4.2 shows how the relative proportions of the urban area in the four subdivisions has changed as urban growth has proceeded in the twenty-five years. The London Built-up Area takes 11 per cent out of

Table 4-2 - Proportion of Urban Area and Urban Coverage in each Subregion of the London Metropolitan Region, 1947-72

Rate : %

	Total Area	Urban Area		Changes in Urban Area
		1947	1972	1947-72
London Built-up Area	11	71	54	19
Urban Islands	7	18	28	49
London Green Belt	51	4	5	5
Rural Metropolitan Area	31	7	13	27
London Metropolitan Region	100	100	100	100

Changes of Urban Coverage in each Subregion — Rate : %

London Built-up Area	100	83	94
Urban Islands	100	34	78
London Green Belt	100	1	2
Rural Metropolitan Area	100	3	9
London Metropolitan Region	100	13	20

Source: Calculated from Table 4-1

the total area of the Region but its proportion of urban area fell from 71 per cent in 1947 to 54 per cent in 1972. The Urban Islands cover 7 per cent of the Metropolitan Region in total area and their contribution to urban area of the region increased from 18 per cent in 1947 to 28 per cent in 1972. These two urbanised areas, the Built-up Area and the Urban Islands, account for only 18 per cent of the total area but 88 per cent of the region's urban area in 1947 and 81 per cent in 1972.

London's Green Belt is the subdivision covering the largest area (51 per cent) of the total area of the Metropolitan Region but it accounts for only 4 per cent of the urban area in 1947 rising to 5 per cent in 1972. Similarly, the Rural Metropolitan Area (31 per cent of the total) has only 7 per cent of the urban area in 1947 and 13 per cent in 1972. Though urban growth in the Rural Metropolitan Area shows the highest proportionate expansion, the urban area itself is still only 25 per cent of that of the Built-up Area.

Table 4.3 contrasts urban growth in the London Built-up Area and the other three areas together named the Outer Metropolitan Area in order to emphasise between 1947 and 1972 the greater urban growth in the outer Metropolitan Region and the relatively stable position in the Built-up Area.

Table 4.3 is shown graphically in Figure 4.1. The diagram demonstrates that urban land is the main component in the Built-up Area and that there is little change between 1947 and 1972. The major increase in the urban area comes from change in the Urban Islands and the Rural Metropolitan Area.

In 1947 the urban area in the Built-up Area holds the absolutely dominant proportion of almost two thirds of the total urban area of the Metropolitan Region. The remaining urban areas are scattered around the London agglomeration with many small and medium sizes of urban settlements in the area of the potential Green Belt. Figure 4.2 tells the reality of the urban area in 1947 and demonstrates the basis for the worry that continuing sporadic development would soon

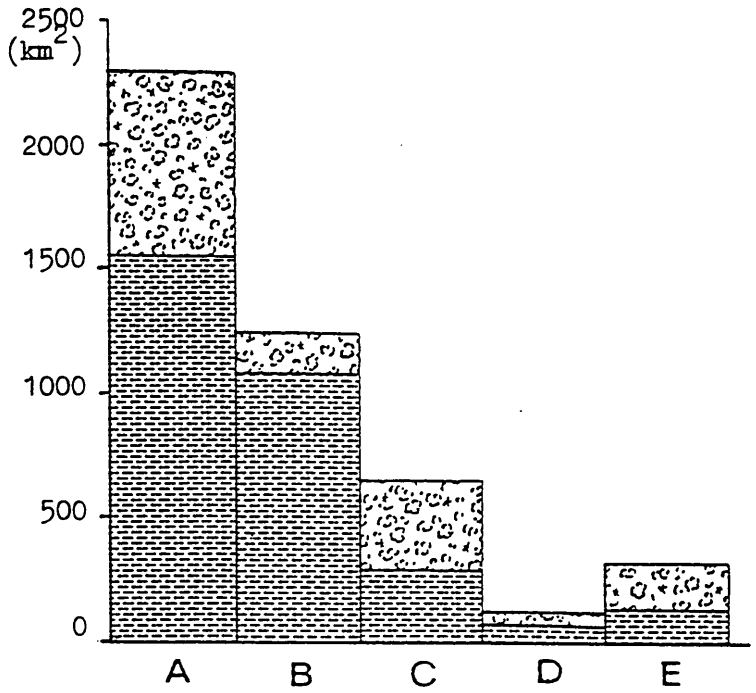
Table 4-3 - Comparison of Urban Growth in the Built-up Area and the Outer Metropolitan Area

	Area : km^2		Rate : %
	Urban Area at 1947 (A)	Increase 47-72 (B)	Net Increase Rate (B/A)
The Built-up Area	1090	140	13
Outer Metropolitan Area	459	606	132
Urban Islands	282	363	129
Green Belt	67	41	61
Rural Metropolitan Area	110	202	184
London Metropolitan Region	1549	746	48

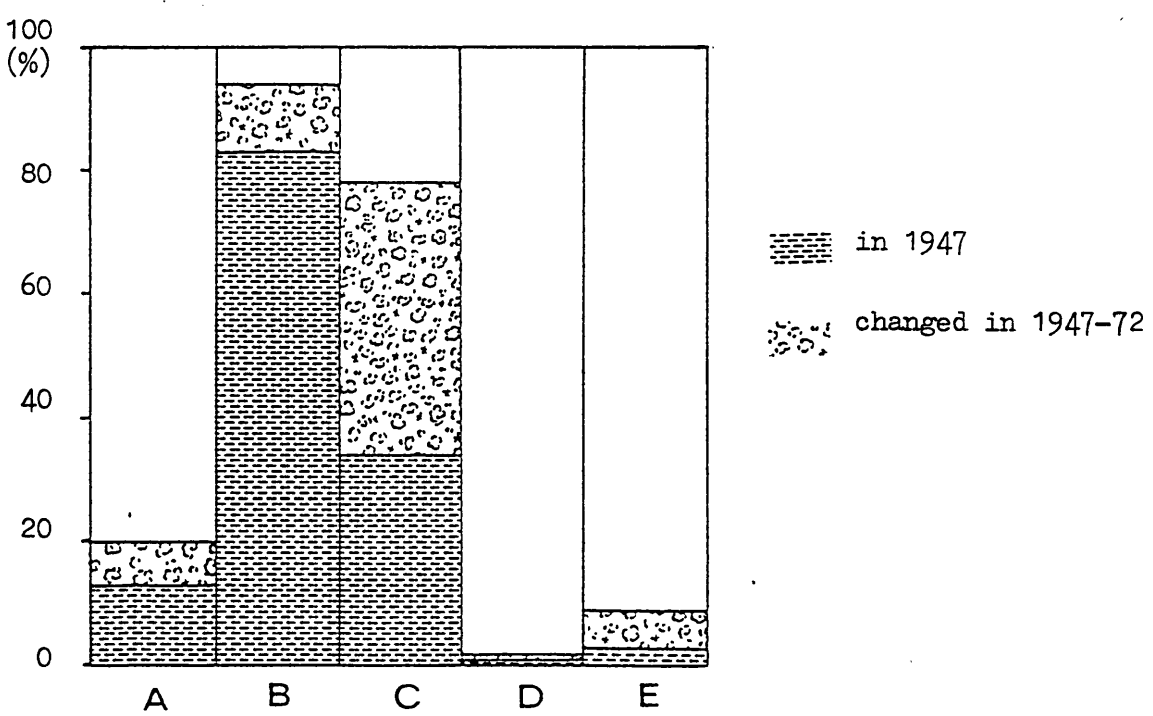
Source: From Table 4-1

Figure 4-1 - Structural and Proportional Changes of Urban Area in the London Subregions, 1947-72

(a) Structural Changes of Urban Area



(b) Proportional Changes of Urban Area



A London Metropolitan Region

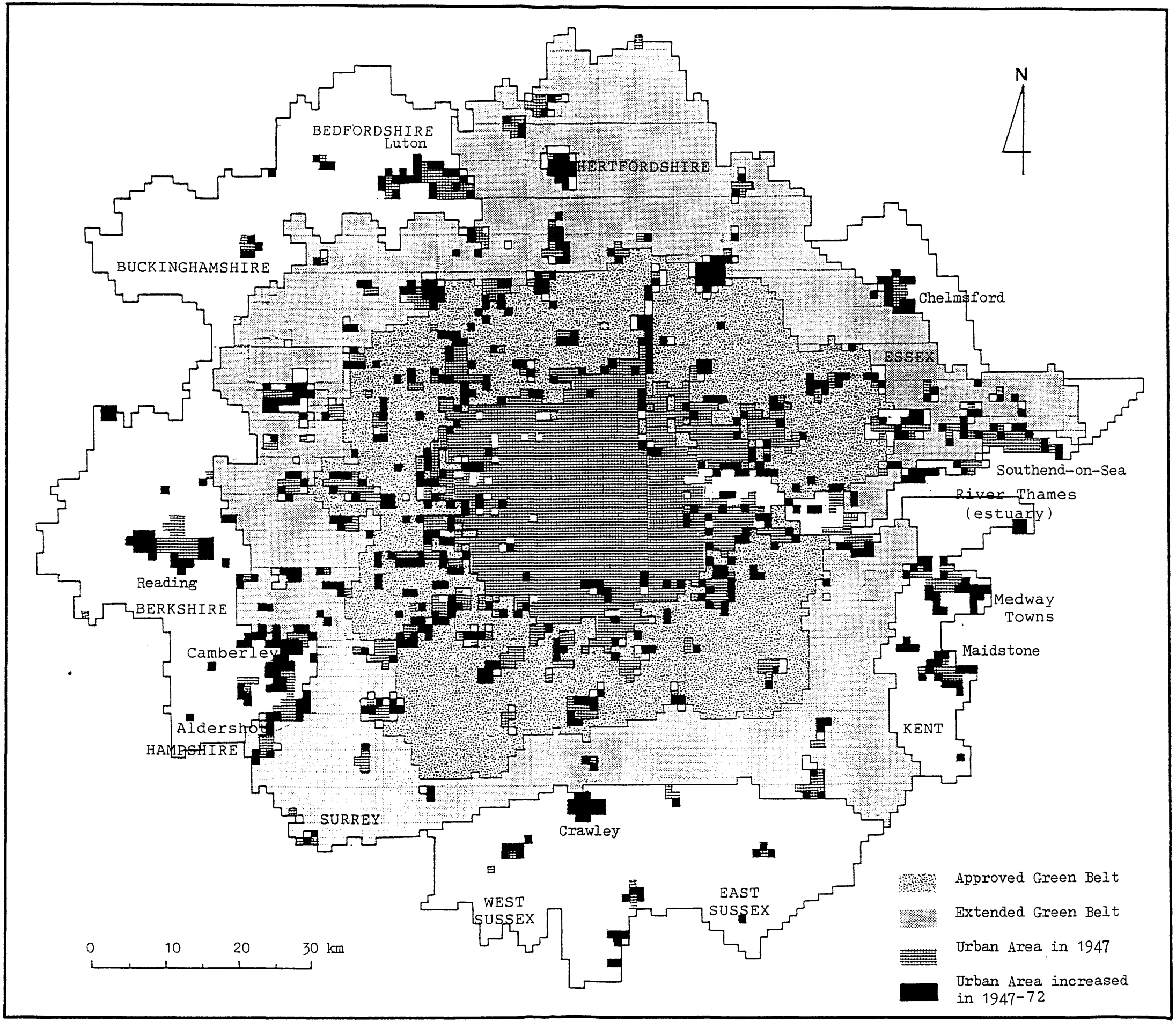
B London Built-up Area

C Urban Islands

D London's Green Belt

E Rural Metropolitan Area

Figure 4-2 - Urban Growth in the London Metropolitan Region, 1947-72



merge into suburban towns which might eventually meet with the expanding London Built-up Area to become a very large conurbation.

The figure also shows the effect of the Metropolitan Green Belt on urban growth between 1947 and 1972 with many separated, small scale areas of growth at the edges of the Built-up Area as well as in the vacant outskirts of the surrounding Urban Islands. The larger scale areas of growth are outside the Green Belt giving a different appearance by the expansion of the existing towns in most cases. Therefore, the extension of the urban area which was not allowed in the London Built-up Area leaps the restraints and occupies either the rural land at the edge of Urban Islands or the rather freer land beyond the Green Belt. Later, this control of the urban area in the London Region will be compared with that of the counterpart Metropolitan Region of Tokyo which allowed its sporadic development to continue.

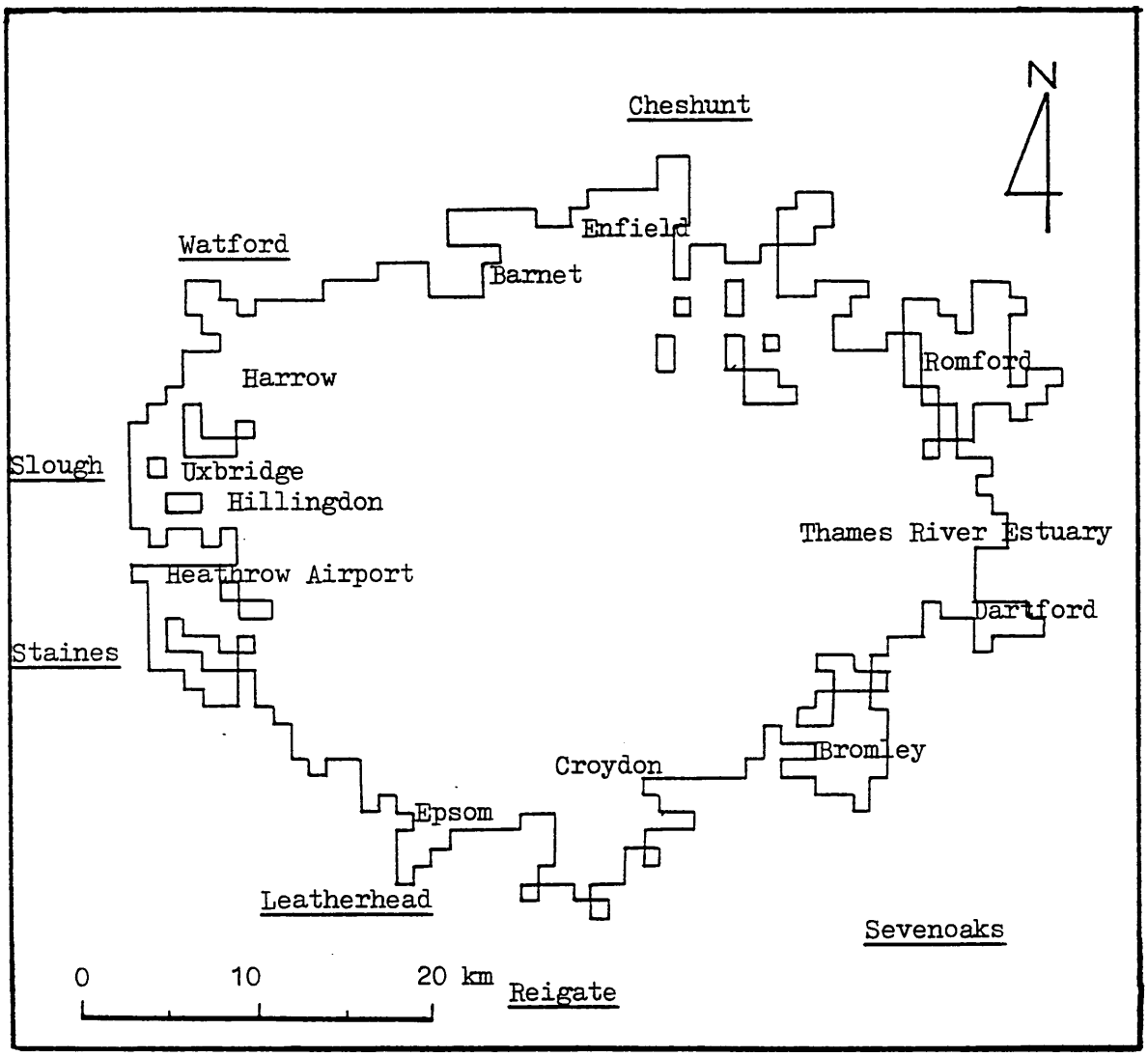
4.3 Urban growth in the four subregions 1947-1972

4.3.1 Urban growth in the London Built-up Area 1947-1972

The urban area in 1947 covers 1090 km^2 of the Built-up Area with only 220 km^2 left as rural mainly at the edge and alongside the Thames estuary. During the twenty-five years between 1947 and 1972 140 km^2 out of this remaining undeveloped area was developed. This conversion occurred mainly along the western boundary area around Uxbridge and Heathrow International Airport. The latter was once categorised as a Green Belt within the 1950s Development Plan (Figure 4.3 map of the London Built-up Area).

On the eastern side one of the main growth areas is the lowland in the estuary of the River Thames in particular along northern banks which have mainly been allocated to industrial uses such as motor manufacture and oil storage and refinery. South east of the estuary the area showing most growth is around Bromley. Elsewhere around London some scattered urban growth fills vacant land at the inner

Figure 4.3 - Map of the London Built-up Area



Note: Towns underlined are located outside of the Built-up Area

Source: One kilometre square method

Green Belt boundary such as at Barnet in the north and Croydon in the south.

In 1972, 94 per cent of the total area of the London Built-up Area is developed and the urban area counts 1230 km^2 out of the total area of 1310 km^2. The remaining rural area (80 km^2) is mostly located in the estuary of the Thames River.

4.3.2 Urban growth in the Urban Islands 1947-1972

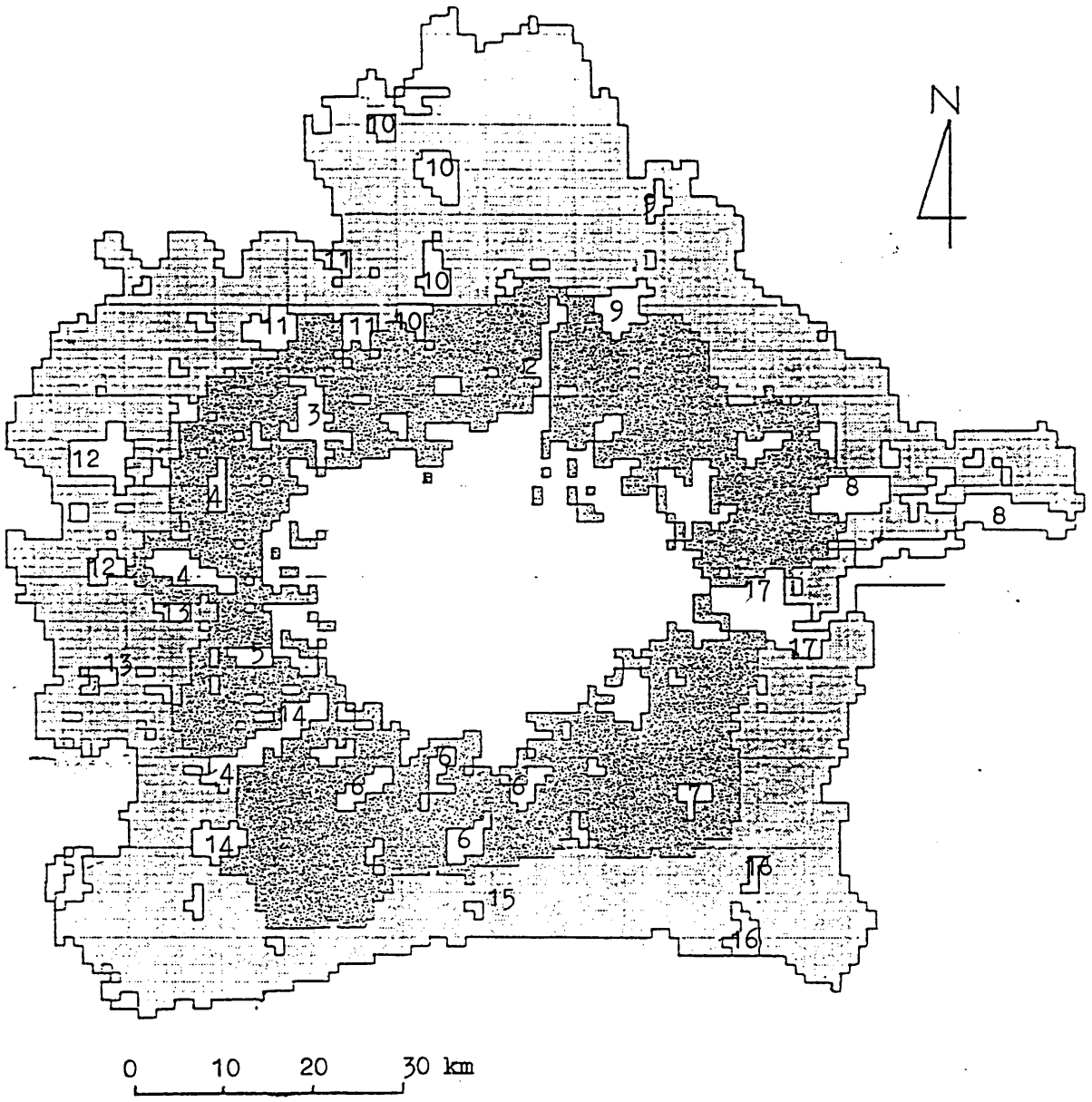
The study of urban growth in the Urban Islands in the London Green Belt is divided into two parts, the inner and the outer Urban Islands. The inner Urban islands are located in the approved Green Belt and the outer Urban Islands in the extended Green Belt (Figure 4.4 Map of Urban Islands).

4.3.2(a) Urban growth in the inner Urban Islands

The inner Urban Islands lie in a band approximately seven miles in width around the inner boundary of the Green Belt. In this band there are a number of large urban settlements which have been excluded from the Green Belt designation, each having its own inner Green Belt boundary. They are: Brentwood in Essex; Cheshunt, Potters Bar and Watford in Hertfordshire; Gerrards Cross and Slough in Buckinghamshire and Berkshire; Staines, Leatherhead, Banstead, Caterham and Reigate in Surrey; and Sevenoaks in Kent.

The total area, the urban area in 1947 and the urban growth in 1947-1972 were measured and are given for the main town areas in Table 4.4. Total area of the inner Urban Islands covers 246 km^2. The urban area in 1947 measures 97 km^2 with large urban areas of 20 km^2 in Watford in the north corridor and in the Slough area in the west corridor, but with the largest urban area (38 km^2) in the south suburban islands of the Leatherhead group in Surrey. In 1947 the other settlements of Brentwood, Cheshunt, Potters Bar, Staines and Sevenoaks were relatively very small.

Figure 4-4 - Urban Islands in London's Green Belt



A. Large Urban Areas in the Inner Urban Islands

1. Brentwood
2. Cheshunt-Potters Bar
3. Watford
4. Slough-Gerrards Cross
5. Staines
6. Leatherhead-Banstead-Caterham-Reigate
7. Sevenoaks

B. Large Urban Areas in the Outer Urban Islands

8. Basildon-Southend
9. Harlow-Bishop's Stortford
10. Hertford-Welwyn Garden City-Stevenage
11. St Albans-Hemel Hempstead
12. High Wycombe-Maidenhead
13. Bracknell
14. Walton-Woking-Guildford
15. Horley-Oxted (Gatwick International Airport Area)
16. Tonbridge-Royal Tunbridge Wells
17. Gravesend-Tilbury

Table 4-4 - Total Area, Urban Area and Growth in the Inner Urban Islands, 1947-72

	Area : km^2		Ratio : %
Large Settlements	Total Area	Urban Area	Rural Area (1972)
		1947 / 1947-72	
Brentwood	15	4 / 11	-
Cheshunt-Potters Bar	29	3 / 17	9
Watford	49	20 / 29	-
Slough-Gerrards Cross	40	20 / 17	3
Staines	20	4 / 16	-
Leatherhead-Banstead-Caterham-Reigate	77	38 / 27	12
Sevenoaks	16	8 / 6	2
Total	246	97 / 123	26
Ratio (%)	100	40 / 50	10

Sources: One kilometre square method

A brief description of the expansion of each town follows, starting in the north of the Thames in the east and going in an anti-clockwise direction. Brentwood consisted of two areas in 1947 that had developed separately around the east and west railway stations but later they merged and grew outwards together. Rural landscape in the Lee Valley around Cheshunt was changed with the expansion of suburban housing development on to low lying land. Potters Bar expanded south towards London, while Watford, already one of the biggest satellites to the north of London, also experienced considerable additional suburban housing development in the post-war period. Slough developed as a big industrial town to the west of London along the M4 motorway and the main westward railway line, but also expanded into the rural land at the inner edge of its Island mainly for suburban house building. Staines and Egham originally developed near railway stations with ribbon development along main roads but with the expansion of housing development around the existing urban settlements the western suburbs grew larger and filled the vacant surrounding land. In south Surrey many Urban Islands had developed reluctantly by employment of the Green Belt. Without a Green Belt, these scattered and sporadic developments would almost certainly have merged onto the big urban mass, similar to the pre-war merger of the inner suburban Ring Towns of Harrow, Hillingdon, Epsom, Bromley, Dartford, Havering/Romford and so on. Sevenoaks, Swanley, Biggin Hill and other smaller urban settlements in west Kent complete the circle of Islands contained in the inner Green Belt.

As a result of this post-war urban growth between 1947 and 1972. the urban area of the Inner Islands more than doubled. By 1972 most of the land was developed and only 26 km^2 was left or preserved as rural land mainly at the edges of the Islands; 9 km^2 in the Cheshunt/Potters Bar area, 12 km^2 in the south Surrey Islands and a few cells in the Slough and Sevenoaks areas. Brentwood, Watford and Staines areas had virtually no vacant space for further development at all in 1972.

4.3.2(b) Urban growth in the outer Urban Islands

Settlements beyond the approved Green Belt became Urban Islands as a result of extensions to the Green Belt. Seven out of the eight post-war new towns around London are located in these islands. The urban area and its growth in the outer Urban Islands are listed by the ten areas of large urban settlement in Table 4.5.

The total area is given in the first column of the table and the areas vary from 135km^2 in the Basildon/Southend area to 8 km^2 around Gatwick International Airport. The total area of the Outer Islands covers 585 km^2 and is more than double that of the Inner Islands (246 km^2).

The 185 km^2 of urban land existing on the Outer Islands in 1947 is also about double that of the Inner Islands (97 km^2). The largest urban areas in 1947 before the establishment of the London Green Belt are shown as 44 km^2 Basildon/Southend, and 40 km^2 in the south west Surrey urban corridor of Walton, Woking and Guildford. Next largest areas are seen to be 26 km^2 in the north New Town corridor of Hatfield, Welwyn Garden City, Stevenage and Letchworth and 22 km^2 in the expanding towns of the High Wycombe/Maidenhead area. Other New Town groups in the Harlow and Bracknell areas show very little urban development in 1947. Tonbridge, Royal Tunbridge Wells, Gravesend and Tilbury were well developed with a combined total of 28 km^2 in 1947 (Figure 4.4).

The major extensions to the urban area between 1947 and 1972 are 46 km^2 in Basildon and Southend in East Essex; 38 km^2 in Hertford, Welwyn Garden City and Stevenage; 37 km^2 in Walton, Woking and Guildford; 35 km^2 in the expanding satellite towns of the High Wycombe area; and 28 km^2 in St Albans/Hemel Hempstead, the area north of Watford. The area of Harlow New Town and Stansted Airport which was proposed as a third London International Airport and was excluded from the extended Green Belt after 1972, shows a net increase of 19 km^2 from the existing urban area of 4 km^2 in 1972. The area of Bracknell New Town,which shows a big increase of 12 km^2 between 1947-1972 from the existing

Table 4-5 - Total Area, Urban Area and Growth in the Outer Urban Islands, 1947-72

Area : km^2 Ratio : %

Main Cities	Total Area	Urban Area		Rural Area (1972)	Notes
		1947	1947-72		
Basildon-Southend	135	44	46	45	
Harlow-Bishop's Stortford	34	4	19	11	Partly excluded later
Hertford-Welwyn Garden City-Stevenage	77	26	38	13	
St Albans-Hemel Hempstead	52	18	28	6	
High Wycombe-Maidenhead	82	22	35	25	
Bracknell	13	1	12	-	Excluded later
Walton-Woking-Guildford	93	40	37	16	
Horley-Oxted (Gatwick Airport Area)	8	2	4	2	Excluded later
Tonbridge-Royal Tunbridge Wells	20	10	6	4	
Gravesend-Tilbury	71	18	15	38	
Total	585	185	240	160	
Ratio	100	32	41	27	

Source: One kilometre square method

urban area of only one km² in 1947, was also excluded from the Outer Green Belt after 1972. Some urban growth is seen along the estuary of the River Thames particularly around Gravesend on the south bank and Tilbury on the north, with a combined additional urban area of 15 km². The area of Horley/Oxted (Gatwick Airport) was later excluded from the Green Belt. The Kentish towns of Tonbridge and Tunbridge Wells reveal one of the smallest growths in the expanding period.

Therefore, the total urban area in the outer Urban Islands accounts for 185 km² in 1947 of which the urban area accounts for 32 per cent. The net growth in urban land between 1947 and 1972 shows 240 km², an additional 41 per cent of the total area, leaving only 160 km² (27 per cent) of the outer Urban Islands in rural uses. Most of the rural area is situated on the outskirts of the Islands and remains as countryside around the towns.

4.3.2(c) Urban growth in the Urban Islands

This section and Table 4.6 summarise the growth of urban land in the two types of Urban Islands and briefly interprets the character of their urban growth.

In 1947 it would probably have seemed that the 549 km² of rural land, made up of 149 km² in the Inner Islands, and 400 km² in the Outer Islands, left plenty of room for further development. However, urban growth occurring at an average rate of 14.5 km² per year had taken the 67 per cent of rural area for urban uses by 1972, leaving only 26 km² in the Inner Islands and 160 km² in the Outer Urban Islands. Table 4.6 demonstrates this active growth of urban land in the Urban Islands between 1947 and 1972, and conversely the decrease in rural land. By 1972 rural land represented only 11 per cent and 27 per cent of the total areas of the Inner and Outer Islands respectively. These figures are, however, misleading as a considerable amount of this land is not available for further urban development. Either it has already been partially built on but not sufficiently to fill a kilometre square and so be measured as urban in this study and/or is

Table 4-6 - Summary of Total Area and Urban Growth in the Inner and Outer Urban Islands, 1947-72

Area : km^2 Ratio : %

	Total Area	Urban Area				Rural Area	
		1947	47-72	1972	47-72/47 (%)	1947	1972
Inner Urban Islands	246	97	123	220	+ 79	149	26
Outer Urban Islands	585	185	240	425	+ 130	400	160
The Urban Islands (Total)	831	282	363	645	+ 129	549	186
Ratio (%)	100	(34	44)	78		66	22

Source: From Tables 4-4 and 4-5

in public open space (such as parks) which are not here defined in the urban category.

4.3.3 Urban Growth in the London Green Belt : 1947-1972

4.3.3(a) Component of urban area in the Green Belt area

Within the 1973 boundaries the total London Green Belt area covers 5851 km^2, of which the area termed the Approved Green Belt comprises 2274 km^2 and the Extended Green Belt 3577 km^2.

In 1947 the Approved Green Belt contained an urban area of 50 km^2 to which was added another 24 km^2 between 1947 and 1972. Similarly the Extended Green Belt contained 17 km^2 urban land in 1947 which increased by another 17 km^2 over the next twenty-five years (see Table 4.1).

Table 4.7 shows the major components of the urban areas in the Green Belt. In 1947 in the Inner Green Belt the 33 km^2 of golf courses form the largest element. Other components are: 1 km^2 of race courses, 3 km^2 of hospitals, 1 km^2 of schools or colleges, 7 km^2 of residential area, 1 km^2 of cemetery and 4 km^2 of airfields. Urban growth between 1947-1972 measured 24 km^2, representing an increase of about 50 per cent in the existing urban area. The main growth is in residential uses (15km^2) mainly around the inner boundaries of the Green Belt, with only an additional 2 km^2 for golf courses. The remaining components are 3 km^2 of hospitals, which were extensions at the edge of existing sites, 2 km^2 of college and university campus, 1 km^2 of sewage works at the end of Heathrow Airport and 1 km^2 of transport land of a large junction of M23 and M25, which was not yet opened but largely developed in 1972.

Total urban area in the Extended Green Belt in 1947 measured 17 km^2. This was made up of 8 km^2 of golf courses, 2 km^2 of schools, 4 km^2 of institutions, mainly the Royal Army Academy at the border between Surrey and Hampshire, 2 km^2 of residential area and 1 km^2 of airfield. The increase in the urban area of 17 km^2 between 1947 and

Table 4-7 - Component of Urban Area in the Approved, Extended and London Green Belt, 1947-72

Area : km^2

	Approved Green Belt			Extended Green Belt			London Green Belt		
	1947	1947-72	1972	1947	1947-72	1972	1947	1947-72	1972
Golf courses	33	2	35	8		8	41	2	43
Race courses	1		1				1		1
Hospital	3	3	6				3	3	6
School, University	1	2	3	2		2	3	2	5
Institution				4		4	4		4
Residential	7	15	22	2	11	13	9	26	35
Cemetery	1		1				1		1
Sewage		1	1					1	1
Airfield, Airport	4		4	1	5	6	5	5	10
Transport (road)		1	1		1	1		2	2
Total	50	24	74	17	17	34	67	41	108

Source: One square kilometre survey

1972 comprises 11 km^2 of residential development mostly in the new town area of Bracknell, 5 km^2 of airfield/airport including Gatwick International Airport, and 1 km^2 of surface transport.

Table 4.8 sets out urban area change in the London Green Belt by land use function and shows that the inner and outer areas together covered 67 km^2 in 1947 and grew by 41 km^2 between 1947-1972 to a total area of 108 km^2 in 1972. The largest component of this urban area in both 1947 and 1972 was golf courses but there has been little change in this element during the twenty-five year period. The second largest component in 1947, residential development, shows by far the greatest increase, almost tripling in size during the two and a half decades. The areal increase, 15 km^2, is greater in the Approved than in the Extended Green Belt (+ 11 km^2). Extensive pre-war landtake for airfields and post-war development of international air travel have had a big impact on Green Belt land with the 4 km^2 in 1947 growing by another 5 km^2 by 1972. Similarly institutional uses increased by 5 km^2 mainly with the extension of hospitals and educational facilities. There was also a 1 km^2 increase in public facilities and a growth of just 2 km^2 in recreational land uses.

The two biggest conversions between Green Belt and urban growth in the London Region are, firstly, residential development or extension at the edge of existing settlements, and secondly, the expansion of the transport facilities of airport and airfield and road junctions. However, the conforming Green Belt land uses of recreational and institutional land use have changed relatively little in the Green Belt area.

4.3.3(b) Locational character of the urban area in the Green Belt

One very interesting finding from the survey is demonstrated by a locational analysis in relation to the London Built-up Area and the Green Belt. Figure 4.5 relates the data on land use functions (Table 4.7) to their locations and shows where the urban area had been developed before and after the introduction of the Metropolitan Green

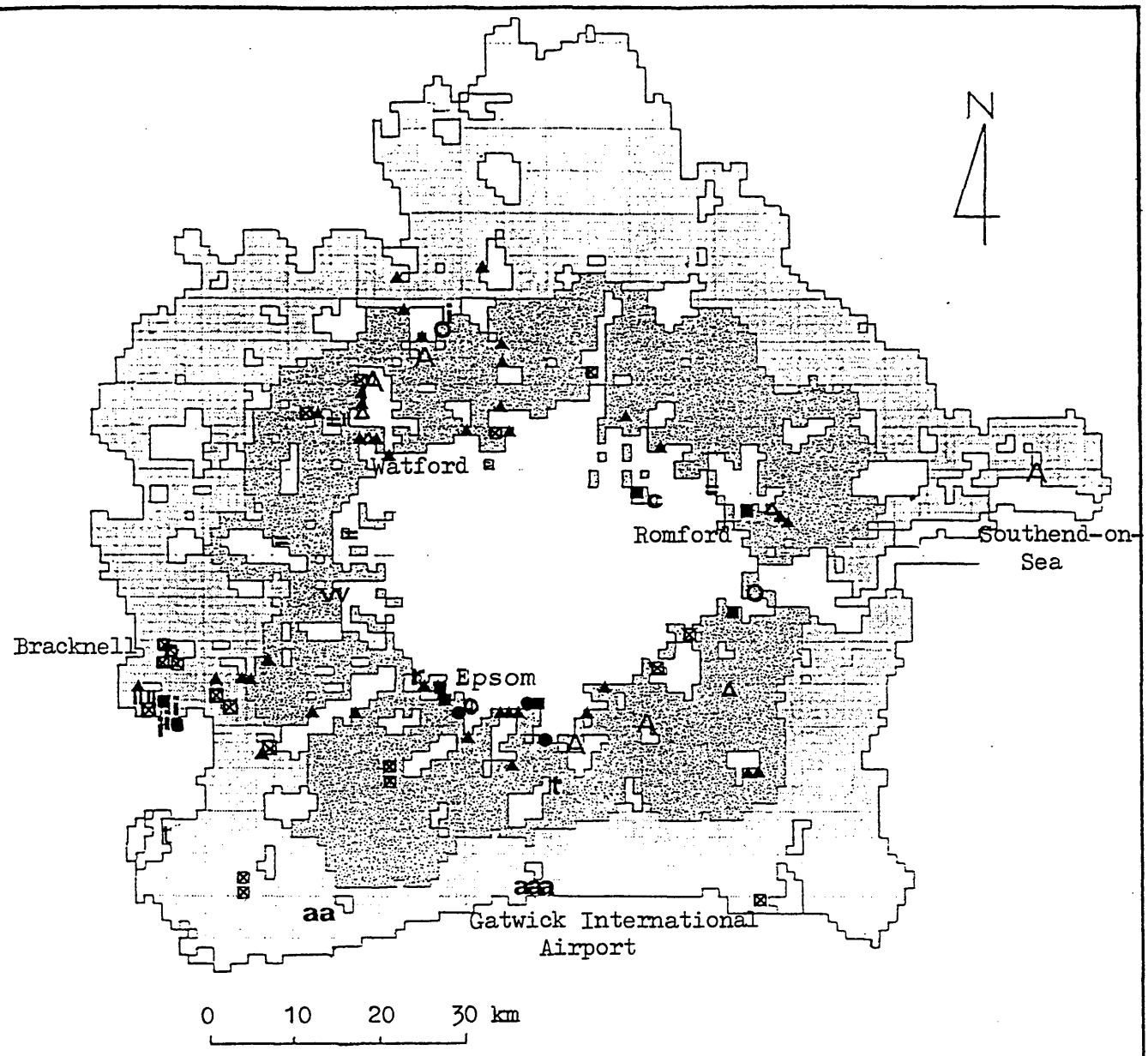
Table 4-8 - Urban Area Change by Land Use Function in the Approved, Extended and London Green Belt, 1947-72

Area : km^2

	Approved Green Belt			Extended Green Belt			London Green Belt		
	1947	1972	Change	1947	1972	Change	1947	1972	Change
Recreational	34	36	+2	8	8	-	42	44	+2
Institutions	4	9	+5	6	6	-	10	15	+5
Residential	7	22	+15	2	13	+11	9	35	+26
Public	1	2	+1	-	-	-	1	2	+1
Transport	4	5	+1	1	7	+6	5	12	+7
Total	50	74	+24	17	34	+17	67	108	+41

Sources: Reorganised from Table 4-7

Figure 4-5 - Changes of Urban Area in the Approved and the Extended Green Belts, 1947-72



▲ golf courses built before 1947

△ golf courses built in 1947-72

r race courses built before 1947

● hospital built before 1947

○ hospital built in 1947-72

|| school built before 1947

═ school built in 1947-72

i institute built before 1947

Extended Green Belt

Approved Green Belt

c cemetery built before 1947

■ residential area developed before 1947

⊠ residential area expanded in 1947-72

A airfield built before 1947

a airfield and airport built in 1947-72

w sewage facility expanded in 1947-72

t transport land expanded in 1947-72

Belt. Three fifths of the total urban area in the Approved Green Belt in 1947 was located at the edge of the inner boundaries of the Green Belt where some urban areas were made separate island settlements from the Built-up Area by the drawing of the Green Belt arbitrarily between them.

Much urban area of golf courses, hospital land and residential area is located along this boundary line between the London Built-up Area and the Green Belt. To the south of London it is mainly concentrated along the south west edge, while in the north this type of urban area is more scattered but with groupings around the Urban Island of Watford and in the Approved Green Belt around the suburban town of Romford.

On the other hand, the urban area in the Extended Green Belt (Figure 4.5) represents a different feature. By 1972 most of the growth in the urban area is shown around the Bracknell New Town. Similarly 3 km^2 was added around Gatwick Airport. Both these areas were later excluded from the Green Belt during Structure Plan Reviews. The building of a new airfield in south Surrey has taken 2 km^2 of the urban area. A few golf courses are located at the edge of the Urban Islands in the north.

The London suburban area had been developed outwards in the inter-war and immediate post-war period with sporadic development merging into the surrounding settlements and ribbon type development along main roads and railway lines had occurred. As golf courses were incorporated into Green Belt land, the linear Built-up Area was broken by the insertion of such areas of Green Belt between them. Hospitals and schools acted as Green Belt in the same way. Banstead became an Island through the employment of a Green Belt of surrounding golf courses. Esher, west of Epsom, was isolated by way of its Green Belt area of race courses, golf courses and school ground. Most of the remaining urban area of this kind was located at the edge of scattered Urban Islands to prevent towns and villages from merging into nearby big settlements.

4.3.4 Urban Growth in the Rural Metropolitan Area

The Rural Metropolitan Area is defined for this study as the area between the outer boundaries of the Extended Green Belt and the boundary of the London Metropolitan Region. This outer subregion lies approximately between 50 and 70 kilometres from the centre of London. It consists of 3520 km^2 in parts of the eight counties of Essex, Bedfordshire, Buckinghamshire, Hampshire, West and East Sussex and Kent. (The other two Home Counties, Surrey and Hertfordshire, are incorporated wholly within the London Metropolitan Green Belt.) (Figure 4.2)

Table 4.9 shows the total area within the Rural Metropolitan Area, urban area as at 1947, increase in urban area between 1947 and 1972 and the main cities of the eight counties. Chelmsford, in west Essex, grew from an urban area of 6 km^2 in 1947 to one of 21 km^2 in 1972. Luton, with Dunstable, comprises one of the biggest centres in the north of the region and its urban area doubled from 21 km^2 in 1947 to 43 km^2 in 1972. Reading and other small towns along the M4 motorway corridor have also expanded considerably from an urban area of 26 km^2 in 1947 to 59 km^2 in 1972. However, the large urban corridor in south west Surrey and Hampshire between Camberley and Aldershot shows the greatest areal increase in the period being studied. To the south of London the development of a New Town at Crawley and the expansion of other rural towns accounts for the addition of 35 km^2 to the urban area in East and West Sussex. Finally, the urban area in east Kent increased from 24 km^2 in 1947 to 70 km^2 in 1972 mainly around Maidstone and the Medway towns.

As a result of expansion, the urban area in the Rural Metropolitan Area grew from 110 km^2 in 1947 to 312 km^2 in 1972 showing a large increase of 202 km^2 during this period. Expressed in percentage terms the Rural Metropolitan Area growth rate represents 184 per cent while that of the Built-up Area shows 13 per cent and Urban Islands 128 per cent, with an average in these two urbanised subdivisions together of 48 per cent. The fastest urban growth rate is therefore found in the Rural Metropolitan Zone beyond the Green Belt.

Table 4-9 - Urban Area in the Rural Metropolitan Area

Area : km^2

County	Total Area	Urban Area			Main Cities
		Urban in 1947	Increase 1947-72	Total (1972)	
Essex	256	6	15	21	Chelmsford
Bedfordshire	355	22	24	46	Luton
Buckinghamshire	569	3	7	10	Aylesbury
Berkshire	608	26	33	59	Reading
Hampshire	274	20	42	62	Camberley-Aldershot
West and East Sussex	1069	9	35	44	Crawley
Kent	387	24	46	70	Maidstone and Medway Towns
Total	3520	110	202	312	

Sources: One kilometre square method

4.4 Urban Growth in the Outer South East

The Outer South East, and its six subdivisions, is shown in Figure 2.1(a) and is as defined by the South East planning team. The measured data for urban growth in the area is given in Table 4.10. From this it can be seen that the total urban area doubled over the period with the largest areal extensions occurring in Solent and the Sussex Coast where increases of 199 km^2 and 74 km^2 respectively are recorded. The highest rate of growth, a 150 per cent expansion, occurred in Buckinghamshire and Bedfordshire.

The main areas of urban growth in each sector can be explained. Buckinghamshire/Bedfordshire has the lowest areal growth, only 24 km^2 and much of this can be accounted for by the development of the New Town at Milton Keynes and expansion of Bedford. In Berkshire / Oxfordshire urban growth has been severely controlled around the historic city of Oxford which has its own Green Belt to maintain separation between the city and the surrounding villages. Urban growth has occurred more along the M4 corridor in Berkshire particularly around Newbury.

The urban area of Solent more than doubled over the period, mainly as a result of developments in the southern port area of Southampton/Portsmouth. South Hampshire Council prepared a very positive regional development plan in July 1967 which proposed the building of a great urban area 40 km long east-west from Southampton to Portsmouth, and 20 km wide north-south across the Solent Channel (Hall 1963). The Structure Plan Green Belt was prepared to guide and control further urban growth in this large area of South Hampshire which was planned to be the most active regional development area in the South East (South Hampshire Structure Plan 1972; Green Belt Maps in DoE 1988).

The adjacent area of the Sussex Coast has traditionally had most of its important settlements along the coast and they continued to expand over the period, but this area shows the lowest rate of growth at only 65 per cent. Kent also showed a relatively slow growth rate,

Table 4-10 - Urban Growth in the Outer South East, 1947-72

	Area : km^2			
	1947	1947-72	1972	% Increase
Berks and Oxon	38	42	80	110
Beds and Bucks	16	24	40	150
Essex	28	37	65	132
Kent	63	51	114	81
Sussex Coast	113	74	187	65
Solent	179	199	378	111
Total	437	437	874	100

Source: One kilometre square method

Table 4-11 - Urban Growth in the South East

Area : km^2, ratio %

	Urban Area			Increase (B/A)
	1947 (A)	1947-72 (B)	1972	
London Metropolitan Region	1549	746	2295	48
London Built-up Area	1090	140	1230	13
Outer Metropolitan Area	459	606	1065	132
Urban Island	282	363	645	129
London Green Belt	67	41	108	61
Rural Metropolitan Area	110	202	312	184
The Outer South East	437	437	874	100
The South East	1986	1183	3169	60

Sources: Table 4-1, 4-3 and 4-10

81 per cent, resulting from the increase in various towns such as Ashford and Canterbury and in the seaside towns. In Essex urban development occurred through expansion in the existing large and small towns during the study period. However, the proposed third London airport at Stansted had very small effect on urban growth in its area by 1972.

Comparing the data for the Outer South East with that for the London Metropolitan Region it can be seen that the the growth rate for the Outer South East (100%) has been more than double that of the London Metropolitan Region (48%) but lower than that of the Outer Metropolitan Area (132%). Overall the urban area in the South East region grew from 1986 km^2 in 1947 to 3169 km^2 in 1972 showing a net increase in urban area of 1183 km^2 in the twenty-five years and a net increase rate of 60 per cent (see Table 4.11). In brief, the large cities such as Reading, Luton, Maidstone and Crawley, in the Rural Metropolitan Region beyond London's Green Belt, had grown more rapidly than the more distant regional cities in the Outer South East.

4.5 Urban Growth in the North West London area : 1947-1961 and 1961-1972

The foregoing two sections study urban growth in the whole of the four subregions in relation to the employment of London's Green Belt. This section illustrates the trend - how urban growth occurred from the Built-up Area to the Inner Urban Island and then to the Outer Urban Island in two periods, 1947-1961 and 1961-1972, by use of a case study of North West London. Data used are the one inch:one mile map sheet No 160 in the New Popular Map Series (6th series) for the urban area in 1948, the Seventh Series of one inch:one mile maps for the 1961 land use, and 1:50,000 map for the urban area in 1972. These maps are closely related to three representative years:
1947 for the urban area before introducing a Green Belt; around 1960 at the time of extending the Green Belt; and 1972 at the end of the study period after putting the Green Belt into practice.

However, unfortunately maps of the date around 1960 were not available for the whole region. Instead, it was possible to study a limited area of only north west London and the surrounding area. Figure 4.6 shows that Approved Green Belt has stabilised the great Built-up Area as it was in 1947 and encompasses the satellite towns of Slough, Gerrards Cross, Watford, Potters Bar and others within the inner Urban Islands. Beyond the Approved Green Belt the adjacent satellite towns of Hemel Hempstead, St Albans, Hatfield, Welwyn Garden City and Hertford are enclosed within the Extended Green Belt.

As shown in Figure 4.6 and Table 4.12 the Built-up Area was virtually fully developed in 1947 and only a little growth has occurred in the vacant land along the boundary area in the period between 1947 and 1961. Only one unit has been added to the urban area between 1961 and 1972 due to the building of Uxbridge College. Before this extension occurred the existing urban development did not amount to over half of the cell.

Very active suburban growth of 37 km^2 in the Inner Urban Islands between 1947 and 1961 has slightly more than doubled the 1947 urban area of 34 km^2. Only a small increase of 3 km^2 in the urban area was added in the following period 1961 to 1972. This increase was due to the construction of a new arterial road and the extension of residential areas in the existing towns. In fact, little extra suburban growth was seen in the Built-up Area and the adjacent Urban Islands between 1961 and 1972. Very small and limited space was available for further development after 1961.

The Outer Urban Islands grew rapidly from 28 km^2 in 1947 by an additional urban area of 37 km^2 by 1961, the same areal extension as occurred in the Inner Urban Islands over the same period. However, whereas growth in the Inner Urban Islands virtually stopped after 1961 it continued in the Outer Urban Islands although at a considerably reduced rate. The 14 km^2 added between 1961 and 1972 was mostly due to infilling, rounding-off and small extensions of the city edge rather than to large suburban expansion, except on the

Figure 4-6 - Urban Growth in North West London between 1947-61 and 1961-72

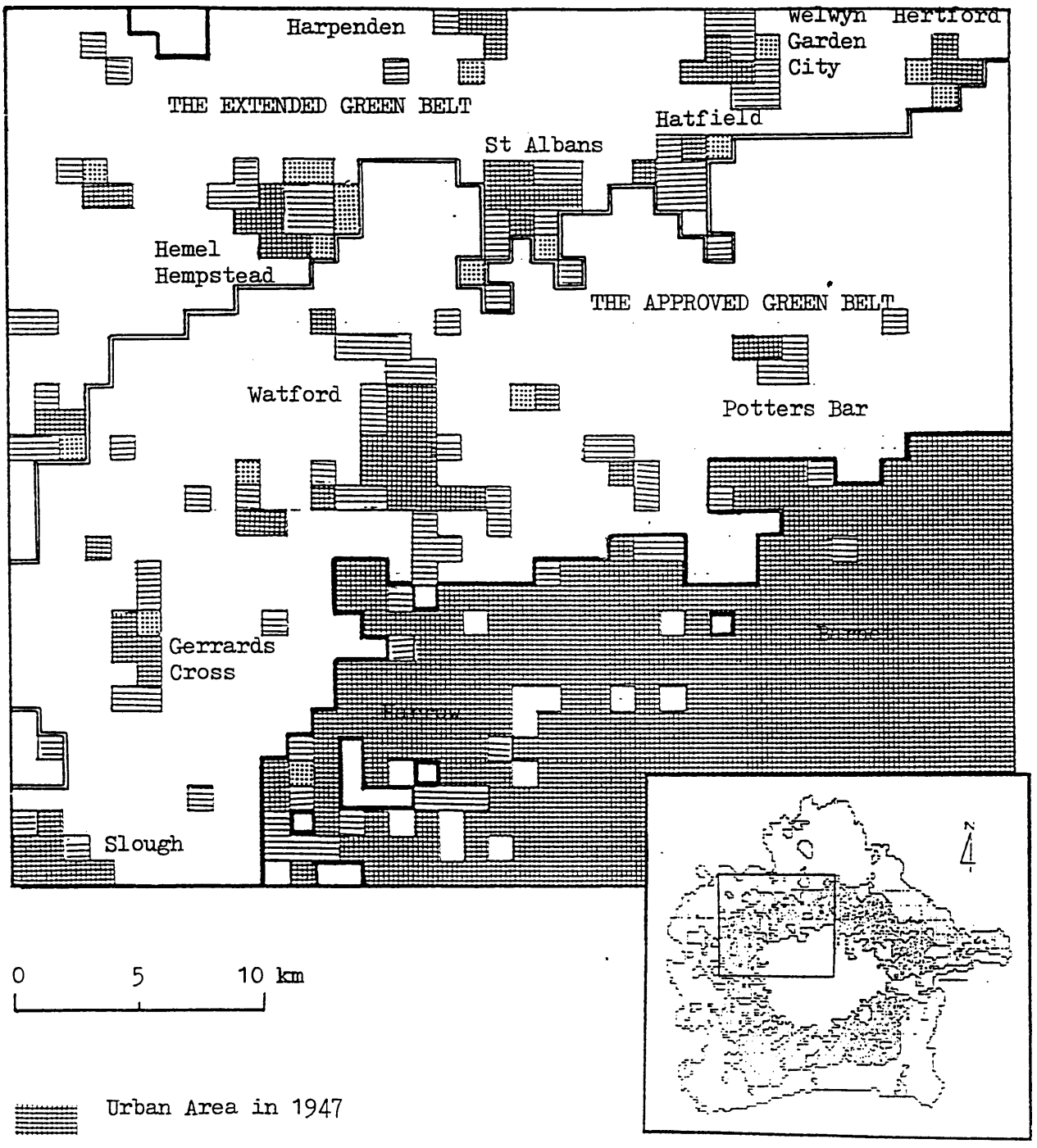


Table 4-12 - Urban Area and Growth in the North-west London and the Satellite Towns in 1947-61 and 1961-72

Area : km^2 (Rate : %)

	Urban Area							
	1947	1947-61	%	1961-72	%	1947-72	%
London Built-up Area	359	18	(5)	1	(0.3)	19	(5)
Inner Urban Islands	34	37	(109)	3	(4)	40	(118)
Outer Urban Islands	28	37	(132)	14	(22)	51	(182)

Source: One kilometre square method

Data from one inch one mile maps of No 160 in 1947 and 1961 and 1 : 50000 maps in 1972

fringe of Hemel Hempstead New Town which was expanded by a large residential development.

