URBANIZING TERRAINS

By

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URBANIZING TERRAINS

ON THE PERIPHERY OF THE EUROPEAN METROPOLIS

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CHRISTOFOROS ROMANOS

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ABSTRACT

Urban "sprawl" in the East Attica area of Athens has dramatically changed the former rural economy in a manner consistent with the urbanizing terrain's underlying properties: agricultural subdivisions, existing centres, transportation infrastructure and administrative management. A similar situation has been witnessed over the last 20 years on the periphery of other European metropoles that have consistently increased the amount of built space while population has seen only a modest rise. The decrease in residential density has created hybrid landscapes in areas identified as the "urban fringe" or "periphery". Supported by an isotropic distribution of infrastructure the properties of this urbanizing terrain affect the pattern of built space creating a spatial order that is neither entirely urban nor rural.

In the first part the thesis examines the organizational effects of these properties in four European cities and the resulting built space of low-density development. Employing the potential to affect positive change through adjustment of these properties a design proposal is suggested for the East Attica region, to reconstitute its territorial order and re-form its permanent image in the public imagination of both local residents and the metropolis as a whole.

URBANIZING TERRAINS

ON THE PERIPHERY OF THE EUROPEAN METROPOLIS

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Master of Science in Architecture Studies
Master in City Planning

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To my Family, for your unconditional love and support.

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To my Father.

Urbanizing Terrains

CONTENTS

INTRODUCTION

With a little or no population pressure, a variety of factors are driving the outward expansion of the once compact European city. These are rooted in the desire to realize new lifestyles in suburban environments, outside the inner city and are accelerated by improved transportation links and enhanced personal mobility. This has resulted in a change in the form of settlements that are no longer continuous or compact, but marked by different residential densities alongside great voids of open space.

Data collected by the European Environment Agency has shown that throughout Europe falling residential densities and urban expansion are having major impacts on the environment, leading to higher consumption of energy and land while permanently degrading good quality agricultural land[1]. The social structure of areas is also affected, as middle and upper class families typify the socio-economic character of low-density development residents, having the necessary mobility to function effectively in these localities. The resulting social polarization in some cities is so apparent that the concept of the "divided" or "dual" city has been applied to describe the divisions between the inner city core and the suburban outskirts. The effects of urban "sprawl" have so alarmed policy-makers that the European Environment Agency published a report in 2006 effectively declaring political war on unplanned urbanization.

Existing literature and theory of urban "sprawl" provides a good explanation of its characteristics, its causes and consequences. Most of it however, relates to North American cities and only very recent books, from the last 10-12 years are specifically concerned with Europe (Couch *et al.*, 2007; Phelps *et al.*, 2006; De Geyter Architects, 2003; Sieverts, 1996). While "sprawl" in Europe may have common characteristics with its North American counterpart, the European situation is more complex, being the result of different urban cultures and historical continuities, that in themselves vary between countries. South European cities for example have grown outwards at a slower pace from those in the North where residents have historically maintained a positive relationship with

1 European Environment Agency, *Urban Sprawl in Europe*, 2006.

the city, that is different from the traditionally anti-city sentiments of the British[2]. As such it is difficult and perhaps unnecessary to formulate a continental theory of low-density urbanization in Europe that can be usefully applied to the situation in all cities.

Approaches to urban "sprawl" generally oscillate between the idea of low-density urbanization appearing as a type of urban *form* (De Geyter Architects, Sieverts) or a *process* of urban change (Phelps *et al.*, Couch *et al.*). The *form* of urban "sprawl" addresses physical-material components such as roads, industrial buildings, houses and open space and their organization into a set of spatial relationships, whereas the idea of *process* accounts for institutional, administrative and individual decisions that can eventually influence form[3]. The latter approach seems to be more amenable to policy-makers, stressing the means through which regulation can incrementally affect urbanization on a political and administrative level such as taxation or urban regeneration. *Process* also successfully accounts for the main characteristic of low-density city growth: unlike the planning of a new city sector, "sprawl" does not occur through collective effort but through a series of unplanned individual decisions[4].

Formal issues on the other hand, are regulated through spatial planning that organizes large spaces on the city's peripheral areas through tools such as zoning. While spatial planning has had some success in organizing low-density growth in various North European cities it has been unable to provide a comprehensive framework that organizes unplanned city growth[5] as the very certainty of a zoning plan contradicts the accessible field surrounding the city which allows scattered development to occur in almost any location. This accessible field, characterized by an almost homogenous distribution of transportation infrastructure and farmland between secondary towns becomes the prime ground for urbanization, as its accessibility, affordability and nearness to regional centres enable processes of individual decision-making to take place. As such this adaptable semi-natural, semi-artificial surface functions as a substitute to typical zoned spatial planning, additionally allowing for a wide variety of land uses (agriculture, housing, industry,

2 Hall & Hay, *Growth Centres in the European Urban System*, 1980. pp. 226- 227.
3 Couch et al., *Urban Sprawl in Europe*, 2007. pp. 4.
4 Thomas Sieverts, *Cities without Cities*, 1996. pp. 3-5.
5 Reasons for the failure of spatial planning include the overlapping of administrative jurisdictions overseeing enforcement and competition between municipalities. Couch et al., *Urban Sprawl in Europe*, 2007. pp. 220-227.

commercial) to develop in relatively close proximity to each other.

The structure and possible influence of this ground on the formal organization of low-density growth however has been poorly explored in urban "sprawl" literature from both Europe and America, where more general characterizations such as "periphery" or "fringe" are used to describe both the relationship between edge and centre but also the ground on which urbanization occurs. Such a gap in research suggests that this peripheral ground may be considered as an impartial entity by "sprawl" investigators, receiving development but incapable of influencing urban form in measurable ways. In part this may be a consequence of the dominance of American studies into "sprawl" where urbanizing terrains have a very different constitution to those of Europe, lacking in territorial rationalization that comes from the historical continuity of settlement. European architects and urban designers however, have not ignored the presence of the field, even though very few have addressed its specific attributes. In projects and research conducted within particular regional entities such as the Veneto of North Italy or the Flemish Diamond, the isotropic ground of low-density city growth has been recovered as an important element influencing physical design, with the ability to converge both spatial planning strategies and unplanned processes of urbanization.

Urbanizing terrains are found on the periphery of most major European metropoles and constitute an unexplored topic in urban "sprawl" literature that may inevitably structure and organize low-density urban growth. The hypothesis that this thesis wishes to explore therefore is the effect of the peripheral terrain's properties on the form of low-density city growth. Research will centre on exploring one particular terrain to the east of the Athenian metropolis where recent investment in transportation infrastructure has accelerated the urbanization process on what was previously good quality agricultural land.

In the first part of the research the properties of this terrain will be compared and contrasted with

similar attributes in three other European cities that have seen an intensification of low-density growth since 1990 in order to establish the possibility of general trends that relate low-density urban form directly with the urbanizing terrain. The second chapter will focus on an exploration of current literature on urban "sprawl" and in particular those sections that identify associations between the land on which urbanization occurs and its effects on the form and process of "sprawl". Special emphasis will be placed on architectural and urban design projects that have developed strategies to deal with this terrain. The final chapter will return to the specifics of the Athenian situation, to suggest ways through which the terrain of East Attica can be designed in order to reduce the negative effects of low-density urbanization where possible.

Chapter 1

STRUCTURE OF LOW-DENSITY GROWTH

URBAN "SPRAWL" IN EUROPE

In 2005 the publication by the World Bank of a study specifically focused on global urban expansion drew attention to the rapid increase in land coverage displayed by many cities worldwide[6]. This trend has been especially true for cities in East Asia where a continued demographic explosion and a steady improvement in national economies have led to formerly moderate sized urban agglomerations doubling or tripling their area. The global trend of rapid urbanization is expected to increase significantly along with population in every continent (with the exception of South America) and by 2030 total urbanized land is expected to triple in area to become the home of the majority of the Earth's population.