While the Built-up Area and the Inner Urban Islands were curbed in their expansion in the period 1961-1972, the Outer Urban Islands did continue to expand. However, the growth was much less than between 1947 and 1961, probably because adoption of the Extended Green Belt, which created the boundaries that made these outer settlements into Urban Islands, strictly limited the amount of developable building land remaining on the fringes of the existing developed areas. The rates of urban growth over the period 1947 to 1961 and 1961 to 1972 demonstrate the pattern of higher rates the further away from London, but the overall decrease as Green Belt policies progressively take effect over the period.

4.6 The effect of new town development on urban growth

It is very interesting to note how much area has been added into the metropolitan urban area due to new town development. Eight new towns were designated between 1946 and 1949 to be developed under the New Towns Act of 1946. These were Hemel Hempstead, Hatfield, Welwyn Garden City, Stevenage, Harlow, Basildon, Bracknell and Crawley (South East Study 1964; MERLIN 1971). The first seven towns were located within the Extended Green Belt. Only Crawley remained outside the Green Belt in the Metropolitan Rural Area. The first garden city of Letchworth was classified as one of the expanding towns under the Town Development Act of 1952 (South East Study 1964).

The total growth of urban area in the planned new towns amounted to 91 km^2 while the London Metropolitan Region grew 746 km^2 over the same period (see Table 4.13). The proportion of urban growth in the new towns represents only 11.9 per cent of the total urban growth for the London region. This could be much lower than planners had expected. It was believed that the building of new towns around London would accommodate a large proportion of London's overspill population and therefore provide a high proportion of post-war urban growth. However, in reality the new towns account for only about 12 per cent of the total growth of the Metropolitan Region over the study period.

Table 4-13 - Urban Growth in the Eight New Towns in the London Region, 1947-72

km^2

Location	Urban Area			Category
	At 1947	Increase 1947-72	At 1972	
Hemel Hempstead	5	12	17	Outer Urban Island
Hatfield	2	7	9	" " "
Welwyn Garden City	5	10	15	" " "
Stevenage	1	13	14	" " "
Harlow	-	17	17	" " "
Basildon	10	9	19	" " "
Bracknell	-	9	9	" " "
Crawley	-	14	14	Rural Metropolitan Area
Total	23	91	114	

Sources: New Towns List by the South East Study, 1964
Area measured by one kilometre square method

It seems that urban growth in the London Region has been achieved by suburban expansion or extension of existing residential areas rather than by new town development. Another new town was later added to the London Metropolitan Region with the designation of Milton Keynes, Buckinghamshire in 1968. The effect of this development would only just have begun to show on maps by 1972. Stretton (1978) also noted that by the end of the 1970s some forty new towns had been built but these only accounted for about 10 per cent of all post-war development and redevelopment.

The reality of London's urban growth pattern between 1947 and 1972 as shown by this study, brings into question the great success of the British planning of new towns and Green Belts. Looking back, the earlier idealists' plans for garden cities and containing Green Belts, later pursued through the post-war new towns movement, have not been fulfilled. Despite the great efforts put into new town developments by government and local authorities they were insufficient to take the majority of urban growth in the Region. Instead most growth resulted from the extension of existing satellites and new towns became only an alternative method of accommodating the Region's demand for growth. The need for a steady expansion of the Green Belt as a way of controlling the outward movement of urban growth was not envisaged.

4.7 Previous studies on urban land measurement and land use change in London's Green Belt

There has been very little research on the measurement of urban area in the London Metropolitan Region and its four subdivisions in relation to the Metropolitan Green Belt. The relevant general urban land statistics were studied largely by Best and researchers at Wye College. Land use change in London's Green Belt was surveyed by Thomas and by a working group for the Standing Conference on London and South East Regional Planning.

4.7.1 Best and other's studies

The earliest urban land estimation in the period 1931 - 1933 was carried out by Stamp. Stamp's First Land Utilisation Survey of Britain defined urban land with broad definitions of 'House and Gardens' and 'Land Agriculturally Unproductive' (Fordham 1974; Best 1981). The Second Land Utilisation Survey was carried out in 1963 by Coleman by the method of point sampling (Coleman 1961).

However, the principal urban land measurement was developed by Best and other researchers based at Wye College. Best estimated the urban area of England and Wales for 1950/51 by combining data from the Town Maps prepared for large settlements under the Town and Country Planning Act 1947 with acreage and population data from County Development Plans and Town Map Areas. From this data he could calculate the average land provision (ha/1000 persons) for cities and large towns. For settlements under 10,000 population he based a land provision figure on information supplied by a selection of planning authorities. He estimated the urban land of England and Wales in 1950 as 14580 km^2 or 9.7 per cent of the total land area (Best 1957, 1962). This estimate was later revised to 13390 km^2 and 8.9 per cent (Best 1981). Best's later work was largely based on calculating the areas of urban expansion using a number of data sources in particular from the Ministry of Agriculture, Fisheries and Food and the Forestry Commission and he provided decadal data for 1951, 1961, 1971 and 1981 (Best 1981, Best and Anderson 1984). Best (1981) calculated 157 km^2 as the average annual transfer of agricultural land to urban uses in England and Wales between 1945 and 1975.

In the 1960s Rogers refined Best's land use statistics on small towns, villages and hamlets under 10,000 population, by means of measurement from a sample of maps of Coleman's Second Land Utilisation Survey. He calculated the area of small settlements at about 750,000 acres (3065 km^2) and enhanced Wye College's urban land data (Rogers 1969; Best and Rogers 1973). Jones also worked towards an accurate measurement of urban areas in 1961 from the Development Plan data. He used the land provision technique and helped to refine

this method into the Density-size Rule (Jones 1974; Best, Jones and Rogers 1974).

Measurements of the extent of urban land in England and Wales in the early 1960s have been calculated by a number of researchers, the percentages being as follows : 9.0 (Fordham 1974); 9.7 (Anderson 1977); 9.8 (Swinnerton in Best 1981); 9.9 (Best 1981); and 10.9 (Coleman 1978). Best discusses these variations and concludes that they arise from a combination of factors of which the most important are the different definitions used for 'urban' and the methods used to measure or calculate the area. His general conclusion is that when these factors are taken into account there is little dispute that the urban area of England and Wales around 1961 covered approximately 10 per cent of the land surface (Best 1981).

Some research has also been carried out to calculate urban land use on a regional basis (Champion 1974). Champion estimates the distribution and change of urban land in the South East between 1950 and 1970. Total urban land in the South East for 1950 was 428,826 ha, for 1960 472,833 ha and for 1970 508,461 ha with an increase in total area of 79,635 ha between 1950 and 1970. At the same time, urban land in Greater London changed little from 123,810 ha in 1950 to 131,924 ha in 1970, a net increase of only 8114 ha, about one-tenth of the growth in the South East over the two decades.

Fordham also presented a survey of urban land use showing; for the South East, 3163 km^2 in 1951, 3637 km^2 in 1961 and 4021 km^2 (Fordham 1974). For this study Bae has measured the urban area of South East England to find trends of urban growth in the three regions of London, Tokyo and Seoul in relation to urban containment. Table 4.14 shows the various urban land use data for the south east and Greater London/London Built-up Area by Champion, Fordham and Bae. The three workers present a very wide range of results due to the employment of different methods and definitions, and the purposes of the work. Champion and Fordham both used sampling for great accuracy of urban extent, whereas Bae used the kilometre square method to demonstrate urban growth patterns. For the reasons explored in Chapter Two,

Table 4-14 - Urban Area [a] in the South East and Greater London by Champion, Fordham and Bae

Area : km^2

	Urban Area in SE			Urban Area in Greater London [e]		
	1947-51	1970-72	Change	1947-50	1970-72	Change
Champion [b]	4288	5085	797	1238	1319	81
Fordham [c]	3163	4021	858	-	-	-
Bae [d]	1986	3169	1183	1090	1230	140

Sources: From Table 4-13, 4-12; Fordham (1974), Measurement of Urban Land Use p 54

a The methods and definitions used to obtain the data were similar for Champion and Fordham but different for Bae (see 2.5.4)

b In 1950 and 1970

c In 1951 and 1971

d In 1947 and 1972

e Bae measures inside the inner boundaries of Green Belt

Bae's results come closer to the other results as the areas become more urbanised.

4.7.2 Land use studies in London's Green Belt by Thomas and the Standing Conference Team

Thomas's Survey

The best known land use study of London's Green Belt is introduced in Thomas's book, *London's Green Belt* (Thomas 1970). The land use survey was carried out with 24 sheets of 1:25,000 air photographs taken in 1959, which cover the Green Belt approved at 1960 and the surrounding zone. The measurement method was based on line traverse. He defines eleven categories of land usage : agricultural, woodland, water, recreational, institutes standing in extensive grounds and unused as conforming uses; residential and commercial, manufacturing, extractive, transport and public services as nonconforming uses. The major land uses within the Approved Green Belt, agriculture (69.5 per cent) and woodland (11.8 per cent) constitute 81.3 per cent of the total Green Belt area. Amongst the other conforming uses recreation has the highest proportion at 6.2 per cent. Together all conforming uses account for 89.5 per cent of Green Belt land use. Non-conforming uses represented only 10.5 per cent of the total Green Belt area. Of these, residential and commercial uses occupy 6.2 per cent,; extractive industries and transport take 1.8 and 1.5 per cent respectively; and public services and manufacturing occupy less than one per cent each.

Land Use Surveys by the Standing Conferences

Surveys of land use within the Approved Green Belt in 1963 were carried out for the Standing Conference on London Regional Planning in 1964, and repeated for land use in 1974 for the Standing Conference on London and South East Regional Planning in 1976 (SCLSERP 1975). The first study was in response to the growing demand for housing land in the region and the second study resulted from an exercise carried out at the request of the Government to find

2000 acres for housing in the Green Belt. The latter survey calculated land use changes and discovered much underused, or derelict land or mining working areas within the Green Belt.

The Standing Conference surveys defined the Approved Green Belt but the Extended Green Belt was ignored. Land use information was taken from data compiled by county planning authorities on Ordnance Survey maps of 1:25,000 and measured by planimeter. The survey employed five categories of land usage: (1) developed areas of human settlement, (2) airfield and public services with open character, (3) institutions and recreational land, (4) public open space and (5) the remainder, mainly agricultural and woodland. These categories differ from those originally defined by Thomas, and Thomas himself redefined his twenty four items to fit these five land use categories.

Despite some differences between the two surveys in definitions and the inner boundaries of Green Belt, they are compared in Table 4.15. The main difference in the figures is found in those of settlements. The reason for this is caused by the exclusion of land use less than five acres (2 ha) in the 1963 survey. Munton pointed out that this meant the result could have been underestimated by as much as 50 per cent of the non-conforming uses. He commented therefore that 'Thomas's figure must be preferred' (Munton 1983). If this explanation is accepted it brings the percentage of nonconforming uses (numbers 1 and 2) to around 11 per cent of the total for both surveys.

Table 4.15 shows land use changes between 1964 and 1974 as surveyed by the Standing Conference. These data show an increase of 1,100 ha (0.5 per cent) for town and rural settlements but a slight decrease (0.1 per cent) in the other non-conforming land use categories within the Approved Green Belt probably due to restoration of damaged land and the returned airfields to other uses. Conforming uses of public open spaces and institutions such as schools and hospitals are reported to have grown quite considerably. Therefore, in percentage terms, there is an increase of 0.5 per cent for settlements, 0.3 per cent for hospitals, schools and other institutions and 0.5 per cent

Table 4-15 - Major Land Use Changes in the Approved London Green Belt:
A Comparison of Thomas and Standing Conference's Findings

Land Use Categories	Thomas (1959)	Standing Conference on London and SE			
		Area at 1963		Net Changes in the same areas 1964-74	Changes as % of the Total Area
	%	ha	%		
1. Towns, villages and other land where surface development predominates	7.9	6,900	3.0	+ 1,100 ha	+ 0.5%
2. Airfields, War Department land, reservoir and water works, mineral workings tips and other land of predominantly open character	3.2	11,300	4.9	- 250 ha	- 0.1%
3. Institutions in extensive grounds, playing fields and other land uses and appropriate to the Green Belt	3.5	16,200	7.05	+ 750 ha	+ 0.3%
4. Public open space	3.9	16,200	7.05	+ 1,100 ha	+ 0.5%
5. Remainder, mainly agricultural and woodland	81.5	178,900	78.0	- 2,700 ha	- 1.2%

Sources: Thomas (1970) Table IV, p 139 Standing Conference on London and South East Regional Planning (1975, Table 1). Area of acres has been metricated by the author

Note: The total area of the Approved London Green Belt surveyed by the Standing Conference on London and SE in 1963 was calculated 229,500 ha (2295 km^2) using information in the above table

for public open space, with a corresponding decrease in agricultural land by 2700 ha or 1.2 per cent of the Approved Green Belt.

4.8 Conclusion : effects of London's Green Belt

4.8.1 The rate of urban growth in the London Region

The urban area of the London Metropolitan Region measured in this research totals 1549 km^2 in 1947 and 2295 km^2 in 1972. The total increase in urban area works out at 746 km^2 over the twenty-five years representing the average annual increase of urban area as 30 km^2 during the study period.. The growth rate represents 48.2 per cent, or approximately 50 per cent. This rate can be calculated by a simplified equation as follows:

$$Y_2 - Y_1 = aY_1$$

$$a = \frac{Y_2 - Y^1}{Y_1}$$

$$a = \frac{2295 - 1549}{1549}$$

$$a = 0.482 = 0.5$$

Y_1 : the existing urban area in 1947

Y_2 : the urban area in 1972

a : growth rate between 1947 and 1972

This equation calculates the extent of urban growth in the Metropolitan Region as an example of urban control by the Metropolitan Green Belt. It will be compared with those of the other counterpart city regions of Tokyo and Seoul in the last chapter.

4.8.2 Distribution of urban growth in the four subdivisions

The increase of 746 km^2 in the urban area between 1947 and 1972 has resulted from a small amount of growth of 140 km^2 in the London

Built-up Area, a large increase of 363 km^2 in the Urban Islands, a small increase of 41 km^2 in the Green Belt area and 202 km^2 in the Rural Metropolitan Area.

The location of the urban development shows that the Built-up Area generally expanded to the inner boundaries of the Green Belt but did not spill over them, and that urban growth in the Green Belt itself has also been strictly controlled. Urban development has occurred to a considerable extent within the confines of the Urban Islands. Judging from evidence from the case study in North West London expansion occurred quickly in the Inner Islands and then slowed as they filled up. The greatest extent of urban development occurred in the Outer Islands, but their expansion was considerably curtailed by the Extension of the Green Belt and the subsequent filling up of these Islands. Seven of London's new towns are Outer Urban Islands. Evidence from the North West London study shows that they grew at a relatively steady pace over the period, eventually accounting for 32 per cent of Outer Island urban growth.

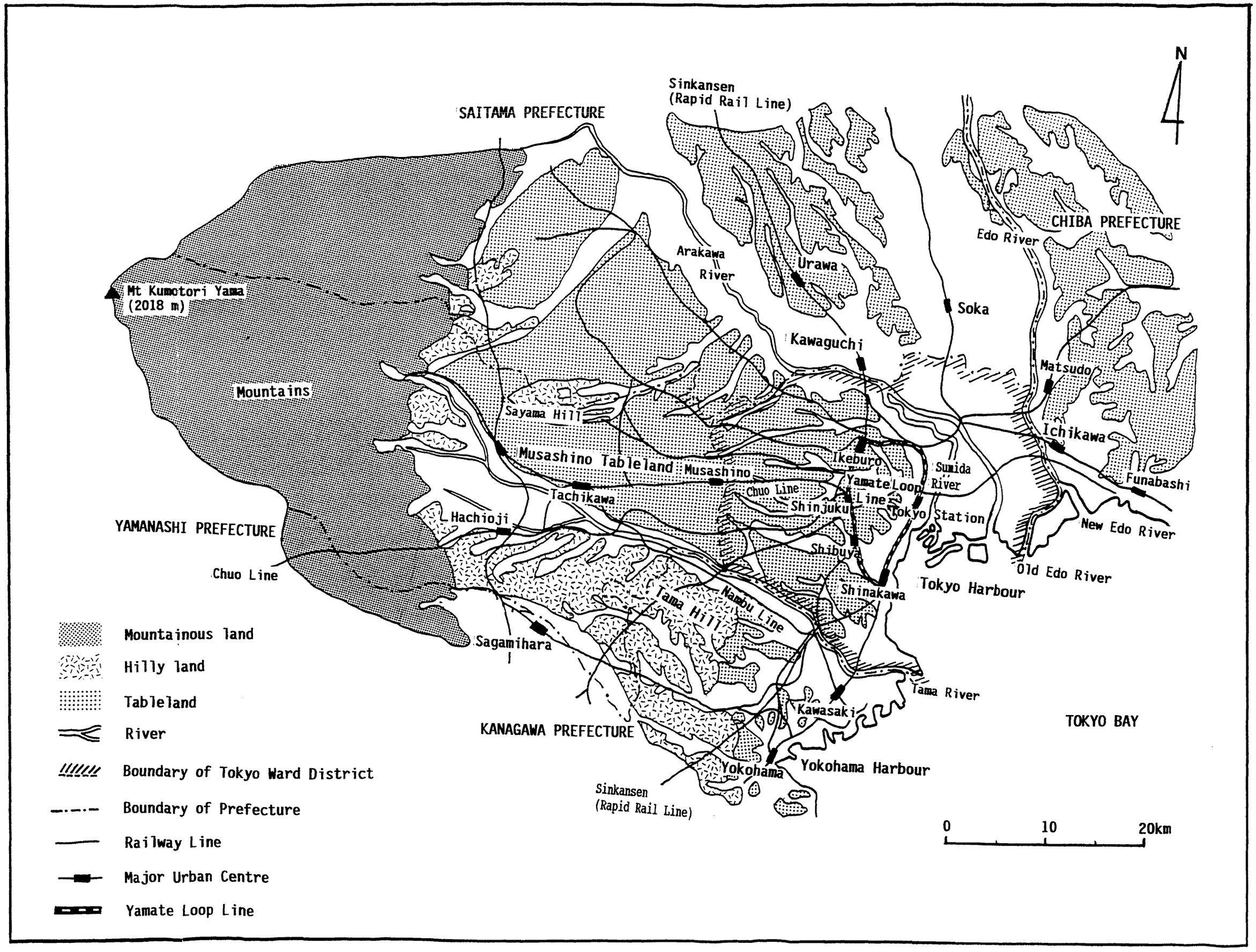
The effect of the containment implemented through the Green Belt seems therefore to have been to push urban development progressively outwards from the relatively stable core, the Built-up Area, toward the Rural Metropolitan Area beyond the Green Belt, where the urban extension of 202 km^2 showed the highest rate of urban growth in the region over the study period. The result of this shift for the Metropolitan Region as a whole is to reduce the proportion of the urban area in the Built-up Area from 71 per cent in 1947 to only 54 per cent in 1972.

In Part Three, Chapter Five examines how the Japanese Capital has learned about Unwin's practical idealism and the British post-war planning of London's Green Belt. Chapter Six studies how Tokyo exhibits sprawl phenomenon to give an example of urban growth in an unrestricted urban region.

PART THREE

TOKYO METROPOLITAN REGION

Figure 5.1 : Geography of Tokyo



CHAPTER FIVE

TOKYO METROPOLITAN GREEN AREA PLAN AND THE TOKYO GREEN BELT

This chapter studies the literature review on three episodes of the early metropolitan formation of Tokyo: the first attempt to preserve metropolitan green areas after the 1932 reorganisation of the Tokyo Metropolitan administration boundaries, and the appearance and transformation of the Tokyo Metropolitan Green Belt in the first and second Master Plans for National Capital Region Development in 1958 and 1968.

5.1 Early Metropolitan Development

5.1.1 Geography of Tokyo

Figure 5.1 shows the topography of the Tokyo Region which is divided into four distinctive areas : lowland; tableland; hilly land; and mountainous land (TMG 1983). The lowland is developed along the major rivers, and their tributaries, of Edo and Arakawa in the east and north, Sumida River in the central area and Tama River in the south. These rivers flow from the north and west into Tokyo Bay.

The large central Musashino Tableland runs westwards for about 50 kilometres from the Sumida River lowland, between the Arakawa and Tama Rivers to the edge of the mountainous land. Other tablelands are situated in the north across the lowlands of the Arakawa River and also to the east across the Edo River. A large area of mountainous land is located in the far west of Tokyo Metropolis. The highest land is around 2000 metres above sea level. This steep mountainous land slopes toward the east, descending into discontinuous areas of the fourth topographical type, the hilly land. The largest hilly area, known as Tama Hill, is especially important and stretches in the south from the mountains to Yokohama.

Musashino Tableland is encompassed with mountainous land in the west, Tama Hill in the south and Arakawa River lowland in the north and

east. This tableland has become as the core of urban expansion in Tokyo.

The original settlement of Edo, the old name for Tokyo and meaning riverside village, was developed in the lowland near the mouth of the Sumida River, around where Tokyo Station now is and close to Tokyo old port. As the town grew it expanded westwards onto the tableland. By the end of the last century when the Yamate Loop Line was built the suburban centres that it linked were already well developed and by 1923 after the great earthquake the west tableland had been largely incorporated into good suburbs of Tokyo. Urban development in the lowland in the east and south had been curbed by the topographical situation and this is reflected in the large industrial development and poor housing for factory workers that took over the lowland of the east Wards and the mouth area of the Tama River in the inter-war period. At the same time the main suburban residential development moved westwards to the safer and better periphery. The main core of Tokyo Ward District, within the shadowed area in Figure 5.1, therefore consists of two different geographical areas of lowland in the east and south and of tableland in the west.

After World War Two and the Korean War, Tokyo's economy grew rapidly. Large scale suburban growth again occurred in the Musashino tableland as the first choice. Development on the other tablelands north of the Arakawa River and east of the Sumida River followed behind the west tableland and unrestricted urban expansion spread throughout the tablelands of the whole metropolitan region. However, urban development in the lowlands and in the hilly land has been slower. The lowlands are still mixed with paddy fields and urban settlements and the hilly land is scattered with housing development sites.

5.1.2 Growth of Tokyo

Tokyo (old name Edo) became the administrative capital of Japan in the early seventeenth century under the rule of the Tokugawa Shoguns. The imperial capital and residence of the Emperor however was not here but in Kunto about 400 kilometres to the west. It was not until

1868 that Tokyo became the combined imperial and administrative capital city.

The period known as the Tokugawa (or Edo) Era in Japanese history lasted from 1603 to 1867. It followed decades of civil war and began when Ieyasu Tokugawa succeeded in subduing all his rivals and uniting the country under one Shogun (or Generalissimo). He and his descendants retained power through the division of the country into about 270 fiefs, each ruled by a feudal lord who owed his position and allegiance to the Shogun.

The Tokugawa Era is notable for its stability of government, and for the isolation of Japan from the rest of the world imposed by the Shoguns for over 200 years. At the beginning of the Era established trade links with foreigners had remained and indeed increased, and considerable numbers of missionaries came to Japan. However, the Shogun felt that foreign influences, especially Christianity, were undermining the country and he began to ban foreign nationals from countries such as Spain and Britain until, after 1639, only Dutch traders were permitted to remain, and they were confined to Nagasaka.

All attempts by other trading nations to return to Japan failed until, in 1853, the US Navy arrived in Tokyo and demanded that Japan open its doors to foreign trade. Within a few years Yokohama, south west of Tokyo and five other ports were designated for foreign trade, and the period of isolation was finally broken. The entry of foreigners however also disrupted the Tokugawa peace. Conflicts arose between those who resented the intrusion of foreigners and those who finally realised that isolation had led to stultification and that Japan must learn the new technologies or remain vulnerable to outside influences, pressures and possibly conquest.

A period of confusion and fighting following 1853 ended with the resignation of the Shogun in 1868 and the assumption of rule by the Emperor Meiji, who moved his capital to Tokyo. The 'Meiji Restoration' (or Revolution) was not without internal difficulties but its major significance was in the fact that it changed the course

of Japanese history and opened Japan to the outside world (Reischauer 1964, Ishiii 1976, McQueen 1989, Beasley 1990).

The new government realised that western civilisation was powerful and advanced and to compete they must promote the modernisation of the country. Japan therefore pushed her industrial development; if she had not done so she could have become a fallen colony to foreign creditors. Military industries, steel factories, shipbuilding yards, textile factories and other manufacturing, which were localised in the capital region, were uprated in the new era under the new regime. Therefore, the capital city Tokyo was developed as the prime centre of politics, administration, culture, education and manufacturing industry. Urban growth in Tokyo proceeded extensively at this time. Ishiii (1976) points out that the Japanese Industrial Revolution was completed between 1886 and 1907, forty years after the Meiji Restoration.

In addition, the construction of a railway between Yokohama and Tokyo which commenced in 1870, became the basis for a new inter-city transport network in the region. Many new railway lines were constructed in the area by public and private bodies. It is said that the basic network of the railway was almost complete in the Tokyo region by 1920 (Arisue and Aoki 1970). The Yamate Loop Line, which was nationalised in 1906, was particularly important. It passed through the outskirts of the contemporary Built-up Area and promoted suburban development in Shinjuku, Shibuya, Toshima and Shinakawa, which are now sub-central business areas (5, 6, 7 and 20 in Figure 5.2). Most of the rest of the railway network was constructed in a radial direction from the centre and connected with the Loop Line.

G D Allison (1979) studied population change in the Tokyo Metropolis between 1880 and 1920. As shown in Table 5.1 the Metropolis is subdivided into the city centre, the periphery (ie the present wards of Shibuya, Shinjuku, Toshima and Shinagawa) and the Tama District (Figure 5.2).

Table 5.1 Population Changes in Tokyo Metropolitan Prefecture 1880-1920

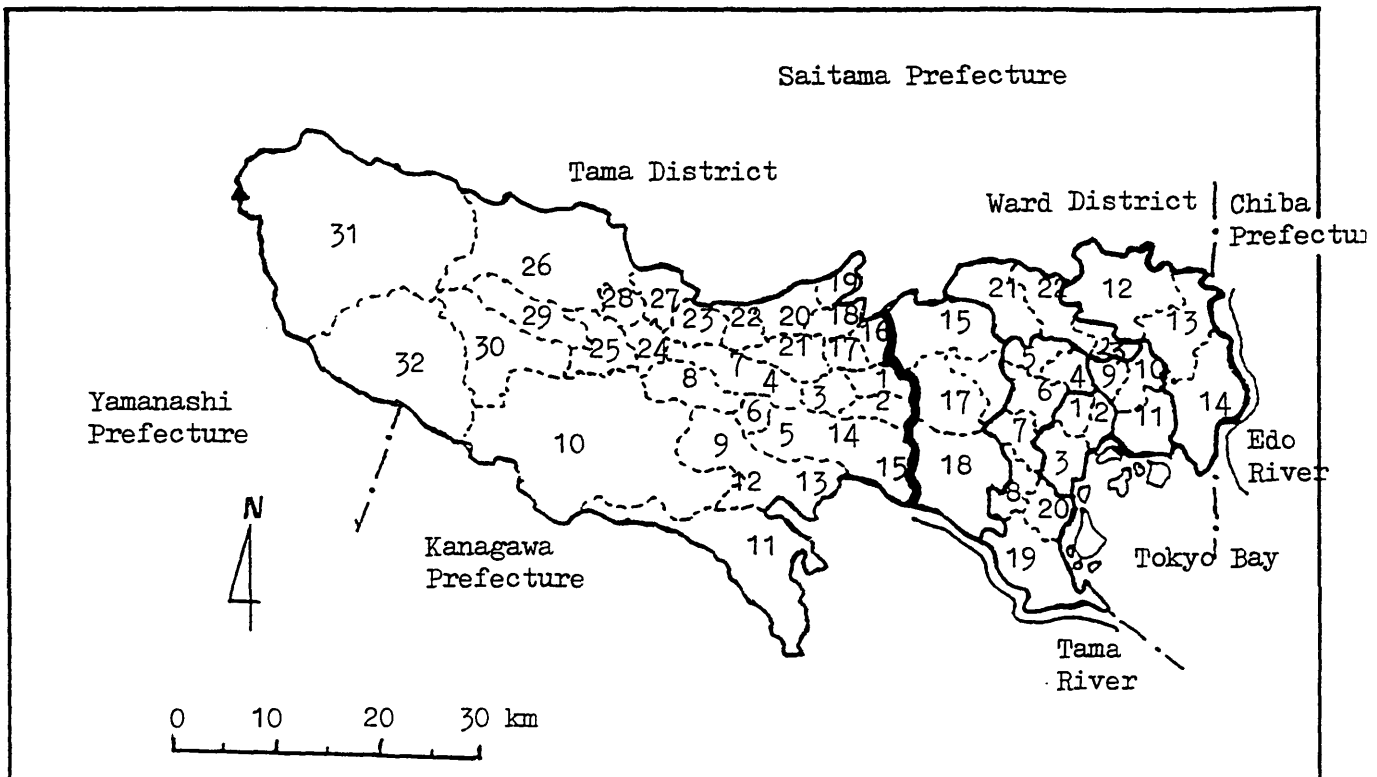
	1880	1910	1920
City centre	888,445	1,805,786	2,173,201
Periphery	288,158	574,940	1,177,018
Tama District	178,812	275,131	316,103
Total :	1,352,415	2,655,857	3,666,322

Source : Allison (1979)

Not surprisingly the population in 1880 was concentrated in the central core area. It had more than doubled by 1910, but in the next decade the increase in the old city centre slowed very significantly. Instead, the population in the peripheral area increased enormously from approximately three hundred thousand in 1880 to six hundred thousand in 1910 and then doubling to nearly 1.2 million by 1920. Urban immigrants preferred to move to the new west suburban, higher, flat land of Shibuya and Toshima, where the circle and radial railways had been completed.

Japan suffers from a very high earthquake rate. The great Kanto earthquake in 1923 brought destruction to half the existing development of the Tokyo Region. About 100,000 persons lost their lives and the homes of over 500,000 people were destroyed or severely damaged. 1.4 million, 60 per cent, of the total Tokyo population, had problems with their damaged houses (Allison 1979). The aftermath of this natural disaster became a suitable time to rebuild the metropolitan area. Hundreds of thousands of people moved westwards into the west flat land in order to settle in a safer place. Urban redevelopment programmes were promoted in many of the damaged town areas. In addition seventy-six underdeveloped areas were programmed for land redistribution projects. The recovery work became the major urban planning and civic works for the city government for more than the next ten years. As a result, the Built-up Area was expanded into the new suburban area beyond the Yamate Loop Line, and the old city was rearranged with more open space, comprising small parks, and new roads (TMG 1937).

Figure 5-2 The Administrative Areas of Tokyo Metropolis



Ward District	1. Chiyoda	2. Chuo	3. Minato	
	4. Bunkyo	5. Toshima	6. Shinjuku	7. Shibuya
	8. Meguro			
	9. Taito	10. Sumida	11. Koto	
	12. Adachi	13. Katsushika	14. Edogawa	
	15. Nerima	16. Nakano	17. Suginami	18. Setagaya
	19. Ota	20. Shinagawa		
	21. Itabashi	22. Kita	23. Arakawa	
Tama District	1. Musashino	2. Mitaka	3. Kogenei	4. Kokubunji
(cities)	5. Fuchu	6. Kunitachi	7. Tachikawa	8. Akishima
	9. Hino	10. Hachioji	11. Machida	12. Tama
	13. Inagi	14. Chofu	15. Komae	
	16. Hoya	17. Tanashi	18. Higashi-Kurume	19. Kiyose
	20. Higashi-Murayama	21. Kodaira	22. Higashi-Yamato	23. Musashi-Murayama
	24. Fussa	25. Akigawa	26. Ome	
(towns)	27. Mizuho	28. Hamura	29. Hinode	30. Itsukaichi
	31. Okutama			
(village)	32. Hinohara			

Source: TMG (1983) Town Planning of Tokyo Municipal Library No 13

Further urban growth in the peripheral area of Tokyo was caused by industrial development during the First World War when Europe was caught up in a great war until 1918. Enlargement of the industrial area near Tokyo City occurred in the east delta area and the south lowland (Figure 5.1). In the east lowland where Sumida, Aragawa and Edo rivers flow from the north toward Tokyo Bay, textile and metal factories were located. The area which is now the three wards of Sumida, Koto and Edogawa (10, 11 and 14 in Figure 5.2) was incorporated into the Built-up Area. In the south lowland between the old city and Tama River, small scale industries of metals and munitions, and medium-sized and large firms of the electrical and vehicle industries enlarged the industrial area. The area of the present Shinagawa and Ota wards (19 and 20, Figure 5.2) were attached to the existing Built-up Area along the southern coast of Tokyo harbour. Urban expansion in the Tokyo region was brought to the west by residential development and in the east and south by industrial development.

By 1932 the definition of the old city within a 5 kilometre radius from Tokyo Railway Station had become too narrow. In order to cope with the urban problems of the Metropolis on a regional basis the boundary was changed to include the whole of the Ward District (Figure 5.2). The enlargement of the city meant a merging of the old city with the newly formed suburban area on the periphery to form a large town planning area. The twenty-three wards now covered an area with a radius of approximately 15 kilometres from the Station. The change of boundary also meant that the administrative population doubled in 1932 from 3.4 million to 6.8 million (TMG 1937).

5.2 Tokyo Metropolitan Green Area Plan

5.2.1 Background

When the old Tokyo City grew into the large Ward District the Metropolitan Government was urged to provide a regional transport network and open space for the city. A 'Grand Regional Plan' was

considered. The Tokyo Town Planning Report of 1937 points out the problems of retaining green space:

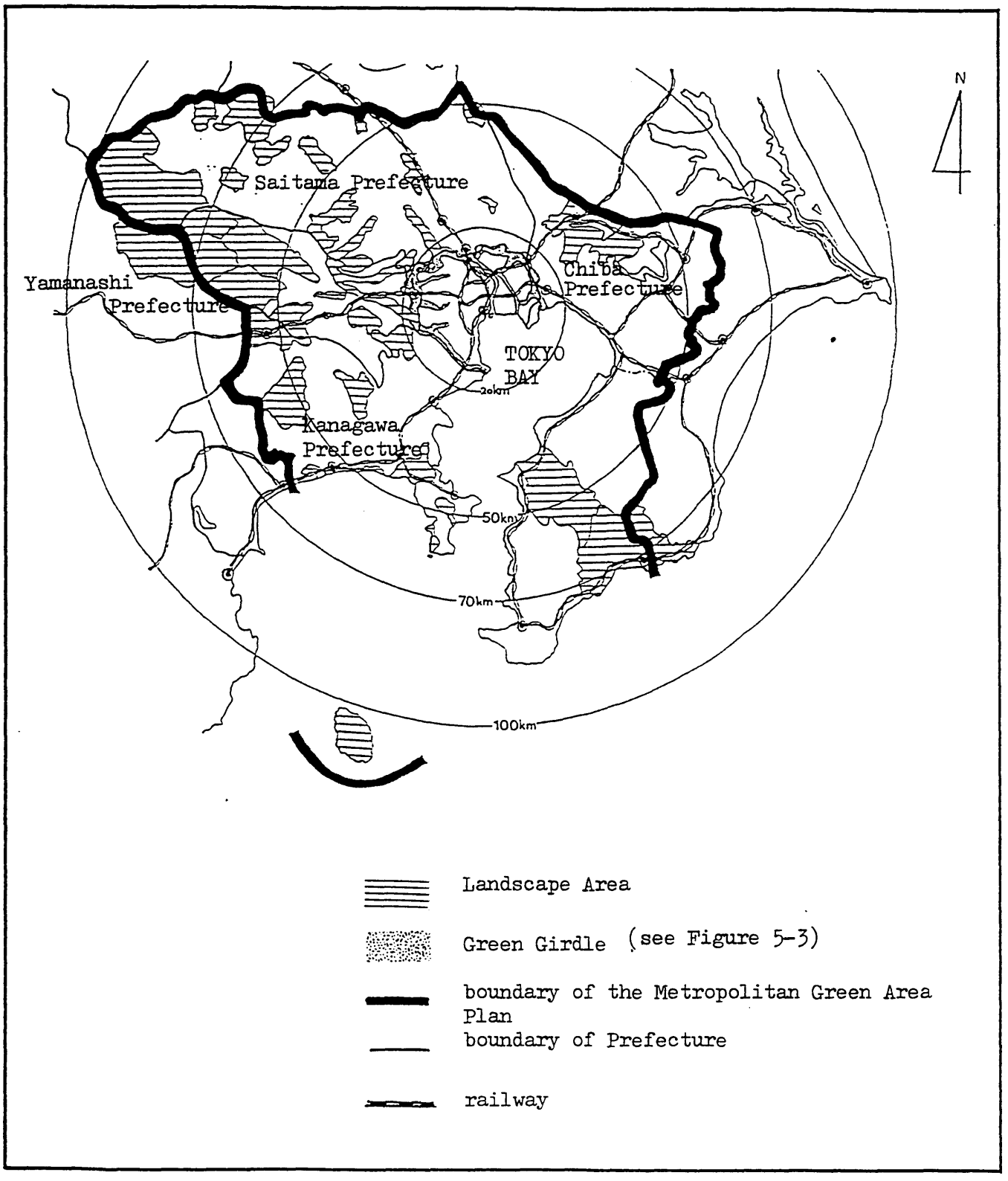
> Owing to the rapid urban growth in Tokyo City, the green area within the city is gradually decreasing and encroachment of green area in the suburb is facing a crisis.

There was no planning tool available to tackle the protection of the green area outside the town planning area and the government was urged to establish a planning body to study the resources of potential green open space and to prepare a master plan for green areas in the whole Metropolitan Region. The provisions of the Town Planning Act 1919 had planned to prepare mainly small parks within the old town planning area and since then redevelopment programmes had been carried out following the great Kanto earthquake (Construction Administrative Research Institute 1978), but the rapid outgrowth had continued beyond the old planning boundary and green areas or open space were therefore urgently needed in the expanding metropolitan fringe.

A special planning authority for the metropolitan green area (or open space) was organised with members from various offices of the Tokyo Metropolitan Government, the Tokyo City Government, Central Government (Home Affairs), the Provincial Governments of Kanagawa, Chiba and Saitama Prefectures, the Tokyo Police Authority, the Tokyo Railway Authority, Capital Commandant (Japanese Army) and the relevant experts on planning. On 10 October 1932 it was decided to establish the Tokyo Green Area Planning Committee to prepare a Metropolitan Green Area Plan for an area that covered the whole of Tokyo prefecture and part of the three prefectures of Kanagawa, Chiba and Saitama, to a radius of between 50 and 100 kilometres from Tokyo Station (Figure 5.3).

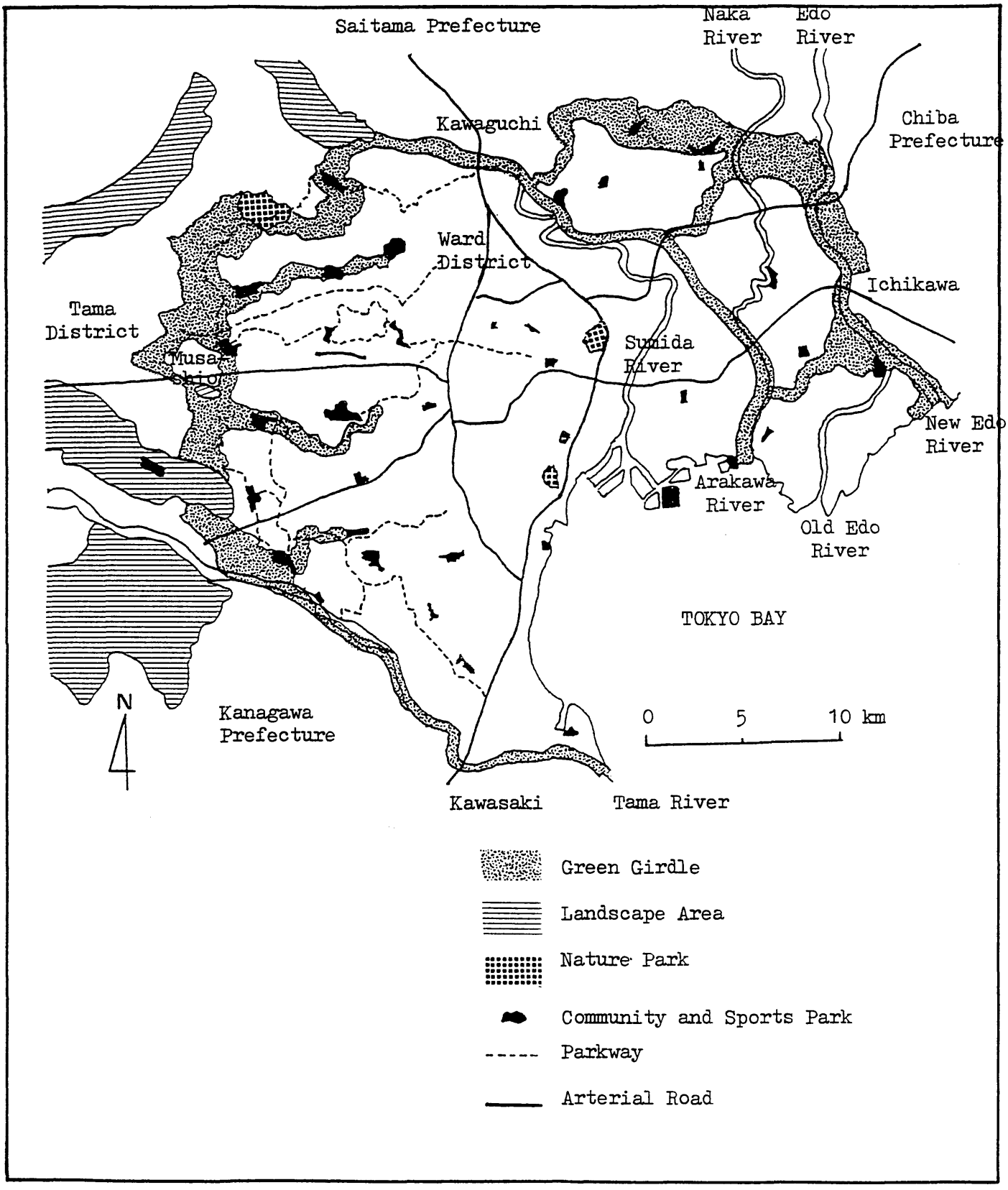
At the second meeting on 25 January 1933 the existing state of the green area and how it was envisaged in future were matters decided for further investigation in the preparation of the Green Area Master

Figure 5-3 Tokyo Metropolitan Green Area Plan, 1939



Sources: Author's redrawing of the Tokyo Metropolitan Green Area Plan with Tokyo's Green Girdle based on Tokyo Town Planning Report of 1937 and the Tokyo Green Area Committee of 1939

Figure 5-4 Tokyo Metropolitan Green Area Plan within Tokyo City Planning Area, 1939



Source: The Tokyo Green Area Committee, 1939

Plan. On 22 December of that year, a first draft plan was prepared. Two years later after the sketch plan, a new concept of landscape planning area and landscaped road was introduced on 23 December 1935 (TMG 1962).

Finally, the master plan on metropolitan green area (see 5.2.3) was completed on 12 April 1939 based on modification and extension of the previous plans (Figure 5.3). Open public green areas, recognition of recreational sites, planning of small park areas and the Tokyo Green Girdle were addressed. The plan of a Green Girdle (Figure 5.4) along the boundary of the Tokyo Ward District was introduced and several green strips were planned around large developable areas beyond the Green Girdle (TMG 1962, Sato 1977).

5.2.2 Definition, classification and planning criteria of the Green Area

The concept of green area was 'imported' from Germany when a modern Japanese Town Planning Act was introduced in 1919. The concept was introduced as a network of green areas in a town planning area (Sato 1977). After the 1923 earthquake, the provision of green areas and parks in a town became more important to provide evacuation space for people in case of natural disaster. The redevelopment plans emphasised the importance of many parks in a city area. The concept of green area was defined as park or open space in a town in the 1920s and 1930s in Japan.

However, turning to 1932 when the old smaller Tokyo City was expanded into a larger Tokyo, the traditional park system of open space was not enough to provide green areas in the expanding metropolitan city. The introduction of a new concept of green area was necessary to prepare the regional development plan in the metropolitan area. A more extensive meaning of open space was given to the definition of green area as follows:

> The original aim of green area is laid on vacant space but it includes permanent open space of buildings such as residential, commercial, industrial and transport uses. (TMG 1937)

It represents a broad concept for open space as is clearly shown in the classification of green area in Table 5.2.

Green area itself consists of three broad categories: general green area, productive green area and quasi-green area. General green area includes parks, graveyards, open green area, public green area and recreational sites. Productive green area consists of agricultural land, forest, pasture and fishing area. Quasi-green area contains gardens, allotments, conservation area and country parkland, known as the landscape zone. It covers whole green areas or open spaces from small private allotments to large regional parks.

The Committee decided the planning criteria on the various green area categories of park road, graveyard, school gardens, productive green areas and landscape area. Detailed provisions on areal size, width of the area, land usage, facilities needed and site conditions to be selected were suggested. For example, width of footpaths should be over 3 metres and riding tracks over 6 metres. Grave gardens should be over 10 ha and each grave over 5 m^2. School garden sizes should be over 8 ha for primary school, over 2 ha for secondary and .02 ha - .06 ha for neighbourhood gardens. Productive gardens would be over 10 ha. The regional open space network of Landscape Areas were selected using detailed criteria of historical scenery, special conservation area, etc (Appendix 5).

5.2.3 Master Plan of Tokyo Green Area 1939

The 1939 Master Plan for the Tokyo Green Area consisted of two parts; one for the Tokyo City Planning Area of the twenty-three wards and the other for outside the planning area (Figures 5.3 and 5.4) (Tokyo Green Area Planning Committee 1939).

Table 5-2 - Classification of the Green Area

- general Green Area
  - 1. park
    - large park
      - general park
      - sport ground
      - natural park
    - small park
      - community park
      - children's park of three kinds
      - road park
  - quasi-park
  - park road
    - park way
    - connected road
  - 2. grave-yard
    - the 1st class
    - the 2nd class
    - the 3rd class
  - 3. open green area
    - the 1st class
      - Japanese temple yards and the garden
      - Buddhist temple yards and the garden
    - the 2nd class
      - public nature and the green area
      - green area to be served for public facilities
      - green area used permanently or temporarily for public facilities not included in the above
  - 4. public green area
    - school garden
      - area over a certain area
      - area excluded the above
    - institution's garden
  - quasi-public green area
    - neighbourhood's garden
      - the 1st class
      - the 2nd class
  - 5. recreational site

Table 5-2 (Contd)

- productive green area
  - 1. general agricultural area
    - the 1st class
    - the 2nd class
  - 2. forestry area
  - 3. grazing area
  - 4. fishery area
- quasi-green area
  - 1. garden
    - the 1st class
    - the 2nd class
  - 2. conservation zone
    - the 1st class
      - nature protection zone
      - historical scenic protection zone
      - historical, scenic zone to be designated
      - scenic forest
      - scenic zone
      - others
    - the 2nd class
      - fishing forest
      - others
    - the 3rd class
      - protection forest
      - reclamation prohibited area
      - sand erosion protection area
      - river usage limited area
      - port or military zone
      - others
  - 3. landscape zone

Source: Tokyo Metropolitan Government (1937), Outline of Tokyo City Plans and Development Projects, p 156 (in Japanese)

It was the responsibility of the Ward District under the Town Planning Act to carry out comprehensive town planning. This involved the application of a zoning system which divided land into four zones: residential,commercial, industrial and green zones. The city plan called for a continuous Green Girdle around the outer boundary of the planning area and green wedges of several fingers along the tributaries of rivers (Figure 5.4). The Green Belt was located in Tokyo Ward District and the neighbouring Tama District, Kawasaki City across the Tama River, northern and eastern territories of Saitama and Chiba Prefectures. The width of the Girdle varied between a few hundred metres and a few kilometres. Different types of parks were designed as large and small playing fields, parks and nature parks. The central urban area had less but the less developed outskirts had more open space in the form of a park zone. A system of Park Roads, or Parkways, was to be built to link the green wedges with the centre of Tokyo and to link up the green fingers and nature features (see Figures 5.3 and 5.4). The area of the Tokyo Green Girdle was proposed to be 13,623 ha. The parkway system was scheduled to be 3,882 km^2 in length.

In addition, the most ambitious proposal was the creation of a regional green area to be called the Landscape Area. The Landscape Area was proposed to a large extent to be outside the Tokyo Green Girdle. It was planned along the lowland of rivers and lakes, and in downs and mountains, areas of nature beauty, coastlines and good agricultural land. It made a large green area network in the expanding city region (Figure 5.3). Thirty seven Landscape Areas were planned in Tokyo and the surrounding provinces with an area of 289,143 ha. Other large open spaces such as named leisure sites, Open Green Areas and Public Green Areas were regarded as part of the Regional Green Area plan.

The sizes and types of open space in the Green Area Plan in the Tokyo Metropolitan Region are listed in Table 5.3 (Sato 1977).

Table 5-3 - Summary of Tokyo Green Area

(1) Landscape Area (regional green area)

Prefecture	Number	Area (ha)
Tokyo	12	96,850
Kanagawa	8	37,110
Saitama	14	79,950
Chiba	4	75,233
	37	289,143

(2) Park Road Network

	Prefecture	Number of Roads	Length (km)
Walking and vehicle combined road	Tokyo	44	976
	Kanagawa	21	660
	Saitama	15	639
	Chiba	8	496
	Subtotal	88	2,771
Footpath	Tokyo	92	1,111
Total		180	3,882

(3) Green Girdle (green belt)

	Location	Area (ha)
Green Girdle	Part of Kanagawa, Kawasaki· Part of Tokyo, Tokyo City and Kita Tama (north Tama District) Part of Saitama and Chiba Prefectures	13,623

(Contd)

Table 5-3 (Contd)

(4) Large Parks

Type	Number	Area (ha)
General Park	19	615
Sports Park	19	626
Nature Park	2	440
Total	40	1,681

(5) Small Park Districts (excluding Tokyo and downtown wards)

Number of Districts	District Area (ha)	Type of Small Park	Number	Area (ha)
27	53,060	Neighbour Parks	98	389.6
		Children Parks	493	284.7
		Total	591	674.3

(6) Leisure Site

Number : 3
Area (ha) : 54.00

(7) Open Green Area

Number : 116
Area (ha) : 51,540.70
Coastal line for use : 42,900 m

(8) Public Green Area

Type	Number	Area (ha)
School garden (1)	14	383.95
(2)	-	-
Other bodies' garden	12	805.26
	26	1,189.21

Source: Tokyo Metropolitan Government (1937), Outline of Tokyo City Plans and Development Projects, p 157-159

5.2.4 Unwin's influence on the Tokyo Green Area Plan

Sato believes that the Tokyo Green Area Plan was not only influenced by the Berlin Green Area Plan which was made in 1910 from a planning competition for Berlin City Development Master Plan (Sato 1977) but, more importantly, it was indebted to Unwin's planning principles. When Tokyo emerged as a large metropolitan city area in 1932, the necessity of preserving open spaces in the light of the extensive building programme was urged, as Unwin had similarly emphasised in the reports of the Greater London Regional Development in 1929, 1931 and 1933. Unwin had stated the importance of the reservation of green areas in advance of building of the urban edge. The scale of open space belts to be reserved was calculated to be one tenth of the development area and the width of the belt was projected to be half a mile. The ultimate aim for London's Green Girdle was revealed as a comprehensive regional Green Girdle with almost continuous circles and many green wedges designed to lie along the many tributaries of the River Thames, valleys, downs, agricultural land and existing open spaces such as parks, playing fields, golf courses and other extensive open grounds.

Green Area plan for the Tokyo Region was similar, based on Unwin's idea of Green Belts on the background of unlimited potential development land, and his positive conception to suburban growth on a regional scale. The Tokyo Green Area Plan proposed unlimited metropolitan growth beyond the Tokyo Ward District into the further city fringe up to a 50 kilometre radius particularly in the Musashino tableland in the west. Several Landscape Areas in type of Green Belts were proposed to enclose the developing area and Landscape Area belts were planned to contain other large urban areas, as large as the old Tokyo City beyond the north boundary of the Tokyo Green Girdle and the same in the south. Several large urban areas were proposed beyond Tokyo Ward District in all directions, possibly bigger than the new Tokyo District. This follows from Unwin's idea of unlimited regional growth with the associated preservation of open spaces in the background of the rapidly expanding area.

The contemporary Japanese planners adopted Unwin's practical idealism and intended to implement this on Japanese soil while in London his positive idea was changed into the development of the post-war new towns and considerable extension of the Metropolitan Green Belt.

5.2.5 Failure of implementation of the Tokyo Green Area Plan

The necessity for green space was recognised as an important public concern in Japan. The metropolitan Green Area Plan idea began to be taken up by other large town areas and then a new body of 'the six large cities and Northern Kyushu five towns Green Area Planning Committee' was organised in April 1938 under the Home Secretary (Sato 1977). New Acts concerning parks and green areas were urged to be enacted.

However, by the end of the 1930s wartime was approaching. The country began to prepare a national wartime system and town and regional planning was shelved for the time being. An anti air-raid network was set in operation within about 30 kilometres of the capital city area. This enabled important industries to be housed in the protected metropolitan area against US air-raid. Planning control policies were obliged to help their relocation. The reserved green areas which had been controlled under planning Acts and regulations were released and benefits such as the providing of additional transport, water supply and other necessary facilities were given to encourage industry to locate there. In addition, regulations regarding the cutting of trees in the landscape and forest protection zones were relaxed. In these ways, therefore, the better green areas were converted into industrial and other urban uses and other well proposed or reserved open spaces were destroyed or damaged during war time.

Under the circumstances the Green Area Plan could not be safe. The wartime cabinet classified the Tokyo Green Area Plan as a 'not necessary and not urgent' task (Sato 1977). Only efforts towards the victory of the war were encouraged and everything else was to be sacrificed. In wartime London the contemporary British planners

worked towards the distribution and dispersal of population and industry from overgrown London and planned post-war recovery plans for the Region. In contrast the Japanese planners worked for victory in the war, promoting concentration of industry into the protected zone of the Metropolitan Region and changing the reserved green area into industrial and development areas. A Japanese planning historian confesses 'it was a great pity and regrettable until today' (Sato 1977). As a result, Tokyo has become a township with almost continuous bricks and cement in the great city region.

5.3 Tokyo Green Belt

In particular although there were a series of plans for a Green Belt for Tokyo, none of them were implemented. Therefore references to Tokyo Green Belt and Green Belt areas mapped and measured were those planned for but never a reality.

5.3.1 Background

During the war many people escaped out of Tokyo but in a brief post-war population survey in Tokyo, the population was numbered at 2.4 million people, which was one third of the pre-war population (Allison 1979). At the end of the war large numbers of people returned to the capital city from other parts of Japan and overseas colonies as well. Hundreds of thousands of returnees gathered in Tokyo every month. The post-war Japanese government proclaimed a special law to block people from moving into the city area, where nearly 70,0000 houses had been destroyed during the war. There was a severe food shortage, and few jobs could be offered because over 80 per cent of the factories were closed. This intolerable situation continued until 1950 when the Korean War enabled the Japanese economy to recover.

With the acceleration of economic growth during the Korean War, industrial production recovered its pre-war level by 1955 and the following year Japan returned to 'credit' country status after hopeless national debts in terms of international trade (Seyakuseya

1984). Industrial production and business activities were concentrated in Tokyo city and the surrounding area. The population of Tokyo Ward District increased to 5.4 million by 1950 and 7 million by 1955. With the revival of economic activities and population increase in Tokyo, there began an outcry against Tokyo's overconcentration, and especially the traffic congestion which paralysed the central area (Yasogima 1985).

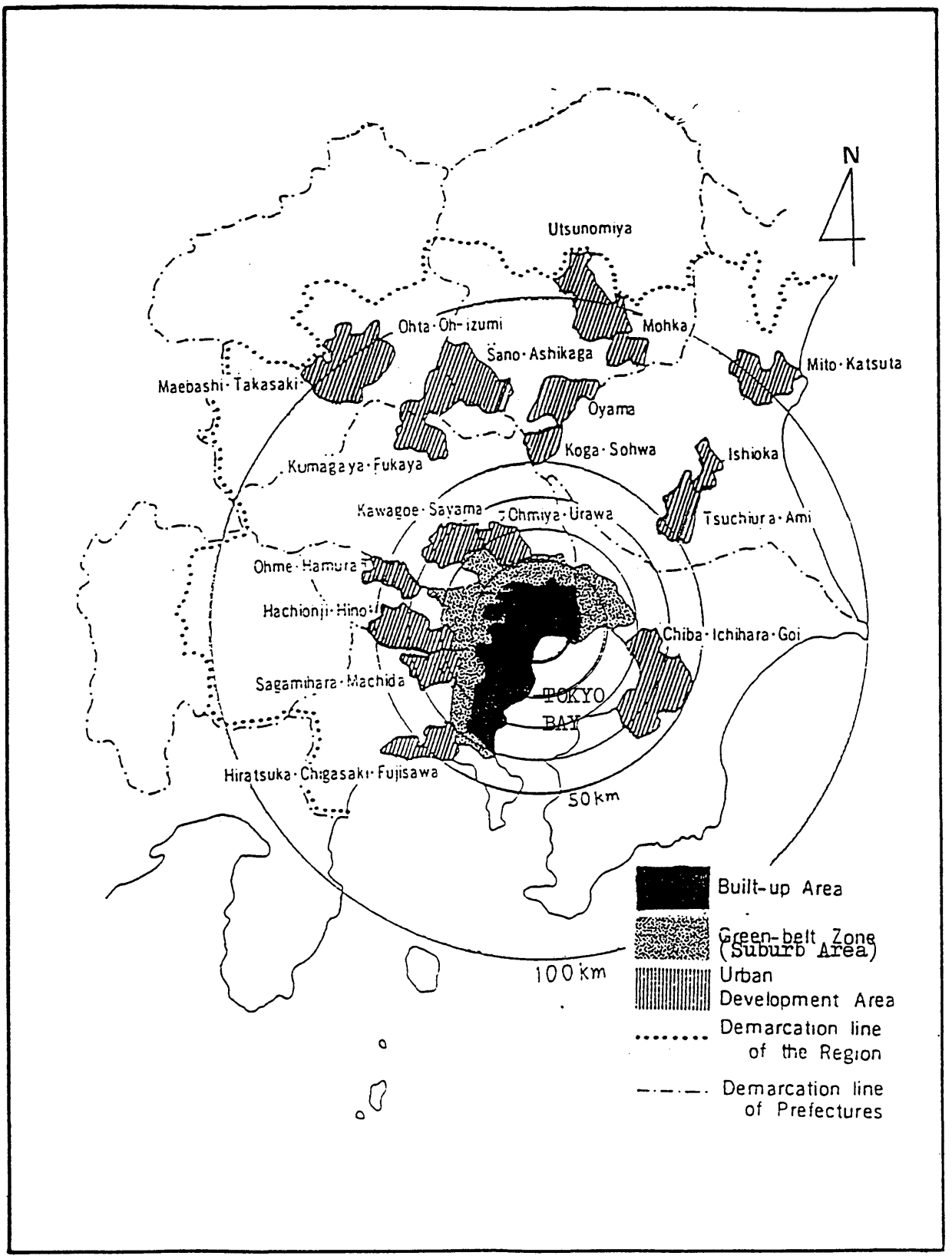
To solve the congestion of the paralysed city and to rebuild the war-damaged areas under the Town Planning Act of 1949, it was realised that the efforts of each individual city in the area would not be sufficient to solve Tokyo's problems and that a regional plan was urgently needed. The National Capital Construction Act of 1950 was established for the reconstruction of the Tokyo region within the administrative boundary of Tokyo Prefecture. The Capital Construction Act, as amended in 1953 emphasised what should be done to solve congestion in the city area and the concentration of population and industry in the capital city region (TMG 1962, 1982).

On facing the city's overcrowdedness, the planners looked at Abercrombie's Greater London Plan of 1944. The members of the National Capital Committee, who were mainly experts on town planning, introduced the British conception of post-war decentralisation and established the 'three areas concept' of Built-up Area, Green Belt and Urban Development Area (Kawakami 1980, TMG 1983, Yasogima 1985). The Committee recommended the creation of the National Capital Region, from the enlargement of the planning area previously centred on Tokyo Province to an actual capital region, to include the eight provinces of Tokyo, Kanagawa, Saitama, Chiba and the four other Prefectures (Figure 5.5) under the new law of the National Capital Region Development Act of 1956.

5.3.2 The First Master Plan for the National Capital Region Development of 1958 and Tokyo Green Belt

The National Capital Region Development Act 1956 introduced the extent of the three areas and their land use control provisions. The

Figure 5-5 The First Master Plan for National Capital Region Development, 1958



Sources: TMG (1962) and Kawakami (1980)

first Master Plan for the Region's development was prepared in 1958 (see Figure 5.5) according to the recommendation of the law. It described population distribution and planning in the subdivisions. The outline of the plan was largely summarised in the 1962 Tokyo Town Plan Report which was published by the Tokyo Metropolitan government, and on the Japanese Construction Law Code.

(a) Population distribution

The population in the National Capital Region numbered 19.8 million in 1955. 8.7 million persons lived in the Built-up Area and 11.1 million lived in the area outside the Built-up Area. It was estimated that if no policy was introduced to control concentration of population and industry in the Built-up Area, the population would be 14.3 million in the Built-up Area and 12.3 million people outside the Built-up Area by 1975 (TMG 1962). This represents a net increase of 5.6 million in the Built-up Area and 1.2 million in the outer zones between 1955 and 1975. It was of great concern therefore, that the additional 5.6 million would worsen the overconcentration in Tokyo and the Japanese planners suggested that the population in the Built-up Area should only be allowed to increase by 2.9 million people. The remaining 2.7 million people would be accommodated by planned overspill beyond the Built-up Area (TMG 1967). Table 5.4 shows the population distribution in the Tokyo Region Development Plan 1958.

(b) Planning in the three subdivisions

Built-up Area

The Built-up Area consisted of two parts : the Tokyo Ward District, including the three adjoining cities of Musashino and Mitaka in the Tama District and Kawaguchi in Saitama Prefecture, and the Yokohama area (see Map of Figure 6.4). The former was regarded as an overcentralised area. Therefore, activities likely to increase population, such as the development and extension of large factories, universities and so on were to be controlled in the Ward District.

Table 5-4 - Decentralisation of Population in the National Capital Region, 1958

(Unit : Thousand Persons)

	1955	1975*	Increase
Total Population in the Region	19,800	26,600	6,800
In case of planned distribution:			
Built-up Area	8,700	11,600	2,900
Outside Built-up Area	11,100	15,000	3,900
In case of laissez-faire:			
Built-up Area	8,700	14,300	5,600
Outside Built-up Area	11,100	12,300	1,200
Decentralised Population into the Urban Development Area			(5,600-2,900) 2,700

* Estimate

Source: TMG, Town Planning Report, 1967, p 31

To decrease population density and to head for an optimum level of living and working conditions, a series of policies were considered. These included decentralisation of central area's functions, the construction of high-rise buildings, the upgrading of land usage to concentrate development, and the preservation of open space. Transportation and public facilities were recommended to be reorganised under the regional interests.

What remained of the Built-up Area (Yokohama Area) was set up as a reception area for the distribution of urban functions from Tokyo Ward District. New development was to take place on new sites and redevelopment in the old town area. It was planned to make the Yokohama harbour an international trade centre and the City of Yokohama was promoted as an outstanding commercial city. The Japanese planners expected that the Yokohama-Tokyo corridor would be promoted to form a new development axis from Tokyo city centre to the Yokohama-Kawasaki industrial area within the Built-up Area (see Figure 6.4).

Suburb Area (Green Belt)

The Tokyo Green Belt, named the Suburb Area, was planned as an area to curb the urban sprawl of the Built-up Area and to preserve open green areas. It was a renewed attempt to reserve scenic and beautiful areas, valuable historical and landscape areas and natural environment, and to provide additional open space and playgrounds which were lacking in the developed area. The reserved open space was intended to be used for residents in both the Built-up Area and in the Urban Development Area outside the Green Belt. Good agricultural land was also required to supply fresh vegetables and food so it was recommended that such land must be preserved from urban encroachment and agricultural land improvement and agricultural production promotion programmes continued. No more large scale housing development was to be allowed within the Green Belt (TMG 1967; Construction Law Code).

However, the Green Belt included existing developed areas within its boundaries. The urban settlements that had developed along the many corridors were not classified as urban islands. Even large towns inn the busy corridors of Ichikawa-Funabashi, Matsudo, northern and western areas were not treated as exceptional cases. The developed area of Musashino-Mitaka and part of Kawaguchi area (see Figure 6.4) were incorporated into the Built-up Area but the rest of the suburban towns within several kilometres of the Built-up Area were included in the Tokyo Green Belt.

Urban Development Area

Figure 5.5 shows the location of the Urban Development Areas outside the Tokyo Green Belt. Seven of these areas adjoin the outer Green Belt boundary, one in Chiba Prefecture, two in Saitama Prefecture, two in Tokyo Prefecture and two in Kanagawa Prefecture. These areas to be a consolidation of the existing large regional town areas instead of building new towns. Eleven regional centres were designated as Urban Development Areas between 50 and 100 kilometres away from Tokyo centre. The nearer Urban Development Areas were planned to be developed in relation to population dispersal and industrial redistribution from the Built-up Area, whereas most of the Outer Development Areas were designed to absorb incomers from outwith the National Capital Region. These latter areas were earmarked for industrial development rather than suburban housing development

The development projects in the Urban Development Area were the responsibility of the local authorities in the early stage. But these small local administrations could not carry out such large projects which required heavy financial support. Therefore, a special body, the Tokyo New Town Construction Corporation, was established in 1961 to complete the regional development under the powerful Tokyo Metropolitan Government. It carried out the planning as a comprehensive and effective operation with abundant supply of finances supported by the Metropolitan Government. Its planning area covered 4675 ha and its population target was proposed around 400,000 people to be accommodated in the newly developed area (Misra 1984).

5.3.3 The Second Master Plan for the National Capital Region

5.3.3(a) Development of 1968 and Tokyo Green Belt

The first Master Plan had a population target of 26.6 million people for the National Capital Region in 1975. It was the main intention of the comprehensive regional plan to prevent the inner development area from suffering over-accumulation of industries and population, to decentralise into the new development areas in the outer ring and to enable the immigrants from the north east region of Japan to be accommodated in the new satellite towns.

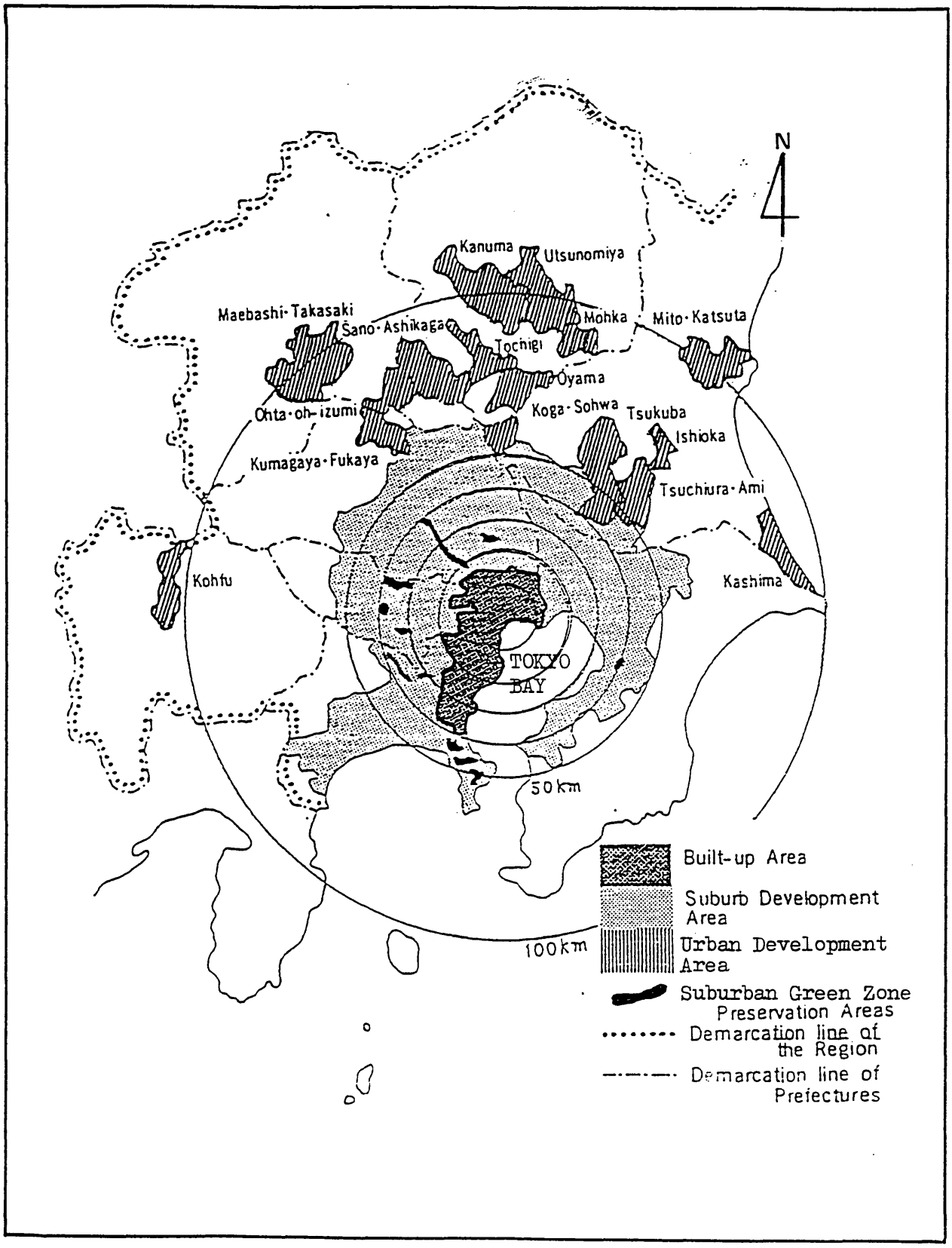
The Japanese economic success had continued. Average annual economic growth rates were 8.9 per cent in 1956-1960, 9.6 per cent in 1960-1965, 12.2 per cent in 1965-1970 and 5.1 per cent in 1970-1975. The later rate, though a decrease for the Japanese, was achieved during a period of zero and minus growth in a world economy depressed by oil shocks (Ishii 1976; Alden 1984). Due to this economic prosperity, urban growth in the Tokyo region was accelerated and population and industry became more concentrated in the Capital Region. The old population projection for 1975 had to be revised from 26.6 million to 28.5 million. This expected addition of two million people necessitated changes in the planning premises for the region and an extensive revision of the first Master Plan was therefore undertaken in 1962.

However, the rapid population increase in the Tokyo region continued so that by 1968 the actual population had already exceeded the projection of 28.5 million for 1975. As a result of population pressure the twenty year regional plan had to be totally changed rather than revised for a second time. The Second Master Plan was produced in 1968 (Figure 5.6).

5.3.3(b) The 'Fifty kilometre zone' as a substitute for the Green Belt

The Tokyo Green Belt in the First Master Plan did not work in practice. Sakai (1982) argues that the reasons for the failure of implementation of a Green Belt in Tokyo arose firstly because of the

Figure 5-6 The Second Master Plan for National Capital Region, 1968



Sources: TMG (1983) and Kawakami (1980)

resistance from residents; secondly, there was no designation of Green Belt into a practical zoning area; and thirdly because of rapid economic growth. When the Green Belt was introduced, the local economy in the Tokyo Region had expanded and industry and population became more concentrated in this region. Suburban growth expanded enormously into the city fringe. Under this expanding situation, implementation of the Tokyo Green Belt could not get the support of the local residents. Landowners strongly resisted Green Belt policies. Many British researchers have mentioned the failure of the introduction of a Green Belt in Tokyo (Alden 1984, 1986; Dawson 1984, Hall 1984, Hebbert 1986).

Urban sprawl in the Suburb Area zone therefore continued and was accepted as a *fait accompli* (Sakai 1982, Hebbert 1986). The British urban policies of Green Belt and new town development were regarded as being unacceptable by the booming society. In fact, a new planning philosophy that recognised the importance of the enormous urban growth in suburban areas was unveiled and the ideal planning theory on Green Belts was criticised. The new regional planning concept took the very optimistic view that further concentration might not be harmful if it followed the rational planning of infrastructure and indeed the concentration of certain industries would be helpful for regional and national economic strength. This view was the opposite to the traditional concept that continuous centralisation in a large city would bring increased congestion and be undesirable. Kawakami states optimistically:

> It is inevitable for service industry and central government functions to be located in Tokyo in order to encourage the development of Tokyo and Japan and 'to enhance the ability to compete internationally'. If sufficient transport capacity and environmental facilities are provided in Tokyo and the Southern Kanto region, it would be possible to continue concentration and further urban development in the area without resulting harm from increasing loads (Kawakami 1980).

With the new concept of unlimited suburban growth in the Tokyo Region, many cities, towns and villages in the Metropolitan Region were urged to integrate in support of rational regional planning. A new zone of 'Suburban Development Area' or, more famous in Japan, the 'fifty kilometre zone' was produced where, within a radius of fifty kilometres from Tokyo Station development would be encouraged (Hidemitsu 1980, TMG 1982, 1983, Kawakami 1982, Sakai 1982). The fifty kilometre zone incorporated the ten kilometre wide Tokyo Green Belt within its boundary.

This very positive view was accepted in the 1965 amendment of the National Capital Region Development Act. The 1965 Act changed the conservative principle of the 1956 Act and it therefore appeared to be reborn as a new Act. The new Act took an aggressive attitude to the extensive suburban growth while the original Act had taken a defensive view towards Tokyo's outward growth.

In line with the 1965 Act, the second Master Plan for the National Capital Region Development was prepared in 1968. The major changes were that : the Suburban Development Area was extensively designed and took over the Tokyo Green Belt and the neighbouring Urban Development Areas; the outer Urban Development Areas were extended in number; and the planning boundary of the National Capital Region was enlarged to include the whole area of the outer four Prefectures (see Figure 5.6).

5.3.3(c) Alternative open space policies

As the Green Belt area once proposed around the Built-up Area and outer fringes became incorporated into the planned suburb, regional open space schemes were urgently required. A special Act for the preservation of regional open space was introduced in 1966 called the National Capital Region Suburb Green Zone Preservation Act. Its aims were to reserve green areas from urban sprawl in the Suburban Development Area. Areas of outstanding beauty were limited in the region and had to be safeguarded against urban encroachment. Provision for the urgent designation of lake areas, the Tama hills and other scenic places within a fifty kilometre radius of Tokyo

Station was therefore included in the Second Master Plan for Capital Region Development of 1968.

Land use control in the Suburban Green Zone Preservation Area was strictly imposed on building and site development, cutting trees, reclamation of sea and water surface and other similar developments. Permission was required from the relevant prefectual government for anyone wishing to carry out such activities. Twenty different sites totalling over 10,000 ha were designated in the Region between 1967 and 1973 (Japanese Construction Law Code). The preservation areas were located in special areas away from developed town areas which were threatening to overwhelm surrounding rural areas. The effectiveness for urban containment by such restraints looked unpromising. It seemed only to be introducing another similar plan.

New land use control systems were introduced under the reorganised Town Planning Act in 1968 (TMG 1983, OECD 1986, Nakai 1988). Under the Act, areas of preserved natural landscape were to be reserved in city fringes. Hebbert and Nakai interpret the Japanese new planning system:

> The city planning system divides almost all urban areas and their immediate hinterlands into Urbanisation Promotion Areas (UPAs) and Urbanisation Control Areas (UCAs). UPA, where land development is encouraged, is supposed to combine the existing Built-up Area with a properly serviced supply of building land for the next ten years. UCA, where urbanisation is, in principle, not permitted, combines a reserve of land for future urban growth with areas of preserved natural landscape. The initial zoning was made around 1970 and has twice been reviewed (Hebbert and Nakai 1988).

However, despite continuous efforts by the Urban Area Zone Preservation Area Act in 1973, the Productive Green Area Act in 1974, the Green Area Master Plan in 1976, the Urban Greenery Fund in 1981 (Alden 1984), urban sprawl in the Tokyo Region could not be

controlled. The whole metropolitan area has continued to be urbanised.

The next chapter measures the urban area between 1955, 1966 and 1976 and examines the unlimited suburban growth in the Tokyo Metropolitan Region.

CHAPTER SIX

URBAN GROWTH IN TOKYO : 1955-1976

6.1 Introduction

Thomas, a well-known researcher on London's Green Belt, raises the question 'what would the Green Belt area have been like without a Green Belt' (Thomas 1970). Tokyo would provide the answer to his question. Tokyo had once proposed a Green Belt in the region. Since repeal of the regional Green Belt, the area has become a suburban residential area for lower-income residents (Kim 1984). This chapter examines Tokyo's massive suburban expansion within the three subdivisions of inside, outside and within the Green Belt, employing measurement of the urban area at three different points in time, 1955, 1966 and 1976. The empirical studies show what has happened to the city in the absence of a Green Belt.

Section 6.2 summarises urban growth in the Tokyo Region and the subdivisions as a whole. An increase in the total area of the Region stems from large land reclamation in Tokyo Bay carried out in order to supply urban and industrial land. Section 6.3 examines each subdivision's urban growth. The last section (6.4) assesses Tokyo's ruthless suburban expansion without a Green Belt.

6.2 Summary of Urban Growth in Tokyo : 1955-1976

The most representative table of urban growth in Tokyo Metropolitan Region is Table 6.1. It summarises the total area of the subdivisions, the urban areas and their increase in 1955, 1966 and 1976. Tokyo has a special geographic character that differentiates it from the counterpart cities of London and Seoul. Tokyo has increased its area through the reclamation of Tokyo Bay which has supplied almost two hundred square kilometres of land for urban and industrial development.

Table 6-1 - Summary of Urban Area in Three Subregions of the Tokyo Metropolitan Region, 1955-76

Area : km^2 Rate : %

Subregion	Total Area			Urban Area and Increase						Growth Rate (55-76/1955)
	1955	1966	1976	1955	1966	1976	1955-66	1966-76	1955-76	
Tokyo Built-up Area	923	959	1005	410	695	902	285	207	492	120
(Tokyo Ward District	567	581	615	333	497	577	164	80	244	73)
(Yokohama Area	356	378	390	77	198	325	121	127	248	322)
Tokyo Green Belt	915	919	941	38	229	503	191	273	464	1221
Tokyo Metropolitan Suburb	4930	4967	5012	135	398	994	263	596	859	636
Tokyo Region (Total)	6768	6845	6958	583	1322	2398	739	1076	1815	311

Source: One kilometre square method

Table 6-2 - Proportion of Urban Area and Urban Coverage in each Subregion of the Tokyo Metropolitan Region 1955-76

Rate : %

	Total Area (1976)	Urban Area			Urban Area Increase		
		1955	1966	1976	1955-66	1966-76	1955-76
Tokyo Built-up Area	14	70	53	28	38	19	27
(Tokyo Ward District	9	57	38	24	22	7	13)
(Yokohama Area	5	13	25	14	16	12	14)
Tokyo Green Belt	14	7	17	21	26	25	26
Tokyo Metropolitan Suburb	72	23	30	41	36	56	47
Tokyo Region (Total)	100	100	100	100	100	100	100

Changes of Urban Coverage in each Subregion

Rate : %

	Total Area (1976)	Urban Area		
		1955	1966	1976
Tokyo Built-up Area	100	44	72	90
(Tokyo Ward District	100	59	86	94)
(Yokohama Area	100	22	52	83)
Tokyo Green Belt	100	4	25	53
Tokyo Metropolitan Suburb	100	3	8	20
Tokyo Region (Total)	100	9	19	34

Source: Calculated from Table 6-1

6.2.1 The extent of Urban Growth in the Tokyo Region : 1955-1976 (Summary)

Table 6.1 summarises the measurement of the urban area and its changes in the Tokyo Metropolitan Region and its three sub-divisions in the twenty-one years between 1955 and 1976. Table 6.2 gives the same data as percentages. In 1955 Tokyo Region as a whole had an existing urban area of 583 km^2 which comprised 410 km^2 in the Built-up Area (of which 333 km^2 was in the Tokyo Ward District and 77 km^2 in the Yokohama Area), only 38 km^2 in the Tokyo Green Belt and 135 km^2 in the Tokyo Metropolitan Suburb (or Metropolitan Suburban Area). At that date the majority of the Region's urban area was situated in the Built-up Area (70 per cent), mainly in the Tokyo Ward District, with the Tokyo Green Belt having only 7 per cent.

Urban growth in the Tokyo Region between 1955-1966 amounted to 739 km^2, an increase of 27 per cent. The 739 km^2 consists of 285 km^2 inside the Green Belt (of which 169 km^2 is in the Tokyo Wards), 191 km^2 within the Green Belt and 263 km^2 outside the Green Belt. In percentage terms this equates to 38 per cent in the inner area, 26 per cent in the Green Belt area and 36 per cent in the outer area. In other words, Tokyo's Green Belt contributed about one quarter of Tokyo's extensive suburban expansion during the period between the recommendation of the National Capital Region Development Plan for Tokyo's Green Belt (1958) and its repeal (1966).

In the next ten years between 1966 and 1976, urban area increased by 1076 km^2 in the Tokyo Metropolitan Region. This was made up of 207 km^2 in the Built-up Area, 273 km^2 in the Tokyo Green Belt and 596 km^2 in Tokyo Metropolitan Suburb. During the ten year period urban growth in Tokyo Wards slowed considerably and was only 80 km^2, mainly in the reclaimed area of Tokyo Harbour and the lower flat land in east and north-east Tokyo. On the other hand the hinterland of Yokohama in the southern half of the Built-up Area increased by 127 km^2, a similar amount to the previous eleven years' growth. The urban area in the Green Belt increased again by more than it had during the previous

period, but the area gaining most was the outer zone outside the Green Belt which received 56 per cent of the total regional growth.

The growth in the Metropolitan Suburb was similar to the size of the existing urban area in the Tokyo Region as a whole in 1955.

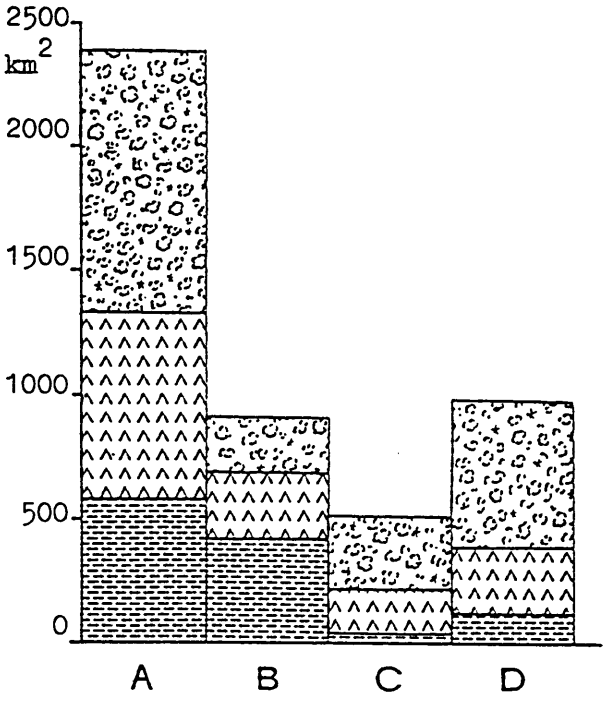
In the period 1955-1976, total urban growth in the subdivisions consisted of 492 km^2 in the Built-up Area - 244 km^2 in Tokyo Ward District and 248 km^2 in Yokohama area - 464 km^2 in the Tokyo Green Belt and 859 km^2 in the Metropolitan Suburb. Urban growth in the region as a whole amounted to 1815 km^2, an area more than three times that of the urban area in 1955.

The proportion of urban total area increased from 44 per cent in 1955 to 90 per cent in 1976 in the Built-up Area. Tokyo Ward District was developed 59 per cent in 1955 but 94 per cent in 1976. A large area of the land being reclaimed in Tokyo Bay was still under construction in 1976. The Yokohama Built-up Area was only 22 per cent urban in 1955 but was 83 per cent by 1976. The southern half of the Built-up Area (Yokohama Area) contained plenty of room for further development when the Tokyo Green Belt was proposed. However the Tokyo Green Belt covers only 4 per cent of urban area in 1955. In the next eleven years urban coverage increased to 25 per cent. In 1976 the extent of urban area in the Green Belt reached 53 per cent of its total area. The wide Metropolitan Suburb received the most urban growth but the proportion of urban area to the total area represents only 3 per cent in 1955, 8 per cent in 1966 and 20 per cent in 1976. In Tokyo Region as a whole, the urban area covered 9 per cent in 1955, 19 per cent in 1966 and 34 per cent in 1976.

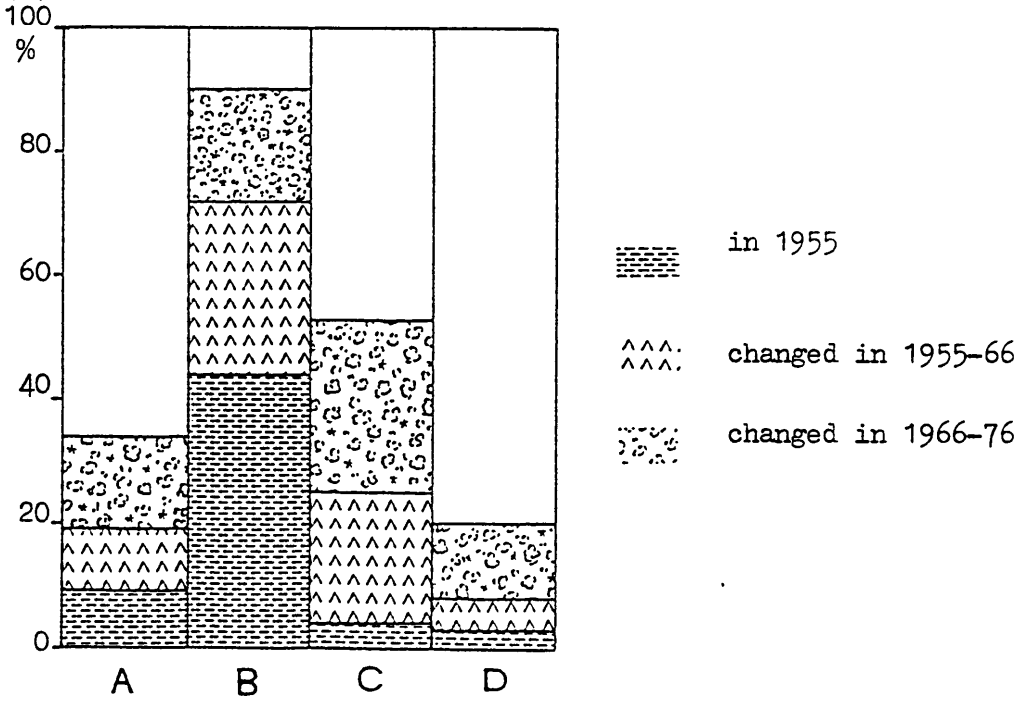
Figure 6.1a illustrates urban growth in the Tokyo Region and the subdivisions by histograms and demonstrates the more than threefold increase in the urban area that occurred in the region over the two periods 1955 to 1966 and 1966 to 1976. The urban growth in the Built-up Area is less than that in Tokyo's Green Belt and the Metropolitan Suburb together. The Metropolitan Suburb exhibited the greatest increase in urban growth among the subdivisions. Figure

Figure 6-1 - Structural and Proportional Changes of Urban Area in the Tokyo Subregions, 1955-76

(a) Structural Changes of Urban Area



(b) Proportional Changes of Urban Area



A Tokyo Metropolitan Region

B Tokyo Built-up Area

C Tokyo's Green Belt

D Metropolitan Suburban Area (Tokyo Suburbs)

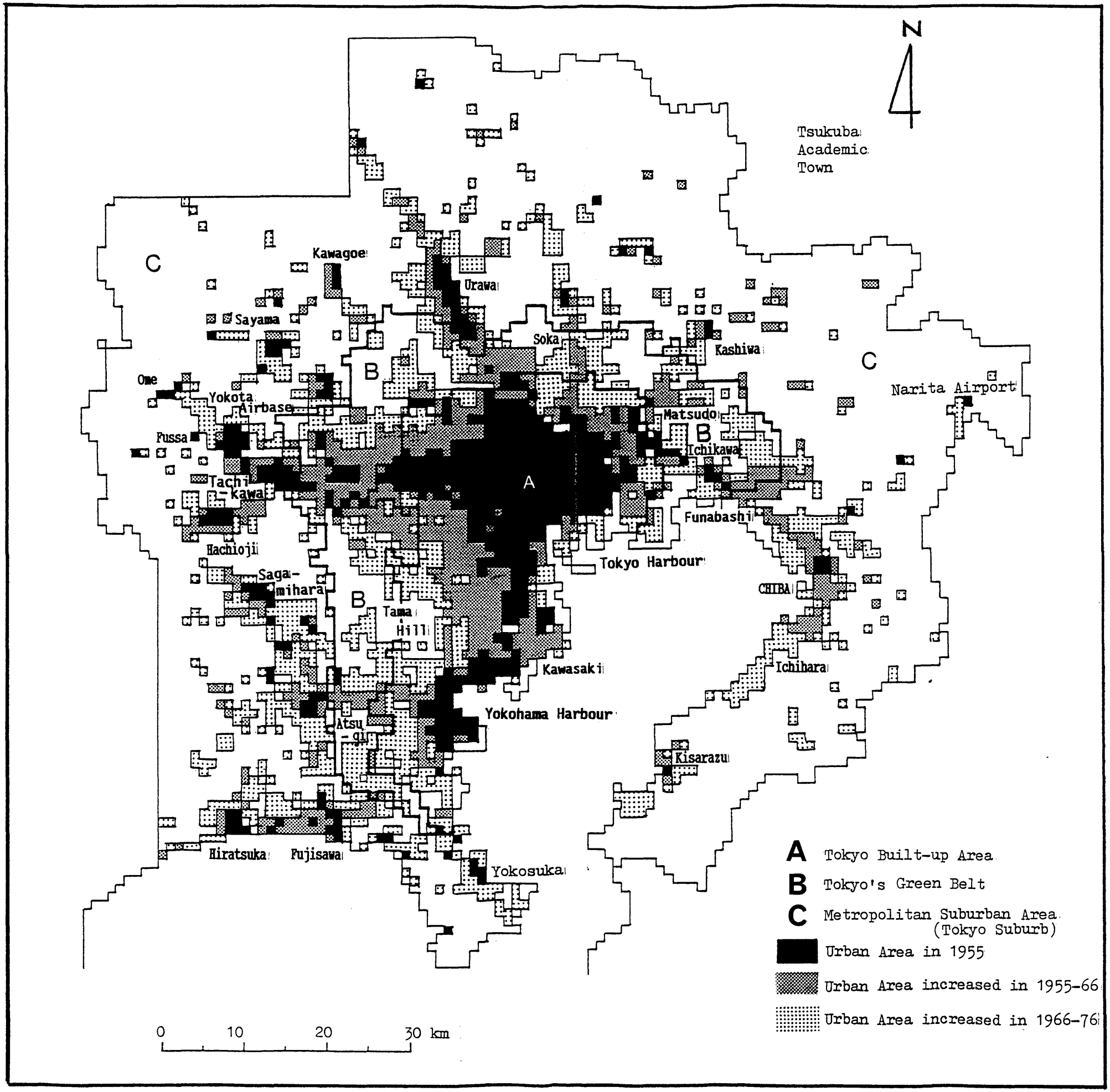
6.1b explains again the proportional change of urban area. In 1955 the existing urban area within the Built-up Area was already very large and by 1976 there was little undeveloped land remaining. More than half the total area of the Green Belt was also developed by 1976. On the other hand the Metropolitan Suburb still retained a large portion of rural area.

6.2.2 The location of urban growth in the Tokyo Region : 1955-1976 (Summary)

The representative figure, 6.2 shows the extent of urban area in 1955 and its growth between 1955-1966 and 1966-1976. It can be seen that the existing urban area in 1955 had developed in four directions: Tokyo-Yokohama, the biggest urban corridor along the south coast; the western corridor of Tokyo-Tachikawa in Tama District; the northern passageway of Tokyo-Urawa; and, less strongly, the eastern urban axis of Tokyo-Funabashi toward Chiba. Some large regional urban developments were scattered in outer islands of Kawagoe, Sagamihara and Atsugi and in the south west coastal area between Hiratsuka and Fujisawa in the outer subdivision. The Tokyo Green Belt had a little development in Tama District and in the eastern corridor but most of the Green Belt was an undeveloped rural area.

Suburban expansion was seen all around the Built-up Tokyo Wards Area in the eleven years between 1955 and 1966. Linear development also occurred and many towns and villages were merged into the Tokyo conurbation. The already established corridors crossing the Green Belt grew thicker and other corridors were developed around Soka and Matsudo in the north east and between Yokohama port and the inland industrial area of Atsugi-Fujisawa-Hiratsuka in the south west. About 20 kilometres of the Chiba coastal area was also developed. The Tokyo Green Belt around Tokyo Ward District became the most favoured area for suburban expansion with locational advantages of proximity to the city centre. A large extent of the tableland in Tama District and Chiba Prefecture was provided for suburban town development.

Figure 6-2 - Urban Growth in the Tokyo Metropolitan Region, 1955-76



However, between 1966 and 1976 urban growth spread in the whole of the remaining metropolitan area wherever land was suitable, regardless of whether it was Built-up Area, Green Belt or Metropolitan Suburb. The whole area became an urban city region of Tokyo by 1976. The land left undeveloped was mainly low lying swampy fields along main rivers and tributaries and the higher land of hills and mountains. Ribbon development ran continuously for more than fifty kilometres from central Tokyo along many corridors.

6.2.3 Increase of total area and reclamation of Tokyo Bay : 1955-1976

Expansion by reclamation in Tokyo Bay has been predominantly to supplement a shortage of urban land required for industrial and town development close to central Tokyo. During the Second World War the war-time cabinet promoted the provision of industrial land outside the existing developed area but within the air defence zone of thirty kilometres. As discussed previously (5.2.5) most of the land reserved for regional open spaces was released for industrial manufacturing due to its locational advantages of being near the river, railway and other facilities in large areas of vacant and cheap land.

After the Korean War when the Japanese economy recovered to its pre-war industrial production level, it became more difficult to provide large amounts of vacant land in the Tokyo Region. As an alternative, Tokyo Bay was able to provide abundant raw land for the economy by large reclamation works in Tokyo port, Yokohama port and along the Chiba coast. Almost two hundred square kilometres were reclaimed from the sea between 1955 and 1976.

Table 6.3 shows the increase in the three subdivided areas. The land reclaimed divides into four areas; Tokyo commercial harbour area in Tokyo Ward District, Yokohama industrial harbour area, Edo Rivermouth area in Tokyo Green Belt and Chiba coast area in east Tokyo Bay (and also see Figure 6.3, a map of Tokyo Bay reclamation).

Table 6-3 - Increase of Total Area in Tokyo Metropolitan Region by Tokyo Bay [1] Reclamation, 1955-76

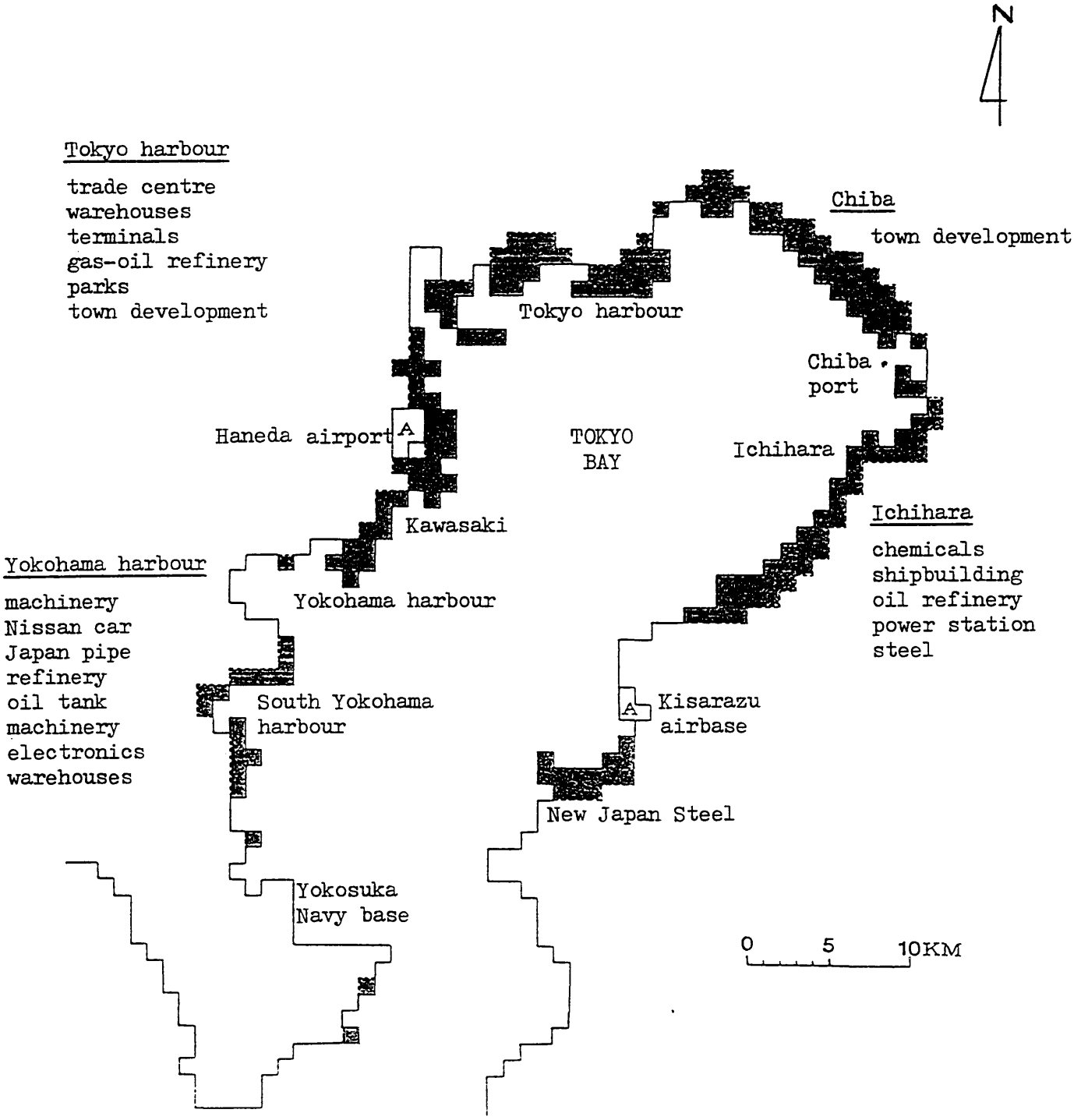
Area : km^2

	Total Area		Increase			Main Land Uses in Reclamation Area
	1955	1976	1955-66	1966-76	1955-76	
Tokyo Built-up Area	923	1,005	36	46	82	
Tokyo Wards	567	615	14	34	48	Transport land, trade and industry, large housing schemes, parks, extension of harbour, metal, car, refinery
Yokohama	356	390	22	12	34	
Tokyo Green Belt	915	941	4	22	26	Town development
Tokyo Metropolitan Suburb	4,930	5,012	37	45	82	Heavy industry of steel, chemical and so on, harbours
Tokyo Region (total)	6,768	6,958	77	113	190	

Source: Measurement of one square kilometre method by the author

(1) Present area of Tokyo Bay estimated by the author is about 1,000 km^2 of open water

Figure 6-3 - Reclamation Land in Tokyo Bay and main land uses, 1955-76



The Tokyo harbour area was expanded by 14 km^2 between 1955 and 1966 and by 34 km^2 between 1966 and 1976. The early reclamation took place mainly inside the old harbour dyke. Later reclamation was extended outside the dyke to give land which is now Tokyo Harbour Circle Motorway and outside Haneda International Airport. Various land uses exist in the new area : port extension, a timber reservoir, a railway terminal, a motorway, an airport runway, a warehouse, a trade centre, urban gas generation, pulp, steel and other factories and urban parks.

The Yokohama harbour area increased by 22 km^2 between 1955 and 1966 and 12 km^2 between 1966 and 1976. The area reclaimed in Yokohama was as a result of the extension of industrial and commercial port facilities. For example, Nissan Motors built its own export port facilities in the extended harbour area since the old port of Yokohama could not cope with the increase in production. Reclamation continued outside the Yokohama dyke in the north Yokohama harbour area, as well as in the southern part of the Industrial-Commercial harbour. Land uses in the old harbour area were mainly concentrated on the extension of port facilities, car manufacturing and the electronics industry, with chemical and refinery industries in the newly developed south area. These two harbour areas of Tokyo and Yokohama ports comprise the Tokyo Built-up Area with an increase of 82 km^2 over the twenty one years 1955-1976. During the first eleven years 36 km^2 was reclaimed and 46 km^2 during the following ten years. The land reclaimed early in the Yokohama industrial port area was predominantly used for industrial goods for export. Later, much reclamation followed in the Tokyo harbour with many large man-made islands in Tokyo Bay.

Much town development took place on the reclaimed land between the old and the new rivermouths of the Edo River. The east area of Tokyo harbour was the site of much high rise new urban development, rather than commercial industrial development. This area grew from the extension of the east Tokyo suburban area, the growth of which was supposed to be controlled by the Green Belt zone. 22 km^2 was reclaimed during 1955-1966 and 12 km^2 in 1966-1976 in this new development area. A new large area was still under construction

outside the town developed area of the reclaimed land until 1976 and later on.

Chiba coastline in east Tokyo Bay has formed the newly developed Tokyo Industrial Belt, especially in heavy industry. The Japan Steel Complex occupies about 12 km^2 of the newly developed area. Ten out of the 12 km^2 was reclaimed from the sea. Large ports were built around the large industrial complex. Many large chemical factories were built along with a mixture of various factories in the south coastal area stretching approximately 40 kilometres from the old fishing port of Chiba. The increased area in Chiba coast counts 79 km^2 and Tokyo Metropolitan Suburb contributes only 3 km^2 on the opposite coast.

Total reclaimed area between 1955-1966 amounted to 77 km^2 and 113 km^2 between 1966-1976, making a total of 190 km^2. The remaining open water area of Tokyo Bay is estimated at around 1000 km^2. The entire coastal area was developed for commercial, industrial and town development. As a result, the total area of Tokyo Metropolitan Region grew from 6768 km^2 in 1955 to 6958 km^2 in 1976.

6.3 Urban growth in the three subdivisions : 1955-1976

6.3.1 Urban growth in the Built-up Area : 1955-1976

The Tokyo Built-up Area enclosed by the Tokyo Green Belt consists of Tokyo Ward District and the Yokohama Area (Figure 6.4). Tokyo Wards consists of twenty-three wards plus the neighbouring wards of Musashino and Mitaka in Tama District to the west and part of Kawaguchi Ward in Saitama District to the north. These areas were included because they already merged with the main city area by development along the main railway lines and roads in the 1950s.

Yokohama Area is the southern part of the Built-up Area across the Tama River which is the boundary between Tokyo and Kanagawa Prefectures. Kawasaki city links Tokyo and Yokohama and is included in the southern part of the Built-up Area.

6.3.1(a) Urban growth in the Tokyo Ward District

Existing urban area in 1955

Tokyo Ward District (Figure 5.2) was an area already largely developed by 1955 with an area of 333 km^2, 59 per cent of the total area of Tokyo Ward District, counted as urban. Most of the wards were well developed, but the outer five wards were seen as rural landscape in 1955. Nerima Ward in the north west and Setagaya Ward - now one of the best suburban areas in Tokyo - remained as traditional rural villages and fields. The three eastern wards of Adachi, Katsushika and Edogawa across the Edo River were less developed than west Wards. Ota Ward in the south end of Tokyo Ward District was under construction with large Land Redistribution projects. Many areas were preparing road networks but as yet were not fully developed. Land under construction was regarded as rural area in 1955. This changing area was found to be fully developed when the urban area was counted in 1966. The west corridor along the Chuo Line (Tokyo - Tachikawa) and the north corridor along in the North East Line (Tokyo - Urawa) were completely developed to a width of four or five kilometres. The eastern developed area in the delta formed a discontinuous urban corridor, an average of a few kilometres wide.

Musashino and Mitaka to the west, are located twenty kilometres away from Tokyo Station. Having three railway stations the Musashino-Mitaka cities had, by 1955, already been developed as good commuter towns in the west tableland. The area outside the third station was little developed at that time and urban continuity stopped here. The surrounding area was generally in rural land uses despite the location of the university campuses of the Christian College, Musashino Women's College and Nikkei College, as well as Nissan car factories.

Kawaguchi is to the north of Tokyo across Arakawa River, which divides the Tokyo Ward District from Saitama Prefecture. The total area of Kawaguchi added to the Tokyo Wards was 15 km^2 and the urban

area was 6 km^2. Land uses in the rural area consisted of various types of small and medium sized factories on the riverside, scattered rural villages and ribbon development along railway lines and trunk roads.

Urban growth : 1955-1976

In the twenty one years, 1955-1976, urban growth amounted to 244 km^2 in Tokyo Ward District. By 1976 virtually all the previously undeveloped area in the outer Wards had become urban with only 6 per cent left as rural (Figure 6.2) Suburban expansion was carried out by land redistribution (see footnote of Section 7.2.3(d) into the rural surroundings. Housing development was dominant in the newly developed area with industry being developed to a limited extent in the area of the north and east lower land. Open spaces were lost to the endless suburban growth although barracks in the north were changed to a city park - a green island in a sea of buildings.

The rural area around Musashino was mainly developed for residential uses surrounding the university campuses, but also for institutions and for water works. More varied changes occurred in Mitaka City. In 1966, the rural South Mitaka area, far away from railway stations was developed into a new suburban residential area. In addition the Christian University expanded its campus; Futo Heavy Industry extended its main factory site; and the Transportation Technique Research Centre, renamed as the Aviation and Astronaut Research Institute, expanded its area. Only a small area around the Shipbuilding Technique Research Centre remained as rural.

The undeveloped area in Kawaguchi was readjusted by Land Redistribution projects and changed into an accessible residential area and many factories were located in the riverside lowland. The flood plains were developed for recreational uses, especially for golf courses.

Most of Musashino-Mitaka and Kawaguchi and Tokyo Ward District were therefore fully developed as urban area by 1976. Undeveloped area in

Tokyo Ward District was to be found in the flood plain in the north east and the east and in the newly reclaimed man-made islands in the Bay.

Urban area in Tokyo Ward District amounted to 333 km^2 in 1955, 497 km^2 in 1966 and 577 km^2 in 1976 with a total increase in urban area of 244 km^2 between 1955 and 1976.

6.3.1(b) Urban growth in the Yokohama Area

The existing urban area in 1955

The urban area in the Yokohama Built-up Area counts 77 km^2 in 1955 representing only 17 per cent of the total area; 83 per cent was rural land in 1955. This rural hinterland consisted of hillside, agricultural land and typical rural landscape in the west. Yokohama town and industrial development was situated in the east on Tokyo Bay. Large areas of land were reclaimed along the coast in front of the Yokohama town area resulting in the development of a heavy industrial and port area. Shipbuilding yards, large machinery factories, oil refineries, cement factories, breweries and chemical factories were located on this land. Light industry such as textiles, food and other small factories were situated on the mainland where residential and industrial uses were mixed.

The Tokyo-Yokohama axis has seen progressive development since the Yokohama port was opened in 1857. By 1955, a 30 kilometre urbanised belt virtually joined the two cities comprising 15 kilometres between Tokyo Station and the Tama River in Tokyo Ward District and 15 kilometres between Tama River and south Yokohama town in the Yokohama area.

Urban growth : 1955-1976

Residential and industrial development grew up separately in the Yokohama Area. Industrial development and extension of port

facilities took place in the coastal area, whilst residential development occurred inland.