Europe however, displays a different and perhaps more interesting trend: with a negligible increase in population the space consumed by European urbanized areas is nevertheless expected to double by the year 2030. In 2006 the European Environment Agency (E.E.A.) published an on-line document that drew attention to this phenomenon. Entitled "Urban Sprawl in Europe" and subtitled "The Ignored Challenge" it consolidated fifty years of data on changes in urban land-use to reveal a possible dispersed future for the European city. Statistical analysis shows that European cities have expanded on average by 78% whereas the population has grown by only 33% since the 1950s while the process of urban expansion at lower residential densities seems to have acceler-

6 Shlomo Angel et al, *The Dynamics of Global Urban Expansion*, 2005.

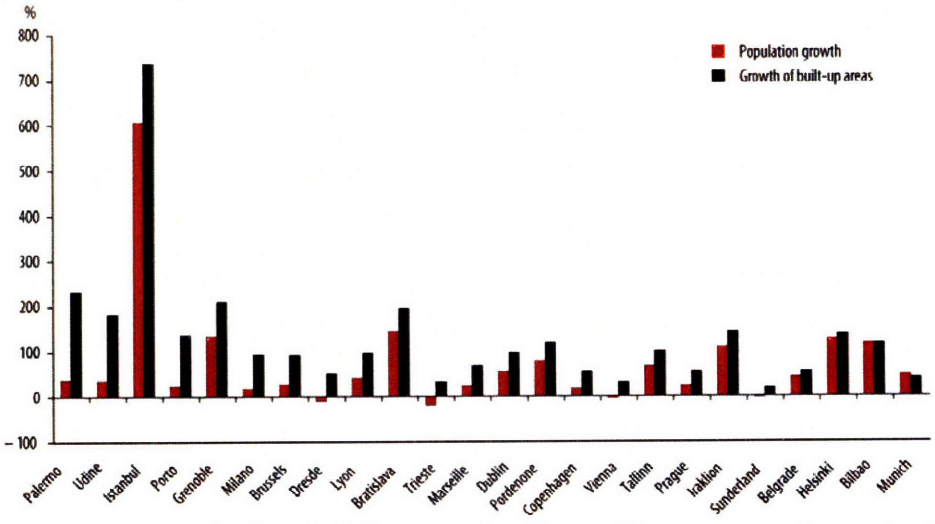


Figure 1 Population growth and growth of built-up areas- selected European Cities *(Source: European Environment Agency)*

ated during the last two decades[7]. Moderate increases of population, accompanied by a proportionately large expansion of urban areas in countries such as Spain, Portugal, Ireland and the Netherlands has led to the realization that urban growth in Europe is radically changing the form of the traditional compact city.

The cause (and consequence) of this low-density urban growth in Europe has been squarely characterized as urban "sprawl", adopting a term used as early as the 1930s in the United States to describe the scattered form of suburban growth around American cities. Invariably definitions of "sprawl" have concentrated on the urban form of low-density growth, which in Europe is generally measured against an ideal prototype of "compact city". Reviewers of "sprawl" literature have also employed the term to refer to "processes" of extending urban areas, causes of particular practices of land use and the consequences of these practices. Galster et al have suggested a more comprehensive definition saying that "sprawl" is:

. . . a pattern of land use in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity. [8]

This operational definition was employed by Galster to measure patterns of urban sprawl in large urbanizing areas of the US, arguing that it can accommodate different forms of "sprawl", which measured at different points in time would reveal the processes at work. This approach however is very demanding on data, making its widespread application difficult and as Couch et al have commented nearly impossible to employ when looking comparatively across the European continent. Additionally this method of study allows for a wide variety of urbanization processes to fall under its umbrella, which may not display the same environmental and social consequences associated with European urban growth.

A more precise definition is offered by the European Environment Agency that describes "sprawl"

7 European Environment Agency, *Urban Sprawl in Europe*, 2006
8 Galaster et al., Wrestling sprawl to the ground: defining and measuring an elusive concept. Housing Policy Debate 12(4): 681-717.

with European urban growth.

A more precise definition is offered by the European Environment Agency that describes "sprawl" as:

The physical pattern of low-density expansion of large urban areas under market conditions into the surrounding agricultural areas. Sprawl lies in advance of the principal lines of urban growth and implies little planning control of land subdivision. Development is patchy, scattered and strung out, with a tendency to discontinuity because it leapfrogs over some areas, leaving agricultural enclaves. [9]

One of the advantages of this definition is that it locates "sprawl" geographically (an extension of existing urban areas), formally (a physical pattern) and as a process (caused under market conditions). It therefore gives a clearer picture of low-density growth in Europe, while avoiding characterizations that limit its operational definition to urban form or growth processes. It also accounts for some of the particularities of European urbanization as they differ from the American situation that forms the overwhelming majority of literature on the subject. As such emphasis on market causation comes within a European planning environment dominated by politically motivated urban expansion and control while the acknowledgment of surrounding agricultural land as the prime area on which "sprawl" occurs refers to a historical pattern of peri-urban land-use and territorial appropriation centred on a shared cultural tradition of urbanism that is not apparent in the US.