Great suburban expansion occurred on the higher flat area parallel with the Tama River and the Nambu Railway line (see Figure 5.1) which was built to link Yokohama-Kawasaki ports with the inland industrial sites of military airbases and airplane industry complex, and many other key industries such as electrical, electronic, vehicle and machinery in the Tama district. Between 1955 and 1966, this rural area in the suburbs was developed with suburban commuter towns rather than industrial land. Houses and shops were densely clustered near railway stations and mixed with small pieces of farmland. Between the stations, more farmland was scattered or surrounded by urban settlements. Large Futo Texture factories near the Kawasaki Bridge on Tama River were removed and the factory site was changed to become a large recreational area with a baseball ground, main sports ground and race course. Some areas of the Tama River flood plains were developed for golf courses.

One very interesting finding in this Japanese land use study was the location of golf courses in the city fringe. When ribbon development was largely located along development corridors, golf courses were constructed around the edge of the ribbon developed area in rural surroundings. As suburban development continued it expanded towards the golf courses. Soon after, the green courses were located in the middle of suburban residential areas. This is the reason why golf courses are classified as urban areas, following the Japanese experience.

Between 1966 and 1976 enormous suburban development occurred over the whole remaining area of the Yokohama Area hinterland. The area surrounding the long corridor of the Nambu Line parallel to the south of Tama River as well as large outskirts of the Yokohama town area were filled with suburban houses. By 1976 the remaining rural area, although still counted as rural, was everywhere under sporadic construction and it was only a matter of time before it was fully converted to urban use.

Between 1955 and 1966 industrial development was increased markedly in the lower land near the Tama River mouth. Factories were built from the outskirts of the Haneda Airport to the Kawasaki town area, largely on reclaimed land.

South of Kawasaki heavy industry also continued to be located in the newly reclaimed land. For example, Toshiba Electric, which had been located beside the Grand Tama River Bridge in rural Kawasaki, expanded its factory site by a large extent on the reclaimed land and the Japanese Nuclear Power Research Institute, a large oil tank site, machinery and fuel factories were also located in the newly extended industrial area. Nissan Motor and Asian Petroleum were also largely situated on reclaimed land in a large coastal industrial complex in the north Yokohama harbour area.

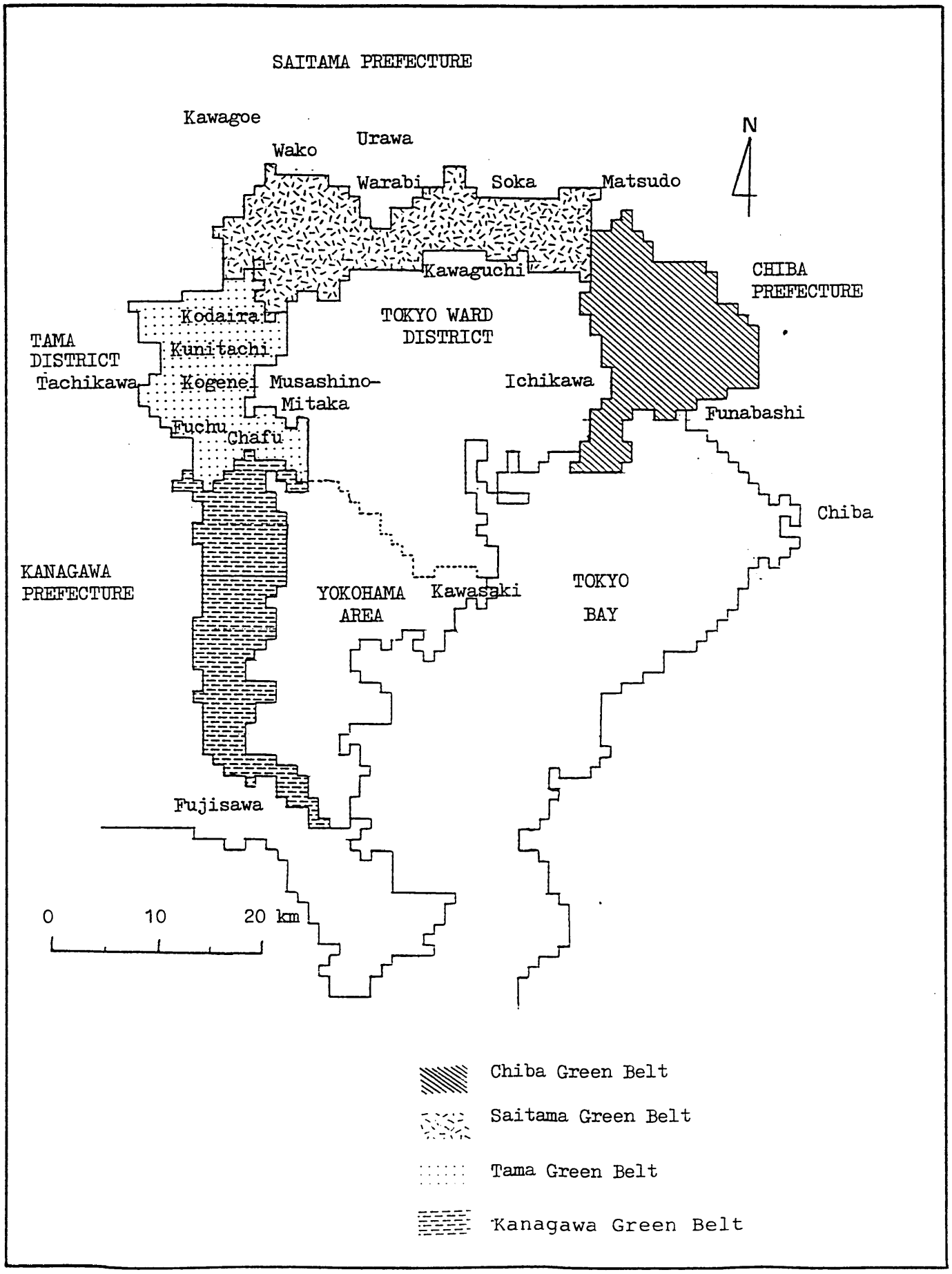
The Yokohama old harbour area was not much expanded. Instead, Yokohama harbour area was newly constructed in a southerly direction from the end of the old harbour. In 1966-1976 the reclaimed area in the south provided for the large extension of port facilities and industrial sites for motor manufacturing, oil tanks, a refinery, new railway lines and so on. At the time of the survey date (1976) large areas of reclaimed land remained as vacant land because they were under construction or constructional works had just been completed.

As a summary of urban growth in the Tokyo Built-up Area, the existing urban area amounted to 410 km^2 in 1955. With the increase in the urban area of 492 km^2 over the twenty one years between 1955 and 1976, the urban area by 1976 measured 902 km^2, covering 90 per cent of the total Tokyo Built-up Area. The remaining undeveloped area was to be found in the Tama Hill outskirts of the Yokohama Area and in the reclaimed land of Tokyo bay. However, these two areas were soon to be developed also for suburban housing and industrial development.

6.3.2 Urban growth in Tokyo's Green Belt : 1955-1976

Tokyo's Green Belt covers parts of the four prefectures of Tokyo, Saitama, Chiba and Kanagawa in very long strips. Figure 6.4 reveals

Figure 6-4 - Tokyo's Green Belt



the shape of Tokyo's Green Belt and its main urban settlements in the four prefectual divisions (see also Table 6.4). The width of the Green Belt varies from a few to fifteen kilometres. In the west corridor of Musashino tableland and the east corridor between Ichikawa and Funabashi cities, the width is 10 kilometres. The northern main passageway between Kawaguchi and Urawa measures 4 kilometres in width. Kanagawa Prefecture contains a long and narrow strip of Green Belt. The average width of Tokyo's Green Belt is estimated at roughly 10 kilometres (Hall 1963; S Y Kim 1981). It must be remembered however that this Green Belt is as outlined in the First Master Plan for the national Capital Region Development (1958), but it was never implemented.

6.3.2(a) Existing urban area in 1955

When a Green Belt was considered for Tokyo the Green Belt area was almost all rural, containing only 38 km^2 of urban land. The largest developed area of 21 km^2 was in the west tableland of Tokyo (Tama District); the Chiba Prefecture contained 11 km^2 and Kanagawa Prefecture had only 2 km^2, covering the American Military base in the west Yokohama area. (The extent of urban land in the Tama district for 1955 is probably overestimated because the measurement was made from a land use map of 1959.) Table 6.4 gives the four prefectures, large cities within the Green Belt, land uses and dates of the maps used.

Chiba Prefecture Green Belt

Ichikawa city had been developed in a long and narrow type of ribbon development from the bridges over the Edo River on the eastern edge of the Tokyo Ward District towards Chiba. The six square kilometres measured contained a mix of houses, commercial buildings, factories in the outskirts, and university campuses of Chiba Business College and Women's College. A good network of underground and electrified trains was prepared for this east commuter city, Ichikawa.

Table 6-4 - Urban Area in Main Cities of Tokyo's Green Belt, 1955

Area : km^2

Prefecture	City and Town and Area	km^2	Main Land Uses	Actual Map Year
Chiba	Ichikawa	6	Residential, factories	
	Funabashi	4	Residential, factories, race courses	1954
	Matsudo	1	Residential, universities	
	(Subtotal	11)		
Saitama	Warabi	1	Residential, industrial	
	Wako	3	Golf courses, military base	1956
	(Subtotal	4)		
Tama District (Tokyo Prefecture)	Kogenei	8	Residential, industrial, universities	1956, 1961
	Kodaira	2	Residential, industrial, universities	1956, 1957
	Kunitachi	5	Residential, industrial, universities, institutions	1961
	Fuchu	6	Residential, industrial, universities, cemetery, prison and airbase	1957, 1961
	(Subtotal	21)		
Kanagawa	Yokohoma	2	Military base (USA) only	1957
Total		38		

Source: Author measured, modal year is the year of 1955

Ichikawa almost merges with Funabashi which had also grown in a linear pattern and amounted to 4 km^2 of the urban area. Land use in the city fringe in 1955 included a race course, the Funabashi Wave Transmission Centre, a large cemetery and Japanese Army Barracks. However, these urban uses did not add up to one square kilometre so these areas were counted as rural.

The town of Matsudo developed on the tableland in the north west corner of Chiba Green Belt and had grown as a suburban town with several universities scattered in the surrounding rural area. Orchards, fields and paddy fields comprise the rural outskirts of the Matsudo city and its surroundings and although ribbon development was common on the riverbank and roadside between Matsudo and Ichikawa this linear developed area could not be counted as urban in 1955.

Saitama Prefecture Green Belt

The development corridor between Kawaguchi and Urawa covers an already very urban influenced area of Warabi City. The area was rapidly changing from rural to urban but urban sprawl did not yet cover the whole area. Land redistribution became popular in the transit area where main railway lines and trunk roads were well prepared. However in 1955, Warabi city accounted for just one square kilometre of the urban area and Hoda town beside Warabi city could not make one unit of the urban area. The Green Belt was at its narrowest, only 4 or 5 kilometres wide, across this busiest corridor. In terms of planning technique, continuous regional open space was to control the active suburban area but it was too optimistic to imagine that the area could be restrained by a few kilometres wide Green Belt.

Wako, in the north west of Tokyo, comprises 3 km^2 of urban area of a golf course and large military base. Several towns around railway stations were developed as commuter towns in the south of Saitama Prefecture. These town areas were not yet large enough to be included as urban area in 1955. Likewise Soka, one of the larger suburban towns of another northern corridor and developed in lowland

between rivers, was not large enough to complete one kilometre square.

In Saitama Prefecture Green Belt, there were many urban, semi-urban or rural settlements. Ribbon development and sporadic development around railway stations was very common in 1955 but this was not sufficiently agglomerated enough to count as urban area.

Tama District Green Belt

The Tama District Green Belt encompassed the most popular suburban residential area in the Musashino tableland between 20 and 30 kilometres west of Tokyo Station. The railway network was complete in this area and many cities such as Kogenei, Kunitachi, Kodaira, Fuchu, Cofu and several other smaller cities and towns were already located there in 1955. These important residential and industrial developments and many medium and small suburban towns in the wet tableland were totally included in the Tama Green Belt without considering urban islands or the openness of the urban corridor.

Kogenei developed as a suburban centre for residential, industrial, university and institutional use next to Musashino City on the Central Railway Line. It accounted for 8 km^2 of the urban area including the surrounding cities of Kokubunji in the west and Kodaira in the north with which it had merged. The land use functions of Kodaira and Kokubunji were very similar to those in Kogenei city.

Kunitachi, next to Kokubunji in the Chuo Line (Chuo means central) was nearly coalesced with Tachikawa city beyond the Green Belt to form the largest urban junction in the mid-Tama district. Land use in suburban Kunitachi represents a very typical pattern of the Tama Towns of residential, commercial and educational uses rather than industrial development.

Fuchu, on the other hand, a big industrial city south of the Chuo Line, was also included in the Tama Green Belt. Several railway lines linked Fuchu city with Kogenei, Tachikawa, Shijuku (the largest Tokyo

subcentre), Hachioji (west end of Tama District) and Kawasaki port. It comprised 6 km^2 of urban area and included the Shiba Electric Company, Japan Steel, Fuchu Airbase, Tama Cemetery Garden, Fuchu Prison, research institutions and universities.

Kanagawa Prefecture Green Belt

Kanagawa Prefecture Green Belt starts from the Tama River and extend southwards across the Tama Hills and the rural hinterland of Yokohama and then curves towards the coast at the south end of Yokohama. The Green Belt stretches about 40 kilometres southwards and gradually narrows towards the southern end. The character of land use in the Green Belt presented a totally rural landscape in 1955. No urban area existed here except the controversial urban area of occupation by the American Communication Battalion in the west corridor out of Yokohama. Military uses accounted for 2 km^2 of urban area in the Kanagawa Prefecture Green Belt in 1955.

6.3.2(b) Urban growth : 1955-1976

Table 6.5 summarises urban growth in the proposed Tokyo Green Belt and each prefecture's Green Belt areas; the pattern of growth is shown on the map in Figure 6.2.

Tama District Green Belt

Urban growth in the west tableland took place in the whole Tama district with enormous pace between 1955 and 1966. The urban area was increased by 4 or 5 kilometres width on both sides of the Central Railway Line. In this way several suburban cities of Kogenei, Kokubunji, Kunitachi, Chofu and Kodaira were merged. This large urban area was attached to Tokyo Wards in the east and Tachikawa City in the west and stretched 35 or 40 kilometres away from Tokyo Station by 1966. Without a Green Belt, the enormous suburban expansion could not be controlled in the most expanding suburb, where several railway lines link with Shinjuku, Ikeburo, Shibuya and central Tokyo.

Table 6-5 - Urban Growth in the Tokyo Green Belt, 1955-1976

Area : km^2

Prefecture	Total Area	Urban Area			Net Increase	
		1955	1966	1976	1955-66	1966-76
Chiba	234	11	53	124	+42	+71
Saitama	267	4	48	130	+44	+82
Tama District	198	21	110	150	+89	+40
Kanagawa	216	2	18	99	+16	+81
(Total) Tokyo Green Belt	915	38	229	503	+191	+274

Ratio : %

	Area	Urban Area		
		1955	1966	1976
Chiba	100	5	23	53
Saitama	100	1	18	49
Tama District	100	11	56	75
Kanagawa	100	1	8	46
(Total) Tokyo Green Belt	100	4	25	55

Source: One kilometre square method

South of the Tama River the rural landscape was generally retained in Tama Hill and its surroundings. Housing development was scattered and areas under construction were on a small scale. Large areas of golf courses and recreational development took place ahead of suburban expansion.

The northern part of Tama district Green Belt was not developed in 1966 except for the sites of the national sanatoriums, hospitals and institutions. Tama Lake and the beautiful surrounding area remained rural.

During the period 1955-1966 the Green Belt area in Tama District became the most popular suburban area outside of Tokyo Wards. In these postwar heyday years the urban area increased by 89 km^2 causing the proportion of land in urban use in Tama Green Belt, as a percentage of the total, to rise from 11 per cent in 1955 to 56 per cent in 1966.

Less urban growth occurred between 1966-1976 when only 39 km^2 was added bringing the proportion of urban land to 75 per cent by 1976. The remaining rural area in the north was to be found mainly around Sayama Hill (Tama Lake) and in the Tama/Saitama boundary area. In the south Tama Hill and the surrounding hills and riverside remained largely undeveloped.

Saitama Prefecture Green Belt

Another area attractive for suburban expansion was the land to the north of Tokyo Ward District. As already noted, rapid development occurred in the northern wards between 1955 and 1966, and it extended into the Saitama Green Belt along three main corridors.

The largest amount of growth occurred right across the Green Belt from the rural areas of Kawaguchi to the north to merge with the provincial city of Urawa and beyond. This wide corridor provided continuous urban development for 40 kilometres outwards from Tokyo Central Station by 1966. By 1976 it had extended to over fifty

kilometres, taking it out beyond the Metropolitan Region's boundary. In the Green Belt most of this growth was for suburban residential use but in some parts, along the Arakawa River, factories were also located.

Soka City, to the east of the Kawaguchi corridor, had also grown by linear development from the north-east Ward along the existing northward railway, arterial roads and newly constructed motorway. This area was developed only as a very narrow passageway by 1966 because the southern part of the corridor was developed between rivers. However, between 1966 and 1976 the physical constraints were not enough to stop the suburban expansion. The lower fields between Soka and Warabi-Kawaguchui were filled in to a large extent, and the low basin in the east from Arakawa River to the Edo River, was also extensively developed.

A group of cities of Wako, Asaka, Niza and Shiki were ribbon developed and coalesced in the north west tableland outside Nerima Ward (Figure 5.2), to the west of the Arakawa River. This large suburban development was situated with convenient transport links with Tokyo Wards in the south and Kawagoe City in the north. The non-stop expansion was producing an almost continuous urban axis across the Green Belt by 1976.

Increase of the urban area in the Saitama Prefecture Green Belt amounted to 44 km^2 between 1955-1966 and 82 km^2 between 1966-1976. The urban area had measured only 4 km^2 in 1955 but a massive 130 km^2 in 1976. This great suburban expansion in the Green Belt area caused the proportion of urban area to the total Green Belt area to increase from one per cent in 1955 to 18 per cent in 1966 and to 49 per cent in 1976.

Chiba Prefecture Green Belt

Lower lying agricultural land on the outskirts of the narrow Ichikawa-Funabashi eastern urban corridor did not develop much between 1955 and 1966. Instead, the tableland, behind Matsudo City,

which consisted of orchards, vegetable fields and rural villages, was developed as a large suburban residential area along a north east corridor away from Tokyo in 1955-1966. Another large area of tableland behind Funabashi City was developed from rural land to become suburban town development. The direction of these developments in the Funabashi tableland was diverted back towards Tokyo due to the existence of flood plains. Extensive military bases were also situated in Chiba Prefecture Green Belt area with the construction of runway for aircraft.

In the later period between 1966 and 1976, suburban expansion produced a different pattern. Firstly urban development in the tableland continued to expand along the local railway line and roads. Secondly the lower land began to be developed into continuous suburban expansion. The lower agricultural land outside the existing narrow urban corridor of Ichikawa-Funabashi was prepared for the orderly development of residential suburbs area. Large land reclamation on the coast of Chiba Prefecture Green Belt was undertaken to provide for a newly developed town area. The seaside town between the old and new Edo River mouths was built on an area of 7 km^2 between 1966 and 1976. More reclaimed land of approximately 15 km^2 was ready for further town development near the seaside town development area. In the reclaimed area adjacent to Funabashi port, a large industrial area was situated and a large recreation park was built to include race courses, marina houses and other leisure facilities by the sea.

The urban area of Chiba Prefecture Green Belt was increased by 42 km^2 between 1955 and 1966 and by 71 km^2 between 1966 and 1976 making a total gain of 113 km^2 during the twenty one year period. Urban coverage in the Chiba Green Belt changed from 5 per cent in 1955 to 23 per cent in 1966 and to 53 per cent in 1976.

Kanagawa Prefecture Green Belt

During the eleven years between 1955 and 1966 the Kanagawa Green Belt was developed only in the Yokohama-Atsugi channel. Here suburban

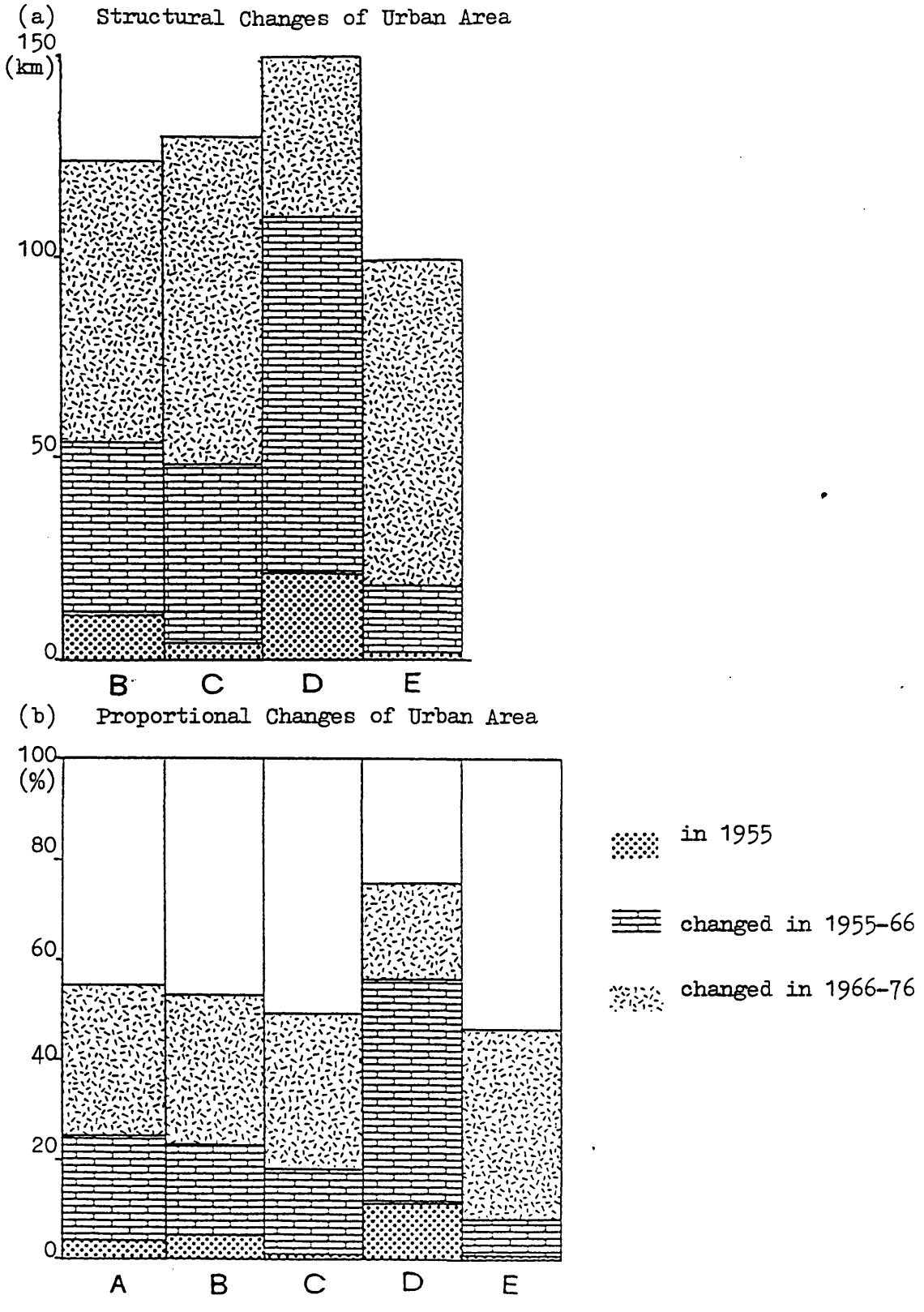
residential development took place in the hinterland of the industrial-commercial port of Yokohama. Along the rural edges of the area of ribbon development a number of golf courses were sited but most of the Kanagawa Prefecture Green Belt remained as open countryside. In contrast to the other Green Belts which rapidly changed to suburban areas in order to accommodate the outgrowth of Tokyo Wards the urban area of Kanagawa Prefecture Green Belt increased by only 16 km^2 between 1955 and 1966.

However, between 1966 and 1976 suburban expansion overflowed across the Tama River from beyond the Tama Green Belt and Tokyo Ward District. The suburban area of Kanagawa Green Belt developed in three main areas, in the north as an extension of Tokyo Wards and in the west and south west as the Yokohama port town expanded. The result was the addition of a large urban area, 81 km^2 between 1966 and 1976. As the Green Belt had thus increased its urban area by 97 km^2 between 1955 and 1976, its urban coverage grew to 46 per cent in 1976 from one per cent in 1955 and 8 per cent in 1966. Kanagawa Green Belt area was developed slowly in the early eleven years but grew rapidly in the following ten years.

Tokyo's Green Belt area as a whole was changed rapidly to suburban residential development during the twenty one year period. In 1955 it had only 38 km^2 of the urban area placed mainly in the Tama Green Belt. Land use in Tokyo's Green Belt in 1955 was characterised as rural except for the selected corridor areas. In order to accommodate Tokyo's suburban expansion, Tokyo's Green Belt received 191 km^2 of urban area between 1955 and 1966 and 273 km^2 between 1966 and 1976, making a total of 464 km^2 in the whole Belt between 1955 and 1976. As a result, Tokyo's Green Belt contained 502 km^2 urban land in 1976 out of the total area of 915 km^2 which represents 55 per cent of the total Green Belt area.

The histograms of Figure 6.5 illustrate cumulative sums and percentages of suburban growth in Tokyo's Green Belt and in the Green Belts of four prefectures. The most notable point is that Tama Green Belt area had its major suburban expansion between 1955 and 1966

Figure 6-5 - Structural and Proportional Changes of Urban Area in Tokyo's Green Belt, 1955-76



A Tokyo's Green Belt (total)

B Chiba Green Belt

C Saitama Green Belt

D Tama Green Belt

E Kanagawa Green Belt

whilst the other Green Belts were developed mostly between 1966 and 1976.

6.3.3 Urban growth in Tokyo Metropolitan Suburb : 1955-1976

In 1955 the existing urban area in Tokyo Metropolitan Suburb, beyond the Tokyo Green Belt had developed out of the Tokyo conurbation. The Metropolitan Suburb contained the Omiya-Urawa urban axis in the north, Tachikawa-Fussa-Hachioji in the west Tama District, Sagamihara and Atuki in mid Kanagawa Prefecture and the Hiratsuka-Fujisawa coastal area in south Kanagawa as well as other independently developed regional cities. The Chiba Prefecture area in the Metropolitan Suburb retained rural land use except for the town area of Chiba city in the east Tokyo Bay. The urban area accounted for 135 km^2 out of a total area of 5012 km^2 in the Metropolitan Suburb in 1955. In twenty one years the Suburb grew considerably with an increase in urban area of 859 km^2. The urban growth spread outwards all around the metropolitan core but most noticeably to the west and north. Most of this expansion took the form of large suburban development, which was preferred to the designing of new towns. Only one new town was developed, south of Tama Hill beyond the Green Belt.

Industrial development land was provided by the large areas of reclaimed land in Tokyo Bay. Large industrial areas for heavy industry were developed in the coastal area. Small and medium sized industrial sites were developed inland outside city areas. However, unlimited suburban residential development was most common over the region to accommodate Tokyo's urban growth.

6.3.3(a) Existing urban area in 1955

The existing urban area in the Metropolitan Suburb had been developed with the promotion of localisation of key industry and large military bases within the anti-air raid network in the Tokyo Region. Tachikawa and nearby Yokota air bases, which were combined with the aircraft industry and the Japanese Air Force, occupied large areas in the west Tama District. Sagamihara housed large military heavy

industry and a military base in the city fringe. The Atsuki air base was situated in the large plain towards the south from Sagamihara and western area on the outskirts of industrial Yokohama harbour in Kanagawa Prefecture. Large military bases could be found in Saitama Prefecture in 1955. Sayama, ten kilometres north east from Yokota base in Fussa, had an Air Force base. Tokorozawa between Sayama and Tokyo Ward District developed a large military base. The large Yokosuka Naval base was built in the entrance of Tokyo Bay.

Tachikawa had grown as a large urban complex of towns, industry, Air Force bases and aircraft industry. It linked with Green Belt cities in the east and other regional cities and large air bases in the west. Across the Tama River from the largest railway junction city of Tachikawa, Hachioji was developed as a regional city at the western end of Tama District. A large urban belt had been developed in the north corridor where Urawa and Omiya cities were merged into an urban strip 10 kilometres long and one or two kilometres wide in 1955. Many other small and medium sized cities and towns were also scattered throughout the Metropolitan Suburb. Several golf course were situated in open countryside and constituted the greatest single unit of non-residential, non-industrial urban land uses outside towns.

6.3.3(b) Urban growth : 1955-1966

Suburban expansion into Tokyo Metropolitan Suburb grew out from suburban development in the Green Belt area. In Tama District, Tachikawa was expanded and merged with Kunichi - Kagenei - Musashino -Tokyo Ward in the east. Further west the cities of Fussa-Akishima and Hachioji-Hino in the south west passageway were also merged. The outskirts of Hachioji and Sagamihara grew larger. In Kanagawa Prefecture Atsuki was expanded and connected with Yokohama by suburban growth in the Yokohama Green Belt area. The south coastal area between Fujisawa and Hiratsuka became a town belt area 10 kilometres long with large urban expansion taking place between 1955 and 1966.

The military cities of Sayama and Tokorozawa in the north east also expanded their urban area with industrial area being developed in an orderly fashion on separate sites around the city edges. The biggest northern urban belt of Urawa city grew further north and westwards and, as previously mentioned, became completely merged with the suburban area of the Saitama Green Belt and the Tokyo Built-up Area. Some urban growth took place in other urban corridors out of Soka and Matsudo.

The large suburban expansion in Funabashi tableland in the Chiba Green Belt grew eastwards beyond the Green Belt. Ribbon development between Funabashi and Chiba cities also occurred, mainly for suburban residential development. Industrial development was situated on land already reclaimed in Ichihara, south of Chiba city, while new large areas of reclaimed land were developed or had civil works under construction.

Large Japanese airbases were built, one in Kisarazu near the large steel complex of New Japan Steel in east Tokyo Bay and another on the rear of Matsudo flatland between 1955 and 1966.

Many golf courses were constructed on the metropolitan fringe, roughly in a 40 kilometres radius from Tokyo Station. The new courses were built on the hillside in the west suburb and lower land in the east Metropolitan Suburb in Chiba Prefecture. Flood plains in Arakawa River and Tama River were also largely developed for public and short golf courses in the areas near the city.

The increased urban area in the Metropolitan Suburb amounted to 263 km^2 in the eleven years between 1955 and 1966.

6.3.3(c) Urban growth : 1966-1976

Urban growth continued to spread throughout the period 1966-1976, permeating the whole Tokyo Region. Large cities, medium towns and small villages in the region were merged together and became the great Tokyo conurbation by 1976, regardless of whether the land was

in the Built-up Area of Tokyo Wards and Yokohama Area, Green Belt area and Metropolitan Suburb. Every corridor grew longer and expanded widthways. Lower lying land around the developed urban area was provided for further suburban expansion.

In the north the large urban corridor from Urawa was developed up to the regional boundary of the study area 50 kilometres out from Tokyo centre. The corridor from Soka grew longer and joined up with the largest Omiya-Urawa belt. The suburban area beyond Matsudo area expanded widely into the north east regional channel toward Tsukuba Science City which was developed as a science new town just outside the Tokyo Metropolitan Region..

Suburban growth in Tama district extended to Ome, the western town of the west Tama mountainous area. Almost all of the developable land of the large flat hinterland in Kanagawa Prefecture was developed. The identity of cities was gone in 1976. A large area from Yokohama harbour to Sayama city, and from Kawasaki across the Tama River to Fujisawa-Hiratsuka cities on the south coast, was amalgamated into the Tokyo conurbation of 1976. At the entrance to Tokyo Bay, the urban area grew extensively from Yokosuka naval city along the bay between 1966 and 1976. Industrial, military and residential developments were mixed in this area. By 1976 the coastal area from Tokyo harbour to the end of Tokyo Bay was continuously developed for 50 kilometres.

On the other side of Tokyo Bay in Chiba Prefecture, reclamation extended the land by a few kilometres mainly for the heavy industries of steel and chemicals, an oil refinery, shipbuilding, and power generation. The old fishing ports of Chiba, Ichihara and Kisarazu were gone or hidden behind large factory yards and buildings. The old coastal line was behind newly built industrial railway lines. As the east Tokyo Bay area was changed into a large industrial belt, new airbases were constructed in Chiba Prefecture. This seemed to supplement the old anti-air raid network which had been prepared at the end of the 1930s. The west area of Tama district, Kanagawa inland and Saitama Prefecture in Tokyo Region were now included under

the protectional network and it was thought that it might be necessary to make a new wider network to cover the newly developed key industry area. During the 1960s a new international airport was developed in the fringe of Narita City, 55 kilometres away from the centre of Tokyo. Narita City was a regional town with an urban area of only one km^2 in 1955. It gained an additional urban area of 5 km^2 between 1966 and 1976.

Many golf courses were built on hillsides, and in mountainous areas in the east and west regions and open countryside in Chiba and Ibaraki Prefecture lower area. The existing golf courses were expanded or neighboured with new courses. New courses were even situated beyond the Metropolitan Suburb. Other recreational land was developed in Tama Hill.

As a result, the large suburban expansion increased the urban area in the Metropolitan Suburb by 859 km^2 between 1966 and 1976 so that the urban area in the Suburb amounted to 994 km^2 in 1976. Urban area was expanded continuously in the Tokyo Metropolitan Suburb in the absence of a Green Belt.

6.4 Assessment of Tokyo's Green Belt

6.4.1 Green Belt and New Town Development in Tokyo

Professor Hall explained that Tokyo accepted the British idea of the Green Belt and Tama New Town was developed 30 kilometres from the city centre, via the Shinjuku subcentre, to Tama (Hall 1984). However, the First Master Plan of National Capital Region Development in 1958 proposed a Green Belt of the British kind, but did not consider a new town development beyond the Green Belt. Japanese planners attempted to retain Tokyo Wards as it was and to divert urban growth from the Tama District toward the Yokohama Area within the Built-up Area. Doing so, they dared to control the growth of the most actively expanding Tama District with a Green Belt. On the other hand, large suburban growth was promoted in the suburban cities beyond the Green Belt in order to create jobs and dwellings. Land

redistribution projects were regarded to accommodate the increasing demand for industrial and residential land in the large areas of city fringe (TMG 1962). The planned towns were not new towns but the existing regional towns of Hachioji-Hino, Sagamihara-Machida, Kawagoe-Sayama, Omiya-Urawa, Chiba-Ichihara and so on. In this respect these towns were more akin to the Mark 3 New Towns in Britain, designed in the 1960s as expanded regional centres, than like the early new towns proposed as part of Green Belt planning by Unwin and Abercrombie. Suburban expansion was designed to develop in an orderly way in the whole administrative areas.

Tokyo considered constructing a large scale new town to provide low cost land and houses outside Tokyo Ward District and to prevent the disorderly development or sprawl of the Tama District (Ministry of Construction in Japan 1982). Tama District had been the most favoured residential area for Tokyolites since the great Kanto earthquake in 1923 and suburban expansion was continuing in the Tama District in the 1960s. Large undeveloped areas were however still left out of the urban sprawl in the western valley across the Tama River beyond Fuchu city. The New Residential Built-up Area Development Act of 1963 provided the legal background for construction of Tama New Town. The Tama New Town project started in 1965 with a total area of approximately 3020 ha to accommodate 410,000 persons. However, measurement of this urban area undertaken in this research found only 3 km^2 in 1976, because the planned new town area was still largely under construction. Large areas in the valley and in the hilly areas were excavated and prepared for the main transport network. Cluster housing development started in the central area and large apartments were situated in the developed sites.

A different sort of new town, Tsukuba Academic city, was formed for the purposes of consolidation and relocation of national research and development in the outer Tokyo region and as an experiment in academic revitalisation and modernisation (Alden 1984). The location for the science new town was decided for south Ibaraki Prefecture, 60 kilometres north east of Tokyo Station and 40 kilometres north of the

Narita New International Airport. The idea of a new academic town near Tokyo was developed in 1963 and the Master Plan for the Tsukuba Academic City was prepared in 1966 to be built in a large rural area 18 kilometres long and 6 kilometres wide with a target population of 200,000. The Act for Construction of the Tsukuba Academic City was passed in 1970. Allen, a professor at the University of Massachusetts, describes the new science town development of Tsukuba city as 'Japanese innovative ideas for urban development toward the twenty-first century' more influenced from the Soviet model of Akademgo rodok (Allen 1983). The urban area around the site of the proposed science new town in 1966 was 2 km^2 of the Vehicle Running Test Centre and one km^2 of golf courses. No land use change was seen in the rural metropolitan fringe alongside the new town area during the period 1966-1976.

6.4.2 Reasons for the failure of Tokyo's Green Belt

Sakai (1982) points out that Tokyo's Green Belt failed to be implemented because it was faced with strong attacks by its residents in the circumstance of the expanding Japanese economy. He did not explain why people in the Green Belt area did not welcome it when in England, in similar circumstances, the idea was accepted. It will be analysed further in terms of background of the Green Belt planning in the 1950s, the planning of large existing urban settlements and areas of high development potential within the Green Belt.

With regard to the planning background in the 1958 plan, the main issue for the National Capital Region Development Plan was to solve the problem of congestion in Tokyo, believed to be a consequence of the high concentration of industry and population, causing traffic congestion and housing shortages. To solve these problems, the plan suggested that Tokyo Ward District be retained as it was, with the inevitable suburban expansion to take place by land redistribution projects in the outer wards. In the Yokohama Area, industrial and commercial development was promoted and the hinterland was to be developed to become a large residential area. It was thought that if work-places and houses were situated close together, traffic

congestion and population concentration would be avoided. Tama District's growth was required to be controlled because continuous suburban expansion in the west tableland would induce more commuters to travel into Tokyo Wards District and so put heavier pressure on the centre and subcentres. So, Tama District was chosen to have its growth restrained. The existing industry was not to be allowed to enlarge its manufacturing space nearby and residential development was to be controlled also. It was decided to house incoming people from other regions in suburban cities beyond the Green Belt where extensive industrial and residential development was planned.

However, planners of the 1950s miscalculated the enormous development of service industries in the city centre. They relied too much on industrial distribution into Yokohama and the outer development cities. When the Japanese economy rapidly expanded in the 1960s and 1970s it was found to be realistic to concentrate jobs and people in the principal city, where administration, business, finance, communication, culture and even industrial production was becoming stronger. Therefore, large suburban growth was accepted as inevitable over a wider commutable area in the region. So the west tableland Tama area became the first and largest suburban residential area and the near Green Belt area was extensively released to meet the increasing demand for land. It would appear to have been unwise to introduce the Tokyo Green Belt in the most active area of Tama and in the active north and east corridors. It would seem inappropriate from the beginning that the large existing urban settlements of Kogenei, Kokubunji, Fuchu, Ichikawa, Funabashi and so forth were covered in a Green Belt.

The time when the Green Belt around Tokyo was embodied in the planning stage was the war-damage reconstruction period of the Second World War. After the Korean War of 1950-1953, the Japanese economy recovered to its pre-war level of production. The international balance of trade was turned from a hopeless situation to a positive one in 1956 for the first time in the post-war period. Tokyo's regional economy had just started to recover its vitality on entering the 1950s. The reconstruction and revitalisation of Tokyo was the

main target to be undertaken with pride and enthusiasm. Control of urban growth and the enhancement of the urban environment were not seen as priorities at that time and the strong controlling tool of a Green Belt was unsuitable to the expanding Tokyo.

It was not surprising therefore that the residents in the Green Belt area would not agree to accept this strange constraint and actual building control regulations could not be prepared. Suburban expansion throughout the Green Belt area and beyond was recognised as inevitable. Tokyo's Green Belt was repealed in 1966 by the amendment of the Act and was replaced with the opposite concept of the 50 kilometre zone in the 1968 plan.

6.4.3 Suburban expansion in the Tokyo Region with a Green Belt

In two decades from 1955 to 1976 unlimited suburban growth occurred in the whole of Metropolitan Tokyo to a 50 kilometre radius. By 1976 the previous areas of ribbon development and star-shaped urban area no longer existed because Tokyo was now one single great conurbation area spreading in all directions. Rural areas only remained in hilly and swampy areas and even many of these areas were undergoing construction and could not be safe from the energetic suburban expansion. Once urban containment policy was rejected in Tokyo, suburban growth expanded seemingly endlessly outwards; in the early stage growth occurred with rounding-off around Tokyo, ribbon development from Tokyo and between large regional cities. At the end, however, development permeated the whole of the metropolitan area.

Tokyo provides a good example of failed urban containment in a large city region. Tokyo now has unrestricted urban sprawl to the limits of the metropolitan area. Endless areas of building can be seen some 70 kilometres to the south and east coastal areas, for 50 kilometres westwards up to the foot of the Tama mountainous area and along the long and narrow northern corridors that extend for over 50 kilometres. Without stopping greedy suburban expansion with a buffer zone of Green Belt it has taken over their metropolitan area as a whole.

PART FOUR

SEOUL METROPOLITAN REGION

CHAPTER SEVEN

SEOUL'S GREEN BELT

7.1 Introduction

This chapter presents the literature review on Seoul's growth and the Green Belt, and analyses the problems of urban containment. The first section is the introduction, the second section (7.2) describes the geographical character of Seoul, Seoul's growth and the regional growth control policies. Section 7.3 introduces the early Green Belts in the Seoul Region, and the following section (7.4) discusses implementation of Seoul's Green Belt. Section 7.5 summarises land use control provisions and the problems in the Green Belt. Section 7.6 describes management of the Green Belt and the last section (7.7) introduces previous studies on Seoul's Green Belt.

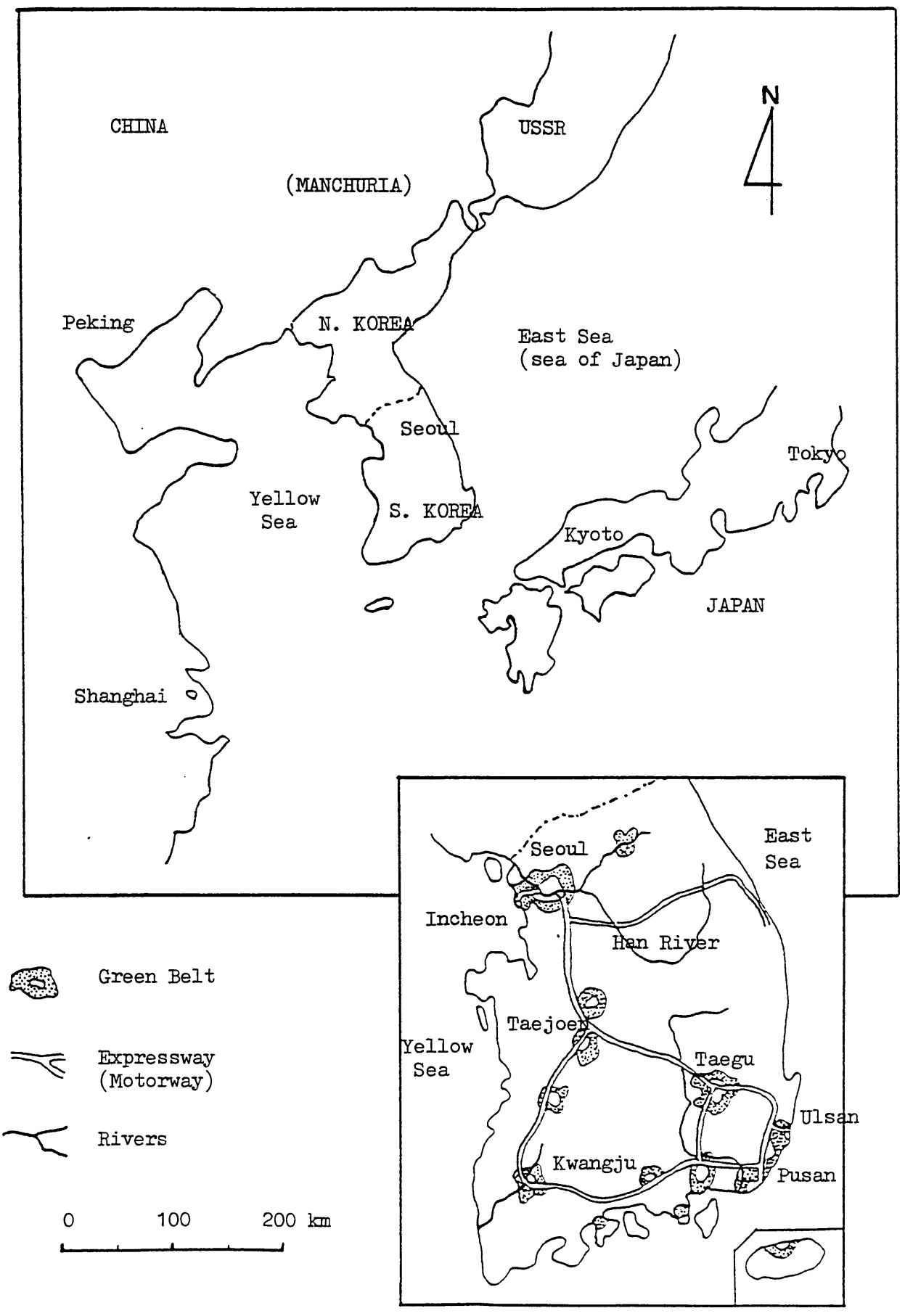
7.2 Seoul's growth and its control

7.2.1 The geographical and historical character of Seoul

Seoul is located in the heart of the Korean Peninsula and has been the most important area in Korea for thousands of years of her history. Due to the Han River, the area has geographical advantages of extensive agricultural land, water resources for irrigation and transport, and defence against enemy invasion. Two thousand years ago when the peninsula was divided into three countries, the Han River Basin was the most strategic location for the control of the other countries. Whoever occupied this heartland was able to strengthen and unify the whole nation. Seoul became the new Capital City in 1392 (see Figure 7.1).

The extent of the new, stronger Korea stretched over Manchuria, the north east region of China, and colonies were established in Japan. When China unified to become one powerful country she invaded Korea and sometimes controlled the peninsula. When Japan strengthened her power she crossed the Korean Strait to invade Korea. At the end of

Figure 7.1 - Geography of South Korea



the nineteenth and early twentieth centuries Japan had victories in the wars against China and Russia. Japan incorporated Korea into the land and built a puppet government in Manchuria. Under the 1940 Central Plan, Japan had planned to move the Japanese capital to Seoul, the centre of Far East Asia between the Japanese isles and the Chinese continent (Kim 1982).

After World War Two the peninsula came under the influence of the USA and USSR and Korea was divided into two parts by the 38th parallel line; North Korea under the Communist Government and South Korea with a capitalist system of government. From 1950 to 1953 the Korean War virtually destroyed the whole country. Possibly two million people lost their lives, a quarter of the houses in South Korea were damaged and 40 per cent of industrial production collapsed. The Capital City, being the most serious battlefield, was almost totally ruined (MacDonald 1990, Chosun Ilbo 25 June 1990).

In May 1961 President Park took power by military coup and achieved an economic miracle out of the miserable situation. The country prepared a five year economic development plan and the per capita income soared over the next three decades from 83 US dollars in 1960 (Kim 1986) to about 5000 US dollars in 1990 (Chosun Ilbo January 1990). South Korea became a newly developing industrial country. However the fear of war has not disappeared in Seoul even after forty years. South Korea has struggled to build up her living standard on the one hand and on the other to defend herself against the aggressive North Korean regime. Seoul is located only 40 kilometres or 25 miles away from the border between South and North. Most of this area from Seoul northwards to the border is the Demilitarised Zone. These are the circumstances under which Seoul has grown to become a large city with a population of over ten million people in 1988.

Despite the rapid growth of Seoul, the Capital City has been well planned and its natural beauty and surroundings have been preserved. Ju, a member of the Economic and Science Advisory Committee, and later a Minister of Construction, looking down at Seoul City's

landscape from the high-rise Government Office building in the city centre points out:

> A beautiful belt of green area starts from Mount Bukak (North Mountain) and stretches to the central city street of Chongro. The Green Belt embraces Mount Namsan (South Mountain in the city area), runs through the National Army Cemetery (across the Han River) and reaches Mount Kwanak (Corona Mountain). So, the city area has been arranged with Green Belt axes of a vertical central green area as well as a horizontal green axis by the Han River and the tributary in the city centre with endless picturesque mountains as the heritage of Seoul (Ju 1971) (see Figures 7.2 and 7.3).

7.2.2 Population growth

In the first census in 1428 after the old country was built in 1392, the population in old Seoul amounted to 103,328 residents within the walled city. As the city was prosperous and urban growth was continuing in the fringe, the city administration boundary expanded to double its original size as did the population, growing to 194,034 by the 1667 census. The city size remained stable for the next two hundred years and in 1864 the population was reported to be 303,639 people (Son 1977). Population rapidly increased during the present century. The 1932 census counted 374,908 people and, in 1943, just before the end of World War Two Seoul had almost one million people (Kim 1982).

During the changing political situation, when Korea became independent from Japan in 1945 after thirty six years, 2.4 million people returned from overseas. Another 4 million people came as refugees from the Northern Communist regime to the place of freedom in the south. The country had suffered from poverty, homelessness and the injuries from the Korean War. When the military coup swept the hopeless Capital City in 1960, Seoul had 2.5 million people (SCG 1984).

Table 7-1 - Population Increase in Seoul City

Population : Persons

Year	Population	Notes
1428	103,328	Surrounding area - 6,044
1667	194,034	Area expanded
1864	202,639	
1907	199,325	
1932	374,908	Korean 265,904, Japanese 104,656
1943	930,547	
1950	1,693,224	
1955	1,574,868	
1960	2,445,402	Annual average increase rate in 1960s = 8.8%
1966	3,793,280	
1970	5,525,262	Annual average increase rate in 1970s = 4.0%
1980	8,366,756	
1988	10,280,000	

Sources: 1428 -1907 from Son, 1977

1932,1943 and annual average rates in 1960s and 1970s from Kim, 1982

1950 - 1980 from GCG Statistics Yearbook, 1984

1st November 1988 from Cho Sun Il Bo on 10 January 1989

Since Economic Planning was promoted in 1962 by the strong centralised government, economic development has been achieved. The Capital City has become the centre for population, industry, education, administration and culture. When the First Five Year Economic Plan was ended the population had increased to nearly 4 million. By 1970 the population in Seoul had grown to over 5.5 million. During the decade of the 1960s the net increase of population in Seoul City was 3 million and the annual average increase rate was 8.8 per cent. This exponential increase in the population caused a serious national security problem, as well as the growing pains of problems with housing, transport and the environment. In January 1968, North Korea sent her army to Seoul to assassinate President Park in the Presidential House. The South Koreans could not forget the tragedy of the Korean War and the assassination reminded them how dangerous the concentration of a population of over 5 million in Seoul was, only 40 kilometres, and a few minutes by air, from the still unstable border.

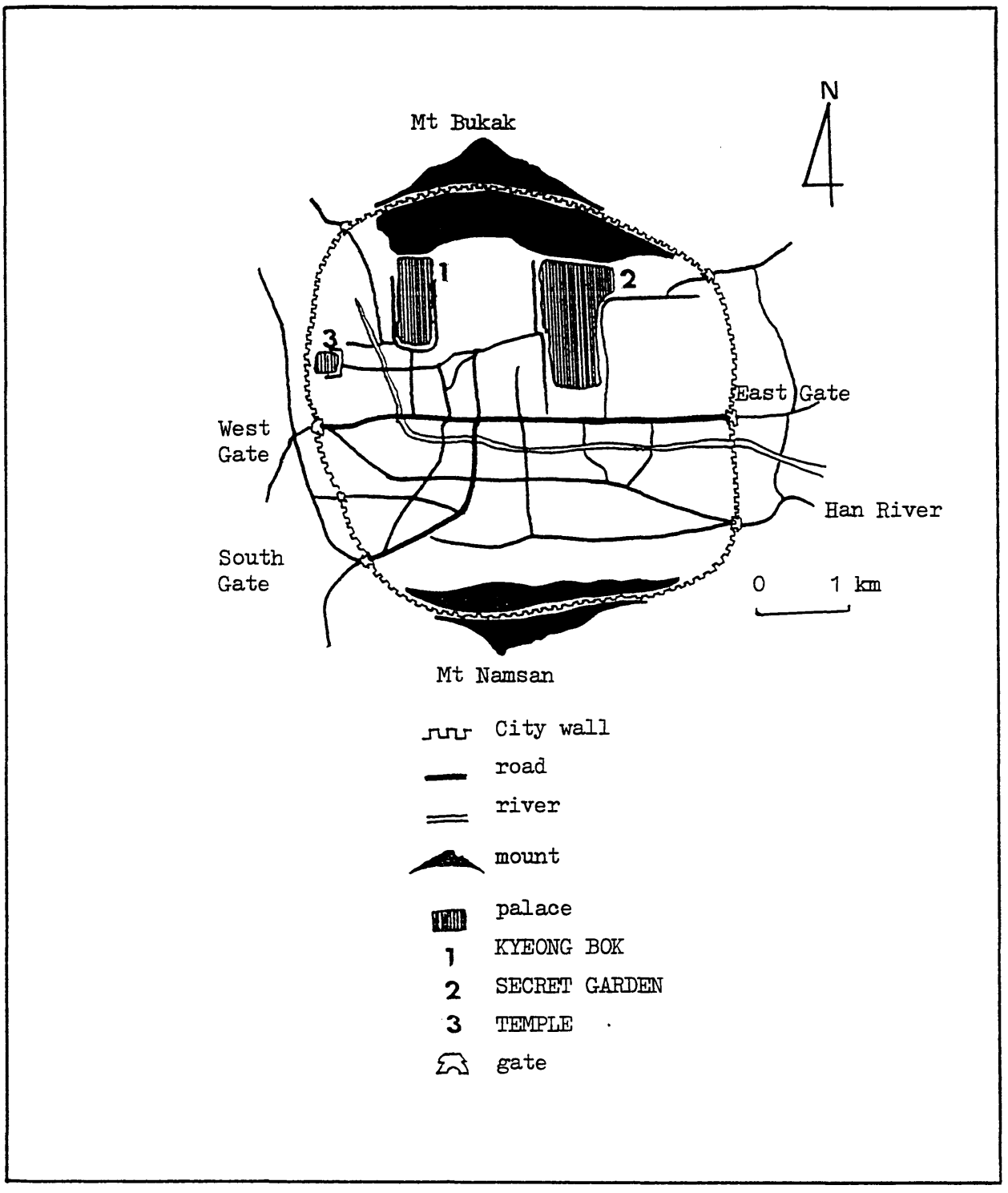
Population growth in Seoul has been strictly controlled by planning policies which continued during the 1970s and 1980s. However in 1988 the population of Seoul City exceeded ten million (Chosun Ilbo 1989 January) (See Table 7.1)

7.2.3 Urban growth in five hundred years

7.2.3(a) The old walled city

When the building of Seoul as a new capital city began in 1394, the location was chosen because of the beautiful landscape in an area of extensive flat land with a good transport network by road and water. Seoul was developed as a planned walled city under an oriental planning principle of wind-water-land. The built township of the old city harmonised with its beautiful surrounding landscape (Figure 7.2 shows the Old Seoul City Map). The encircling city wall was constructed along Mount Bukak (North Mountain) in the north, Mount Naksan (Pleasure Mountain) in the east, Mount Namsan (South Mountain) in the south and Mount Inwan in the west. The areas in the north and

Figure 7-2 Map of Old Seoul City in 15C and 16C



Source: SMC (1977), Old City Map in the History of Seoul City Planning

south are so high that they could not be used for building purposes. The east and west directions were lower and more open. The main road of Chongro in the old city was constructed to run in an east/west direction and linked the East Gate with the West Gate. The South Gate was extended from the main street. The city developed area was divided into parts. Palaces where the ruling people lived were situated in the northern part at the foot of the picturesque mountains. The middle area around Chongro was used as the commercial area. Even now Chongro and the South Gate area is the busiest business area in Seoul. The southern area served as a residential area for non-ruling people of high class and poor scholars. The road pattern was designed in a gridiron type. Land subdivision and building regulations were provided.

Many ordinary people had to live outside the wall in the east and west. Farmers and workers lived in the east flatland. Lower public servants and working class government workers lived outside the West Gate. A Chinese town was made in and outside another small West Gate. Vegetables and dairy necessities were delivered from the eastern hinterland through the East Gate. Rice, fish and fish sauces and salt were transported through the South Gate from the southern area and Han River. The West Gate was more important for official uses as a military and international route to China and as an external trade route. So, the East Gate market and Chekidong-Chung Yangri Markets outside the East Gate, the South Gate market and the outside South Gate Fishery market (now moved outside the gate) have remained prosperous to the present day. The old city area consists of the present central business area and core area of the city.

As the area outside the Wall became extensively developed, the old Seoul administrative area was extended to include the outer urban area around 1667. The population doubled in the capital city at this time.

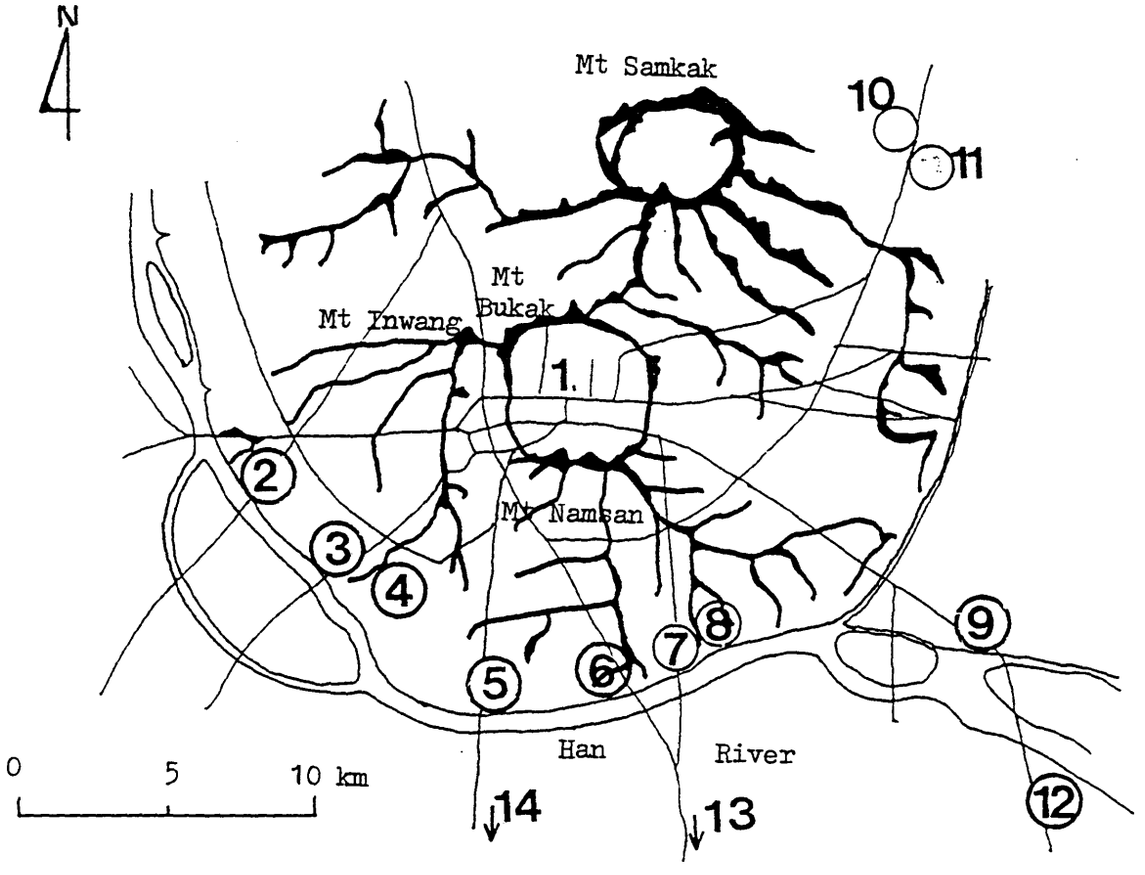
7.2.3(b) Satellite towns and new towns in the 17th and 18th centuries

Figure 7.3 shows the Map of Old Seoul and its satellites around 1789. Beyond the extended city developed area, several commercial towns had been developed along the Han River. The river transportation was very important to move the main commodities of rice, fish, fish sauce, salt, fuel and other heavy commodities through the Han River to the Yellow Sea so many river towns had been located along its banks. Seo Kang Port was used for rice transportation and warehouses, Mapo Port for rice, fish and fish sauces and salt and Dong Zak Jin as a junction town for crossing the river. Seo Bing Ko, which means West Ice Warehouse, was a location for ice factories, fish and food industries. Han Kang was developed as a ferry town and a market town. Dumapo and Duksum ports were located up river as market towns of the east hinterland and stored fuel and charcoal in the port areas. The first group of satellite towns had been mainly developed with commercial activities at river crossings and approximately four kilometres from the South and East Gates. The term 'Sung-Jea-Ship-Ri' means 'other towns within four/five kilometres from the wall gates'.

The other group of satellite towns had been developed in the outer area within 10-15 km from the gates. Ruwon and Nowon were market towns in the north-east hinterland, Songpa was a large market town serving the south-east region, Malzukguri, which means place to feed horses, was a trade and hotel accommodation town, and Kwacheon was also a hotel and market town. These second outer satellite towns were developed for residential accommodation rather than commerce, except Songpa Market.

According to the 1789 census, Mapo, the largest satellite town, contained about 15000 people, Seokang the second largest contained about 6000 people, the rest of the towns had a population of 3000 - 4000 people. Mapo had a very similar size to large cities in Korea at that time, Seokang a similar size to provincial cities and the

Figure 7-3 Old Seoul City and Satellite Towns around 1789



	Mountains	7	Han Kang
	Road	8	Du Mo Po
	River	9	Duk Sum (2nd Group)
1	Old Seoul (1st Group)	10	Ru Won
2	Seo Kang	11	No Won
3	Mapo	12	Song Pa
4	Young San	13	Malzukguri
5	Dong Zak Jin	14	Kwacheon
6	Seo Bing Ko		

Source: Son (1977) from the original map in the eighteenth century by Kim, Cheong Ho

other satellite towns were a similar size to the regional medium-sized towns.

Meanwhile with the promotion of commercial activities through the country and the capital region, academic activities became very active in the seventeenth and eighteenth centuries. Practical Confucianism was developed in Korea and named Shilhalk - Practical Confucianism which studied Confucianism, science, and western technological Christianities. The practical scholars advised the building of a new town, Hwasung, 30 kilometres south of Seoul, now known as Suwon City. To build the new town, new technology and science were applied and to improve its local economy, commercial promotion policies were used. When the new town was built in 1792 the distance of 30 km from Seoul was regarded as sufficient to make it beyond the city's influence so that the commercial activities would not be in competition with the other existing commercial satellite towns in outer Seoul.

As for data sources on urban growth in Seoul before 1945, Kang argues that the old town development history of Seoul should depend on two scholars' works, those of J M Son and Y W Kim, because the old data was not easy to understand from the ancient description and uniquely these two scholars worked on the histories of the urban society of Chosun, the old kingdom of Korea and of national planning in Chosun (Kang 1986).

7.2.3(c) Urban growth in the changing political periods of the early half of the twentieth century

The first railway was constructed between Incheon and Seoul in 1900 and the railway between Busan and Seoul was completed in 1905. The commercial river towns lost their priority to railway transportation. Mapo, Seokang, Yong San and Han Kang were declining in urban prosperity. A large railway terminal was located in the outskirts of Yongsan, Han Kang and Mapo. Seoul Central Station was located beside the South Gate. Trade activities were concentrated into the central

area of Seoul from the outer ports. The South Gate became the largest market in Korea as well as in Seoul.

When the Japanese Army came at the beginning of the twentieth century, they camped in Yong San between Mount Namsan/Seoul Railway Station and the Han River in the large flat area (Son 1982). The hillsides outside the existing developed area were developed for new residential areas for increasing numbers of Japanese. Their main residential areas were located in the south and west areas on newly developed land situated in a flat and hilly area between the existing city area and the first group of satellite towns.

With employment of the 1934 Chosun Built-up Area Planning Regulation to apply to Seoul in 1936, Seoul City prepared for a further large expansion of new suburban area by Japanese immigrants. After World War Two ended in 1945 the Japanese returned to their country and many Koreans came back to their home country. Shortly after this, millions of people came down from the Communist North and settled in war damaged Seoul. Large shanty towns were developed in the city walled area, the reserved park area, and surrounding hilly areas. However, the main site of the worst living conditions was developed in the hilly background of the newly developed residential area and the old satellite towns. Several areas in the central area were planned to be rebuilt for postwar residential area programmes and implementation took place on a small scale until 1954 (see Table 7.2).

7.2.3(d) Great suburban expansion in the 1960s and 1970s

The national economy moved to an expanding mood from the completion of the first Five Year Economic Development Plan in 1967. The determined central government used their absolute powers for social and economic revolution. People as well as service industries were concentrated in the capital Seoul City and the city's size would soon exceed its optimum capacity for residence. When the city planning boundary was expanded to more than double from 270 km^2 to 596 km^2 in 1962, the optimum population goal of 1985 was estimated to be 5.6

million in the total area of 851 km^2 which included the periphery beyond the city boundary. Out of this area the possible residential area was calculated to be 573.8 km^2 mainly in Seoul City and the surrounding provincial area to provide housing for the increasing population. So, in 1963 the city planning area was expanded again to 713 km^2 (SCG 1977).

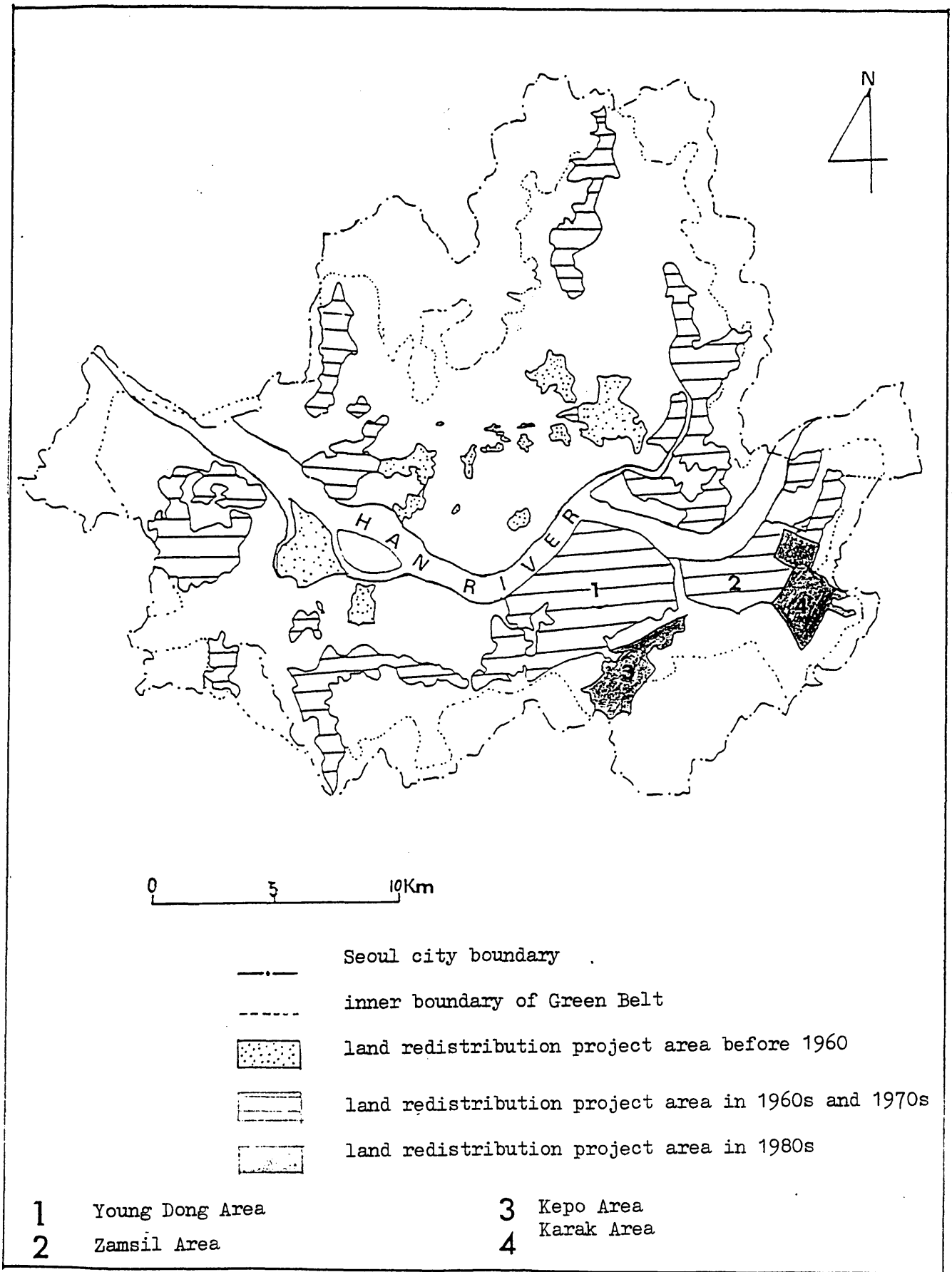
Great suburban growth was achieved by the employment of land redistribution[1] in the city fringe. Figure 7.4 shows how Seoul's suburban growth developed. Until 1960, small scale project areas were developed or redeveloped in the central area but during the two decades between 1960 and 1979 all the city fringe was developed to become urban area. The new suburbs included the second group of the old satellite towns from Nowon and Ruwon in the north to Malzukgeri and Songpa before 1980 (see Figure 7.3). The two hinterlands of Malzukgeri and Songpa were added to the suburban development in the 1980s. Table 7.2 shows the development of land around 1965 the largest area was given permission to develop by land redistribution programmes. In the 1970s the development area was expanded to adjacent areas already developed in the 1960s. In comparison with other cities, there has been no example like Seoul which achieved such great suburban expansion with employment of land redistribution (Unwin 1909 and GLRPC 1929, Miller 1963, Bae 1983, Dawson 1984, Okita 1984).

In practice the great extensive suburban expansion in the south east part of Seoul across the Han River has created a new South Seoul rather than constituted suburban growth. it consists of the Young Dong Project Area which covers over 30 km^2, Zamsil Area (11.2 km^2), Gepo Area (6.5 km^2), and Karak Project Area (7.5 km^2). Most of these projects were carried out by the City government. However, this

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[1] Land redistribution provides large areas of building land and community facility land such as roads, open space, educational and other public facility land, from development of mainly undeveloped land at the edge of a city. Most of the development cost of the project is funded from selling reduced land, which is shared among land owners. Therefore, this project does not usually need public spending. It was developed in Germany during the nineteenth century and contributed urban extension of many cities in Japan, Korea and Taiwan.

Figure 7-4 Suburban Growth by land redistribution in Seoul City



Source: Author's drawing based on the information and cover map of History of land redistribution in Seoul by Seoul City Government (1984)

Table 7-2 - Suburban Expansion by the Land Redistribution in Seoul City

Commencing Date	Number of Project Areas	Area	Authority
		(km^2)	
1937-40	10	16.8	Seoul City Government
1952-54	9	1.2	" " "
1960-68	17	58.4	" " "
1970-79	11	39.9	" " "
After 1980	4	14.4	" " "
1969-81	4	5.8	Land Owner Association
1967-70	3	1.9	Housing Corporation
Total	58	138.4	

Source: SCG (1984), Seoul Land Redistribution History pp 20-23

great urban development was achieved without direct financial support from the government by employing the land redistribution method which was developed in Germany. Through this method the newly developed suburban areas posed no financial problems to the city in the preparation of urban infrastructure such as roads, parks, water catchment areas in the lower land and educational land for children. The land redistribution scheme has become the most effective urban development tool in Seoul. By its use Seoul has become a very rapidly grown but well planned metropolis amongst large cities in the Third World.

When Seoul's Green Belt was designated in 1971 there were plenty of undeveloped spaces and extensive land redistribution project areas in the fringe. The strict land use control proposed by the Green Belt was not therefore recognised as a great restraint to suburban growth.

However, on entering the 1980s the remaining undeveloped area was incorporated into the land redistribution. The new development areas were now adjacent to the inner boundary of Seoul's Green Belt. This meant, therefore, that most undeveloped land inside the Green Belt was now developed or under construction. The increasing demand for urban land could hardly be met inside the Green Belt. The Green Belt now became a great restraint against the expected enormous suburban growth. Suddenly the expansion of suburban development had to be stopped at the front line of the Green Belt. That was one of the most serious urban problems facing Seoul in the 1980s.

7.3 Introduction of the early Green Belts in Seoul

7.3.1 Green Belt plans in 1964 and 1968

Green Belt in the Capital Region Development Plan 1964 and Seoul City Master Plan 1966

The First Economic Plan was prepared in 1962, and was followed by the National Physical Comprehensive Planning Act in 1963 designed to promote regional development. To use limited national resources

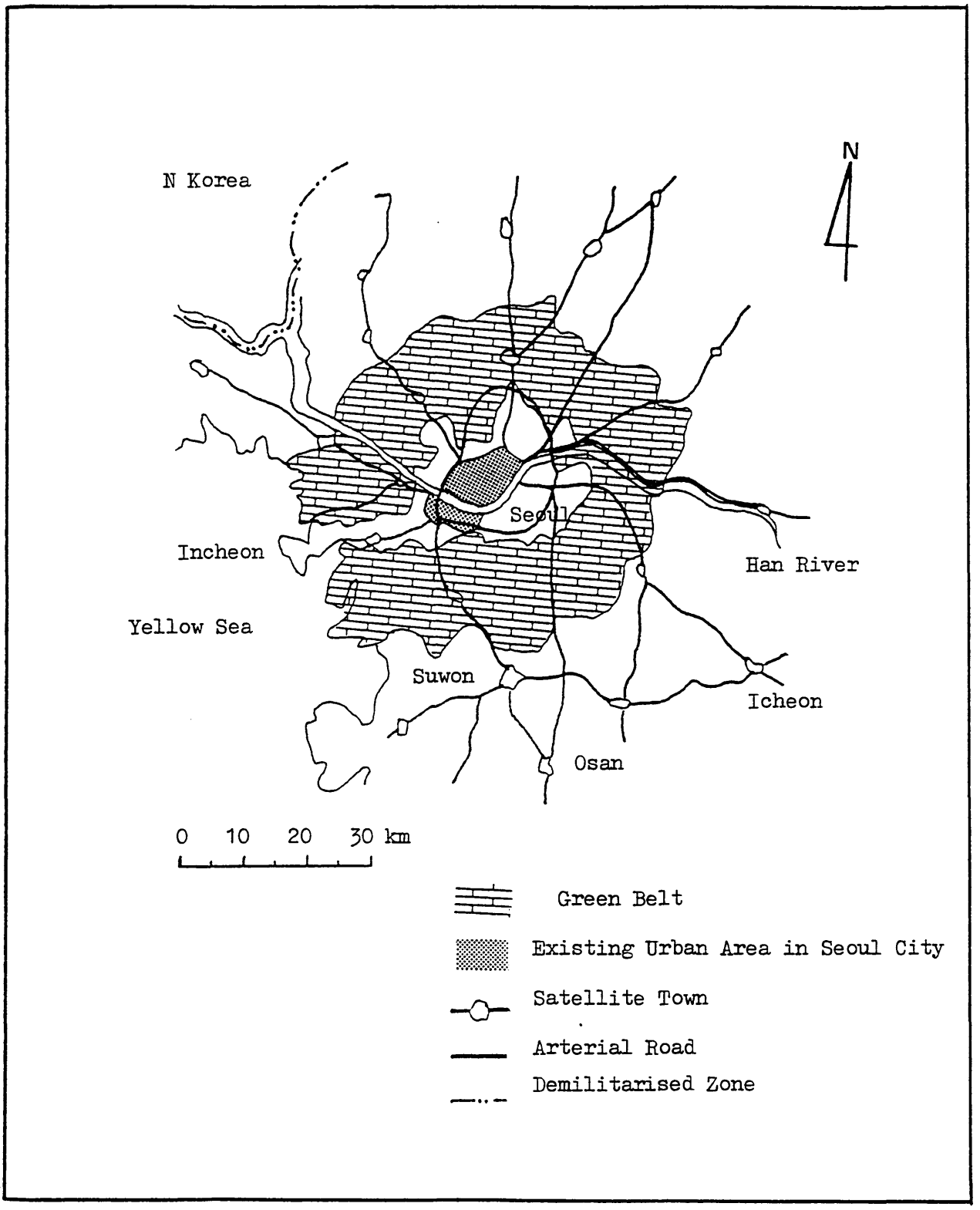
effectively, the government selected seven special regions for regional development strategies. The region between Seoul and the city of Incheon on the Yellow Sea was chosen to promote industrial development in the Capital Region at the expense of control of Seoul's growth. However, actual large investment for heavy industrial development was diverted to the construction of the Ulsan Industrial Complex on the south east coast of the Korean Peninsula rather than development of the Capital Region during the first Five Years Economic Plan between 1962 and 1967.

In the meantime, control of population concentration in Seoul City was urgently discussed; the Government realised that Seoul should not overconcentrate its population and adopted strong population control policies in the large cities in 1964 (Choi 1981). With the recommendation of decentralisation policies, a Capital Region Urban Plan was prepared by the Korean Planners Association, led by Ju in 1964. This Master Plan introduced the idea of a Green Belt to surround Seoul. Figure 7.5 outlines the Green Belt and concentric satellite towns along the radial corridors. The development potentiality of the main development corridor between Seoul and Incheon, the proposed Special Region was accepted.

Yoon points out that the first Capital Region Urban Plan had learnt from the 1944 Greater London Plan and the 1958 National Capital Region Development Plan for Tokyo (Yoon 1972). The outline of the plan followed the British idea of a Green Belt around London and the principle of new town development in respect of the existing satellite towns. The open development corridor between Seoul and Incheon can be likened to the concept in Tokyo's regional plan which employed the Yokohama-Kawasaki area as the strategic area to house the decentralisation of population and industry in the area inside the Green Belt. The idea of a development axis between Tokyo and Yokohama provided the influence behind the Seoul-Incheon development corridor, which was enclosed by the regional Green Belt.

However, the conceptual Master Plan had no power to impose the Green Belt and new town development. Seoul city government therefore

Figure 7-5 A Master Plan of Seoul Capital Region and a Green Belt, 1964



Source: CHOI, BGC (1981) reproduced map from the information on the Master Plan for the Capital Region Development Plan prepared by Korea Planners' Association in 1964

Table 7-3 - The Projected Population Distribution in the Seoul Capital Region

Division	Population in 1962	Area	Projection for 1985			Reference
			Population	Persons/ha	Increase	
	thousand	km^2	thousand		thousand	
Central Built-up Area	800	250	2,000	150	1,200	Radius 8 km
Suburban Area	200	500	2,300	70	2,100	" 8-15 km
Green Area	400	1,300	600	10	200	" 15-25 km
1st Metropolitan Influence	1,600	4,100	2,000	15	400	" 25-45 km
2nd Metropolitan Influence	3,000	16,400	3,100	6	100	" 45-120 km
Total	6,000	22,500	10,000		4,000	

Source: SGM (1977) pp 182-183

First four subdivisions (excluding 2nd Metropolitan Influence) covers 6,150 km^2

prepared a Master Plan in 1966 in line with the regional planning concept, suggesting a Green Belt for Seoul's fringe between 15 and 25 kilometres from the City Hall, of an average width of ten kilometres. This earlier regional plan designated five subdivisions in an extensive metropolitan area of 22,500 km^2, central Built-up Area, Suburban Area, Green Area (Green Belt), First Metropolitan Influence and Second Metropolitan Influence. The Green Belt was proposed to contain the Central Built-up Area and the Suburban Area and covered 750 km^2.

Table 7.3 shows projected population distribution in the Seoul Region. Total population was estimated at 6 million in 1962, increasing to a projected 10 million by 1985 in the Seoul Metropolitan Region with its influence extending up to 120 kilometre away. The 1962 population distribution in the five subdivisions is doubtful because the census shows about 3 million in Seoul City which consists of the Central Built-up Area and the Suburban Area in Table 7.3 and population statistics in the Plan show only eight hundred thousand in the central area and two hundred thousand in the suburban area. The outer planning boundary of the capital region was suggested to be located 120 kilometres away from Seoul City. The second Metropolitan Influence located between 45 and 120 km would seem to be out of reach of Seoul in those days. The regional plan was prepared so roughly that basic population information was not collected. Nor did it consider national security, presenting concentric regional development in the form of an outer ring of satellite towns and showed no regard for development taking place in North Seoul towards the Demilitarised Zone. The regional plans were not actually adopted by the government in the 1960s and Seoul's growth continued without a Green Belt.

7.3.2 A Green Belt Plan in the National Physical Plan 1971

Based on the 1963 National Physical Comprehensive Planning Act, a Master Plan on National Land Comprehensive Development was prepared in 1968. Soon after this conceptual plan was published in 1968, the Ministry of Construction was required to prepare a more practicable

physical plan for national development in accordance with public finance.

The next plan, the National Land Ten Years Comprehensive Development Plan (1972-1981), was therefore prepared to tie in with the average annual economic growth rate of 9.2 per cent projected in the Economic Plan. It was seen as necessary that the Economic Plans should be matched with the National Comprehensive Physical Plans (Kim 1982). The early Economic Plans had not been able effectively to organise national resources with resulting bottlenecks to continuous economic development, from a lack of overall social infrastructure of railways, roads, harbours, communications, electricity, water resources, industrial sites etc. To try to overcome these problems basic motorway networks and the Four Main River Basins Comprehensive Development Plan were prepared in the Second Five Years Economic Plan between 1967 and 1972. The Ten Years Physical Plan was completed in 1971.

President Park envisaged the National Comprehensive Physical Plan as follows:

> with greenery, mountains, flowing rivers with plenty of fresh water, planned cities, ordered agricultural land, a separate industrial area, a wide and complete road network, agricultural production without damage from flood and drought and increasing exports, let us build our blessed country in order to become an upper middle class country in the world in the 1980s and to have happier lives (Korea Government 1971).

The leader of the country stressed his philosophy on harmonisation between higher economic achievement and a better environment from the early stage of economic development.

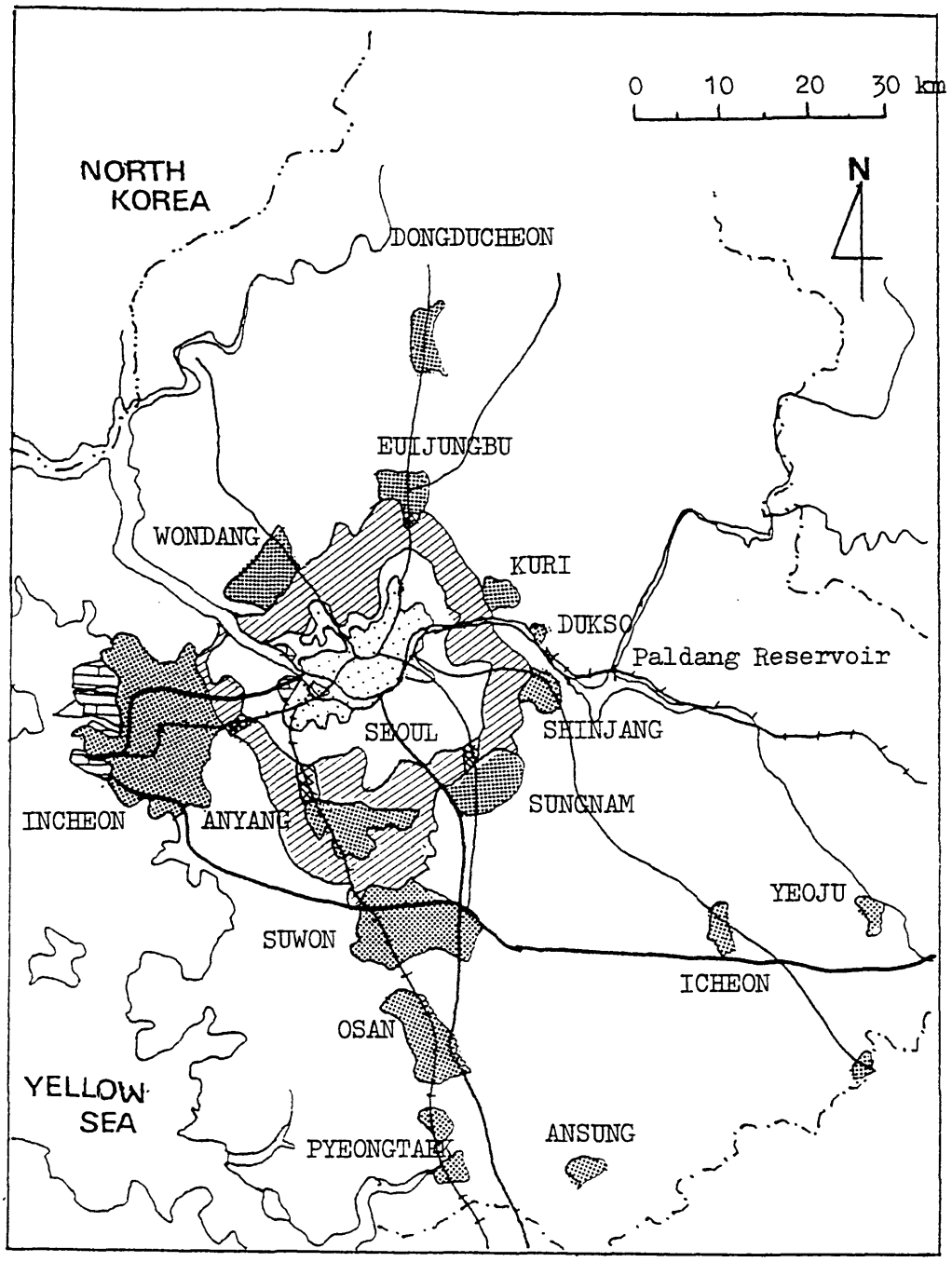
Moreover, the urban problem was addressed in the National Comprehensive Physical Plan. Population and industry concentration in the Capital City was considered a serious problem on a national

scale. The report points out that 'industrial output in the capital region represented 45.2 per cent of the nation's total output in 1970 and the trend of industrial concentration is expected to be accelerated' and that 'population in Seoul city accounts for 5.5 million or 17.6 per cent of the total population of the country' (Korea Government 1971). The National Plan recommended to keep levels of industrial output down at 29.9 per cent of the national product and population at 10,687000 people in the Seoul Region and 6.3 million in Seoul City. There are strong echoes of the 1940 Barlow Report on the redistribution of the industrial population in Britain (see para 3.2) in these concerns and proposed solutions.

In order to control Seoul's growth, the Physical Plan in 1971 strongly recommended the employment of a Green Belt around Seoul. This, it was thought, would prevent the conurbation from a possible merger between Seoul and Incheon, Seoul and Suwon, or Seoul and Euijeongbu. It stated: 'To control urban sprawl around Seoul, Seoul's Green Belt should be introduced with a radius of 15 kilometres'.

Figure 7.6 shows the Master Plan for the Capital Region Development and Green Belt within the 1971 National Comprehensive Physical Plan. It was proposed that Seoul city would be contained inside the Green Belt but a large undeveloped area left room for further suburban expansion on the city fringe. Beyond the Green Belt there was to be much urban development in the existing satellite towns. A large amount of urban development in Incheon, Suwon-Osan, Sungnam and other cities was suggested. Anyang city was enclosed within the Green Belt. However, the Green Belt was not very wide, averaging only a few kilometres in width. These proposals were not accepted by Seoul City and the surrounding cities at that time but the National Physical Plan provided the foundation for Seoul's Green Belt when it was finally designated in 1972.

Figure 7-6 Master Plan for the Capital Region Development and Green Belt, 1971



Source: MOC (1971), the 1st National Physical Comprehensive Development Plan

7.4 Implementation of Seoul's Green Belt

7.4.1 Enactment of Green Belt in the Town Planning Act 1971

Many population control policies had been carried out to curb population increase in the capital city since Seoul's population increase control policy began in 1964 but the effects of the policies seemed to be negligible. When President Park visited Seoul City Hall on 12 January 1970 on his regular New Year visit, he strongly ordered the Mayor not to allow population increase in the northern half of Seoul and to designate a Green Belt. According to his requirement the city planners prepared a Green Belt plan which was published on 10 October 1970, nine months after the date of the order. The Green Belt consisted of agricultural land, lower hills and high mountains around the Seoul city boundary. The width of the Green Belt varied from one kilometre in the lower land to six kilometres in the higher land (Back 1981). This 1970 proposal looked like a Green Girdle around the city boundary, similar to the Tokyo Green Girdle in 1939, rather than to the London Metropolitan Green Belt.

However, the Green Belt proposal was worked out by city planning officers in secret and submitted to the Minister of Construction to obtain planning permission. The Minister could not find the legal background to permit the Seoul Green Belt. An urgent amendment of the Town Planning Act was therefore required. This was achieved through a new provision in the amended Town Planning Act of 19 January 1971. The new provision stated that a Green Belt, called a Development Control Zone in the Act, can be designated in order to control urban sprawl, to preserve outstanding natural areas in the city fringe, to provide a healthy living environment for the city and citizens, and to curb urban development by the special requirement of national security.

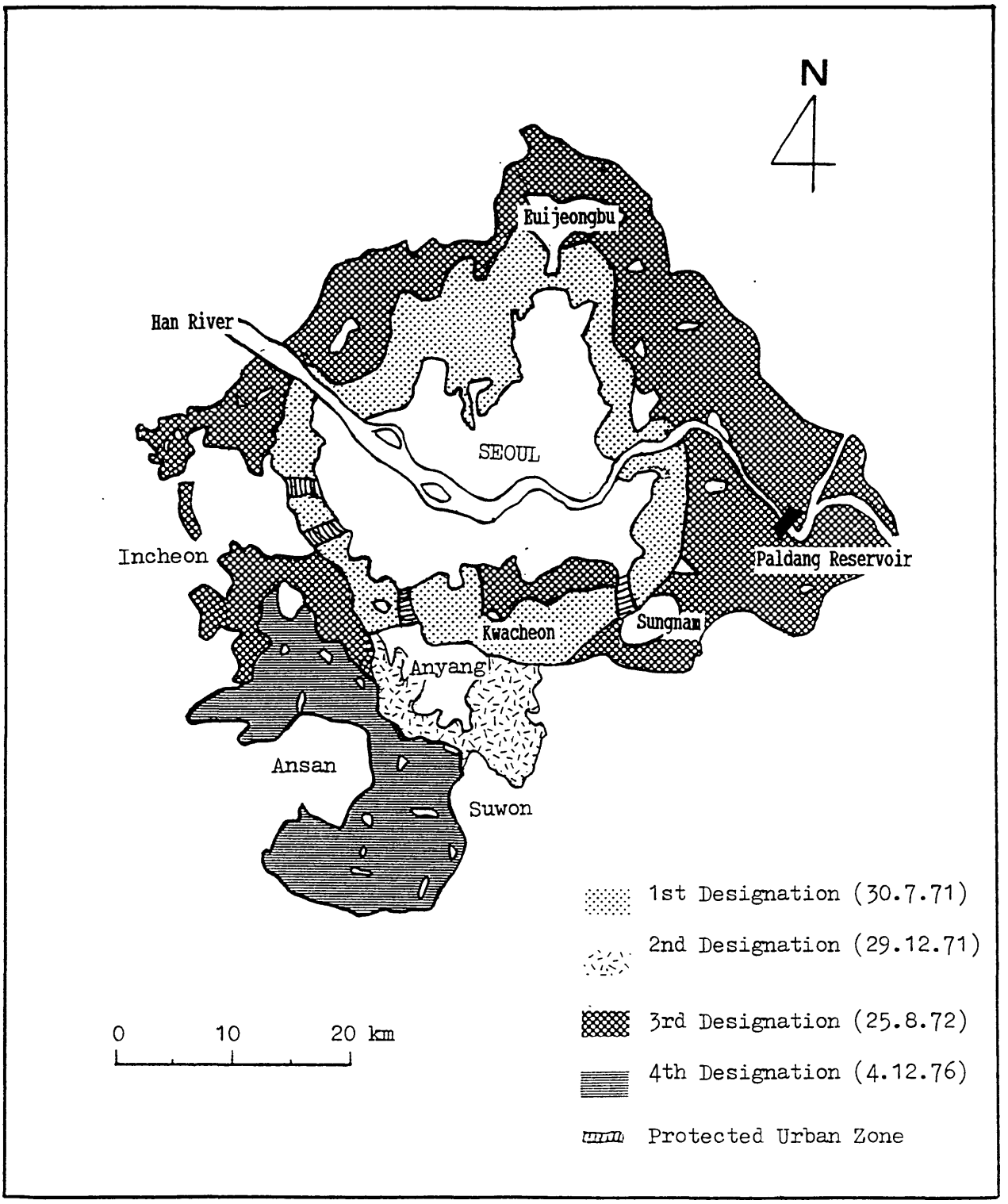
7.4.2 Designation of Seoul's Green Belt

7.4.2(a) The first designation on 30 July 1971

Five months after obtaining legal support, in early June 1971 the determined President called together in his office the Minister of Construction, the Seoul Metropolitan City Mayor and the Governor of Kyongki Prefecture, surrounding Seoul Metropolitan City, and ordered them again to prepare a Green Belt around Seoul. One week later on 14 June 1971 the first Seoul Green Belt was reported to the President by the Ministerial planners (Kim 1982). The Green Belt map was the same as the previous proposal prepared by Seoul City in 1970 which had been rejected by the Minister of Construction. The shape of the Green Belt shows the narrow Green Girdle style drawn along the boundary of Seoul City (Figure 7.7). The proposed Green Belt area included wide areas of hills and mountains and narrow agricultural areas. Much of the mountain area overlapped with the Bukak National Park and other regional and city nature parks.

On 30 July 1971 the first Seoul Green Belt was announced in public and designated. People did not clearly understand how strictly a Green Belt affects land use control within the Belt. They perhaps thought the government had introduced a new regulation of city planning. The Green Belt was designated 15 kilometres away from the City Hall with a width of between one and nine kilometres. Continuous strips of Green Belt encircled the city area with the exception of a few corridors in Seoul-Incheon, Seoul-Anyang, Seoul-Sungnam which were kept open and in Seoul-Euijeongbu in the north east corridor which was left half open. Most of the satellite towns were located outside the Green Belt because the first Green Belt area consisted of mountains, hills and farmland. Exceptionally, the north-west densely developed area was included in the Green Belt, because the location was near to the Demilitarised Zone, some 30 kilometres away. The area of the Green Belt was 463.8 km^2.

Figure 7-7 Designation of Seoul's Green Belt



Source: BAEK (1981), Seoul Green Belt Map

7.4.2(b) The second designation on 29 December 1971

Almost immediately after the designation of the first Green Belt suggestions began to be made for more designations. As the 1971 National Physical Comprehensive Ten Years Plan had suggested a Green Belt in Seoul Region which would have contained Anyang City (see Figure 7.6) the hinterland of Anyang was included in the Green Belt area before the end of the year. The area has a beautiful landscape including Mount Cheong-ke (Blue Valley) in the east, Mount Suryo (Most Beauty) in the west and the splendid and historical Jijide Downs between Anyang and Suwon in the south. There was an urgent need to preserve this area of outstanding beauty which was very vulnerable to urban encroachment from the city areas of Seoul and Suwon. When the first Green Belt was announced in July 1971 speculative development occurred in this area. So, on 29 December the Anyang area of 86.8 km^2 was added to Seoul's Green Belt. However, the east boundary of the added Green Belt was carefully manoeuvred in order to maintain development potential in the Seoul-Pusan Motorway Corridor between Seoul and east Suwon. The outer boundary of the Green Belt in the development corridor was delineated along the topographical line of 200 metres above sea level (Baek 1981). Therefore, the development corridor in the east of the second designated Green Belt was mostly excluded from the restraints.

At the same time Pusan, the second largest city in South Korea and situated on the south east coast, also acquired a Green Belt area of 597.1 km^2 .

7.4.2(c) The third designation on 25 August 1972

The Green Belt policies were largely reviewed after one year from the first designation of Seoul's Green Belt. It was found that the control of population increase in the Capital Region and other regional and urban development policies, were generally operating effectively and in co-operation with each other but that satellite town development beyond the first Green Belt was required to control possible urban sprawl. There was a danger of coalescence of the towns

and villages on the outer boundary of the Green Belt. The Green Belt therefore was reviewed in order to contain the surrounding towns within an extended Green Belt (Figure 7.7). However unlike Japan where the medium-sized existing towns and many rural centres were covered by the Green Belt, in Korea they remained as urban islands within the Green Belt, more on the British pattern.

Therefore Sungnam and Euijeongbu cities became large urban islands where some hundreds of thousands of people lived, and many medium-sized towns also became large satellite developments located within Green Belt islands. The largest development corridor of Seoul-Incheon was not closed by extension of the Green Belt. Large areas were left as open land for further urban growth inside the newly extended Green Belt. This development corridor was prepared extensively along the railway, motorway and trunk roads between Seoul and Incheon. The northern territory beyond the first Green Belt in the north, was to be included in the expanded Green Belt despite having dense settlements in the north-west corridor, which is the shortest route to North Korea. No urban islands were created in the busy north-west corridor.

Surprisingly, an expansion of Green Belt area inside the existing inner boundary of the first Green Belt occurred in a suburban area of south Seoul. The zoning of the area was residential in the Seoul City Planning Area. The area was expected be included in a new land redistribution scheme for suburban growth in the near future.

The greatest expansion of the Green Belt on the third occasion was the inclusion of the eastern rural area in the Han River catchment. A large area with less general possibility of urban sprawl was integrated into the Green Belt area to provide development control around the Paldang reservoir and the River Basin.

As a result an area of 768.6 km^2 was additionally incorporated into Seoul's Green Belt on 25 August 1972 and the Green Belt's width was increased from 15 km to 35 km wide. Along the upper river basin, the width of the Green Belt was extended to over 20 kilometres. The

extended Green Belt contained most of the existing satellite towns around Seoul within approximately 30 kilometres.

Taeku, the third largest city in South Korea was given a Green Belt on the same day as the third designation of Seoul's Green Belt.

7.4.2(d) The fourth designation on 4 December 1976

In 1976 the Central Government decided to develop a new industrial town in the capital region, to house overspill and for redistribution of overcrowded industry from Seoul to an area about 30 kilometres away beyond the Green Belt. The location of the industrial town was announced to be on the west coastline between Incheon, Suwon and Anyang. The distances from those cities to the new town was between 10 and 15 kilometres. With such proximity to these existing cities, it was feared that development in the new town might merge with the neighbouring cities whereas it was intended that it should be a separate and independent town development. They feared that when it was completed disorderly expansion would continue beyond the new town planning area. It was thought that extension of the Green Belt could be the best way to develop the new town under a self-contained development principle. The large hinterland behind the new town beyond the outer boundaries of Seoul's Green Belt around the outskirts of Incheon, Anyang and Suwon, was therefore designated to be included in the Development Control Zone. The added Green Belt area was 247.6 km^2 and the date of the fourth designation was 4 December 1976.

The result of the four designations was that Seoul's Green Belt Area became 1566.8 km^2 in total. After 1976 no additional area was incorporated into the Green Belt and almost no more boundary changes occurred. The inner boundary of the extensive Green Belt designated in the Seoul Region was located at 15 kilometres from the city centre and the Green Belt outer boundary extended to over 40 kilometres from the city centre at its widest.

7.5 Character of designation of the Green Belt

Designation of Seoul's Green Belt can be characterised as being for physical control over Seoul's growth, especially in the northern half of Seoul City, and for prevention of urban sprawl in Seoul and the satellite towns, while including a large development area for suburban expansion inside and outside the Green Belt. Environmental protection has also been a main goal of Seoul's Green Belt and control of land speculation was used as a subsidiary land policy to invoke the extension of Seoul's Green Belt.

7.5.1 Physical control of Seoul's growth for national security

The most important reason to control Seoul's growth and to prepare a Green Belt however is that of national security. Since the Korean War ceasefire in 1953, the border has not completely settled down. There is always the fear that Seoul might be taken by the North. Most Seoulites had lived in the old Seoul City area which comprises the northern half of the present Seoul City. If the North became aggressive again just 40 or 50 kilometres away, almost everything in Seoul would be lost. At the worst, the Han River could be the last life-saving line but how could millions of people cross the Han River before an invasion? The government proposed to improve the situation by redistributing people from North Seoul to South Seoul, south of the river to achieve a target of 50:50 North:South. It was vital to the government that Seoul should control its growth especially in the northern territory, so the densely developed area at the northern boundary of the Green Belt was also to be included in its restraint through the third designation in 1972. In particular, the large area in the north east corridor around Euijeongbu City, the biggest urban area in the north east, was included in the extended Green Belt.

Many other control policies against Seoul's growth have been practised since 1964. Industry, universities, government offices and large urban facilities were urged to move out of Seoul and the Capital Region. Green Belt policy was employed as one of the Capital

Region Overconcentration Control Policies and squeezed development space in Seoul City and the Region.

7.5.2 Prevention of urban sprawl

Designation of the Green Belt was secondly to prevent disorderly urban development. Large outskirts of undeveloped land around Seoul were included as Green Belt in 1971 and urban sprawl could not continue outwards as the Green Belt encircled the city fringe in all directions. Only in four areas were corridors narrowly opened along trunk roads, motorways and railway lines. Shanty towns which had developed in the city wall and higher land to the rear of existing developed areas were largely included in the Green Belt. Later many shanty towns were cleared and the hills were recovered as real green areas.

When the Green Belt policies were reviewed in 1972 there were anxieties that the rapid outgrowth in outer satellite towns might mean the re-occurrence of shanty towns beyond the Green Belt, possibly as expansion of the outer cities. Sungnam was therefore constructed to house lower income people who had moved from the early shanty towns in Seoul and who came from poorer provinces in the country. It was not sensible to leave open land behind Sungnam City which therefore became an urban island after the extension of the Green Belt in 1972.

The extension of the Green Belt in 1976 was employed particularly to contain the industrial new town south of Incheon and to prevent it from merging with the existing large cities nearby. Disorderly development beyond the new town developed area could be more easily controlled when the Green Belt was designated on the wide outskirts. Extensive hinterland between the new towns and the nearby cities remains as rural land in the extended Green Belt.

7.5.3 Environmental protection

When the first Green Belt was introduced in 1971 as a type of Green Girdle, the designated area consisted of national parks, regional parks, a landscape area of mountains, hills, rivers and river banks, and agricultural land. It emphasised the reservation of regional open spaces rather than the preparation of development constraints.

However, the third designation to include large reservoirs and the Han River catchment was the most remarkable achievement for the extension of the Green Belt area in Seoul Region. Water supply for more than ten million people depends on the water reservoir. The catchment area was already protected by the strongest development control zone. This area was therefore included in the Green Belt for reasons of environmental protection rather than to protect against coalescence of towns and villages into a large city.

Environmental protection became one of the most critical reasons to expand the Green Belt area in 1976. The large area of east Seoul consisting of higher mountains and rivers would not be suitable for development of urban areas, but would be included in the Green Belt as a kind of environmental protection zone.

7.5.4 Suburban expansion and development axes : a comparison

London's Green Belt was intended to control the extensive suburban growth which had doubled the size of the developed area around London in the interwar period between 1918 and 1939. The Green Belt was proposed to contain the great urban area as it was, and new towns beyond the Green Belt were to house London's growth.

Unlike London, Seoul's Green Belt was prepared before the great city had grown so considerably. When the Green Belt was designated in 1971 and 1972, there was plenty of undeveloped land inside the Green Belt, although large suburban projects, mainly in the form of land redistribution, were under construction or in the process of preparation. It was therefore possible at this time to expand large

suburban areas inside the Green Belt and not to develop new towns beyond the Belt. To house millions of people, the Seoul City government had to continue extensive land development in new suburban areas and plans for extensive residential areas within the Seoul City Planning Area were contained. However, a large area planned for residential use within the Seoul City planning area was suspended from development when it was included in the Green Belt (named Development Control Zone in South Korea) on 25 August 1972. All development proposals had to be cancelled immediately when the land concerned was taken into the Green Belt. The old satellite town of Kwacheon remained as an urban island because it had survived as a rural town for a hundred years.

Meantime Seoul's Green Belt allowed for the preparation of large areas for development to take place in the Seoul-Incheon corridor. When the third designation extended the Green Belt around Seoul Region, the development potential of the Incheon corridor was taken into account and the area was reserved for further industrial and suburban development.

The boundary of the Green Belt around the Suwon corridor was also carefully manoeuvred to exclude the potential development area along the Seoul-Pusan Expressway. The development corridor was not included in the extending Green Belt at the third designation. As a result, a very narrow Green Belt of a few kilometres width separates the Seoul Built-up Area and the outer subdivision of the Seoul Metropolitan Development and Environment Area at this point.

Seoul's Green Belt attempts to harmonise the seemingly incompatible concepts of strict control of urban growth with the promotion of large suburban expansion. Urban growth in the northern area of Seoul has been severely controlled by the requirements of national security and in the large eastern area for environmental reasons. The west and south corridors have been prepared for active urban growth. The large rural area in the south west has been preserved on the outskirts of an industrial new town.

7.5.5 Control of land speculation

Kim (1981) states that the effect of the Green Belt was to weaken land speculation. When the first Green Belt was introduced around Seoul, land speculation spread beyond the Green Belt. Speculative development in the countryside took place in the non-designated area around Anyang and Sungnam cities. As the periphery of Seoul's Green Belt was moved out by the designated extension, the speculation boom soon became weakened in the fringe. He argues, therefore, that Seoul's Green Belt had contributed to the demise of land speculation.

7.6 Management of the Green Belt

The first provisions of the Green Belt were enacted in the Town Planning Act on 19 January 1971. The first regulations were very general to allow land subdivision and small building below a certain size by residents in the Green Belt.

On 30 December 1972, the moderate regulations were changed to become the strictest law, which did not permit any development activities to take place within the Green Belt. Such activities included land subdivision, all new building, including small farm buildings, almost all land use change and change of use of existing residential and industrial buildings. However, upgrading of houses and villages were allowed in exceptional cases (Ministry of Home Affairs 1981). The Green Belt Management Regulation was amended in relation to rural village improvement and housing upgrading in April 1978, as follows:

> (1) A Rural Village Structure Improvement Project can only be implemented by plans prepared by local government. Only existing houses are allowed to be rebuilt on the same site or on a nearby site. Any large private improvements are not allowed unless included in the project plan.

(2) In the case of rebuilding a village on a new site, the Ministry of Construction and the Ministry of Home Affairs must carry out field surveys. Permission for village reconstruction is given in exceptional cases of recommendation by the survey report. The report decides whether an existing village site is unsuitable for human settlement, because of flood and so on or when a village should be moved into a Green Belt area.

(3) The proposed new village site cannot use good woodland and forest or good agricultural land. The Green Belt land of the previous village and houses must return to agricultural land or be planted and landscaped (Ministry of Home Affairs 1979).

Public purpose construction works, such as road works or military works for national security, may be practised without permission. Otherwise any large building or development within the Green Belt must be covered by altered regulations or be listed in the Law (Ruh 1981).

To obtain permission for a change of land use in the Green Belt, President Park must be informed because alteration of Green Belt regulations is seen as the responsibility of the manager of the country. Even the Ministry of Construction cannot change the policies without his permission. Seoul Green Belt regularly takes air-photographs which are sent by Seoul City Government to the local authorities. Illegal buildings and activities are, sooner or later, destroyed or prohibited by public servants. It is reported that approximately 5200 persons concerned with Green Belt management have been penalised because of mismanagement of the Green Belt in South Korea during the last twenty years (Kim 1990). The Green Belt has been administered under very strict management in South Korea. One could hardly have complained, argued or discussed this in public, in the days of President Park and his successor, President Cheon, before the mid 1980s.