The EEA definition also operates well amongst European regions and cities that in themselves display different cultures of urbanism. Most notable is the divide between North European and Mediterranean cities that have, broadly speaking, experienced different growth trajectories, with the North having a longer tradition of decentralization and exodus of population from the city core while Southern European cities have a tendency towards centralization. Although this pattern

9 European Environment Agency, http://glossary.eea.europa.eu/EEAGlossary/U/urban_sprawl (Accessed 01/04/2008)

of centralization may be slowing down or even reversing in Southern Europe, positive geographical imaginations for urban life have had a great impact in forming Mediterranean cities creating a long history of spontaneous urban growth and informal popular settlements as new urban residents sought to fortify themselves from rural poverty and insecurity[10]. By contrast, industrialized Northern cities by the mid-19th century created an anti-city culture whereby the view of the "city as virtue" switched to a perception of the "city as vice" with wealthy residents fleeing urban squalor and congestion in search of a pastoral ideal beyond the city's limits[11]. This difference in urban cultures can also account for one of the major reasons that studies of American sprawl have only limited application in Europe, the US being strongly influenced by the decentralizing Northern European pattern of urbanization.

Traditional urban models show that intensity of urban use gradually declines with increasing distance from the centre. This implies a density gradient sloping downwards away from the city centre. While in reality the slope and precise shape of this line will be distorted by a host of factors such as topography, transportation routes, urban cultures and so forth it is still an important abstract model, especially when considering the difference between urban growth and "sprawl" as the effects of "sprawl" will result in the density gradient becoming less steep. On the other

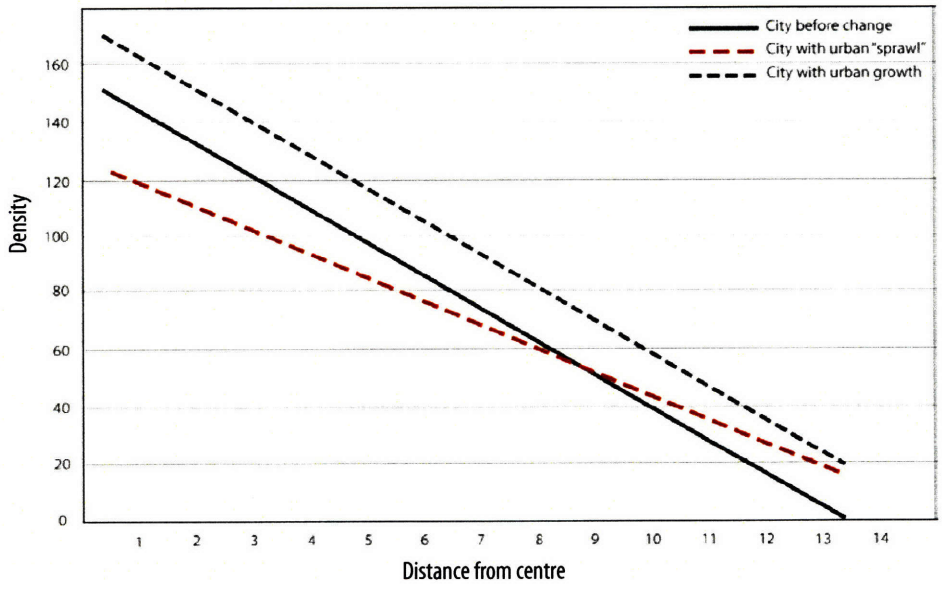


Figure 2 Distinguishing urban "sprawl" from urban growth *(Source: Couch et al, Urban Sprawl in Europe)*

10 Lila Leontidou, *The Mediterranean City in Transition*, 1990.
11 Carl Schorske, *Explorations in the Passage to Modernsim*, 1998.

hand "healthy" urban growth is distinguished by an expansion of population or economic activity within an urban region, leading (all other things remaining equal) to the density gradient shifting right while retaining the same gradient. This analysis leads to an important indicator of "sprawl": changes in residential density at different distances from the city centre. Data collected by the EEA showing changes in land-cover between 1990-2000 offer a strong indication that European cities have expanded their physical extent faster than their population. Growing national economies and an increasing emphasis on the entrepreneurial city-model through which cities compete globally to attract investment, has seen some national and regional capitals develop outward more rapidly than in previous decades.