Since 1971, the concept of the Green Belt - the idea that the Green Belt is sacrosanct land and that nobody can touch it - has been established in the minds of the people in the country When a democratic presidential election was held in 1986 the democratic opposition argued that the Green Belt should be flexible. Public opinion denounced their propaganda as senseless and they withdrew the campaign.

However, since then, the strict Green Belt policies have been argued against and condemned by the residents who live in the Green Belt area. Their complaints can be summarised in two points : firstly, their properties have not increased in value like others outside the Green Belt. Secondly, land use control has been so strong that community facilities have not been able to be developed. The second complaint was accepted and land use control regulations were adjusted in September 1988 (Chosun Ilbo 21 June 1988). This allowed the construction of new primary and secondary schools and the existing land use of houses, factories and shops was allowed to be changed. Many other community facilities such as sports centres, tennis courts and playing fields were allowed to be built. However, the release of Green Belt land for residential site development would never be allowed, announced the new President Noh (Chosun Ilbo 11 May 1988).

7.7 Previous studies on Seoul's Green Belt

Although research into Green Belts has not been prohibited in South Korea, only very limited studies have been done. Some articles were written in newspapers and town planning journals and a few dissertations for masters degrees were carried out (KRIHS 1983).

The first special issue on a Green Belt appeared in the Journal, Municipal Affairs, July 1971. Ju, Noh, Lee, S C Choi and Ban participated in this special issue. Ju was interviewed on Green Belts with a brief introduction to the concept. Noh describes town patterns in relation to Green Belts. Lee discusses legal points of view on the Green Belt. Choi interprets the function of Green Belts and Ban introduces Green Belts again.

In the Korea Planners' Association Journal December 1972 Yoon examines the background of the Green Belt, the early Green Belt planning in 1964 and a comparison of the 1958 Tokyo Green Belt and 1964 Seoul Green Belt. In 1980, Yoon argues that the Green Belt is a kind of urban nature park and it should be planned like a national park, supporting the nature protection movement campaign in the Local Administration Journal.

Another special issue of the Municipal Affairs Journal on the Green Belt was published in March 1981. S C Choi, Kim, Baek, Ruh, and B S Choi analyse ten years' implementation of the Green Belt since the first Seoul Green Belt was introduced in 1971. S C Choi wrote an introduction presenting positive effects and problems in the Green Belt. Y W Kim tells of his experiences on the designation of Seoul's Green Belt and its history in South Korea. Baek introduces planning techniques and reasons for the extension of Seoul's Green Belt. Ruh reviews land use control regulations and the associated problems. B S Choi studies urban structure and the Green Belt. He also reports on the same topic in another journal of the Cadastral Survey, May 1981, Vol 1 No 5. S Y Kim analyses how to improve management of Green Belt land from the legal point of view in the Cadastral Survey, June and August 1981.

Cho, Om and Nah from Korea Research Institute for Human Settlement (KRIHS) assessed the socio-economic effects of Green Belt in the Korean Planners Association Journal, December 1982. Ironically the governmental research centre of KRIHS did not use the title of Green Belt Study but called it a 'Study on land use of forest'. The report briefly covers the literature survey and policy review and was incorporated into a secret report (KRIHS 1983). Y U Kim unveils the introduction of the Institute's Green Belt study for the Institute Journal in October 1985. The Institute prepared a working paper of 'Korean Government Policies toward Seoul's Green Belt' worked by Mills, Song and K H Kim in June 1986. The researchers present a very relaxed attitude to control by the Green Belt and state 'some Green Belt land within 15 or 20 kilometres of the centre of Seoul has been identified for open space preservation and some for urban development' (Mills, Song and Kim 1986).

Three Masters theses on Green Belt study come from the Department of Landscape Architecture, Graduate School of Environmental Studies, Seoul National University by Ke in 1978, Oh in 1984 and K Y Kim in 1985.

Y W Kim gathers a great deal of information about Seoul's growth and the Green Belt in the large volumed book of the Korea National Land Development History in 1982. The previous workers on Seoul's Green Belt have repeated the Green Belt's conception, background and introductory works. It is understandable that only preliminary work on Seoul's Green Belt has been done in South Korea where the Green Belt has been accepted as sacrosanct. This very sensitive topic had not been willingly discussed or researched during the time that President Park strictly managed it.

However, the author had foreseen serious conflict arising between Seoul's Green Belt and urban growth. He had the impression of it as a land crisis in the late 1980s and the very early 1990s. It was very difficult for him to approach this hypersensitive subject with such limited information and inadequate studies in Seoul.

CHAPTER EIGHT

URBAN GROWTH IN SEOUL : 1972-1985

8.1 Introduction

This chapter examines urban containment by Green Belt in Seoul Metropolitan Region and explains the urban growth in the Region and in the subdivisions of Seoul Built-up Area, Satellite Towns and Urban Islands, Seoul's Green Belt and the Metropolitan Development and Environmental (De-En) Area. The urban area is measured between 1972 and 1985. Seoul's Green Belt was designated on three separate occasions between 1971 to 1972 and again in 1976.

Section 8.2 summarises the increase of urban area within the whole area and the subdivisions. Section 8.3 explains the urban growth in each subdivision and describes land use changes in Seoul's Green Belt between 1972 and 1985.

8.2 Summary : Urban Growth in the Seoul Metropolitan Region 1972-1985

The Seoul Metropolitan Region covered by the study area is 5121 km^2. The Built-up Area takes up 457 km^2 which is much smaller than the Built-up Areas of London or Tokyo, and even that of Tokyo Ward District. The total area of Satellite Towns and Urban Islands around Seoul consists of a small area of 354 km^2, of which Incheon Area occupies 195 km^2. Seoul's Green Belt and Seoul Metropolitan Development and Environmental Area (Metropolitan De-En Area) amount to 1566 km^2 and 2744 km^2, 30 and 54 per cent of the total area, respectively.

In 1972, Seoul Built-up Area contained 172 km^2 urban area and comprised 70 per cent of the total urban area in the Region where the urban area amounts to 244 km^2 (Table 8.1). When Seoul's Green Belt was designated, the Built-up Area occupied the centre area of the Green Belt. Incheon urban area was 26 km^2 and many other satellite towns around Seoul represented only 11 km^2 of the urban area.

Table 8-1 - Summary of Urban Area, Proportion of Urban Area and Urban Coverage in each Subregion of the Seoul Metropolitan Region, 1972-85

Summary of Urban Area	Area : km^2				Rate : %
	Total Area 1972	Urban Area Increase			Growth Rate (72-85/1972)
		1972	1972-85	1985	
Seoul Built-up Area	457	172	171	343	100
Satellite Towns	354	37	140	177	378
(Incheon Area)	(195	26	82	108	315)
Seoul's Green Belt	1,566	12	9	21	75)
Seoul De-En Area	2,744	23	35	58	152
(Total) Seoul Region	5,121	244	355	599	145

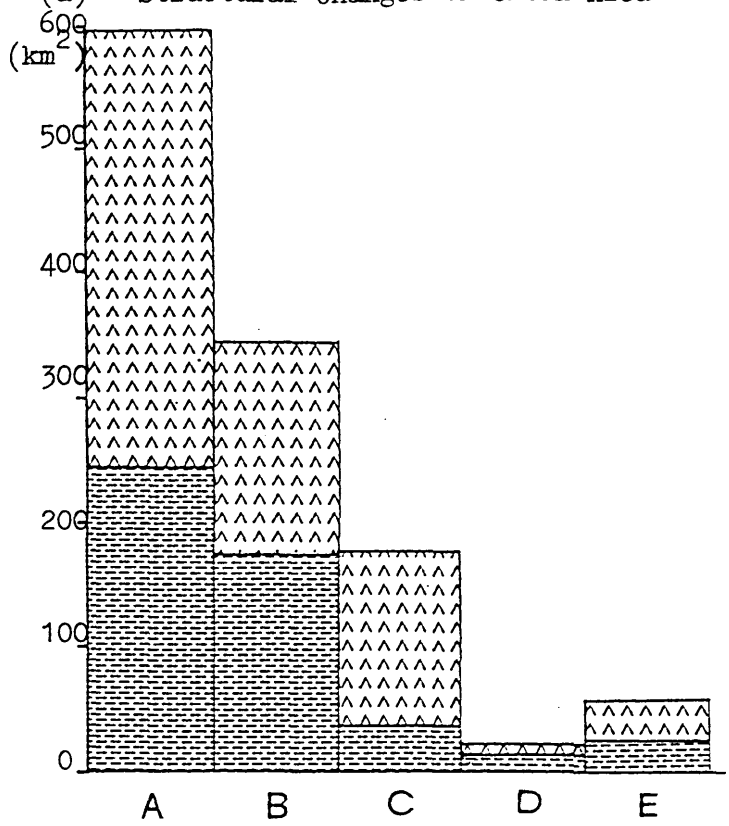
Proportion of Urban Area to the Total Area	Rate : %			
Seoul Built-up Area	9	70	48	57
Satellite Towns	7	15	39	30
(Incheon Area)	4	11	23	18)
Seoul's Green Belt	30	5	3	3
Seoul De-En Area	54	10	10	10
Seoul Region (total)	100	100	100	100%

Changes of Urban Coverage in each Subregion	Rate : %			
Seoul Built-up Area	100	38	37	75
Satellite Towns	100	10	40	50
(Incheon Area)	100%	(13	42	55)
Seoul's Green Belt	100	0.8	0.6	1.4
Seoul De-En Area	100	0.8	1.3	2.1
Seoul Region (total)	100	5	7	12

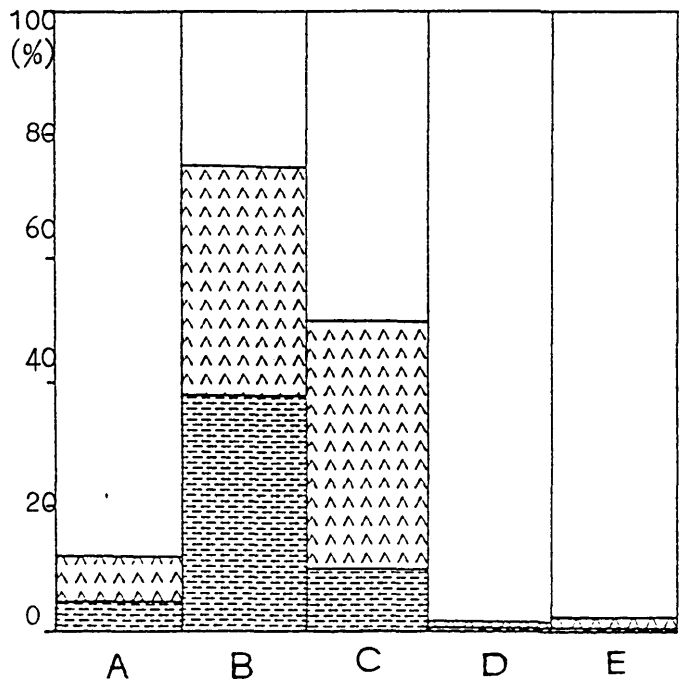
Source: One kilometre square method

Figure 8-1 - Structural and Proportional Changes of Urban Area in the Seoul Subregions, 1972-85

(a) Structural Changes of Urban Area



(b) Proportional Changes of Urban Area



in 1972

changed in 1972-85

A Seoul Metropolitan Region

B Seoul Built-up Area

C Satellite Towns

D Seoul's Green Belt

E Metropolitan De-En Area

Therefore, most of the urban area in Seoul region in 1972 was concentrated in the Seoul Built-up Area and the Incheon Area. The first designated Green Belt had 12 km^2 of urban area. The outer zone of the Metropolitan De-En Area accounted for 23 km^2 of urban area beyond the Green Belt.

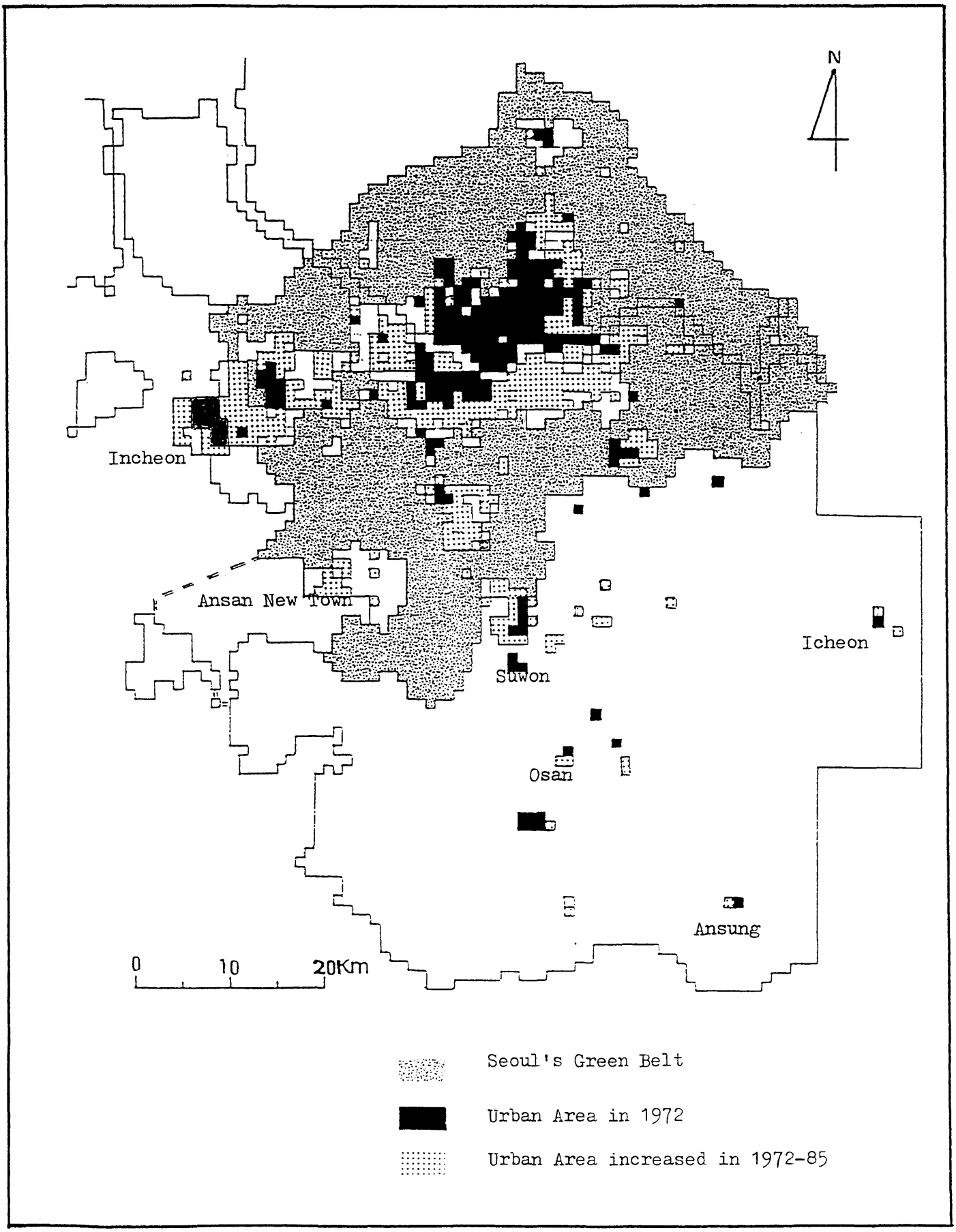
With the implementation of strict Green Belt policies between 1972 and 1985 urban growth was consolidated in the Built-up Area, with the addition of 171 km^2, as much again as the existing urban area. In the satellite towns the addition was 140 km^2 of which considerably more than half occurred in the Incheon corridor. Seoul's Green Belt gained only 9 km^2 of urban area for recreational and transportation uses. Urban growth was very limited beyond the Green Belt with only 35 km^2 added in the outer subdivision.

As a result, the majority of the suburban expansion was centred in the Seoul Built-up Area, the Incheon Area and a few satellite towns. 87 per cent of the urban area was concentrated in those subdivisions in 1985. The proportion of the urban area in the Seoul Metropolitan Development and Environmental Area to Seoul Region was a constant value of 10 per cent from 1972 to 1985.

The coverage of the urban area in Seoul Built-up Area was changed from 38 per cent in 1972 to 75 per cent in 1985. With the exception of the wide Han River and riverside, Seoul Metropolitan city inside the Green Belt was almost fully developed in 1985. The satellite towns were half way from urban saturation. However, the outer zone remained rural. Enormous suburban expansion could not spread beyond Seoul's Green Belt within the thirteen years, while the urban area inside the Belt had been consolidated.

Figures 8.1(a) and (b) demonstrate graphically that Seoul's urban growth had been concentrated in the Built-up Area and satellite towns inside, within the Green Belt. The outer subdivisions of the Green Belt and the De-En Area cover 88 per cent of the total area of the Seoul Metropolitan Region, but the urban area they contain is tiny both in 1972 and also in 1985.

Figure 8-2 - Urban Growth in the Seoul Metropolitan Region, 1972-85



Source: One kilometre square method

The map in Figure 8.2 shows the location of urban growth in Seoul in 1972 and 1985. In 1972 the urban area in Seoul was concentrated in northern Seoul beyond the Han River and in the south west industrial-commercial subcentre of Yoengdeungpo Area. The largest urban area outside Seoul City was seen in Incheon City. Some scattered developments were in other surrounding satellite towns and in Suwon outside the Green Belt. The large US Osan Airbase, golf courses and a few regional towns were counted as the urban area in the extensive outer subdivision in 1972.

Figure 8.2 gives a strong impression of urban containment in the expanding Seoul Region between 1972 and 1985. Suburban expansion was carried out in South Seoul and the Incheon Area. The large area of Anyang in the south corridor between Seoul and Suwon was expected to receive development and was enclosed as a large urban island within the Green Belt, which was enclosed with the second designation of the Green Belt.

Urban growth beyond the Green Belt was centred in the Suwon Area and its fringe in 1985. Suwon itself grew considerably with the expansion of its town area, and with industrial development of the Samsung Electronics Site in the south hinterland and chemical and textile industries in the north fringe. Some golf courses followed along the Seoul-Pusan Expressway in east Suwon. Growth in the other regional towns in the outer zone was found only in small measure in several urban areas within the large Seoul De-En Area.

In conclusion, with the policy of urban containment the urban area of Seoul grew from 244 km^2 in 1972 to 599 km^2 in 1985, an increase of approximately 2.5 times in the thirteen years of large expansion.

8.3 Urban Growth in the Four Subdivisions : 1972-1985

8.3.1 Urban Growth in the Seoul Built-up Area

Seoul's city administrative area covers 627.6 km^2 (Figure 8.3). The Built-up Area amounts to 457 km^2 as the total area inside Seoul's Green Belt. A large area of Seoul City fringe located in the Green

Table 8-2 - Urban Growth in the Seoul Built-up Area, 1972-85

Area : km^2

	Total Area 1972	Urban Area Increase		
		1972	1972-85	1985
Seoul Built-up Area	457	172	171	343
(Han River)	(32)			
North Seoul District	203	129	46	175
South Seoul District	222	43	125	168

Rate : %

Seoul Built-up Area	100	100	100	100
(Han River)	(7)			
North Seoul District	44	75	27	51
South Seoul District	49	25	73	49

Seoul Built-up Area		38	75
(rate excluding river)		(40	81)
North Seoul District	100%	64	86
South Seoul District		19	76

Source: One kilometre square method

Belt area. The area of the Built-up Area is divided into two districts of north and south Seoul by the Han River. The north Seoul District covers 203 km^2 and the South Seoul district 222 km^2, 44 and 49 per cent of the total area respectively, the remaining 7 per cent comprising the Han River.

The north Seoul District has been developed for a long time. Its centre was built five hundred years ago. The fringe has been expanded since the walled city was constructed. Recently its periphery has rapidly grown by the implementation of land redistribution projects since 1960. In 1972 the survey in this research counted 129 km^2 of urban area out of a total area of 203 km^2 in the north Seoul District, representing urban coverage of 75 per cent. The south territory includes 43 km^2 of urban area, 25 per cent of the total area. The Central and City Governments promoted large suburban development in the south and attempted to move the focus of the city from north to south across the Han River. In addition a large suburban area of 125 km^2 was developed between 1972 and 1985. The strong and desirable redistribution policy of a ratio of 50:50 development in north and south Seoul districts was successfully achieved in terms of urban area coverage by 1985. The urban areas amounted to 175 km^2 in the north and 168 km^2 in south Seoul district by 1985. The northern half was nearly infilled with an urban coverage of 86 per cent and the southern area was rapidly developed from having 19 per cent urban coverage in 1972 to 76 per cent in 1985.

As the Green Belt took developable land away from the north district, urban growth in the north was severely controlled. In the south, a large fringe area enabled suburban expansion with a generous inner Green Belt boundary.

8.3.2 Urban Growth in the Satellite Towns and Urban Islands

The satellite towns and urban islands developed in the Seoul Green Belt consist of four categories; the Incheon area comprises the biggest suburban development corridor west of Seoul; the Ansan Industrial new town was developed on the West Sea coast, south of

Incheon city and west of Suwon city; the Anyang-Sungnam area has developed suburban dormitory towns south of Seoul; and the rest of the satellite towns and urban islands form the last category. Figure 8.3 shows a map of the location of satellite towns and urban islands and Seoul's Green Belt.

8.3.2(a) The Incheon Area

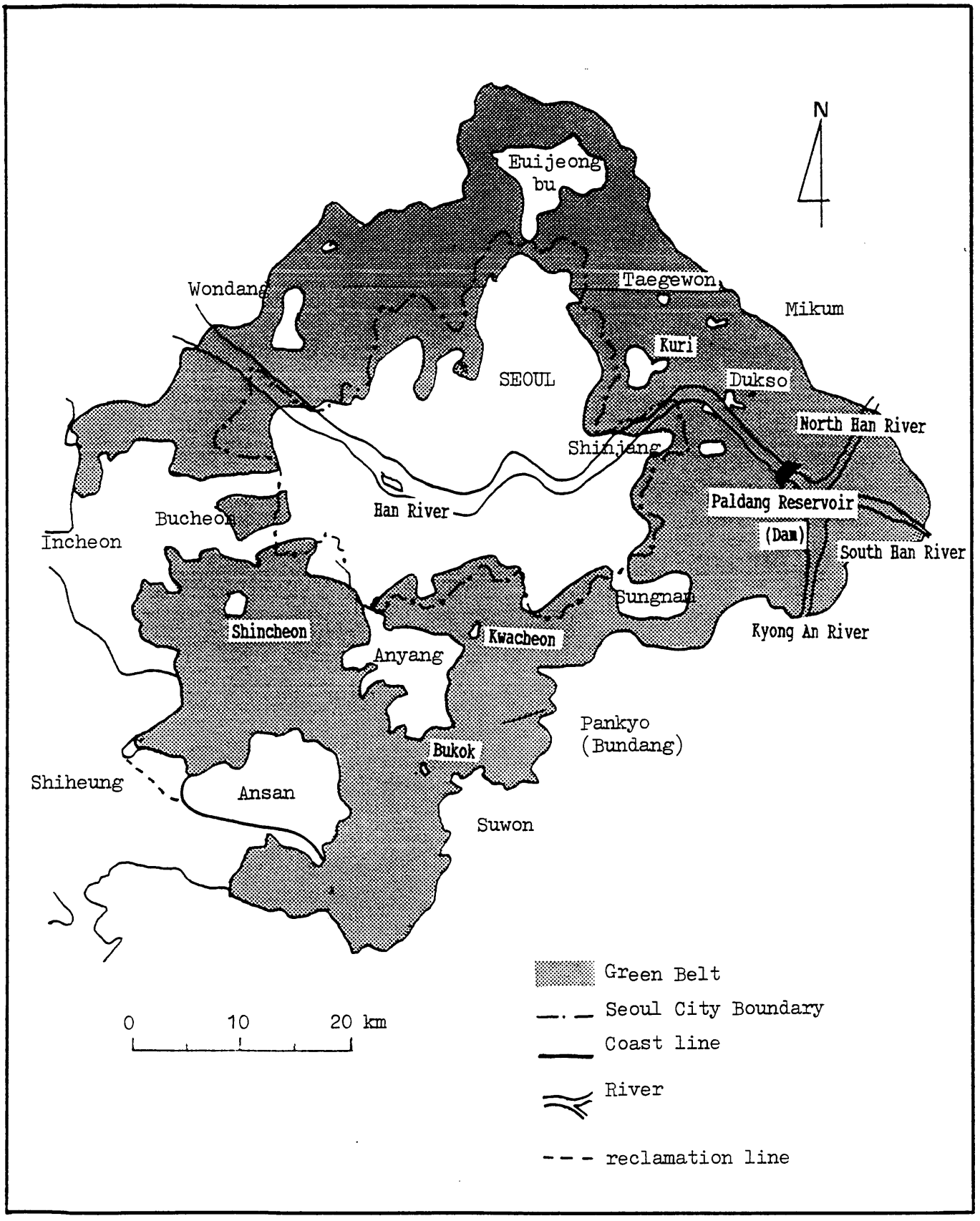
The Incheon Development corridor consisted mainly of the two cities of Incheon and Bucheon. Incheon city was used as a port to communicate with China by sea for some thousand years. Modern Incheon harbour was opened by the Western powers in 1883 as an entrance to Seoul and the first railway line in Korea was built from Incheon to Seoul in 1889.

In the early 1960s the South Korean Government established a Special Region Development Plan of the Seoul-Incheon Region covering an area of 3325 km^2. The first motorway was constructed in this corridor in 1968 and industrial site development was carried out. The city population reached over one million in 1979 and the area became a special city of provincial level.

As shown in Table 8.3 the Incheon area comprises 158 km^2 of Incheon city, 34 km^2 of Bucheon City and 3 km^2 of the urban island of Sincheon to make a total area of 195 km^2. In 1972 the urban area in Incheon amounted to 25 km^2 made up of the town area near the port and the inland industrial area where the General Motors-Korea car, other machinery and textile factories were located. Bucheon accounts for just 1 km^2 of the urban area based around the railway station.

Between 1972-1988 a large industrial development area was expanded in the harbour area and reclamation land. Incheon Steel along with Taewoo Heavy Industry, Incheon Electronics, Taewoo Electronics, Cement, Incheon Export Manufacturing site, furniture and wood manufacturing and many others are sited near the seaside along the Incheon-Seoul Motorway. The harbour area was expanded with port facilities, transport land and freight terminals. The Korean GM

Figure 8-3 Satellite Towns and Seoul's Green Belt



Source: Author's drawing based on Seoul's Green Belt Map, 1985

Table 8-3 - Urban Growth in the Satellite Towns, 1972-85

Area : km^2

Area Division	Cities	Total Area 1972	Urban Area			Developable Area Remained
			1972	1972-85	1985	
Incheon	Incheon	158	25 (5)	62 (16)	87 (21)	57
	Bucheon	34	1	20 (2)	21 (2)	13
	Sincheon	3				3
		195	26 (5)	82 (18)	108 (23)	73
Ansan	Ansan	57	-	13 (7)	13 (7)	27
	Shiwa	-	-			
		57	-	13 (7)	13 (7)	
Anyang-Sungnam	Anyang	41	3	23 (7)	26 (7)	13
	Kwacheon	2	-	2	2	-
	Bukok	1	-	1	1	-
	Sungnam	15	4	10 (1)	14 (1)	1
		59	7	32 (8)	39 (8)	14
North and East Satellite Towns	Euijungbu	23	3	2	5	15
	Wondang	7	-	1	1	6
	Kuri	6	-	3	3	3
	Shinjang	3	-	2	2	1
	Others	4	1	1	2	2
		43	4	9	13	27
Total		354	37 (5)	140(33)	177 (38)	141

Source: One kilometre square method

( ) shows industrial area

expanded its car factories to a large extent and other textile industries have followed.

The city fringe was developed into a suburban residential area by the application of land redistribution alongside the commuter railway line and the motorway. The urban growth in Incheon city between 1972 and 1985 amounted to 62 km^2 and the industrial area accounts for 16 km^2 of this sum. Incheon was developed as the biggest manufacturing area in the Seoul Metropolitan Region and the second largest harbour in South Korea.

Bucheon city, located centrally between Seoul and Incheon, was developed to be a large suburban town to Seoul. The urban area of the city grew from just 1 km^2 in 1972 to 20 km^2 in 1985. Bucheon is located in the west beyond the industrial and low-income residential area of south west Seoul. The Incheon-Bucheon area was not very popular with people of higher incomes who preferred south-east Seoul. However, the electrified railway could transport large numbers and so lower income workers moved to find cheaper houses within the one-hour commuting distance from Seoul. Sosa, the old name of Bucheon city, was famous for its peach orchard outside Seoul. The orchards and surrounding flat fields were developed for these home-seekers' shelters in the suburbs by way of land redistribution. The Seoul Green Belt enclosed the favourable area of south Seoul and induced the lower income group to move westwards along the development corridor.

In 1985 the urban area in the Incheon Area measured 108 km^2, including 23 km^2 of industrial area, which accounts for over 60 per cent of the total urban and industrial area of the satellite towns as a whole.

The Incheon Area still retains a large amount of rural land at the boundary, located in south Incheon and the city fringe of Bucheon. Approximately 70 km^2 of developable land remained in Incheon and Bucheon cities in 1985. A developable area in the Bucheon city fringe was under construction for so-called 'new town development' in the later 1980s (Chosun Ilbo 1989). A large salt field in south Incheon was under construction to provide a large industrial area

especially for the extension of the Export Industrial Site in the Built-up Area in the late 1980s. The small island of Sincheon remains as a rural area beyond the south hill of Bucheon city.

8.3.2(b) Ansan Industrial New Town

Numerous control policies on metropolitan growth had been tried to relieve the concentration of population and industry in the Capital City but by the mid 1970s there was no indication that it had succeeded. The late President Park advised the building of a new industrial town to disperse people and industry as a practical proposal on 21 July 1976. A working team was to be organised under the Minister of Construction and four potential sites were studied in the Metropolitan Region between 30 and 70 kilometres from Seoul: Balan and Choam 50 kilometres away in the south west, Anjung, as a comprehensive industrial base 70 kilometres south, and Banwol - later renamed as Ansan - on the seaside over 30 kilometres away from Seoul beyond the Seoul Green Belt (E W Kim 1982). Banwol Industrial Site was finally decided upon on 21 September 1976, two months after the first recommendation of the proposal.

In the meantime, there was concern that the location of Banwol was too close to Seoul and the surrounding large towns of Anyang, Suwon and Incheon. However Banwol was chosen to succeed the first new town development around Seoul. Three weeks after the decision of the location of the new town, the Banwol new town development and land price control policy against land speculation was declared. Designation of the town planning area and an extension of the Seoul Green Belt between the planning boundary and the existing outer boundary of the Green Belt were announced on 4 December 1976. The master plan of the new town was revealed on 28 March 1977 and on 30 March 1977 the constructional works for entrance roads was started. The plan proposal was to accommodate 200,000 persons as the population target, but possibly up to 300,000 and to prepare a large industrial area for many factories to relocate from Seoul City to the west part of the new industrial city (MOC and Korea Industrial Site Development Corporation 1977). The new town was planned in four core areas; one in the west for the location of industry in the style of

an industrial park with many green wedges and parks; the second core mainly for workers' residential areas and shopping centres; the third for administration and houses for newcomers and the east end core for a university campus, research institute and suburban houses. In the 1980s, a new electric railway line was built which linked the four core areas to the Seoul underground, contrary to the original planning idea of 'a separate, independent and self-contained new town'.

The total area of Ansan measured 57 km^2: 13 km^2 was developed as the urban area in 1985; 7 km^2 existed in the newly developed industrial site and six in the town area. The industrial site was developed ahead of the residential and commercial development. The remaining area of 27 km^2, excluding a reserved area of 17 km^2 for protection of lower swamp paddy field and hills, was now under construction to meet non-industrial development. Once land sales soared in the early 1980s to meet expanding demand for industrial land, it was realised that the amount of designated industrial area of about 8 square kilometres in Ansan was definitely insufficient to accommodate the redistribution of industry from Seoul and the inevitable newcomers.

Another large industrial site in the west sea frontage of the Ansan Industrial Area was to be built in a reclaimed salt field, the Shiwa project. It was designed to release partly Green Belt area which would constitute new extension of the industrial site of the Ansan New Industrial Town. This additional development area became Shiheung City (MOC and Korean Industrial Site Development Co-operation 1986).

8.3.2(c) Anyang-Sungnam Area

Anyang

The area between Anyang and Sungnam could have been a suitable suburban area beyond south Seoul if the Green Belt had not been introduced. Anyang became one of the largest urban islands in Seoul's Green Belt and Sungnam was also a large urban island. Small islands of Kwacheon and Bukok are located near Anyang. The total

area of the southern islands comprises 59 km^2; 41 km^2 in Sungnam, 2 km^2 in Kwacheon and 1 km^2 in Bukok railway town. The urban area in 1972 amounted to only 3 km^2 in Anyang and 4 km^2 in Sungnam. With rapid suburban expansion in the two cities and new town development in Kwacheon, the urban area increased by 32 km^2 between 1972-1985. Anyang had gained a large urban area of 23 km^2 including 7 km^2 of industrial area. The lovely vineyards and fields of growing vegetables and flowers were transformed into a gridiron industrial area in south Anyang where the landscape had still been beautiful throughout most of the 1970s. The urban area in Anyang amounted to 26 km^2 and 13 km^2 of the rural area remained which was available for further suburban expansion in the Island. These developable areas were under construction as so-called 'new town development' in the later 1980s (Chosun Ilbo 3 March 1989).

Anyang has developed as a suburban town of Seoul City. Many apartments were built by private housing construction companies at a lower price in comparison with the apartment prices in south suburban Seoul (Anyang City 1985).

Bukok, an urban island in south Anyang developed its 1 km^2 between 1972-1985. It was known as a railway village since a large number of train drivers and railway workers lived there in their own residences, and a railway engineering college was located in the village. Recently the south Seoul Freight Terminal was built in the Green Belt area near the village.

Kwacheon New Town

Kwacheon is a unique place as far as Seoul's growth and Seoul's Green Belt are concerned. The satellite town was developed several hundred years ago, The census in 1789 reports its population as 2,778 persons (Son 1977). It was classified as a main outer satellite town to Seoul, approximately 20 kilometres away from central Seoul in the south.

The old town was enclosed as an urban island when the third designation of Seoul's Green Belt was announced in December 1972.

Until this time, the valley between Kwacheon and the end of south Seoul suburb was regulated as a suburban residential zone and expected to develop by land redistribution. However, once it was encompassed by the Green Belt, Kwacheon remained as a small island with a total area of 2 km^2, which remained largely undeveloped.

In 1979 Kwacheon was planned as a suburban new town of Seoul with a target of 30000 people. The population target was later increased to 50,000 to be housed in high-rise apartments and cluster houses (MOC and the Korea National Housing Corporation 1975). It was developed by the Korean National Housing Corporation between 1972 and 1985. The 1986 census reported over 68,000 people. The total area of the small new town covers 2 km^2. As the result of rapid housing development by the Corporation, the urban island was counted as urban area as a whole in 1984. The Second Government Office Buildings were moved into the new town. Green Belt land was released to build government buildings and relative facilities in the edges of the Second Government Office Site and could not be accounted for one square kilometre of urban area.

Sungnam

Sungnam city was developed in order to allow slum clearance to take place in Seoul city. It was reported in the 1966 housing survey that in Seoul 36 per cent of the total of 649,290 dwellings were illegal buildings. It was seen as vital to clear shanty towns in hillside and flood plains in the capital city. A large residential area development project was started in the south east fringe of Seoul in order to accommodate those moved from the cleared settlements in 1968. It was not planned as a new town or in garden city style. It was known at first as the Kwangju Residential large site. It aimed to share out a small piece of land, distributing 66 square metres per household to newcomers who were compelled to move into the new place and allowed to build new shanty houses on the distributed raw land. After a great outcry against the hasty resettlement policy in 1971 the project was changed to a new policy to build a new city. So, it is arguable whether Sungnam city is a new town or not. Roh argues it cannot be classified as new town development but just redevelopment

of another shanty city on a new site (Roh 1973). Kim describes Sungnam as one of the early new towns in South Korea (Y W Kim 1982).

When the site of the development project was decided in 1968 in the old rural centre, population was 26,573. With the rocketing average annual population increase rate of 48.5 per cent between 1970 and 1975, the population reached almost half a million in such a small area of 15 km^2 in 1985 (Sungnam City 1984; Kyongki Statistical Yearbook 1986).

The urban area measured 4 km^2 in 1972 and was increased by 10 km^2 between 1972 and 1985. Only a small area of 1 km^2 of undeveloped land remained in the outskirts by 1985. Strict Green Belt control has tightened the dense city until it could not grow any more inside the Green Belt, rather redistribution of the overpopulated city would be required.

8.3.2(d) North and East Satellite Towns and Urban Islands

There is the large satellite town of Euijeongbu in the northern corridor, several urban islands in the eastern area of Seoul's Green Belt in the Han River basin, and the large urban island of Wondang and a smaller island in the western area of the Green Belt.

Euijeongbu

Euijeongbu was the third largest satellite town around Seoul after Incheon and Suwon in 1972. The city had been developed as a gateway city from the north east region of the Korea peninsula. Since the end of the Korean War however, it has been controlled under a military protection zone because of its location in the north area of Seoul. The Green Belt took away development area in the fringe and Governments have urged people to move into south Seoul. As a result Euijeongbu's size has been fairly stable between 1972-1985.

The population of Euijeongbu city slowly increased from 101481 people in 1972 to 162701 in 1985 while the three cities of Bucheon, Anyang

and Sungnam in the south of Seoul were approaching half a million people in the middle of the 1980s (Kyongki 1973, 1986).

The total area in Euijeongbu Urban Island is 23 km^2. The urban area accounted for 3 km^2 in 1972 and urban growth between 1972-1985 increased the urban area by only 2 km^2. Out of 18 km^2 of rural area, 15 km^2 could be controlled under the military protection zone which cannot be observed on the map.

Wondang

Wondang is located north west of Seoul alongside the northern circle suburban railway line of Seoul-Wondang-Euijeongbu-Seoul. It is situated 15-20 kilometres away from Seoul Central Railway Station and midway between Seoul and the Demilitary Zone. The island of 7 km^2 did not contain even one square kilometre of urban area in 1972 and just one in 1985.

Despite good transportation conditions and plenty of development space, this northern island has been controlled in its urban development for reasons of a military facility protection zone and a zone of good agricultural land and production.

Other Urban Islands

Kuri has rapidly grown, gaining 3 km^2 of the urban area between 1972-1985. The Kuri Island is separated from the Built-up Area by a large public cemetery which is the Green Belt. Suburban expansion leap-frogged the Green Belt and was developed in Kuri Island after Seoul's Green Belt contained the Built-up Area. Land redistribution was implemented for suburban growth and lower income people moved out of Seoul into this area in order to find low-cost housing.

Mikum and Taegewon had grown rapidly but they were not counted as urban area in 1985 because the urban land of those cities was too scattered to make one kilometre of urban area.

Dukso has been developed for a special branch of a Christian community beside the upper Han River bank, where they have lived self-sufficiently. In 1972 one km^2 of the urban area was counted and did not change after this time.

Sinjang was largely developed out of south east suburban Seoul. The total area amounts to 3 km^2 and the urban area grew by 2 km^2 between 1972 and 1985. This area was upgraded to city level at the end of the 1980s.

8.3.2(e) Summary of Urban Growth in the Satellite Towns

As the Green Belt did not allow any more room for suburban expansion in the Built-up Area, urban growth had been switched to satellite towns, mostly in the Incheon Area and Anyang-Suwon suburban islands area. Therefore Incheon had grown to a city of over one million people and Bucheon, Anyang and Sungnam cities had become cities of half a million people in the 1980s. The urban area increased by 140 km^2 in 1972-1985; 62 km^2 of this in Incheon City, and 20 km^2 in Sungnam. These three cities were not closed by the Green Belt but were linked with open narrow passes to the capital.

Ansan city was developed as an industrial new town in the west coastal area, some 30 kilometres away from Seoul centre. The new town developed 13 km^2 of urban area between 1972-1985.

Otherwise, the northern cities and towns of Euijeongbu and Wondang had been controlled by the locational disadvantage of being north of Seoul.

In 1972 the urban area in the satellite towns as a whole measured 37 km^2 including 5 km^2 of industrial area. With the net increase in the urban area of 140 km^2 between 1972 and 1985, the satellite towns accounted for 177 km^2 of urban area in 1985. This satellite area in the Green Belt achieved the highest growth rate among the four subdivisions. The remaining developable area amounted to about 141 km^2 in 1985.

8.3.3 Urban Growth in Seoul's Green Belt

8.3.3(a) The Urban Area in Seoul's Green Belt

In 1972 the urban area in Seoul's Green Belt measured 12 km^2 out of the total area of 1566 km^2. All over the Green Belt area could be found rural landscapes of mountains, fields and typical rural villages apart from a little urban land use. The component of the urban area was 4 km^2 of urban settlements, 6 km^2 of airport and airbase and 2 km^2 of golf courses (Table 8.4).

Before the designation of the Green Belt there was a large urban settlement situated between the northern boundary of the Built-up Area and the north corridor toward the Demilitarised Zone. Three square kilometres of urban settlement was developed in the busy north west corridor, an area which had been developed for a long time, of which 2 km^2 of the urban area which is totally developed was situated adjacent to the inner boundary of the Green Belt. One km^2 was alongside the city wall in the hillside and had made a large shanty town. The Green Belt was designated on the lowest income residential area. With the strong policy of slum clearance in the 1970s this shanty town was cleared and returned to landscaped hillside. The Green Belt policy contributed to clearance of slums and the worst houses in the hills and mountains to become green land in Seoul. Therefore, one square kilometre of urban area was reduced between 1972 and 1985 after Seoul's Green Belt was implemented.

Kimpo International Airport occupied 3 km^2 in the west boundary area in 1972. It was expanded by another 3 km^2 between 1972-1985. The airport had extended runways and a large new Korean Airline terminal building in 6 km^2 of the urban area in 1985. A military airbase for protection of the capital city moved from Han River island to east Seoul when the City Government developed the island as the new centre of finance, business and broadcasting, the Parliament Houses and a suburban residential town since 1968.

Golf courses were located in two places, one in the north west corridor and one in south Anyang in 1972. No more golf courses were

allowed to be built and neither were expansions allowed to existing courses. One km^2 of race courses and 1 km^2 of boat racing courses were prepared specially for the 1988 Seoul Olympic Games in Kwacheon Green Belt and in Han River side. Beside the race courses, Seoul Grand Park was built to provide public open space. The community park was sited in 3 km^2 of Green Belt. A large zoo was in the centre and plant houses were moved there from the palace garden in central Seoul. Sports facilities, maintenance buildings, car parking, a museum, an art gallery, and other open places were developed in the Kwacheon valley, which has been the most sensitive area for urban development.

The urban area in Seoul's Green Belt amounted to 12 km^2 in 1972 and 21 km^2 in 1985, with only a net increase of 9 km^2 of the urban area between 1972 and 1985 (see Table 8.4).

8.3.3(b) Land use change in Seoul's Green Belt

Accurate statistics on land use in Seoul's Green Belt were not available until 1983 when the land use data were computerised. Table 8.5 shows the official land use information in 1985. Forest and woodland, and agricultural land, comprise 60 per cent and 27 per cent of the total Green Belt area respectively. Building land occupies 4 per cent. The remaining land consists of 9 per cent river, flood plain, transportation land, many minor uses and unclassified land; a mix of rural and urban land uses. This relates to the fact that Seoul's Green Belt was designated on the mountains around the Seoul city boundary and on the agricultural land in the plain alongside the Han River and in the western coastal area. The proportion of agricultural land in Seoul's Green Belt area exceeds the national average of agricultural land to the nation because Seoul is located in the Han River Basin. As there is a large amount of riverbank and the River Han is very wide, due to the fact that the river and its tributaries flow through the middle of the region, the proportion of other uses is higher than that of the national average (9 per cent as opposed to 6.9 per cent). The sum of the rural building land represents quite a large area of land as a whole. This building land comprises piecemeal land, scattered in the rural area and does not represent many urban areas in the one square kilometre method.

Table 8-4 - Change in the Urban Area in Seoul's Green Belt, 1972-85

	Area : km^2		
	1972	1972-85	1985
(Urban Uses):			
Urban Settlement	4	-1	3
Airportand Airbase	6	+3	9
Railway Freight Base		+2	2
(Recreational Uses):			
Golf Courses	2		2
Race Courses		+1	1
Boat Racing Course		+1	1
Community Park		+3	3
Total	12	9	21

Source: One kilometre square method

However, the area classified in Table 8.5 was referred on the cadastre of the City Government. The nominal land uses may not coincide with actual land use. For example, many fields exist within the category known as forest-woodland because of delay in re-classification of land where use has changed. The title of forest-woodland had been allowed in order for transfer of land ownership to take place easily as ownership of agricultural land had been controlled to remain with farmers and residents within certain areas. Building land can be transferred without such a condition. Sites of construction work come under the title of building land. However, in the Green Belt, no cadastral change to the building land from other classes has been allowed and even the building land is not permitted to be developed, except in very special circumstances.

Table 8.6 examines land use change in Seoul's Green Belt between 1972 and 1985. As far as the author knows, this work has been carried out by the author for the first time as a land use change survey. The survey was carried out in a limited area of 1036 km^2 out of the whole Green Belt area of 1566 km^2 because of the lack of 1972 land use maps for 408 km^2 in the northern end and 122 km^2 in the eastern end of the Green Belt. These areas consist mostly of mountains and partly of river and reservoir. Because of the difficulties of measurement the results represent an estimation of the land use in Seoul's Green Belt. However, it was considered worthwhile to attempt to create a broad picture of land use change within the Green Belt.

The paddy field is the most valuable agricultural land in a traditional monsoon society and irrigation is the first criterion to decide the land grade of a rice production field. Adjusted paddy field is the best land, fully irrigated and rearranged for machinery agriculture. The field has a rectangular shape 0.3 - 0.5 ha in size, in order to make work easier with regard to irrigation and accessibility for agricultural machines. The fully irrigated field is second best with very good irrigation conditions. These two classes compare to Grades I and II in the Agricultural Land Classification in England and Wales (MAFF 1968; Weiers 1975; Worthington 1982). The biggest land use change in Seoul's Green Belt was agricultural land improvement resulting from land consolidation

Table 8-5 - Land Use Components of Seoul's Green Belt Area, 1985

Cadastral Uses	Seoul's Green Belt[a]		South Korea[b] (Average)
	Area (km^2)	Rate (%)	(%)
Building land	65	4	4.1
Forest/woodland	934	60	66.4
Agricultural land	416	27	22.6
Field	173	11	
Paddy field	243	16	
Others	151	9	6.9
Total	1566	100	100.0

Source: (a) Municipal Yearbook, Ministry of Home Affairs, 1986

(b) MOC, Annual Report on National Land Use (1986a)

Table 8-6 - Land Use Change in the Seoul Green Belt, 1972-85

		Rate : %		
Group (9)	Category (21)	1972	1985	Change
Paddy Field	fully irrigated	6.8	3.9	-2.9
	adjusted	2.6	5.6	+3.0
	partly irrigated	11.6	11.4	-0.2
		21.0	20.9	-0.1
Field	cropland	14.1	13.3	-0.8
	orchard	1.2	1.1	-0.1
	pasture and livestock	0.2	0.2	
		15.5	14.6	-0.9
Forest		53.2	53.2	
Others	salt field	1.9	1.9	
	reclaimed land	0.4	0.3	-0.1
River	rivers	1.8	2.2	+0.4
	reservoirs, dam	0.3	0.5	+0.2
	flood plain	1.4	0.6	-0.8
		3.5	3.3	-0.2
Settlement	cities	0.5	0.7	+0.2
	villages	1.4	1.4	
	industry	0.2	0.2	
		2.1	2.3	+0.2
Cemetery		0.5	0.5	
Transport	railway	-	0.1	+0.1
	roads	0.1	0.3	+0.2
	airport	0.7	1.0	+0.3
		0.8	1.4	+0.6
Recreational	golfcourses	0.3	0.3	
	race courses and sports	-	0.2	+0.2
	(recreational sites and parks)	0.8	1.1	+0.3
		1.1	1.6	+0.5
Total		100%	100%	

Source: Author's estimation by point counting method

projects to provide with accessible agricultural roads and waterways into each piece of rearranged paddy field. The upgrading of agricultural land was implemented in a large area of the Green Belt in Kimpo plain near the Kimpo International Airport and on large flat areas in the west coastal area.

The biggest rural land loss occurred from the conversion of other types of fields, mainly to urban development. The fields were on the higher flat land or slightly sloped area nearer to the town area, and regarded as unimportant agriculturally in South Korea compared to good paddy fields. The loss measures 0.9 per cent. The second biggest change of use comes from the river. During the period between 1972 and 1985, Han River Development was largely undertaken to rebuild the banks and a large area was gained from reclamation, which was subsequently built on. A new residential area along the river was developed for good high-rise apartments. It was an unrevealed fact that a large amount of building materials of sand and gravel were provided from excavation of the River, an activity which was not controlled under the Green Belt regulation but was regulated under the River Management Act.

Although in general, land was unable to be released for town development in the Green Belt area, small areas were developed for the Government Office Site in Kwacheon Green Belt and for the projects of the South Seoul Grand Park and the Olympic Race courses. Minor areas also seemed to have been taken around the New Town when the Kwacheon New town was built.

The biggest urban land gains between 1972 and 1985 were for transport and recreational use. Kimpo Airport was doubled in size. The large South Seoul Railway Terminal was built in the railway junction town of Bukok and another terminal was built north west of Seoul's Green Belt. Although development of public open space was not accepted in the Green Belt, a large area was developed for the Olympic Games and for citizens' park facilities in the Kwacheon area by special permission.

Table 8-7 - Proportion of Land Use and Urban and Rural Division of the Seoul Green Belt, 1972-85

Rate : %

	1972	1985	Change
Rural area	(95.4%)	(94.2%)	(-1.2%)
agricultural land	36.5	35.5	- 1.0
forest	53.2	53.2	
salt field	1.9	1.9	
reclaimed land	0.3	0.3	
river, reservoirs, flood plain	3.5	3.3	- 0.2
Urban area	(4.6%)	(5.8%)	(+1.2%)
cities, villages, factories	2.1	2.3	+ 0.2
cemeteries	0.5	0.5	
transport	0.8	1.4	+ 0.6
recreational and leisure land	1.2	1.6	+ 0.4

Source: Author's estimation by point counting method

Table 8.7 summarises the land use changes in Seoul's Green Belt into two divisions of rural and urban areas. The rural area covers about 95 per cent of the total area and a small loss of 1.2 per cent occurred between 1972 and 1985. Seoul's Green Belt has remained generally undisturbed with only minor and very exceptional land use changes.

8.3.4 Urban growth in the Metropolitan De-En Area

8.3.4(a) The urban area in the Metropolitan De-en Area : 1972-1985

The urban area in the outer area beyond the Green Belt amounts to 23 km^2 in 1972, made up of 10 km^2 of town area, 9 km^2 of airbases, 3 km^2 of golf courses and 1 km^2 of public cemetery. Half of the urban settlement had developed in Suwon City, which was built as a new town about 200 hundred years ago and is now the second largest town in the area surrounding Seoul.

The other regional centres of Osan, Pyeongtaek, Ansung, Kwangju and Incheon measure one km^2 of the urban area each (see Figure 8.4). Two airbases are located in south Suwon and south Osan. The latter airbase is used for the US Airforce in the extensive area of approximately 6 km^2. The location of the existing golf courses in 1972 was along the Seoul-Pusan Motorway in the east Suwon Development Corridor, one in Pankyo and two near Osan motorway interchanges. One km^2 of cemetery was built when Sungnam town was developed. Large existing graves were moved in the new site and some spaces were prepared for future use.

Between 1972-1985 increase of the urban area amounted to 35 km^2 in the wide outer metropolitan subdivision. 22 km^2 was developed in Suwon city and 3 km^2 of the urban area was located in the east hinterland of Suwon, the development corridor. The remaining 10 km^2 of the urban area occurred from the expansion of regional towns; 2 km^2 in Osan, 1 km^2 near Osan airbase, 1 km^2 in Pyeongtaek, 1 km^2 in Ansung, 2 km^2 in Icheon, 1 km^2 of parkland in Young In and 2 km^2 of golf courses nearer the Osan interchange. Other rural towns of Namyang, Balan, Anjung and Young In were too small in 1985 to be classified as urban.