The indications are that during the 1990s, urban growth in Europe has predominantly favoured the "sprawl"-model, developing on land adjacent to existing urban limits. New low-density development has encroached on both natural ecosystems and agricultural land with well-recorded negative impacts on fuel consumption and social cohesion. Additional improvements to transportation infrastructure fuelled by the entrepreneurial city-model and the economic benefits for transforming agricultural to urban land-uses have exemplified this type of growth. The territory surrounding the European city has also been subject to weak land-use planning and poor enforcement of existing plans and regulations, especially in Southern European countries that have a history of illegal building and informal settlement, encouraging or at least not limiting the development of "sprawl".[12]

Whereas the processes causing "sprawl" have been the subject of intense investigation by both American and European researchers, the resulting urban form has only received attention to the extent that it is able to illustrate these same processes. So for example, Couch and Leontidou have described the mixture of agricultural and urban land-uses in Europe as a "hybrid" landscape[13], while Sieverts has used the phrases "in-between city" and "landscaped city" to explain the ambiguous physical appearance of the same phenomenon. Similarly, the organizational complexity

12 Couch et al., *Urban Sprawl in Europe*, 2007. pp. 4.
13 Couch et al., *Urban Sprawl in Europe*, 2007.

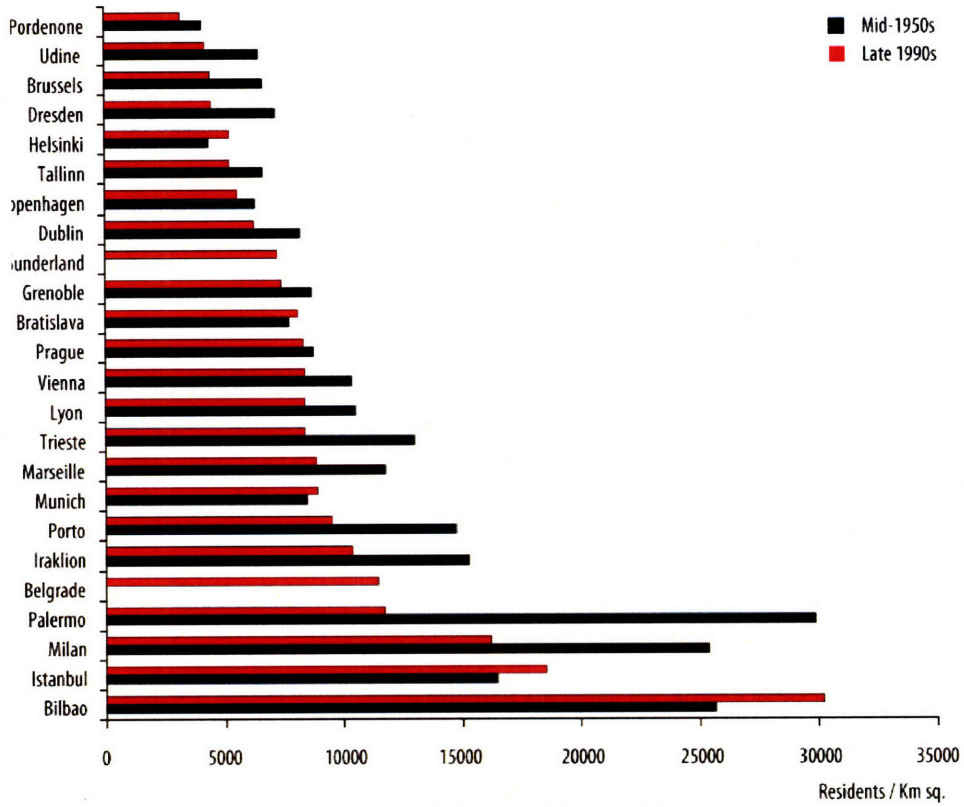


Figure 3 Residential density in mid-1950s and late 1990s - selected European Cities *(Source: European Environment Agency)*

of low-density development, when not described in derogatory aesthetic terms is characterized by its "unplanned" appearance, which "...at first sight is diffuse and disorganized with individual islands of geometrically structured patterns..."[14]Neither description however accounts for the territorial rationalization embedded in the subdivision of agricultural land and its potential effects on urban form. Such insufficient spatial determinations imply that the landscape on which the majority of low-density urbanization occurs is an empty plane devoid of any physical character and therefore has negligible effects on the pattern of urban "sprawl". Though Sieverts recognizes that "settlement surface [...] has acquired something of the character of the surrounding landscape"[15], the extent to which this landscape is able to inform the pattern of settlement is not elaborated.

Nevertheless closer observation of this territory reveals a surface layered with a configuration of both physical and political infrastructure that enables low-density urban growth to develop.

14 Thomas Sieverts, *Cities without Cities*, 1996. pp. 6.
15 ibid.

This accessible field is characterized by an almost homogeneous distribution of transportation infrastructure and farmland between secondary towns administered by competing municipal authorities. The accessibility, affordability and proximity to regional centres offered by this ground permit processes of individual decision-making to take place, making it potentially influential on the resulting physical form. As such the idea of a perceivable material structure ceases to exist becoming instead an infra-structure on which development is left to accumulate almost randomly in an isotropic field. The suggestion is that while the ever-increasing production of low-density development may appear disorganized it is nevertheless based on an underlying structural configuration that becomes apparent when the idea of "sprawl" is examined through the lens of the European landscape.

METHODOLOGY

The infra-structure of urbanizing terrains however is not only determined by existing physical conditions such as existing urban centres and topography within the metropolitan region. It can be extended to include both microeconomic factors such as the competitiveness between municipalities and the price of land. In this regard the assumptions of forces currently shaping urban expansion adopted by Shlomo Angel's team in drafting the World Bank report become valuable tools to explore the relationship between terrain and urban form. However, where the World Bank report included factors determining the form of urban growth on a global scale[16], the current study permits modifications according to current European conditions outlined in the EEA report. Thus the available data enabled the categories of Economics, Demographics and Preference for Proximity to be considered as pan-European trends with little or no variation between individual countries and cities.

Specifically it was assumed that economic conditions within the study period of 1990-2000 were stable with an annual increase in national GDP, while population did not show a significant change, although there was a modest increase. The effects outlined by the category of Preference for Proximity were also considered as being the same amongst study cities. This is due to the

16 Shlomo Angel et al, *The Dynamics of Global Urban Expansion*, 2005. The report analyzes cities on every continent including Europe. However the criteria employed are an attempt to discover global trends in the urbanization process and thereofre not entirely applicable to Europe.

fading contrast and dualism of the past, as an emergent culture of urbanism spreads from South to North Europe, reproducing re-urbanization and gentrification[17]. On the other hand the effects of the natural environment, transportation system and governance were regarded as significant forces embedded in the urbanizing terrain that potentially determine the form of low-density development. However these forces were adapted to fit the specifics of the European condition.

Four properties of the urbanizing terrain where thus identified as having a possible influence on the urban patterns resulting from processes of low-density urbaniztion:

1. AGRICULTURAL PATTERNS

The Natural Environment category, which encompasses specific physical circumstances, was replaced by the presence of agricultural land surrounding the European city. This was considered a determining feature of the peri-urban terrain as it describes the dominant land-use during the urbanization phase.

2. ADMINISTRATIVE UNITS

The category of Governance was seen as important but only so far as it pertained to the administration of land suitable for urban growth. It was therefore limited to the municipality that has been the most powerful administrative unit shaping growth on the metropolitan periphery.

3. TRANSPORTATION INFRASTRUCTURE

Transportation infrastructure was deemed as essential in describing the infrastructure of urbanizing terrains. The presence of highways, farm roads and fixed-track mass public transportation systems have been considered as the main force determining the growth of urban "sprawl".