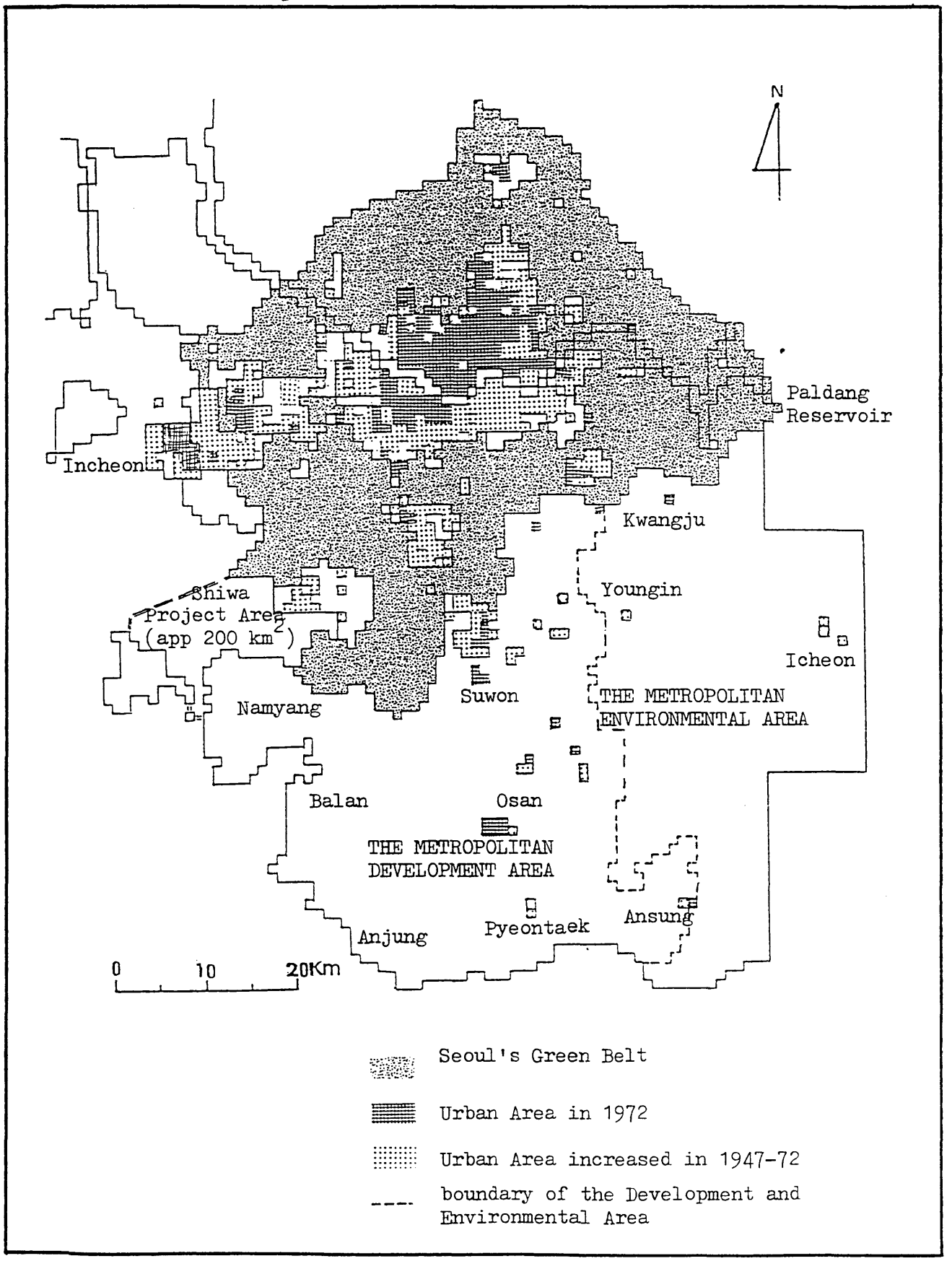
Over the study period Suwon became a city of half a million people similar to the other surrounding towns of Bucheon, Anyang and Sungnam. The prefectual government of Kyongki was located in Suwon. The railway became electrified during the 1970s and expanded into four tracks so that Suwon had a good railway link to the west and motorway to the east. East Suwon, a large suburban expansion, was built in the city fringe on good agricultural land (Suwon City 1984) and the Samsung Electronic Site was situated in the east Suwon plain near the motorway junction. University campuses, relocated from Seoul or newly established, were situated between the east junction and the city edge. The Korea traditional village was situated in the eastern expanding area. Many high-rise apartments were built in both east and west Suwon by the Korea Housing Corporation and private developers. The rural area around Suwon Railway Station was changed into a dense town area and became a popular suburban commuting area in south Seoul. However, only suburban expansion took place in the large city of Suwon. Urban sprawl and ribbon development was totally controlled in the Seoul Metropolitan Development and Environmental Area, beyond the Regional Green Belt.

8.3.4(b) The Metropolitan Development Area and the Metropolitan Environmental Area

The Metropolitan De-en Area is located in the extensive rural area beyond the Green Belt in the south and covers 2744 km^2. The Seoul De-En Area consists of two contrasting areas of directed development and physical environmental protection. As shown in Figure 8.4 the outer zone is divided along the line of a watershed.

The east zone is called the Metropolitan Environmental Area and water flows from the Han River and its tributaries into the Paldang Reservoir, which supplies water to more than ten million people in Seoul, Incheon, other large cities and their surrounding areas. Therefore water pollution seriously needs to be avoided. The reservoir gets water from three main sources; the North Han River via the Cheong Pyeong Dam, the south Han River via many regional towns of Yangpyung, Icheon, Yeoju (east of Icheon) and others upstream. The third source is from the Kyongan River flowing from Young-In Kwangju

Figure 8-4 - Subdivision of Seoul De-En Area; the Metropolitan Development Area and the Environmental Area



valley to the reservoir. All of these rivers have been polluted, to a greater or lesser extent, by discharges from urban settlements, many cloth industries, electronics, electricity, furniture, textile and many other factories. Waste from piggeries in the Young In Park was also a serious source of river pollution. The Metropolitan Environmental Area in this study covers mainly the South Han River Basin covering 197 km^2.

On the other hand, the west zone of the De-En Area is freer in terms of environment protection and called the Metropolitan Development Area. The Metropolitan Development Area covers 1547 km^2. As the remaining developable land is very limited in Seoul Built-up Area and the satellite towns have less than 200 km^2 for actual development, the Development Area would inevitably be expected to provide large areas of land in the near future for suburban and industrial development. Within the Seoul Metropolitan Region, a rough estimation of 1500 km^2 from the 1985 maps was left in gross area and possibly 800 - 1000 km^2 of net developable area could be available for Seoul's growth. This area has two potential development axes; a suburban development axis in the eastern corridor of Suwon, Osan-Pyeongtaek beyond south Seoul, and an industrial axis in the west coastal (Yellow Sea) corridor of Namyang-Balan-Anjung beyond Incheon and Ansan industrial cities (see Figure 7.6).

A further development area is the Shiwa project area on the west coast which it is estimated at will add over 200 km^2 to the Metropolitan De-En Area including 60 km^2 of a large lake, 44 km^2 of islands and approximately 100 km^2 of reclamation land. Some industrial new town development was proposed but the main land use will be agricultural uses. At one time a second international airport site was considered on this reclaimed land but the site for the second international airport was chosen to be Young Chong Do, from part of Incheon city.

Over the study period almost all of the Metropolitan Development Area beyond the Green Belt remained rural with about 1000 km^2 of net developable area. By contrast the Built-up Area inside Seoul's Green Belt became overcrowded with over ten million people in the small

area of 457 km^2 and an incredibly high gross density of nearly 22000 persons/km^2 (but net density of 28000 persons/km^2). As a result the inner boundary area of the Green Belt has suffered from the heavy pressure of urban development. But in contrast, the Metropolitan Development Area beyond the Green Belt remained as almost all rural area of about 1000 km^2 of net developable area.

The next chapter includes discussion arising from the studies on the three metropolitan cities of London, Tokyo and Seoul and a comparison of urban growth in metropolitan city regions with and without Green Belts. The urban growth trends studied would help Seoul to prepare to meet the growing population and land use demands of the future. Development and environment protection policies in the regions will be analysed. The British invention of new town development as a counterpart to Green Belt will be examined to determine whether it is sufficient to cater for metropolitan growth. Lastly the hypothesis in this research, which was intended to solve the land crisis in expanding Seoul, will be tested to see whether it is right or wrong.

PART FIVE

CONCLUSION

CHAPTER NINE

COMPARISON AND LESSONS

This chapter summarises urban growth in the city regions of London, Tokyo and Seoul in the first section (9.1). The second section (9.2) reviews regional policies in the three different places. It discusses Green Belt and new towns in London, uncontrolled suburban expansion and a new approach in Tokyo, and suburban growth and environmental protection in Seoul. The difficulties and differences in international comparative studies on urban growth and Green Belts are explained in section 9.3. Future land need in Seoul Metropolitan Region is estimated in section 9.4. The last section (9.5) reviews Unwin's influence on Tokyo and produces Unwin's Tokyo Model.

9.1 Urban growth in the Metropolitan Regions of London, Tokyo and Seoul

Table 9.1 summarises urban growth in the Metropolitan Regions of London, Tokyo and Seoul in a single table.

London had a large urban area of 1549 km^2 in the Metropolitan Region in 1947 before the Metropolitan Green Belt was implemented and urban growth in the London Region was very much controlled during the study period of 1947-1972. The Built-up Area increased its urban area by 140 km^2, an increase of only 13 per cent; the Urban Islands around London gained considerably more urban land, 363 km^2, which represented a growth rate of 129 per cent; the urban area in the Green Belt grew by only 41 km^2 mainly from expansion of the existing suburban residential areas and public facilities; the Rural Metropolitan Area beyond the Green Belt increased its urban area by 202 km^2 showing the highest growth rate of the four subdivisions. London Green Belt was designated to control suburban expansion of the London Built-up Area and land use change within the Green Belt.

The Urban Islands and the Outer Metropolitan Area had large increases in their urban areas. Urban growth in the London Metropolitan Region

Table 9-1 - Urban Growth and the Growth Rate in London, Tokyo and Seoul Metropolitan Regions

Area : km^2 Rate : %

	London				Tokyo					Seoul			
	1947	1972	1947-72	1947-72/47	1955	1966	1976	1955-76	1955-76/55	1972	1985	1972-85	1972-85/72
	km^2	km^2	km^2	%	km^2	km^2	km^2	km^2	%	km^2	km^2	km^2	%
Built-up Area	1090	1230	140	13	410	695	902	492	120	172	343	171	100
Urban Islands	282	645	363	129						37	177	140	378
Green Belt	67	108	41	61	38	229	503	464	1221	12	21	9	75
Outer Metropolitan Area	110	312	202	184	135	398	994	859	636	23	58	35	152
Metropolitan Region	1549	2295	746	48	583	1322	2398	1815	311	244	599	355	145

Sources: From Tables 4-1, 6-2 and 8-1

represents a growth rate of 48 per cent in twenty-five years, with an additional urban area of 746 km^2.

Meanwhile, Tokyo Metropolitan Region grew extremely rapidly. The urban area in the Region in 1955 was 583 km^2 and increased by 1815 km^2 in the twenty one years between 1955 and 1976. The urban area of Tokyo Region in 1955 was much smaller than that of London in 1947 but the sizes of the urban areas in Tokyo in 1976 and in London in 1972 were very similar area at around 2400 and 2300 km^2 respectively. The urban area in the Tokyo Built-up Area more than doubled but within the Tokyo Green Belt it increased by more than twelve times from 38 km^2 in 1955 to 503 km^2 in 1976. By contrast London's Green Belt gained 41 km^2 of urban area between 1947 and 1972 and Seoul's Green Belt only 9 km^2 between 1972 and 1985. Tokyo provided a good answer to Thomas' question about what would happen if the Green Belt area would serve for large suburban expansion.

Growth in the Outer Metropolitan Area had also been promoted in the Tokyo Region. Once London and Seoul had controlled suburban outgrowth with Green Belts, their outer metropolitan areas were not very active and showed lower growth rates of 184 per cent in London and 152 per cent in Seoul, compared to Tokyo's continuous suburban growth in the outer zone of 636 per cent, represented an additional urban area of 859 km^2. Tokyo's urban sprawl took over the Metropolitan area as a whole, while London contained urban growth in the Urban Islands within the Green Belt and controlled the growth of regional cities and towns beyond the Green Belt. Seoul Metropolitan De-En Area remained rural area beyond the Green Belt until today.

Therefore, as can be seen in Table 9.2 urban coverage in Green Belt areas had been changed from 4 per cent to 53 per cent in Tokyo, and severely controlled at one or two per cent in London and Seoul before and after the Green Belts were introduced. The outer metropolitan area's urban coverage was much increased in Tokyo, but less growth occurred in London and little change occurred in Seoul (see Table 9.2).

Table 9-2 - Increase of Urban Coverage to the Total Area in London, Tokyo and Seoul Metropolitan Regions

Area : km^2 Rate : %

	London			Tokyo				Seoul		
	Total Area	1947	1972	Total Area (1976)	1955	1966	1976	Total Area	1972	1985
	km^2	%	%	km^2	%	%	%	km^2	%	%
Built-up Area	1310	83	94	1005	44	72	90	457	37	75
Urban Islands	831	34	78					354	10	50
Green Belt	5851	1	2	941	4	25	53	1566	0.8	1.4
Outer Metropolitan Area	3520	3	9	5012	3	8	20	2744	0.8	2.1
Metropolitan Region	11512	13	20	6958	9	19	34	5121	5	12

Sources: From Tables 4-1, 4-2, 6-2 and 8-1

Urban growth in the Seoul Metropolitan Region had concentrated on suburban expansion in the Built-up Area inside the Green Belt boundary, the South Seoul District across Han River and the Incheon Development Corridor. Urban coverage in Seoul Built-up Area amounted to 75 per cent in 1985, lower than those of London and Tokyo because the Han River and its tributaries occupy more than 10 per cent. Therefore, the Seoul Built-up Area had been almost fully developed in 1985 and little space remained for further development inside the Green Belt. Urban coverage in the Satellite Towns and Urban Islands represented 50 per cent of the total area by 1985. On the other hand, the Green Belt and the Metropolitan De-En Area show very low urban coverage around one or two per cent of their total areas between 1972 and 1985. Seoul Region represents a dual land use structure of urban Seoul and urban satellites contrasting with rural Green Belt and the rural outer metropolitan area.

It is very interesting to note that the proportions of urban land in the Built-up Areas to the total area of the Metropolitan Regions was coincidentally 70 per cent in each of the three city regions when the Green Belt was introduced (Table 9.3). As expansion took place in the Urban Islands and Metropolitan Areas rather than in the Built-up Areas the urban proportion of the latter changed, that of London decreasing from 70 to 54 per cent over twenty-five years, Tokyo's to 53 per cent in the first eleven years and to 38 per cent in the following ten years, and that of Seoul to 57 per cent over thirteen years. Presumably Seoul may reduce even more to around 40 per cent in the year 2000 if Seoul follows Tokyo's decreasing trend.

It is possible to draw the following conclusions from the comparison of measurements of urban growth in London, Tokyo and Seoul. Firstly, the Green Belt area changed to a large extent to become a suburban area without the implementation of a Green Belt as shown by Tokyo. Secondly, an implemented Green Belt curbed outward suburban growth and consequently also controlled metropolitan growth as a whole, as it was shown in London as well as Seoul. This is confirmed by Ackerman (1985) who also noted that the London Green Belt has squeezed urban growth in the whole regional context, rather than

Table 9-3 - Proportion of the Urban Area in the Subdivisions to the Metropolitan Regions of London, Tokyo and Seoul

Rate : %

	London		Tokyo			Seoul	
	1947	1972	1955	1966	1976	1972	1985
Built-up Area	70	54	70	53	38	70	57
Urban Islands	18	28				15	30
Green Belt	5	5	7	17	21	5	3
Outer Metropolitan Area*	7	14	23	30	41	10	10
Metropolitan Region (Total)	100	100	100	100	100	100	100

Sources: From Tables 4-2, 6-2 and 8-1

* Outer Metropolitan Area in this Table includes Rural Metropolitan Area in London, Metropolitan Suburban Area in Tokyo and Metropolitan De-En Area in Seoul

promoting outgrowth beyond the Green Belt. London's growth rate was found to be 48 per cent between 1947 and 1972 by the author's estimation. Seoul's growth was stopped at the inner boundaries of the Green Belt, and so was confined to the Built-up Area and the Urban Islands. This pattern of urban growth contrasts dense Built-up Area with the open countryside of the Green Belt and the Outer Metropolitan Area. It can be concluded that the introduction of a Green Belt controls suburban growth of a Built-up Area as well as metropolitan growth in a whole region.

9.2 Review of regional policies in London, Tokyo and Seoul

9.2.1 London

The post-war regional framework of London was deeply influenced by Unwin's planning of a Green Belt and new towns, and the Barlow Commission's recommendations on the decentralisation of industry and population out of London and the neighbouring regions. Abercrombie, a strong minority on the Barlow Commission, proposed a tighter and wider Green Belt to control suburban expansion around London, and intended to accommodate one million people largely in new towns within and beyond the Green Belt. The number of new towns was strategically simplified to ten limited areas rather than the hundred satellite settlements of new or existing towns and villages that Unwin had proposed.

During the expanding economy of the 1950s and 1960s planners accepted Abercrombie's wartime planning proposals and preferred to promote the negative view of control by more than doubling London's Green Belt. It contained the expanding urban area by safeguarding much land from urban growth. This static policy has been continued in the 1970s and 1980s at the expense of London's growth. However, the sporadic and ribbon development that occurred in the interwar period was stopped by the Green Belt and enabled an extensive green area to be retained around London, containing a large urban area within its inner boundary. Urban growth in the Outer Metropolitan Area has been

controlled in and beyond the Green Belt. New towns were situated around London and many small or medium sized urban islands surround the large developed area. Green Belt and new towns have been much respected all over the world as a great success of post-war British planning.

This research examined the new towns in respect of how much area was taken by new town development in the London Metropolitan Region. This measured only 12 per cent out of the total urban growth of the region between 1947 and 1972. It seems therefore that in terms of their contribution to total urban expansion the achievement of new town development around London has probably been exaggerated. Suburban extension at the edge of the great city, urban islands and outer cities inside and outside the Green Belt received the major growth in the urban area. Hall (1989) points out that the majority of London's growth has gone 'into suburban growth around the existing towns and even villages'. From his population data, Hall calculated that the population growth rate in the eight Mark I new towns around London accounted for only 11 per cent of the total population increase in the rest of the South East between 1951 and 1986, a proportion in line with the proportion of urban growth in new towns. The majority of urban growth in London has been the result of suburban growth rather than new town development. However, the extent of suburban expansion around existing towns has been curtailed as a result of the concentration of some of the population increase into the new towns as well as being strictly controlled by the introduction of the Metropolitan Green Belt and its extensions. The central problems of the Metropolitan Region have been the control of suburban growth and the preparation of the Green Belt.

9.2.2 Tokyo

Tokyo has had no history of new town development. Although Tama New Town was so named, it was really a large suburban development on a vacant area across the Tama River in the south west valley of Tama District and as such followed a pattern of suburban expansion that began when Yokohama port was forced to open to the West in the

nineteenth century. At that time it was intended only to develop an urban axis between Tokyo and Yokohama and linear suburban growth proceeded along this corridor from the time of the early port developments and the first railway line built in Japan to post-war industrial expansion. By the end of the 1910s, however, a railway network had been developed in the Tokyo Region which, combined with the effects of the 1923 Great Kanto Earthquake, encouraged people to move westwards to the Musashino Tableland along the Chuo and other radial suburban railway lines.

As a result, the metropolis expanded outwards and the small area of old Tokyo was restructured in 1932 into twenty three Tokyo Wards and Tama District to cope with metropolitan urban affairs. The Government worried about the diminishing green area due to the rapidly expanding urban growth at the city edge so the Tokyo Metropolitan Government prepared a large regional green area and suburban development area in the 1939 plan. The large development area was enclosed within the regional green area. It was designed to follow Unwin's planning principle of unlimited suburban growth on the background of open space. This regional green area plan was considered the first and the best regional structure plan for the Tokyo Region, which was carefully manoeuvred to fit Tokyo's physical features and to adopt the Japanese tradition of concentration on the capital city, Tokyo. It was not, however, adopted.

However, during the Second World War, the reserved green area was used to accommodate key national industries within the protected air-raid zone of 30 to 40 kilometres around Tokyo centre. The war-time cabinet considered the well-prepared regional plan as unnecessary for victory in the war and not urgent. It asked that local government help the national goal of continuous industrial production in the safer places and proposed to build large factories in the Tokyo Region, especially in the extensive protected open space. These areas were located near to the rivers, in accessible areas with good railway and road networks and cheaper land. The large industrial areas in the outer cities later became centres of suburban growth when the post-war economy was booming.

The economic recovery in the 1950s brought paralysis of urban functions in central Tokyo. City congestion from overconcentration of population and industry was seriously discussed and it was concluded that a remedy for the city region was to be found from the British experience. The new concept of three areas, Built-up Area, Green Belt and the Urban Development Area, was revealed in the First Master Plan for National Capital Region Development in 1958. This plan employed large suburban growth in the Yokohama Area inside the Green Belt and in the outer expanding suburban towns and did not follow the British model of New Town Development dispersed from the great city. Contrary to the Japanese planners' wishes the plan was not implemented so the Green Belt was never designated. Instead Tokyo expanded into the fringe westward towards Tama District, along the northern development corridor and into the higher flatland in the east, which had once been planned as Tokyo's Green Belt. Without a Green Belt the area turned into an extensive suburban area around Tokyo Wards. This research states that the urban growth rate in the Green Belt amounts to over 1200 per cent over the two decades between 1955 and 1976. The urban area in Tokyo's Green Belt increased from 38 km^2 in 1955 to 503 km^2 in 1976. The urban area in the Tokyo Metropolitan Region as a whole grew from 583 km^2 in 1955 to 2398 km^2 in 1976 without control of suburban growth by a Green Belt policy.

It was inevitable that the Japanese Government should accept the existing large suburban growth as a *fait accompli* in the 1960s and afterwards. Japanese planners then argued that the British idea of a Green Belt and new towns had not been suitable to Tokyo but the actual situation was that the proposed Green Belt area became a suburban residential area. Tokyo had sprawled over almost the whole metropolitan area by the mid-1970s. Endless suburban expansion became Tokyo's urban character. Even the beautiful coastal area of Tokyo Bay was almost replaced by industrial development, as much as an area of around 200 km^2.

A new concept of the fifty kilometre zone was therefore introduced in the 1960s to cope with the sprawled region. The new idea urged that greater concentration into the Tokyo Region of certain manufacturing

industries, service industries and central government functions might enhance the international competition of Japan and would not be harmful to Tokyo Region if transport and environmental facilities were rationally prepared. A very positive suggestion was put forward to make an integrated urban mass of the whole of the region's cities, towns and villages. The 1968 plan attempted to restructure Tokyo Region into a more expanding and integrated city region for pursuing higher economic growth. Continuous urban growth in an already overcrowded Tokyo Region was the fundamental premise. This is a very different principle from traditional British planning. The Japanese idea might seem to be a good excuse for their failure to contain development in Tokyo but it may not be enough to justify the undesirable living and commuting conditions created by the urban sprawl in the Metropolitan Regions. To a 'traditional' and negative view of urban planning as control and containment the 'abnormal' Japanese principle of regional planning in 1968 would seem too positive.

9.2.3 Seoul

London studies in this section conclude that suburban growth and the Metropolitan Green Belt have been situated as the central issue in the control of London's growth. Tokyo has not controlled its suburban expansion with a Green Belt and at the end accepted the sprawl as it was, suggesting a very positive view of suburban growth.

Seoul has employed a Green Belt around Seoul with the initial provision of an extensive area for suburban development in South Seoul across the Han River and in the Incheon Development Corridor within the Green Belt. As a result, Seoul has been able to expand the urban area of the Region very considerably while at the same time containing its suburban growth inside the Green Belt's inner boundary.

The historic structure of old Seoul had been formed with four rings; the walled city area and the attached building area in the centre; a first ring of outer commercial ports and towns about 8 kilometres

from the centre of Seoul; a second circle of commercial satellite towns some 15 kilometres away; and the most outer area of Hwasung New Town as a newly established regional commercial town in 1792, 30 kilometres away from the old Capital. In this century the first ring of commercial towns has been slowly developing from 1900, with the opening of the first railway lines in Seoul, to 1960. Rapid suburban growth had started with the almost miraculous economic growth of South Korea and immense population increase into Seoul since her economic plans in the 1960s. The second ring of the old satellite towns was integrated into the Seoul Built-up Area and made a large suburban area of Seoul City during the 1970s. Suburban expansion then took over the remaining undeveloped area inside the boundary of the Green Belt, before it was suddenly stopped within the inner boundaries of Seoul's Green Belt in the 1980s leading to increased conflict between suburban growth and Seoul's Green Belt.

The urgent problem of the end of the 1980s was that there was little space left for suburban growth in the Seoul Built-up Area and the Satellite Towns. It was recognised that the demand for suburban expansion was not diminishing. It would occur either in the Green Belt area, if land were released, or in the Outer Metropolitan Area beyond the Green Belt. The Green Belt is a designation which is accepted by the public, who agree that Green Belt land should be preserved permanently and must not be released for suburban development in South Korea.

However, the Seoul Metropolitan De-En Area has special characteristics. It consists of two contrasting areas of the Development Area in the west and the Environmental Area in the east. Further urban growth must be controlled in the East zone because it contains the environment protection area for water supply to over fifteen million people. Therefore environmental protection of this special area must be carried out at any cost and only very limited urban growth could be allowed in this eastern half of the outer metropolitan area. It is concluded that the only reception area for Seoul's future growth is the Metropolitan Development Area.

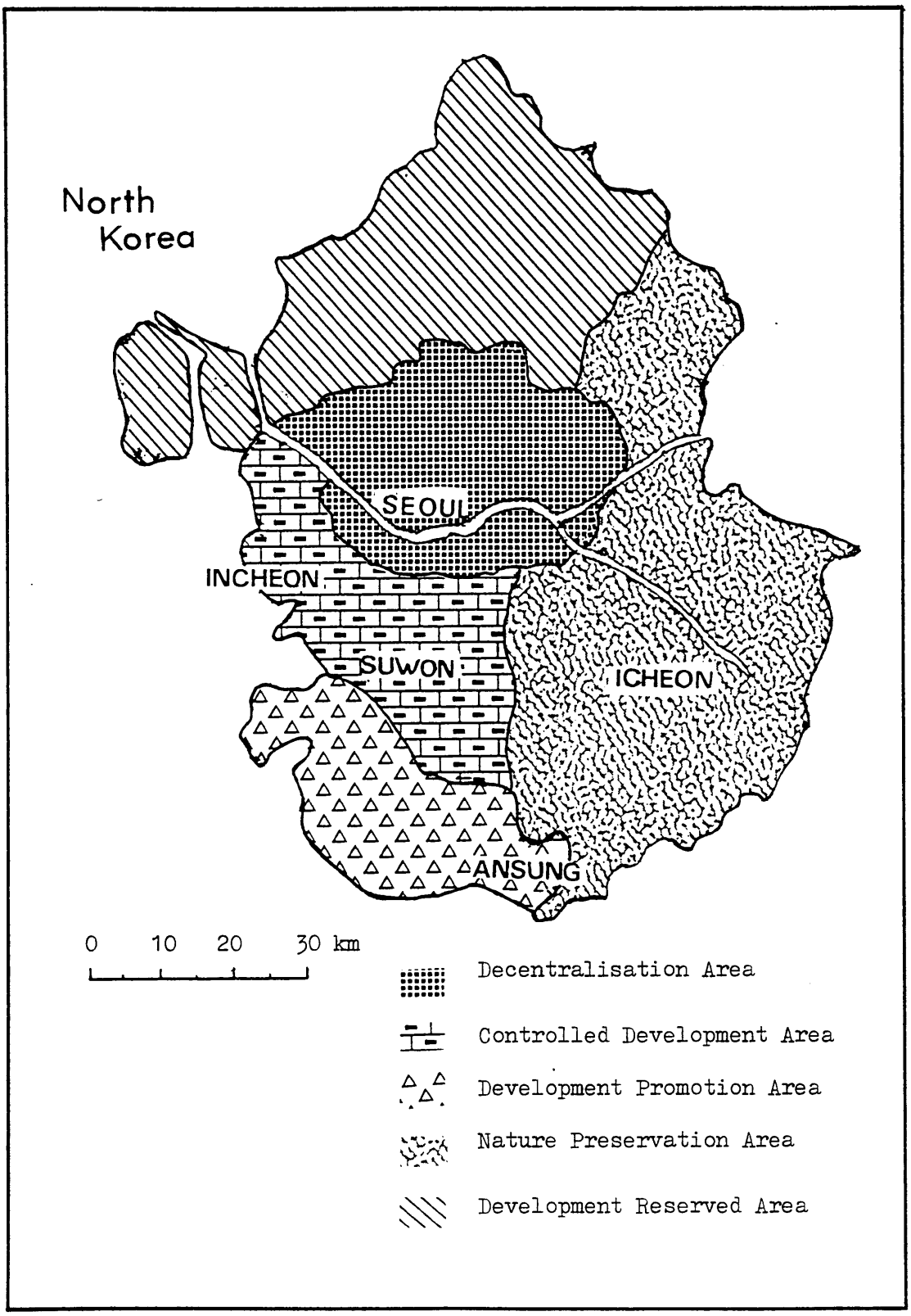
However, a negative regional plan has been prepared in Seoul Capital Region in accordance with the British ideas of the late 1930s and the original philosophy of the Japanese National Capital Region Development Act in 1956 and the First Master Plan for Tokyo Region in 1958. Behind Japan by twenty six years, the Korean Act and the Plan for Seoul Capital Region Development were introduced in 1982 and 1984 (Korea Research Institute for Human Settlement 1981; MOC 1986b).

This regional plan copies the planning framework which Tokyo abolished. The Seoul regional plan in 1984 subdivides the Capital Region into five areas; the Decentralisation Area in the centre; the Controlled Development Area between Incheon and Suwon-Osan, including Anyang and Sungnam Urban Islands; the Development Promotion Area in the south half of the Metropolitan Development Area in this study; the Nature Preservation Area in the Han River Basin; and the Development Reserved Area in north Seoul Region (see Figure 9.1).

The last two subdivisions should be preserved undoubtedly because of national security and environmental reasons. The first critical mistake in this proposal is that Seoul's Green Belt has been excluded from the master plan having been subsumed into the four subdivisions. The second planning error arises from the conventional attitude to suburban growth. Seoul needs land for further suburban expansion but this plan neglects the demand. Irresponsibly, the plan directs urgently needed suburban growth to the far outer edge of the Region, some 50 kilometres and more away from central Seoul. The Suwon Development Corridor has been put in the Controlled Development and Development Promotion Areas, showing an extremely negative viewpoint. It would be difficult to solve the urgency of Seoul's growth with such contradictory planning attitudes.

There are no doubts that Seoul will continue to expand and large areas of land will be urgently required in the Seoul Region. The Korean Government has projected that population in the Seoul Capital Region will be increased from 15,827,000 people in 1985 (Seoul, Incheon, Kyoengki Municipal Yearbooks 1986) to 21,775,000 people in

Figure 9-1 Master Plan of the Seoul Capital Region, 1984



Source: MOC (1986), the Master Plan of the Capital Region Development

2000 and 46.5 per cent of the total population in South Korea will be living in the Capital Region by 2000 (Chosun Ilbo January 1989).

Now it is time for Seoul to look at Tokyo's positive approach which argues that Tokyo's further growth may not be harmful and could even be helpful in improving its international economic status, if sufficient transportation and environmental facilities are provided by rational regional planning schemes. But if Seoul wishes to retain strong Green Belt policies it should house suburban expansion elsewhere within the Region. The most suitable area to receive development would be in the Controlled Development Area of the 1984 Seoul Capital Region Plan. Tokyo changed its attitude of suspicion to suburban growth to encouragement in the second Master Plan for the Capital Region Development in 1968, and Seoul may be able to copy this philosophy in the early 1990s, possibly again 25 years behind Tokyo.

On the other hand, Seoul must learn from London's experiences of the 1950s. In terms of environmental protection, Seoul has a special geographical character which requires water quality protection and it has achieved remarkable success to preserve this special area under strict Green Belt policies. The large area around the Paldang reservoir in Han River has been controlled but recently it was realised that this reserved area is insufficient and so over 2000 km^2 upstream of the reservoir was declared as another Environmental Protection Zone under an environmental law in the summer of 1990 (Chosun Ilbo, July 1990). Therefore, Seoul may be able to extend Seoul's Green Belt to measure more than double its existing designated area as London extended its Metropolitan Green Belt to more than double in size in the late 1950s and 1960s. In that case, the extending Green Belt would be safeguarded from urban encroachment in the Seoul Metropolitan Environmental Area, the open land east of the Suwon-Osan Development Corridor.

9.3 Difficulties in and differences of international comparative studies on urban growth and constraints

The main difficulties of the comparative studies stem from two roots. The first one is that the three Metropolitan Regions have had different stages of urban growth, with different problems and different approaches to solving them. The second problem arises from the many different data sources, classifications, definitions, land use patterns and relevant information etc required to establish data for comparison between the three city regions. The land use statistical and methodological difficulties were discussed earlier in Chapter Two.

It might be dangerous merely to collect land use data and to compare them. The researcher fortunately can read Korean, Japanese and English and has worked for several years in the UK. He has been familiar with planning and its background in Japan because Japan has some similarity with South Korea in legal and cultural aspects. The worker's practical experiences of town and regional planning and public land management in South Korea have been helpful in learning other countries' and regions' urban evolution and their problems.

However, international comparative study was still not easy work. This research studied land use in three different metropolises and land use and urban growth in relation to three urban containment policies. Therefore, it was necessary to understand many differences of land use information, land use behaviour, customs, cultures, political, social and economic changes etc in the three countries.

For instance, large numbers of Londoners would prefer to live in a cottage in the countryside, but Tokyolites would be happy to have their own small wooden houses in a Tokyo suburb and Seoulites are proud to live in a modern high rise apartment in South Seoul. British people may not like to live in a great city but Japanese and Koreans wish to come and live in their capital cities. London has contained suburban growth inside a Green Belt. Tokyo has sprawled development all over the Metropolitan Region and beyond. Seoul has

high-rise living space within the Built-up Area and even in satellite towns around Seoul. Tokyo is situated in lower delta land, between several large rivers and tributaries, and seaside, in Tokyo Bay. The lower and swampy area is limited for development and so reclaimed land has been provided for new large industrial and commercial sites, as well as for suburban residential development. Seoul has been influenced by the Korean War and national security has been a priority of the country. Londoners have had a long history of industrial town development and fear the reappearance of these unpleasant urban environments.

For all three cities the overconcentration of population and industry has been a major problem. Urban congestion was seriously discussed in the late 1930s in London, paralysed Tokyo in the mid-1950s and brought painful problems to Seoul in the 1980s. From this it seems that in terms of development Seoul is about half a century behind London and a quarter of a century behind Tokyo.

London's Green Belt has the longest history. It begins with Howard's introduction of a Green Belt or agricultural belt in his early book *Tomorrow : A Peaceful Path to Real Reform (1898)*, re-edited as *Garden Cities of Tomorrow*. The Garden City Movement, later the Town Planning Association, had strongly influenced Britain to build garden cities or new towns outside great cities, as the remedy to city overcrowding, and to contain town development areas inside a Green Belt. Unwin had further developed the British planning framework of Green Belts and new towns in the Greater London Region Development Plan in the early 1930s. The philosophy of control of urban growth was emphasised in the reports of the Royal Commission on the Distribution of the Industrial Population (the Barlow Report) and the Committee on Land Utilisation in Rural Areas (the Scott Report) in the late 1930s and early 1940s and it became a reality in the post-war period with the development of New Towns and the Metropolitan Green Belt around London. The 1984 Green Belt Circular seems to have settled the Green Belt issue for the time being. It took nearly half a century from the birth of the Green Belt idea to the appearance of a Metropolitan Green Belt (from the 1890s to the 1940s), and getting

on for another half century from the start of the Metropolitan Green Belt to its reconfirmation in the 1980s. The history of the London Green Belt, therefore, almost spans an entire century.

In Tokyo the Japanese tried to learn Unwin's lesson during the 1930s soon after he presented his idea of suburban expansion and Green Belt, but this advanced concept did not flourish on Japanese soil. The well-prepared regional plan for the Tokyo Region in 1938 might have been the most suitable in the 1950s, when the economy had recovered and rapid suburban expansion began, but the Japanese did not review their excellent pre-war proposal and instead directly copied another newly developed plan, the Greater London Plan of 1944 and the Abercrombie Green Belt. In the 1950s and 1960s Tokyo needed suburban growth rather than control of its expansion by the introduction of a Green Belt.

In contrast to Tokyo, and even more to London, Seoul introduced the Green Belt at a very early stage of its growth, before urban congestion or overconcentration of population had occurred in the capital. The real problems of overconcentration were not realised in Seoul until the 1980s. The population of Seoul City grew to over ten million in 1988, which was highly overcrowded compared with an optimum population size projected in 1962 for 1985 of 5.6 million people in the total area of 851 km^2. The number of registered cars in Seoul City increased from 40,573 in 1972 to 296, 848 in 1985 and 988,880 in 1989 (Ministry of Transportation Yearbook 1973, 1986 and Chosun Ilbo December 1989). Seventy per cent of the total deposits and 64.4 per cent of total credit from Korean banks was concentrated in Seoul City in 1980 (MOC 1986b; KRIHS 1981). Forty per cent of industrial production was from the Capital Region in 1978 (KRIHS 1981). Therefore, Seoul in the 1980s had a serious problem of overconcentration and would have had seriously to consider a Green Belt if its Green Belt had not already been designated over a decade earlier. Perhaps the institution of the Green Belt had come too early in the history of Seoul's expansion, despite the fact that an apparently ample area of land was left without the Green Belt for

future expansion. By 1985 the remaining undeveloped area inside Seoul's Green Belt had almost all been developed.

In fact, the total area of the Seoul Built-up Area of 457 km^2 seems small compared with the London Built-up Area of 1310 km^2 and Tokyo Built-up Area of 1005 km^2. The total area of Seoul's Satellite Towns and Islands of 354 km^2 is also small in comparison with London's Urban Islands of 831 km^2 and the Tokyo's Green Belt suburban area of 941 km^2. Seoul has had a much smaller area available for suburban expansion, in its Built-up Area as well as in satellite settlement than the other two cities, largely because of its early designation of a Green Belt.

Munton (1986) concluded that London's Green Belt in the 1980s was reaching 'the end of an era'; it was no longer an issue of great controversy. Tokyo's Green Belt has been forgotten a long time ago by the Japanese (Sato 1977). Seoul's Green Belt on the other hand has brought real problems in the 1980s by preventing suburban growth in the area which is the most suitable and nearest land to Seoul for suburban expansion (Mills, Song and Kim 1986).

9.4 Land needs in Seoul in 2000

It is not easy to estimate the land required for suburban growth in the expanding Seoul Region, which has been contained by a Green Belt. Three different methods have been used : the use of growth trends in the three cities; a comparison between Tokyo's and Seoul's urban expansion; and a projection of the proportion of urban land within the Metropolitan Area. These estimates of land need in Seoul are then compared in order to try to make the estimate.

9.4.1 Trend method

Table 9.1 presents various urban growth data in the three Metropolitan Regions. The first projection of the land needs in Seoul are obtained from the application of the growth trends of each region.

Average annual growth areas in the three city regions are calculated as follows;

Seoul (1972-85) : 355 km^2 ÷ 13 years = 27.3 km^2/year
Tokyo (1955-76) : 1815 km^2 ÷ 21 years = 86.4 km^2/year
Tokyo (1955-66) : 739 km^2 ÷ 11 years = 67.2 km^2/year
Tokyo (1966-76) : 1076 km^2 ÷ 10 years = 107.6 km^2/year
London (1947-72): 746 km^2 ÷ 25 years = 29.8 km^2/year

Urban growth in Seoul Region between 1985 and 2000 is estimated with three city regions trends :

With Seoul's trend : 27.3 km^2/yr x 15 years = 409.5 km^2

With Tokyo's trend : 86.4 km^2/yr x 15 years = 1296 km^2
67.2 km^2/yr x 15 years = 1008 km^2
107.6 km^2/yr x 15 years = 1614 km^2

With London's trend : 29.8 km^2 yr x 15 years = 447 km^2

The urban area in Seoul Metropolitan Region in 2000 is projected from the urban area in 1985 plus the urban growth between 1985 and 2000 estimated above as follows:

In the case of following Seoul's growth trend

599 km^2 + 410 km^2 = 1009 km^2 ≒ 1000 km^2

In the case of following Tokyo's growth trends

599 km^2 + 1296 km^2 = 1895 km^2 ≒ 1900 km^2
599 km^2 + 1008 km^2 = 1607 km^2 ≒ 1600 km^2
599 km^2 + 1614 km^2 = 2213 km^2 ≒ 2200 km^2

In the case of following London's growth trend

599 km^2 + 447 km^2 = 1046 km^2 ≒ 1050 km^2

The calculation of Seoul's urban growth between 1985 and 2000 varies from 400 km^2 to 1600 km^2 of additional urban area. Therefore, the total urban area in Seoul Region in 2000 is calculated to be between 1000 km^2 and 2200 km^2 when the 1985 existing urban area of 599 km^2 (= 600 km^2) is added. This estimation gave such a wide measurement of urban growth that it makes it difficult to know the more precise land requirement over the fifteen years, 1985-2000. Seoul's and London's trends of between 400 and 450 km^2 show a lower extent of enlargement than Tokyo. Tokyo's trend is calculated at a very large range of between 1000 and 1600 km^2. The trend of the eleven years between 1955 and 1966 gives a smaller estimation of 1000 km^2 and the trend of the later ten years between 1966 and 1976 gives a larger land requirement of 1600 km^2.

9.4.2 Comparison of Seoul's and Tokyo's urban growth and urban sizes

The previous studies in this research suggested that there is a time lag in urban growth between Tokyo and Seoul of about a quarter of a century. This opinion concurs with the views of the experts on Japan-Korea studies and the Namura Institute that there is a gap of around twenty-five years between Seoul and Tokyo (Watanabe and Fukagawa 1988; Y K Kim 1988). Therefore, it could be argued that the 1985 Seoul is like the 1960 Tokyo and the 2000 Seoul would be like the 1976 Tokyo. The total urban area in 1960 in Tokyo Metropolitan Region is calculated at 919 km^2 from the average between 583 km^2 in 1955 and 1322 km^2 in 1966 (see Table 9.1). As the total urban area in Seoul Region in 1985 was 599 km^2 and in Tokyo was 919 km^2 in 1960, the size of Seoul's urban area represented 65 per cent of Tokyo's size, without regard to differences of population densities between Tokyo and Seoul. Following the same logic, Seoul Metropolitan Region in 2000 could expect to have 65 per cent of 2398 km^2, which was the total urban area in Tokyo Region in 1976. This works out at 1559 km^2 as the total urban area in Seoul Metropolitan Region in the year 2000. The additional urban growth between 1985 and 2000 in Seoul Region is estimated by this means to be 960 km^2 (1559 - 599 km^2), or approximately 1000 km^2 of the urban area.

The above estimation can also be compared with the previous estimation of a total of between 1008 and 1614 km^2 by Tokyo's growth trend method. The common estimated value from the two methods (960 and 1008 km^2) is around 1000 km^2. In conclusion, the estimated net increase of the urban area between 1985 and 2000 in Seoul Metropolitan Region, by these different methods, is between 400 km^2 from Seoul's and London's trends (in round figures) and 1000 km^2 from Tokyo's.

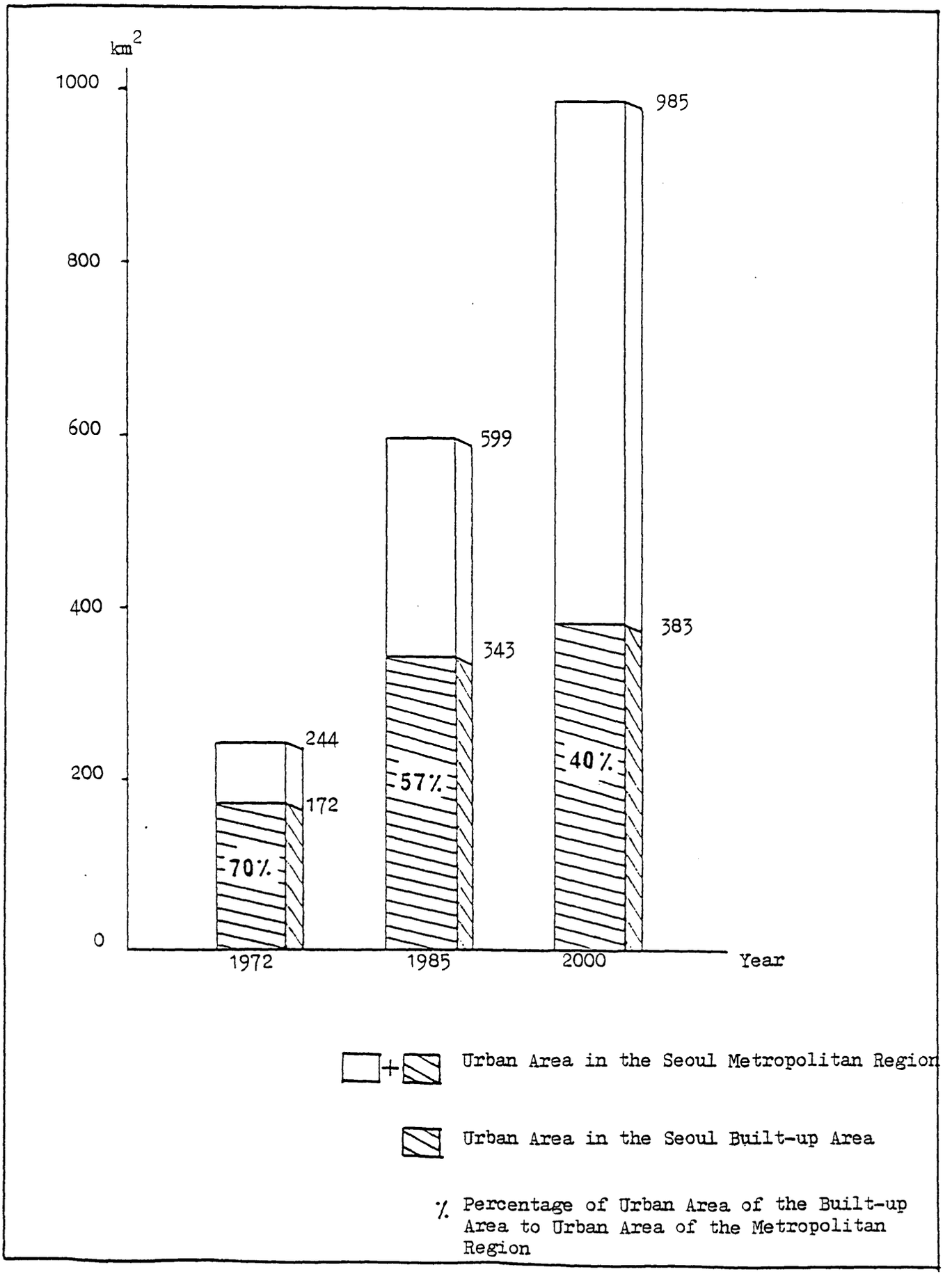
9.4.3 Projection of proportion of the urban area in the Built-up Area in 2000

One of the very interesting findings in this research was discussed in the previous section (9.1), that the proportion of urban area in the Seoul Built-up Area to the urban area of the Seoul Metropolitan Region would drop to around 40 per cent by the year 2000 if Seoul follows Tokyo's trend.

By 1985, most of the developable land in the Seoul Built-up Area had been developed and the only remaining area for further urban growth inside the Green Belt was 40 km^2. If the area is all developed by the year 2000 the total urban area in the Seoul Built-up Area will be 383 km^2 (see Table 9.3). According to studying the trend of proportional changes in the Built-up Area, the area of 383 km^2 will be 40 per cent of the urban area of the Seoul Metropolitan Region by 2000.

Therefore the total urban area in the Seoul Metropolitan Region will be 985 km^2. From this calculation 386 km^2 (995-599 km^2) or approximately 400 km^2 of additional area is required to meet urban growth in the Seoul Metropolitan Region between 1985 and 2000. Figure 9.2 illustrates urban growth in the Seoul Metropolitan Region and the Built-up Area, as well as proportional changes of urban area in the Seoul Built-up Area between 1972 and 2000.

Figure 9.2 - Projection of Urban Growth in the Seoul Metropolitan Region and Change of Urban Area Proportion in the Seoul Built-up Area to the Region between 1972 and 2000



Sources: From Tables 9.1 and 9.3

9.4.4 Actual land requirement in Seoul

In conclusion, the urban area in Seoul Metropolitan Region may amount to at least 1000 km^2, a net increase of around 400 km^2 by the year 2000. This conservative estimate is based on the existing Seoul development pattern of high rise, high density development and urban containment.

London's development trend estimates 450 km^2 of net increased urban area, 50 km^2 more than the estimation of the urban area by Seoul's trend. However, with the highly expansive sporadic trend of Tokyo, Seoul Region's urban area might grow by up to 1000 km^2 by 2000, although it is unlikely that restrictive controls would be sufficiently relaxed to allow this to happen in Seoul.

The figures of 400 km^2 to 1000 km^2 are still too wide apart to imagine by how much the urban area would actually be increased in the Seoul Region in the coming fifteen years. It could be that if Seoul's growth were to be tightly contained as around London the urban growth may amount to 400 km^2, and if there was to be urban sprawl such as in Tokyo without a Green Belt, the urban area might be increased by as much as 1000 km^2. Nevertheless it is very unlikely that Seoul will ever abandon the Green Belt and allow highly sporadic development like that of Tokyo to happen in the Seoul Region.

Therefore, probably the extent of increase in Seoul's urban area will depend more on whether Seoul's present development pattern of high-rise apartments continues or is changed to a lower density cluster housing pattern such as that in London's suburbs.

Supposing that the future development pattern in Seoul was to be less dense than the existing high-rise, high density housing development, then the land requirement would be more than 400 km^2. However, there will be some possibility that the high-rise housing development pattern will continue for future suburban growth in Seoul because the land shortage inside the Green Belt has created the development of higher density apartment blocks as a style of living continued in the

newly developed districts. On the other hand a newly expanding suburban area in the future would at least require open spaces such as golf courses and playing fields, and more public and institutional areas within city development areas. Considering the existing development pattern, new housing development of less high density in suburban areas, and new demands for more open spaces and other development, the actual land needs between 1985 and 2000 can be estimated at more than 400 km^2 of additional urban area in Seoul Metropolitan Region. If Seoul allows lower density development in the new suburban area beyond the Green Belt the additional urban area might be estimated up to 600 km^2, 50 per cent more than 400 km^2.

9.4.5 Land balance in Seoul in 2000

Although in 1985 there wasstill some vacant land in the Built-up Area (about 40 km^2) and also in the Satellite towns and Urban Islands (about 140 km^2) the rate of expansion is such that by the erly 1990s this land will have been largely used up. Therefore it seems reasonable to conclude that the amount of land required for future development can still be calculated at about 400 km^2. Another important question arises of **where** the large suburban expansion of 400 km^2 (or possibly 600 km^2) should be located. As Seoul's Green Belt area would not be released for suburban growth and the Metropolitan Environmental Area may be protected against urban encroachment, the Metropolitan Development Area would be the main recipient of urban growth of 250 (or 450) km^2 which is similar to the size of the Seoul Built-up Area in 1985.

The conclusion to be drawn from this is that Seoul needs to build a new Seoul beyond the Green Belt, in the Seoul Metropolitan Development Area by the year 2000.

9.5 Remaking Unwin's Model on suburban growth (Unwin's Tokyo Model)

The British planning principle of new towns outside a Green Belt would not be able to accommodate effectively a large suburban growth

of as much as 400 km^2, or possibly 600 km^2, in the Seoul Region. Such large urban growth would require development on a regional scale (Herington 1990) rather than following a Utopian garden city principle or even new town ideas. Unwin, as long ago as 1929, suggested that over 1000 square miles (2560 km^2) within the Greater London Region was available for unlimited potential building development. On this basis he developed his dynamic twin planning philosophy of unlimited suburban expansion on a background of Green Belts, and of a Green Girdle on the background of development land. The emphasis of his idea was that preservation of Green Belts should not override the importance of providing adequate living space and facilities for the population.

Japanese planners took lessons from Unwin's dynamic approach for the expansion of Tokyo during the 1930s. In 1932 the administrative boundary of old Tokyo was restructured to create a metropolitan city and Japanese planners applied Unwin's idea to the new-born Tokyo Metropolitan Region. They prepared plans for green rings in the Tokyo Region and overlapped green wedges along Tokyo's geographical features such as hills and over valleys. The Tokyo Green Area Plan was eventually published in 1939 (Figures 5.3 and 5.4) and proposed large areas for future suburban growth on the background of Green Girdles or proposed landscape area rings on the background of unlimited suburban development, based on Unwin's imaginative plan for urban dynamism.

As discussed in Chapter Five this Tokyo Regional Plan (1939) was designed to accommodate the extension of Tokyo on a regional scale of about 100 kilometres radius, and to provide a green area scheme before urban sprawl took over all the open space within the region. The regional green area network was intended to embrace both large potential development areas inside the proposed landscape areas and a Green Girdle along the boundaries of the Ward District. Even though it was sacrificed by the World War, this outstanding original plan should not be forgotten.

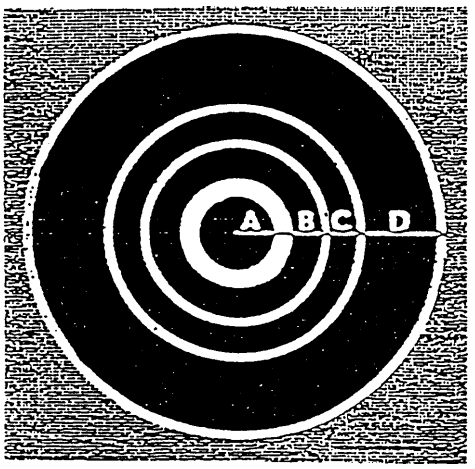
It was suggested in this research (Chapter Five) that the shelved plan would have been very relevant to the Tokyo Region even in the expanding 1950s. If Tokyo had revived the pre-war metropolitan green area plan instead of looking only towards the establishment of a Metropolitan Green Belt, Tokyo might have succeeded in keeping large green areas around the city and in controlling the seemingly endless urban sprawl.

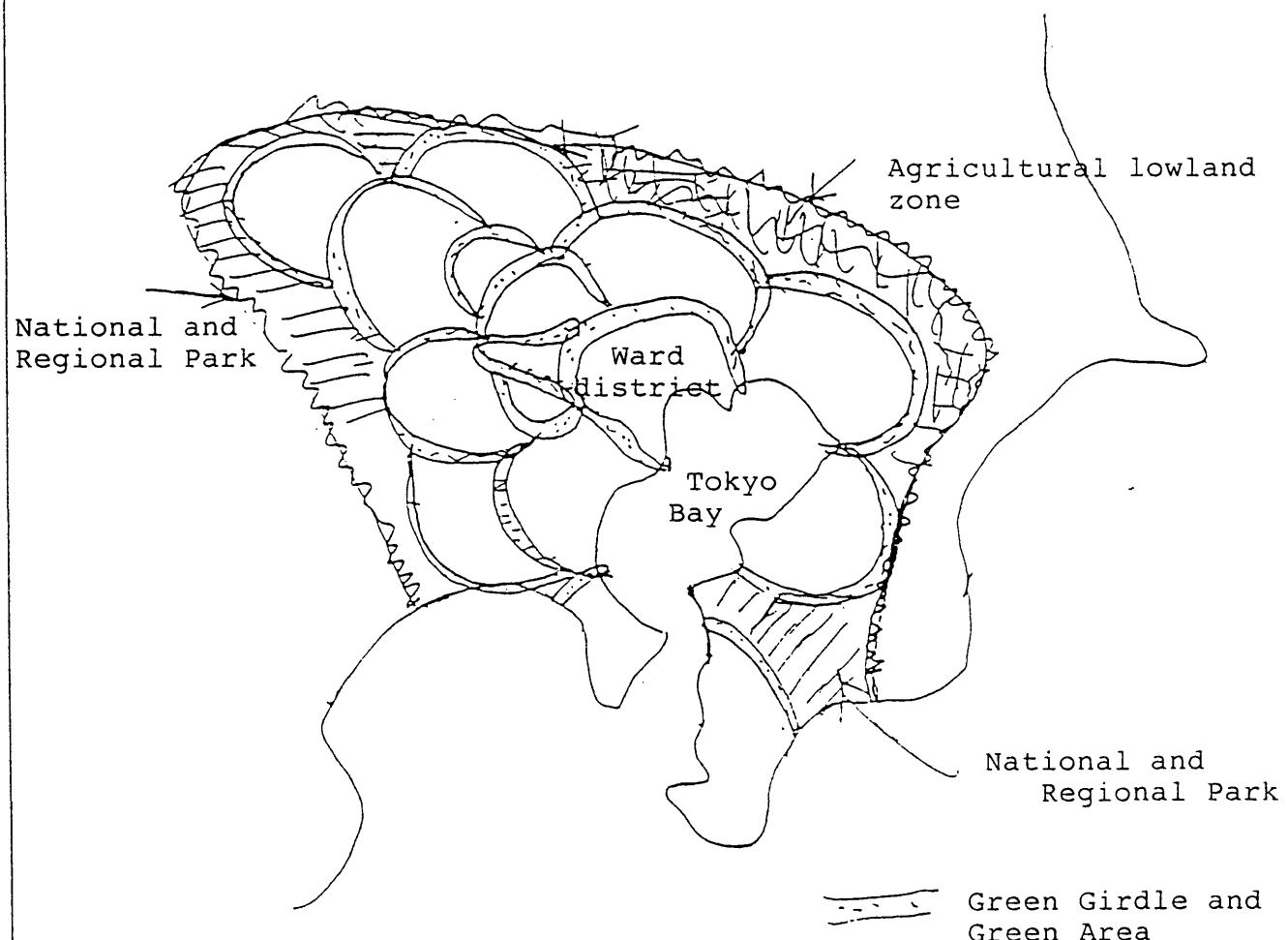
The author has incorporated Unwin's theoretical model of 1929 and Tokyo's actual Green Area Plan of 1939 to create a simplified dynamic regional growth model (Figure 9.3). This model could be used as an example of how Seoul's new urban growth could be accommodated.

Figure 9.3

A Modified Sketch of the Tokyo Green Area Plan based on the Unwin's Dynamic Model

Unwin's Dynamic Model





Sources: Figure 3-5 and 5-3

CHAPTER TEN

CONCLUSION

It has taken a long time for the boundaries of London's Green Belt to be settled. The Green Belt grew from a depth of about 8 kilometres in Abercrombie's Greater London Plan of 1944, to between 11 and 16 kilometres in the old Development Plans of the early 1950s, and to over 30 kilometres in the 1960s and 1970s, finally returning to around 20 to 25 kilometres as a more reasonable extent in the 1980s (Herington 1990). Increasing demand for land for London's growth has conflicted with the Green Belt. Over this period pressures for the release of land in the Green Belt continued but the Green Belt Circular of 1984 confirmed that land in the Green Belt should remain safeguarded and that boundaries should only be altered in exceptional circumstances. It was seriously argued that even small alterations to the boundaries of the Green Belt would bring continuous instability and, in the end, it would be very difficult to continue a permanent Green Belt if much erosion were allowed to occur.

On the other hand, Tokyo abandoned its Green Belt and the proposed Green Belt land became low income suburbs. With the failure to control and direct suburban expansion, Tokyo has experienced seemingly endless sporadic and ribbon development, until the whole city region has become incorporated into an integrated metropolitan area (Watanabe 1986). This research has revealed that without a Green Belt Tokyo has undergone a land consuming pattern of enormous urban growth. The counterpart cities of London and Seoul have controlled speculative suburban growth with Green Belts and safeguarded the urban fringe from the powerful intrusion of sprawl.

Tokyo has experienced the highest economic success in the world, but the quality of life and of the urban environment are not equivalent to those of the other advanced countries (OECD 1986). London has a per capita park area of thirty square metres while Tokyo has only three square metres. The Tokyo Metropolitan Government budgetted 3852 million yen (approximately £12 million at 1984 sterling exchange rate) to acquire only 58 ha of park land for the extension of

community parks in the three years 1985-1987 (TMG 1984). Tokyo seems to have achieved economic miracles at the expense of its environment and living standards.

Meanwhile Seoul's Green Belt was produced under the special circumstances of national security and was introduced at an earlier stage of urban development than London and Tokyo. When it was designated in 1971 there were extensive development spaces inside the Green Belt and a large development corridor was prepared between Seoul and Incheon. These remaining development areas were filled by rapid suburban growth. Strong development pressures were put on the inner boundary areas of Seoul's Green Belt in the 1980s. By the end of the 1980s, Seoul City had grown to a great city of over ten million people with a net density of 28,000 persons per square kilometre inside the Green Belt. This situation of growth was expected to continue but only a small area of land was left to accommodate the increasing population inside the Green Belt. The strongly protected Green Belt has stood firmly against the force of suburban growth. At the outset of the research the author made what he now believes to have been a naive hypothesis that part release of the Green Belt land could meet the increasing demand for land for Seoul's growth.

However he studied the background of the success of the establishment of London's Green Belt and the failure of disastrous suburban growth in the Green Belt once planned for Tokyo. Urban growth in the two city regions of London and Tokyo were measured on maps for two or more post-war decades of expansion. From the growth trends of the two city regions and that of Seoul, it was estimated that a large urban area as big again as the present Seoul Built-up Area would be necessary by 2000 to accommodate Seoul's growth. This large land requirement could not be found by releasing some area from the Green Belt. The lessons of London's Green Belt show that the release of Seoul's Green Belt would be very dangerous and make it difficult to keep permanent Green Belt policies. The London Green Belt provided the lessons that, once its boundaries were defined, the Green Belt area has to be strongly held. Therefore, even if Seoul's Green Belt has had problems in the delineation of its boundaries, it would still

be better to maintain strong Green Belt policies in South Korea. The Tokyo studies also provide lessons for Seoul. If Seoul's Green Belt, like Tokyo's, were abolished, the land would be turned into a suburban residential area and it would not be possible to control sprawl throughout the whole remaining Metropolitan Region.

The estimation of land requirement shows that, if Seoul carries on with urban containment policies, it would need an additional area of about 400 km^2 (or 600 km^2) for further growth but that if Seoul were to abandon Green Belt control and follow Tokyo's trend, it would require around 1000 km^2 of additional urban area by the year 2000. Therefore Seoul's Green Belt should neither be abandoned to meet suburban growth nor an attempt made to rely on weak Green Belt policies.

The conclusion of this research, therefore, is that if Seoul were to begin to release some Green Belt area to accommodate growth, Seoul's Green Belt would be lost but without the gain of solving the land crisis in Seoul. The answer lies in the urgent preparation for the building of a new Seoul in the rural Metropolitan Development Area on the background of a Green Belt.

From this it follows that the research hypothesis that 'Release of some of the Green Belt is an essential and practical way to meet land demand for urban growth in Seoul' has been proved to be incorrect.

In this research the city of Seoul of around 1985 has been compared with the expanding Tokyo of the early 1960s. Therefore it would be worthwhile for Seoul to review Japan's second National Capital Region Development Plan of 1968. The Tokyo Plan substituted Tokyo's Green Belt with the very positive regional planning concept of the 'Fifty Kilometre Zone' to incorporate the whole area of the Tokyo Region into the planned suburbs, enhancing social infrastructure of transport, environmental and other relevant facilities (TMG 1983). Seoul should review its negative Capital Region Development Plan of 1986 in the light of its likely growth. The revised concept of

active regional development in the Tokyo Region would help Seoul to rethink its defensive approach to the expansion of Seoul. In addition, it may be risky if Seoul decided to solve the problem of urban growth through the building of several new towns around Seoul. It has to be borne in mind that new town development has accommodated a lower proportion of London's growth than planners had expected. However the outstanding achievement of urban containment in London should not be underestimated and it should be kept in mind that Tokyo's once proposed Green Belt has been given up to ruthless suburban expansion and Tokyo now has endless sprawl throughout the Metropolitan Region in the absence of a Green Belt.

This research has concluded that Seoul needs to provide as much as 400 km^2 in the near future and needs to build a second Seoul. Furthermore it has suggested that without the immediate supply of a large area of land to meet the enormous demand for urban development Seoul's Green Belt may not be able to be safeguarded permanently and the strong Green Belt policy may not be able to continue.

Seoul would do well to apply Unwin's expanding model; to prepare a large area for development beyond the Green Belt, maintaining within it designated green areas, and then consider an extension of the existing Green Belt around the now large development area of the second Seoul. Possibly a third Seoul may follow by the same process, perhaps in the early twenty-first century.

Seoul Metropolitan Region and the Capital Region should be redesigned in line with Unwin's Tokyo Model and the expanding planning philosophy of the Tokyo Region. However, success of the application of Unwin's dynamic concept for Seoul's growth will much depend upon the practical integration of the South Korean situation, in terms of political, social, economic, geographical, environmental, national security and other elements, into the planning process.

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Note [Korean] : written in Korean

[Japanese] : written in Japanese

APPENDIX 1.1

ENVIRONMENT SECTION
DEPARTMENT OF AGRICULTURE, HORTICULTURE AND THE ENVIRONMENT

MAA/acw

4 August 1988

Ordnance Survey Office
Romsey Road
Maybush
Southampton
SO9 4DH

Dear Sirs

Urban growth in the South East

I am currently involved with a postgraduate student studying urban growth in South East England since 1948 and its relation to the Green Belt. This work is largely based on map surveys of the old 1 inch:1 mile maps and more recent metric maps.

The most up-to-date maps the student has used so far are the 1974 series based on 1972 surveys. Please could you tell me:

(a) Whether the 2nd series/landranger series dated 1980 contain re-surveyed information on urban areas in the South East and, if so, the date of resurvey and the sheet numbers of the maps involved.

(b) Whether there is any more up-to-date resurveying of urban areas in the South East and, if so, the dates of resurvey and whether the information is published or otherwise available. If it is 'otherwise available' I would be glad to know where and at what cost.

I would be grateful for as early a reply to these questions as possible. Thank you.

Yours sincerely

Dr Margaret A Anderson

ORDNANCE SURVEY

Romsey Road, Maybush, Southampton SO9 4DH

Telephone: *(Direct Dialling)* 0703 79) GTN 2027 Telex: 477843

(Switchboard) 0703 792000 Facsimile: 0703 792404 National Grid Reference SU 387148

Dr Margaret A Anderson
Wye College
University of London
Wye
ASHFORD
Kent TN25 5AH

Your reference

Our reference IE/A/88

Date 17 August 1988

Dear Dr Anderson

Thank you for your letter dated 4 August concerning urban growth in the South East.

I have enclosed a leaflet with the 1:50 000 sheet lines and pencilled in a cut off line for you. On the reverse I have written the dates of resurvey and the known anticipated dates of the latest edition.

In answer to parts A and B of your letter:

A) The compilation and revision note in the Legend of the Landranger would indicate the latest date for urban information. The revised date shows when a full resurvey has taken place, that would include all known change up to the date quoted.

The selected revision date indicates that only major changes have been incorporated, usually motorways, main roads and other items of communication, but can also cover large area of urbanisation over 1 km square or significantly altering the currently depicted built up area.

B) The latest resurvey of urban areas is available as SIM or SUSI as explained in the enclosed leaflets and on page 27 of the Ordnance Survey Maps and Surveys 1988 Catalogue.

I enclose our map brochure, price list and details of Agents through which our publications may be obtained.

I hope that this explanatory letter and the information contained in the enclosed leaflets and brochures will prove helpful.

Yours sincerely

B. Harper

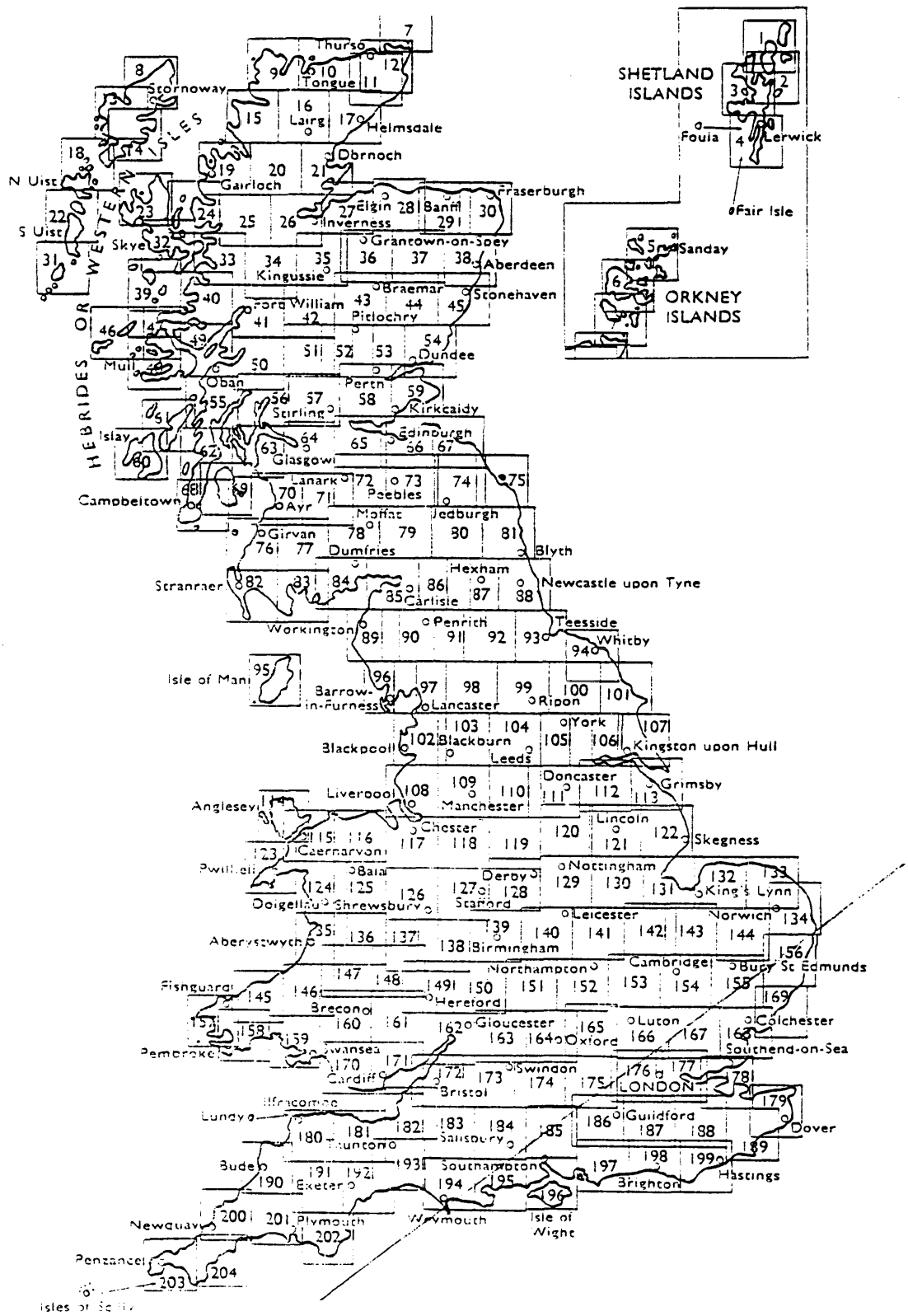
BARBARA HARPER (Mrs)
Information Branch

Ordnance Survey

CI/SfB reference by RIBA SfB Agency
(A3s) (Y)

January 1979
OS Leaflet New Series No. 2

Index to 1:50 000 maps of Great Britain



APPENDIX 2.1

ENVIRONMENT SECTION

DEPARTMENT OF AGRICULTURE, HORTICULTURE AND THE ENVIRONMENT

MAA/acw

21 September 1988

Mr P Hudson
Planning Department
Kent County Council
Springfield
Maidstone
Kent

Dear Paul

Thank you very much for your helpful comments on my Channel Tunnel paper. This is now being retyped with your suggestions on board and you will be sent a copy.

I wonder if you can also help me on another matter? I have a postgraduate student currently working on Green Belts in London, Tokyo and Seoul. For London he has been able to locate all the suitable early maps except Sheet 171 (1 inch) and I wondered whether the County would have one in the archives somewhere that he could look at. The only 171 map he has been able to find (in the British Museum) is dated: full revision 1931, roads 1946.

The information he is looking for is the urban area in about 1948 - which will clearly be different from that in 1931. Any help, or suggestions you can make will be much appreciated.

Yours faithfully

Dr Margaret A Anderson

APPENDIX 2.2

Head of Economic Development Tim Bvies

Kent County Council

ECONOMIC DEVELOPMENT

Springfield
Maidstone
Kent ME14 2LL
Fax no: (0622) 687620
Tel: Maidstone (0622) 671411

Ext: 3086
Ask for: Mr. Hudson
Your ref:
Our ref: ED2
Date: 13th October, 1988

Dr. Margaret Anderson,
Wye College,
Wye,
Ashford,
Kent TN25 5AH

Dear Margaret,

Thank you very much for your letter of the 21st September. I have now received your re-drafted paper and many thanks for that.

As to the problem of finding early one inch maps of West Kent, I am afraid our drawing office here keeps only the most up to date ones, so I am afraid we are unable to help. I suppose this is a consequence of moving offices too frequently that all the old maps get left behind!

My suggestions are to try the specialist local resources section of the County Library here at Springfield or the County Archives based at County Hall, the Royal Geographical Society in Kensington or if all else fails the Ordnance Survey itself in Southampton.

Yours sincerely,

Paul

Assistant Head of Economic Development

APPENDIX 2.3

ENVIRONMENT SECTION

DEPARTMENT OF AGRICULTURE, HORTICULTURE AND THE ENVIRONMENT

MAA/acw

21 September 1988

County Planning Officer
Essex County Council
Globe House
New Street
Chelmsford
Essex CM1 1QH

Dear Sir

Ordnance Survey 1 inch Map Sheet 161, circa 1948

I have a postgraduate student currently working on Green Belts in London, Tokyo and Seoul. For London he has been able to locate all the suitable early maps except Sheet 161 and I wondered whether the County would have one in the archives somewhere that he could look at. The only 161 map he has been able to find (in the British Museum) is dated: first published 1940, full revision 1932, roads 1946.

The information he is looking for is the urban area in about 1948 - which will clearly be different from that in 1932. Any help, or suggestions you can make will be much appreciated.

Yours faithfully

Dr Margaret A Anderson

APPENDIX 3

Land Use Components in the Green Girdle

(GLRPC Second Report 1933)

I : PLAYING FIELDS

(1) Playing fields purchased and allotted to free public use.

(2) Playing fields purchased for the public, but leased or let to clubs at a more or less substantial rent.

(3) Playing fields owned by clubs, institutions, factories, etc upon which a restriction is or can be imposed against building use, either by agreement or by payment of small compensation.

II : OTHER OPEN SPACE

(1) Lands purchased and maintained for public enjoyment, eg public park or natural reservation.

(2) Lands purchased, but for the time being left in private enjoyment, with a limited public use for wandering on footpaths, and landing on river banks; or grounds open to the public occasionally.

(3) Lands purchased, but left exclusively in private enjoyment with restriction against building use, or destruction of existing amenities.

(4) Lands left in private ownership, but subjected to restriction against building use or serious destruction of amenities; for example, private open spaces under a town planning scheme.

(5) Lands left in private ownership but the building use of which is limited to such a low density, providing so much land to each house, that the total effect will be to increase the value of the Green Belt.

III : SUNDRY USES OF LAND INCONSISTENT WITH ORDINARY OPEN SPACE REQUIREMENTS WHICH NEVERTHELESS MAY TEND TO INCREASE THE EFFECTIVE AREA OF THE BELT

(1) Allotment gardens; (2) Nursery gardens; (3) Horticultural or agricultural experimental grounds; (4) Intensive fruit farms or orchards; (5) Aerodromes; (6) Cemeteries

Lands in this category might either be purchased or be subject to restriction against building use.

IV : VARIOUS INSTITUTIONS IN WHICH ONE LARGE BUILDING STANDS IN EXTENSIVE GROUNDS OF SAY TEN ACRES OR MORE

(1) Hospitals or Asylums; (2) Schools; (3) Country Clubs, or Residential Hotels.

Appendix 4

CONTROL OVER DEVELOPMENT IN GREEN BELTS

The following is an extract from *Planning Policy Guidance* Note No 2 on Green Belts (paras 12 - 18)

12 : The general policies controlling development in the countryside apply with equal force in Green Belts but there is, in addition, a general presumption against inappropriate development within them.

13 : Inside a Green Belt, approval should not be given, except in very special circumstances, for the construction of new buildings or for the change of use of existing buildings or for the change of use of existing buildings for purposes other than agriculture and forestry, outdoor sport, cemeteries, institutions standing in extensive grounds, or other uses appropriate to a rural area.

14 : Structure and local planning policies should make no reference to the possibility of allowing other development in exceptional circumstances. Nor should the visual amenities of the Green Belt be injured by proposals for development within or conspicuous from the Green Belt which, although they would not prejudice its main purpose, might be inappropriate by reason of their siting, materials or design.

15 : Minerals can be worked only where they are found. Their extraction need not be incompatible with Green Belt objectives, provided that high environmental standards are maintained and that the site is well restored.

16 : Green Belts contain a large number of substantial and attractive agricultural buildings which, with normal repair and maintenance, can be expected to last for many years. When these are no longer needed for farming, the planning authority will need to consider whether they might be appropriately re-used for other purposes which help to diversify the rural economy. Redundant agricultural buildings can

provide suitable accommodation for small firms or tourist activities or can be used as individual residences. The re-use of redundant buildings should not be refused unless there are specific and convincing reasons which cannot be overcome by attaching conditions to the planning permission.

17 : In the next few years many older hospitals located in Green Belts are likely to become redundant. In planning for the future of these buildings and their sites the aim should be to use them for purposes compatible with the Green Belt, which can include institutional uses. The size, layout and form of the buildings may, however, make them unsuitable for such purposes. In such cases it will be necessary to consider whether very special circumstances exist that would warrant the change of use of the buildings or the construction of new buildings.

18 : In some cases it may be possible to convert the existing buildings for housing or other uses, perhaps with some demolition of ancillary buildings. But if that is not a practical solution then the future of the buildings and the site, and the possibility of redevelopment, will need to be carefully considered. Putting the sites to beneficial use will be preferable to allowing the buildings to remain empty and the site to become derelict.

Source : DoE (1988) The Green Belt. London HMSO, 38

Appendix 5

Design criteria of the Tokyo Green Area

(1) Recreational road

Facilities	footpath, riding and driving roads, view sites, signboards, parking areas, petrol service stations and rest facilities;
Width	footpath : over 3 metres; walking and vehicle road : two lanes or plus walking space (each 3 metres); riding track : over 6 metres; planting strip : over 2 metres between walking, vehicle and riding tracks;
Site and area	scenery area : area linked with general green area, conservation areas and historic and popular areas, good accessibility, accessible distance within 600 m;

(2) Graveyard (the first class)

area over 10 ha, each grave over $5m^2$;
over 60 per cent of the total area should be service roads
and landscaping area;

(3) School garden

over 80 acres for primary school garden;
over 2 ha for secondary school garden;
between 2 acres and 6 acres for neighbourhood garden;

(4) Productive green area

area : over 10 ha

condition of area:

vegetable growing land, irrigated paddy field, buffer zone against urban coherence; town planning area excluded from development; reserved area for airport, emergency landing area and parks;

approved usage:

buildings for farming and farmers;

(5) Landscape area : regional green area zone

object :

scenery, animals and plants, historical heritage and sites; sites, buildings, gardens; controlled areas against speed, hunting, pollution, cutting trees; roads, squares, camp sites, nature gardens;

location:

landscape area;
historical and special conservation area;
good accessible area;

others:

landscape development plan;
conservation plan;
historical, special conservation plan;
administrative boundaries;

A paper of not more than 5000 words which considers the relevance of the research findings to the past and future development of Seoul, considering in particular what is known about :

(a) broad regional planning strategies which might be adopted, and

(b) past and likely future movements of population in major world urban centres.

Submitted as part of the oral examination for the degree of Doctor of Philosophy.

Cheong Bae
1991

I : INTRODUCTION

The thesis studied urban growth in the three Metropolitan Regions of London, Tokyo and Seoul, within an approximate radius of 50 kilometres from each city centre, in relation to Green Belt policies in the post-war decades of expanding suburban growth. The research findings suggest Seoul should need about 400 km^2 of extra urban area within its Metropolitan Region by 2000.

To accommodate this large amount of new urban land in the Metropolitan Region, Unwin's dynamic idea was examined as providing a desirable solution for the future of Seoul's growth. In order to set this solution into context this paper will examine alternative scenarios for regional planning strategies for Seoul's growth and consider the global trend of urbanisation in advanced countries.

II : BROAD REGIONAL PLANNING STRATEGIES

Planning strategies have been developed to address the problems of population agglomeration and urban expansion in different metropolitan regions around the world. The strategies adopted by individual countries have been chosen and adapted broadly in relation to political, cultural and geographical needs and influences. London, for example, has developed new towns to house overspill out of its conurbation combined with a policy to contain the city's growth inside the Metropolitan Green Belt. Tokyo attempted to follow this model but could not control its suburbs and the city is characterised by its urban sprawl. Los Angeles and many third world cities resemble the Japanese capital city. However, some of the advanced countries' capitals followed a different model and employed development axes for their planning strategies of regional/urban growth.

Master Plans for the Paris Region of 1965, Moscow's Regional Plans of 1973, the Finger Plans in Copenhagen and Washington DC have been based on axial development alternatives. Randstad in Holland, on the other hand, and the Ruhr in Germany have been planned using polycentric development policies. Some countries have tried to solve their problems by building a new capital city far away from the previous metropolitan cities as in Australia and Brazil. Other advanced countries have carried out regional decentralisation strategies, a private entrepreneur-orientated policy in the USA but in France and West Germany more supported by the state.

These different strategies for regional development and restructuring have been introduced in many different countries and at different periods. Here, some of them are explored in relation to the development of Seoul.

New Town Development

The British model of new town development has been the most popular regional planning strategy in the post-war era (Merlin 1971; Cherry 1974, Williams 1984). In his Greater London Plan (1944) Abercrombie planned new towns beyond a Green Belt which were to receive overspill population from congested London. This development idea was made possible by the New Towns Act of 1946. Eight new towns were built around London and around twenty more were designated in the UK by 1971. Also, Expanded Town Development was employed to expand suburban growth around existing towns by the Town Development Act of 1952. Under this Act many existing small and medium-sized towns were designated and expanded. The idea of new towns was largely developed from Howard's ideas for self-contained Garden Cities in the late nineteenth century, but in practice both New towns and Expanded Towns were based on the decentralisation policies which had been strongly discussed by the Barlow Report (1940). However, by 1964 the South East Study employed the idea of larger city development at Milton Keynes, Newbury and South Hampshire in the Outer South East, moving away from the small scale Garden City idea.

Chapter Three of the thesis gives a literature review of the development of the British urban and regional planning system and Chapter Four analysed the effect of new town development around London in terms of areal extension. The research finding argues that London's growth has depended more on suburban growth than on new town development. The latter shows only approximately 12 per cent of the total urban growth in the London Metropolitan Region between 1947 and 1972.

Suburban Growth

Post-war urbanisation has been characterised by large suburbanisation in many advanced countries, mostly in the 1950s and 1960s (Vining and Pallone 1982; Fielding 1989). Among the many countries experiencing suburban growth, the United States have been so remarkable that the metropolitan cities in the North East have formed a megalopolis from

Boston to Philadelphia (Gottomann 1974). In the West Los Angeles has developed one of the largest urban sprawls in the world. This western metropolitan city region has expanded to the extent that the city's influence now reaches beyond the boundaries of California.

Equally, Tokyo in the Far East has developed a huge metropolitan region with unrestricted suburban growth beyond the metropolitan regional commuter zone. Tokyo introduced a unique regional planning strategy to cope with the reality of its extensive suburban growth. It rejected British planning policies of a Green Belt and new town development and encouraged the urbanised outer metropolitan area to be a single integrated metropolitan suburban area. The fundamental planning strategy appeared to be to enforce an adequate transport network and provide environmental facilities which would enable urban lives to be enhanced. However, the research findings concluded that Tokyo's ruthless suburban growth could not satisfy the theoretical statements of its positive regional planning policy; instead the quality of the urban environment became worse in Tokyo.

Axial Development

The framework for the British planning system, and the concepts of new towns and Green Belts, were being developed before the age of mass private transportation. Post-war urban growth worldwide however has been strongly influenced by the transportation revolution of car ownership and excellent accessibility by modern transport facilities. Regional strategies based on urban development along major transport corridors have therefore been both popular and logical. Planners have drawn development axes and then located towns in close relation with an axis. This planning technique is very different from that of concentric development with new and existing towns around a prime city, with or without an intervening Green Belt. This planning strategy gives the impression of a more development-orientated model than that of urban containment in the London model.

One of the most outstanding plans for axial development is the Paris regional plan of 1965. The 1965 plan implied two parallel

development axes of approximately 80 kilometres long on each side of the River Seine, and designed eight large new towns (between 300,000 and 1,000,000 persons each) along the corridors. It anticipated that this large suburban extension would almost double the size of the existing urban area by 2000 (35 year period). Additional motorways and rapid rail networks were to be constructed to supplement the existing transport routes. The background for this grand scheme for Paris was the projection of high population growth from 8 million in 1965 to 14 million in 2000 (Allen 1984). However the amended 1969 plan reduced the number of new towns from eight to five and scaled down the population size to between 150,000 and 300,000, as the total population estimation was reduced. This plan has not yet been completed but in comparison with British new town development around London, France has a different planning strategy towards the urban growth of Paris Region in scale, function, location and planning background.

Another outstanding example of regional planning along transportation corridors is the Finger Plan in Copenhagen of 1948. This plan was intended to guide the city's dynamic growth along four transportation corridors called fingers. At first small urban centres were to be located on the fingers going outwards from the central area of Copenhagen. Later in the plan of 1960, major centres would be developed beyond the early small communities and subsequently small and larger centres would alternate along the fingers. High speed transport by motorways and railways have been built to link the urban settlements to the central area. Homes, employment, recreation, environment and transportation were well proposed as a growing model of Danish capital city region.

Stockholm had a similar idea in its regional plans of 1952 and 1966. Suburban satellite towns were to be established along the main transportation corridors. The 1973 Moscow Regional Plan revealed another alternative. The communist city has had a Green Belt since the 1930s (Simons 1937) and the 1973 plan suggested new town development along the major development axes beyond the Green Belt with high speed links between the central area and the new towns.

This type of regional strategy tends to be popular when a metropolitan region is looking towards dispersal away from a pattern of concentric development. However, problems occur as people still commute to the central city causing more congestion of traffic and environmental disadvantages if proper investment on special infrastructure is not made (Hall 1984).

Other Regional Development Strategies

Two other alternative scenarios are the construction of a new capital city away from the first congested capital, and the development of growth poles, usually based on strategies for industrial reconstruction and relocation.

New capital policies were implemented in Canberra, the new capital city of Australia, and Brazilia the new capital of Brazil. These new capital cities were built in remoter inland areas for the purpose of balanced regional development between central and more peripheral areas of large countries. These cities tend to work as individual cities but are less successful in redressing population movements.

In the early 1970s Japan attempted to move the central governmental functions of Tokyo out of the crowded central area to an area near the foot of Mount Fuji, approximately one and a half hours distant. But this idea never came to fruition. In the same decade of the 1970s South Korea studied building a new capital city under the similar principle of the new Tokyo capital construction (E W Kim 1984). These two oriental capitals shelved this regional strategy for the creation of a new capital city as a means of solving overconcentration of population and urban functions in the prime cities, mainly for political reasons.

Policies for the development of growth poles by the relocation of industries from industrialised cities to surrounding areas, or far away from the cities, is not a new issue. The Barlow Report (1940) discussed industrial dispersal from, and the prevention of industrial migration to, the overcongested London and the surrounding counties.

Industries locate in major cities for good economic reasons therefore to implement a reversal of this trend many governments have tried different regional strategies.

Growth poles have been discussed since regional planning was studied in the 1950s and 1960s. Hall (1975) for example, considers 'growth sectors' in the strategy for the South East of 1967 and 'major growth' in the Strategic Plan for the South East of 1970. This regional development strategy did not apply only to the South East but also to Central Scotland and the North West region of England (Balchin and Bull 1987). The growth pole theory was widely introduced to promote industrial development in lagging regions. During the 1960s and 1970s South Korea employed this regional development policy to establish the south east coastal industrial belt in accordance with the First, Second and Third Five Year Economic Development Plans.

Recent regional development strategies by the promotion of high-tech industry has significantly affected classic spatial patterns during the 1980s (Hilpert 1991). Newly developed and fast-growing technology based regions have been formed in the Silicon Valley and Route 128, California, and the Research Triangle area of North Carolina in the USA; the M4 corridor between west London and Bristol in the UK; Baden-Wurttemberg in Germany; Rhone-Alpes-Maritime in France and in the areas of North Turin and Milan in Italy (Hilpert 1991). In South Korea the late President Park was enthusiastic to restructure the nation with the building of a co-existence city containing a science and academic city, a new capital city and a military research base in the heart of the country to the north of Taejeon (see Figure 7.1 in thesis). This area is approximately between 120 and 140 kilometres away from Seoul Railway Station along the main transportation corridor to the south. This large city region of Taejeon is expected to be merged into the extended Seoul Metropolitan region early in the next century. If high speed train tracks are built in the 1990s as proposed this high-technology-based area could become a central growth pole in South Korea in the next century.

Conclusion : an alternative regional planning strategy for the development of Seoul

Seoul has rapidly and continuously grown since 1960 making the concentration issue a centre of the government's regional and urban policies. During the 1960s and the early 1970s the government carried out a large suburban expansion with the construction of South Seoul across the Han River by means of a large scale land redistribution project. At the same time local industrial development bases were constructed along the south east coastal area. This new industrial belt has provided for the national key industries of steel, shipbuilding, car manufacturing, chemicals and machinery. Several new industrial towns were established and existing large regional cities were expanded during this time. However, control of the concentration of population and industry into Seoul has not been workable and the problem has continued into the 1980s.

Little development space has been left inside the tight green Belt for further suburban expansion, so further development in the Seoul Region has inevitably moved beyond the city boundary into the satellite towns. Especially good transportation accessibility was prepared in the Seoul-Incheon corridor to the west and secondary transportation lines in the Seoul-Anyang-Suwon corridor. Also a large new town development occurred with the construction of Banwol (Ansan) Industrial New town in the late 1970s and planning and construction for a second new town started in 1977. This was designed to house a second Governmental Office Building group in Kwacheon urban island, 15 kilometres away from the City Hall. When a large shortage of housing land arose in the late 1980s South Korean government hurried to announce (Chosun Ilbo 23 April 1989) the building of three/four new towns in Bucheon, Anyang and Bundang in the Seoul Metropolitan Region (see Figure P.1). The former two were suburban extensions of existing large satellite cities. Bundang was the only really new town. It was located along the expressway transportation corridor just beyond the narrowest part of Seoul's Green Belt.

Industrial land in Seoul region became in high demand during the economy expanding period of the 1970s and 1980s and the basic policies on industrial development control in and around Seoul were severely tightened. To cope with the extension of the existing production capacity as well as the export of factories out of Seoul, which could not be properly located near the large market, an industrial development axis has been created down the west coast. In the early 1980s Namdong Industrial Site was allowed to receive an extension of the existing base for industry exported from the Seoul Built-up Area in the reclaimed salt field of South Incheon. At the same time the Korea Agricultural Land Development Corporation launched a large agricultural area development project at Shiwa near Ansan. For the first time a large part of an agricultural reclamation project area was to be shared with the development of new industrial towns. Shiheung New Industrial Town was planned in the neighbouring area of Ansan New Industrial town in the west, occupying about 30 km_2 and Hwasung New Industrial Town of 40 km^2 proposed on the opposite site of Ansan in the south (MOC and ISWACO 1986). Further south is the planned town of Hwasung and south again Balan has been developed as a research and development centre particularly for the pharmaceutical industry. Anjung has not been developed yet. It has been competing for major industrial developments such as the Pohang Steel Works since the 1960s but has so far not succeeded in attracting investment. Development of the northern part of this industrial development axis is under way but implementation of the southern part awaits the building of a proposed West Sea Expressway (motorway).

The east transportation corridor has been provided with a good transportation network of main railway line and expressway between Seoul and Taejeon. From Taejeon the main corridor divides with one branch going to Pusan, Taegu and the south east industrial belt and the other to Kwangju Region, the main agricultural area in South Korea. It is expected that suburban growth will cross the narrow Green Belt and locate in the Bundang area at first. Possibly the second stage of growth will be in the east Suwon and Osan area, and

then Pyeongtaek and Ansung areas may follow the linear pattern of satellite towns along the development axis.

These two axes will be developed for two different functions, with more industrial expansion in the west axis and more bed-town functions in the east axis (see Figure P.1). Following previous experience in South Korea the average size of the new cities will probably be around 300,000 persons in the Industrial Towns and around 500,000 persons in the east suburban cities.

However, the author doubts whether this axial development in the Seoul Metropolitan Development Area, particularly along the eastern axis, will relieve the problems of overcrowding in Seoul. Planners may introduce planning techniques of policentric development in the new large satellite cities as in the 1965 Paris Plan, but people may not accept them. With the continuation of Seoul as the administrative and commercial capital city the disadvantages of long commuting from the suburban cities will become apparent and the real problems of concentration towards the central city will remain.

III COUNTERURBANISATION : A NEW GLOBAL TREND OF URBANISATION

Counterurbanisation is a term first used in the United States in the 1970s. In the early 1970s the US Bureau of the Census produced data demonstrating movement in four administrative subregions, the North East, Mid West, West and South. This population movement was different from that in the 1950s and 1960s when enormous suburbanisation was popular in the American metropolitan cities especially in the industrial North East and Mid West. However, the 1970s population flow was reversed from the industrial regions to the West and the South. The less urbanised counties in the West and sunny Florida in the South gained much population while the other regions lost their population. Therefore, Berry used the terminology of counterurbanisation and stated 'A turning point has been reached in the American urban experience. Counterurbanisation has replaced urbanisation as the dominant force shaping the nation's settlement patterns' (Champion 1989).

Vining and his colleagues at the University of Pennsylvania developed the American idea into the world trend. Vining and Kontuly (1978) conducted an international comparative study on population dispersal from major Metropolitan Regions in eighteen countries. The most updated studies on international population geography was carried out in the core and peripheral regions of twenty-two countries (Vining and Pallone 1982). These countries show four different categories of trends. The first includes the North West European countries of Belgium, Denmark, France, the Netherlands and West Germany (5). These advanced countries had experienced a long term decline in net in-migration since the 1950s and in the 1970s were demonstrating net out-migration to the peripheral regions. The second category of North America, USA and Canada (2), represents the most distinctive case of deconcentration from core regions. The North East and the Mid West in USA balanced their in and out-migration during the 1960s but the 1970s suffered large net losses of large population every year. The research found that Canada had a similar population trend to the USA. The peripheral West of Canada gained net in-migration

while the core region of the Centre showed a negative net migration rate. The third group comprises the remaining countries in Western Europe and two non-European countries : Finland, Iceland, Italy, Japan, New Zealand, Norway, Spain, Sweden and the United Kingdom (9). Vining and Pallone's study interprets that these countries generally experienced large net flows into the core during the 1960s, followed by a sharp drop in net migration towards the core regions around the early 1970s. Japanese population concentration continued in the 1960s towards the Tokaido megalopolis axis of Kanto (Tokyo), Tokai (Nagoya) and Kinki (Osaka) Metropolitan Regions. In the 1970s the net immigration rate in the three metropolitan areas slowed down. However it began to increase again, in the Tokyo Region only, from the late 1970s. The fourth category includes the Eastern Europe countries of Czechoslovakia, East Germany, Poland and Hungary (4). These communist countries were represented generally as having a low and moderate net immigration rate to their core regions, except the concentration into East Berlin. The core and peripheral regions in the Eastern European countries showed not much difference of net migration rate in the 1960s and 1970s. Two rapidly growing Asian new industrial countries of South Korea and Taiwan belong to the fifth category (2). These recently expanding countries show higher net migration to the core regions, as the West had experienced in the post-war period. For the time being these countries do not show any sign of immediate slow down of in-migration towards the core regions.

The researchers conclude that 'in the developed world at least, the century-long migration towards the high density core regions is over' (Vining and Pallone 1982). Also as economic growth and the advantage of accumulative economy proceeds, concentration of population towards core regions is the general feature at first. However, with the disappearance of advantages of agglomeration in the core regions, the peripheral regions will gradually get net gain. The research emphasises that the concentration of population in the core regions has limits. Therefore newly expanding countries such as South Korea will show a significant decline in the core regions, possibly more quickly than expected.

On the other side, Fielding (1989) in the UK studies urbanisation and counterurbanisation in the fourteen countries of West Europe for the three decades of the 1950s, 1960s and 1970s, and the early 1980s where data was obtainable. His main research finding presented that the spatial extension of suburbanisation trends in the 1950s and the early 1960s was replaced by counterurbanisation in the 1960s and 1970s. The urbanisation and counterurbanisation in West Europe is summarised as following:

(1) Urbanisation trend was dominant in the 1950s in Western Europe.

(2) In the 1960s the phenomenon of suburbanisation was broken first in North Western Europe in the mid 1960s, but the peripheral countries continued through the 1960s. Spain sustained into the 1970s.

(3) By the 1970s most of the countries of Western Europe were showing a counterurbanisation trend in the relation between net migration and settlement size. This was continued in the core regions of Western Europe.

(4) In the early 1980s counterurbanisation became less dominant but there was no return to the previous urbanisation.

Champion (1989a and 1989b) approached counterurbanisation in Britain with caution. He pointed out that the debates on counterurbanisation were fairly recent, only fifteen years from Beale's report on a rural population turnaround in the USA and around ten years since Vining and Kontuly's first work. As Britain has experienced urbanisation for a long period of around 150 years, the short period of counterurbanisation should be examined to determine whether it is a new cycle in the urban-rural shift. He explains that population deconcentration was not a new trend in Britain but had been carried out during the post-war period and that there has been a cycle of population concentration and deconcentration through the 1960s and 1970s. During the early 1980s London and the surrounding region again achieved net in-migration.

Frey (1989) studied population changes in the urban hierarchy of metropolitan and non-metropolitan areas in the United States in the three periods of 1960-1970, 1970-1980 and 1980-1985. His results show continued metropolitan growth in the South and the West during the whole period while the North has to some extent reversed counterurbanisation. In some selected metropolitan areas in the North, such as New York and Chicago, positive population change occurred although this did not resemble the growth rates of the pre-1970s. He generally accepts counterurbanisation in the USA but is still waiting for further analysis of later censuses to show whether the reversal of the counterurbanisation trend is a period influence or not. These examples of slow down or reverse depopulation trend can be found in Japan and Norway in addition to USA and UK.

Despite general agreement between American and European researchers, Japanese researchers would not like to agree with the idea of counterurbanisation. Yamaguchi (1989) at Tokyo University argues that the research finding of Vining and Pallone 'may be inaccurate to refer to the Japanese case as a typical example of deagglomeration'. The concentration of population and economic functions in Tokyo has continued since the late 1950s and will likely be sustained in future. In the study, Vining and Pallone subdivided the three Metropolitan Regions of the Tokyo, Osaka and Nagoya dominant urban belt area into the core regions and the rest into the peripheral region. Net internal migration rates in the core regions were increased in the 1950s but decreased in the 1960s and then sharply dropped from 1970. Otherwise the periphery runs in opposite direction. This interpretation seems not to have satisfied Japanese sense. Tsuya and Kuroda (1989) demonstrate net migration in the twelve regions of Japan between 1950 and 1985. Minami-Kanto (Tokyo Metropolitan Region), Nishi-Kinki (Osaka Metropolitan Region) and Tokai (Nagoya Metropolitan Region) gained large net migration between 1950 and 1965. From 1965 to 1975 the net migration dropped down and more sharply. After 1975 Osaka and Nagoya Metropolitan Regions had net losses of population, and only Tokyo Metropolitan Region continued to increase its net migration although at a lower proportion than the previous periods. However, most of the other

regions (periphery) have lost population since the 1950s. Exceptionally the two adjacent regions of Tokyo and Osaka gained net migration between 1975 and 1985 in Kita-Kanto (northern three prefectures of Ibaraki, Tochigi and Guma to Tokyo Metropolitan Region, see Figure 2.2, No 5, 6 and 7), and in Higashi-Kinki (eastern region of Osaka Metropolitan Region) at small numbers.

Therefore, Tokyo Metropolitan Region and the surrounding Outer National Capital Region (Kita-Kanto) has concentrated the population at the expense of the whole peripheries since 1950 and even of the other two Metropolitan Regions since 1975. During the early 1980s Tokyo Region recovered dramatically its net migration while Osaka and Nagoya had little gain or even losses.

Also, further population change and net migration change was carried out within Minato Kanto Region which covered four administrative prefectural boundaries of Tokyo, Saitama, Chiba and Kanakawa. The Minato Kanto Region is a wider area than the author's Tokyo Metropolitan Region because the outer edge of rural area beyond a commuter zone of approximately fifty kilometre radius was added. The total population in the four prefectures rapidly increased from 13 million in 1950, 15.4 million in 1955, 17.9 million in 1960, 21 million in 1965. 24 million in 1970, 27 million in 1975, 28.7 million in 1980 and 30.3 million in 1985 (Tsuya and Kuroda 1989). Tokyo prefecture began to decrease net migration from 1965 but neighbouring prefectures of Saitama, Chiba and Kanakawa had a large net increase of in-migration. During the 1975 to 1980 period the adjacent northern prefectures of Guma, Tochigi and Ibaraki started to receive the overspill from Minami-Kanto and inflow from outside the National Capital Region, that is from the other ten regions of Japan. Son (1986) estimates that the seven prefectures in the National Capital Region (or an extended Tokyo Metropolitan Region) contain 45 million people, approximately 40 per cent of total population in Japan at the present situation.

In conclusion, Tokyo Region has never lost its concentration since 1950 but continues its growth and extends its spatial boundaries into

the adjacent area at the expense of deagglomeration of the rest of the regions in Japan. It is quite understandable that most Japanese researchers have had doubts about counterurbanisation as a global trend in the 1970s and beyond.

The extensive suburbanisation in Tokyo between 1955 and 1976 was measured by its aerial growth in Chapter Six. Urban area in the Tokyo Metropolitan Region discloses at 583 km^2 in 1955. Suburban growth between 1955 and 1966 shows 739 km^2 and that between 1966 and 1976 increases 1815 km^2 of additional urban area. In 1976 urban area is measured 2398 km^2 at four times bigger than the urban size of 1955. Suburban Tokyo area has been seen into an integrated urban Tokyo Metropolitan Region (see Table 6.1, page 157). This metropolitan growth seems to continue in-fill within the Metropolitan Region as well as outward growth beyond the Metropolitan Region to the outer adjacent area within the National Capital Region wherever geographical constraints are free or less problem in planning constraints.

Turning to Seoul, as Chapter Seven and Eight studied, Seoul has grown dramatically with a concentration of its population and its economy. Population in Seoul Metropolitan City increased from 1.6 million in 1955 to over 10 million in 1988. At the end of the 1980s Seoul Metropolitan Region contained approximately 18 million but many more than 20 million people will be accommodated by 2000 (see Section 9.2.3, pages 279-281). Also, as Tokyo's trend, it is expected that the actual extent of Seoul Metropolitan Region will be beyond the existing metropolitan boundaries of Seoul, Incheon and Kyongki provinces and may incorporate the next provinces of Chungcheong in the South and Kangwon in the East. The distance of the Metropolitan Region's influence could be expanded to about 150 kilometres at the outer edge of an extended Seoul City region in the future. At the moment Seoul City administrative boundary reaches approximately 15 kilometres from the centre and the commuter distance mostly extends to 30 - 35 kilometres but to 50 kilometres in the south. Later commuting could be extended to 70 - 100 kilometres and then possibly

to the area of 150 kilometres distant if transport facilities are improved early in the next century.

The rural periphery in the extended city region may be limited to receive urban population and industry because of political, environmental and geographical reasons in South Korea (see Chapters Seven and Eight). The inter-regional depopulation phenomenon which occurred in the USA during the 1970s seems unlikely to happen in such a small country as South Korea. Rather probably Korea will follow the trend in the Kanto (Tokyo) region of Japan and twenty-five or thirty million people will live and work in the extended Seoul Metropolitan Region by early in the next century. Therefore, counterurbanisation may not be the main concern to refer to South Korea and, instead, how to deal with continued agglomeration of population and industry in Seoul Region will be one of the most serious issues.

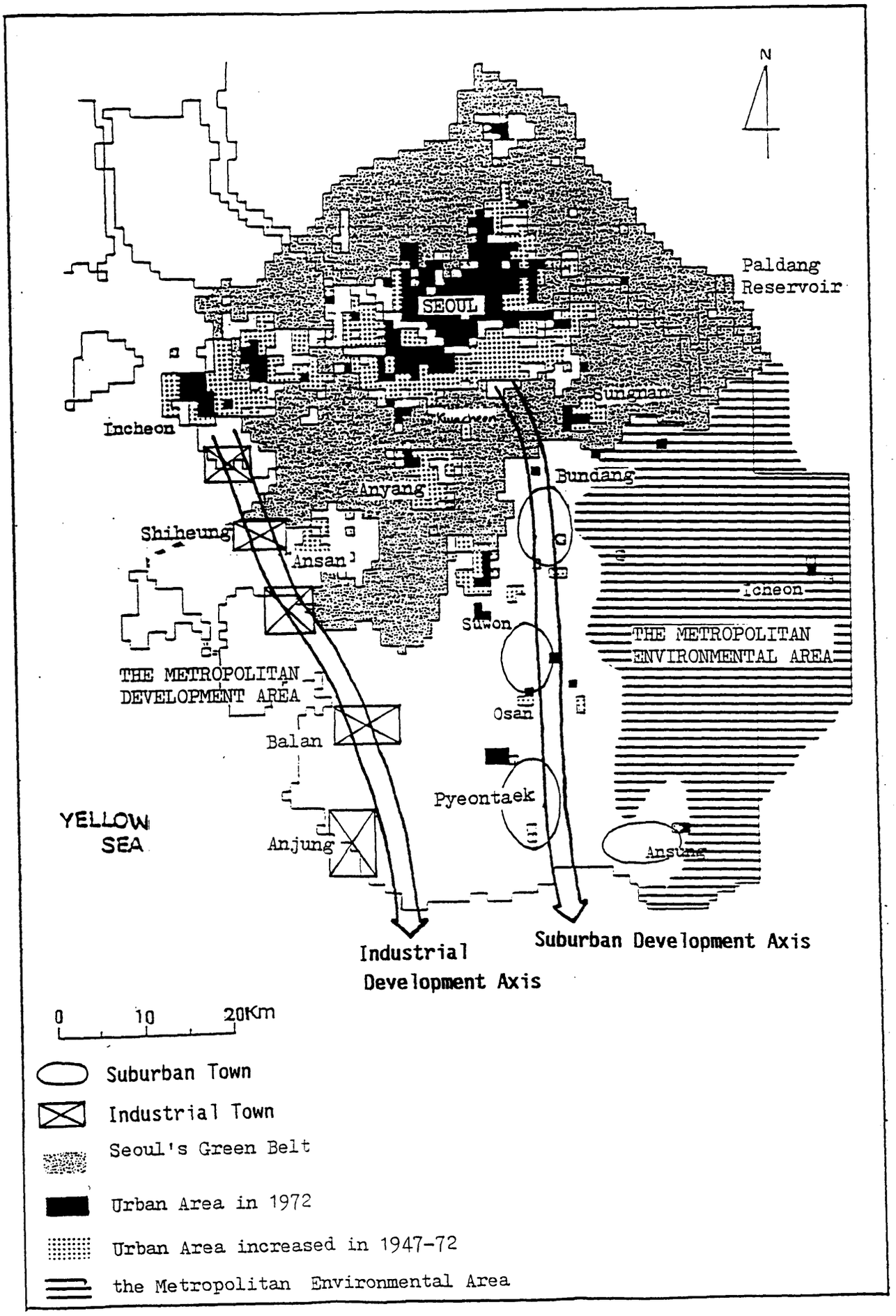
CONCLUSION

This paper shows that South Korea has taken lessons from broad planning strategies developed in other countries. In particular Green Belts have been implemented around major cities, notably Seoul, growth poles have been developed through the location of industrial towns along the South coast and, more recently, transport axes are proposed to provide the location for industrial and bed-town cities to the south-west and south of the capital.

Despite these strategies Seoul City and its region have continued to grow in population and urban extent. The trends of counterurbanisation experienced elsewhere have so far shown no sign of occurring in South Korea although the major oriental counterpart country of Japan has experienced counterurbanisation to a certain extent. However, in Tokyo itself, with its concentration of administrative functions and policy of urban expansion, the trend has been reversed.

It seems likely therefore that the dispersal and control measures taken so far in South Korea will only be partially effective and the need to accommodate Seoul's future growth will remain. It is to be hoped that Seoul can find a solution that will reap the benefits of agglomeration without the environmental and quality of life disbenefits experienced by a city like Tokyo. Unwin's dynamic image, embodied in the Greater London Regional Plan of 1929 and developed in the Tokyo Metropolitan Green Area Plan of 1939, is not an out of date planning principle but could be a useful and practical regional planning strategy to achieve this goal. Unwin's approach may help to solve the large extension of suburban growth of Seoul at the end of this century and be workable for the continuous extension of Seoul into the next century.

Figure P.1 Development Axes in Seoul Metropolitan Region



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