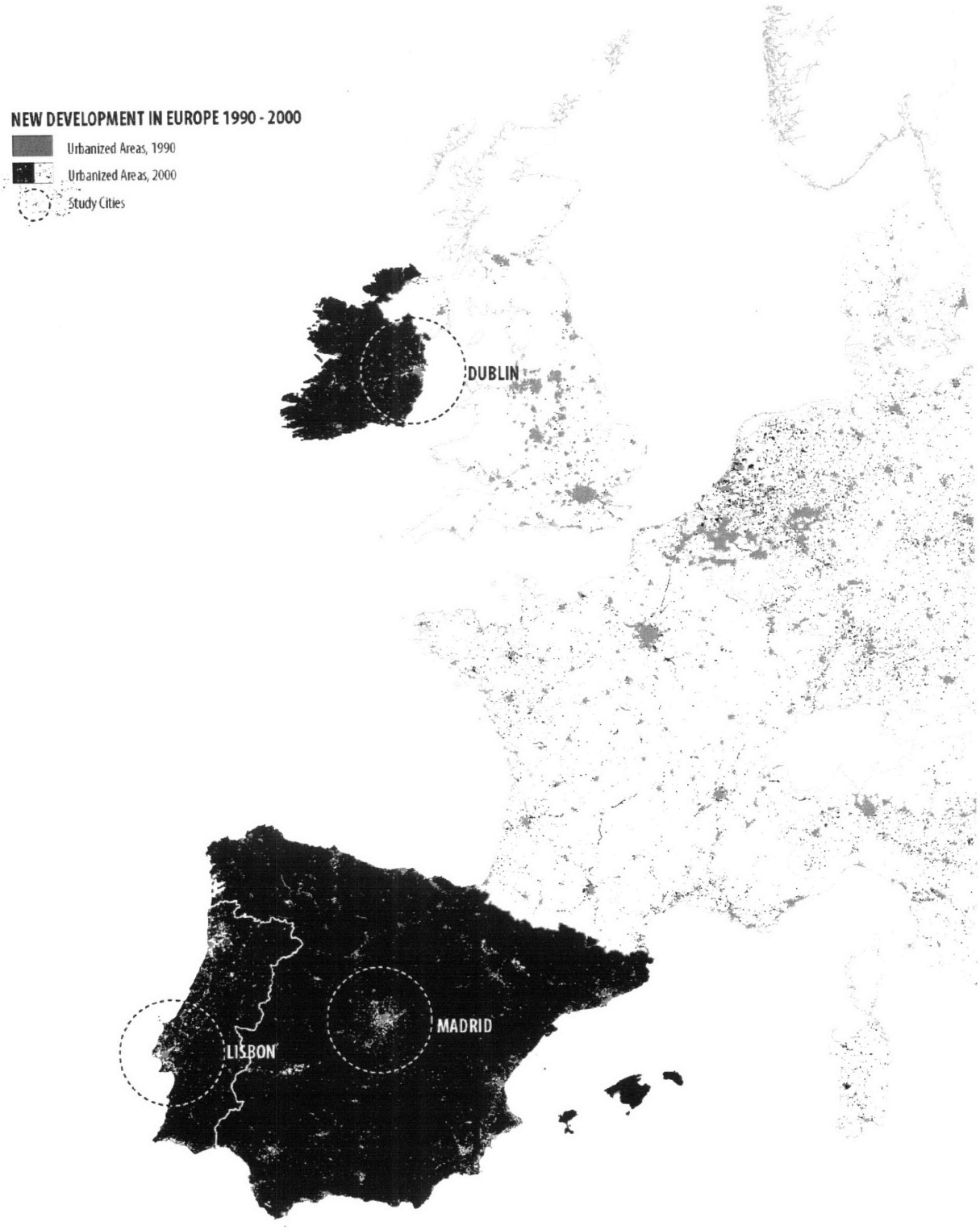
3. EXISTING SETTLEMENTS

A final category was added that is associated with the historical evolution of European cities. The

17 Couch et al., *Urban Sprawl in Europe*, 2007.

smaller centres surrounding the metropolis was seen as vital to understanding the patterns of low-density growth in this context as it relates both to a historic pattern of settlement dispersal and the propensity for urban "sprawl" to develop in proximity to regional centres.

The research therefore proceeded to examine these four properties s and the extent to which available data and analysis could provide evidence as to their influence on the physical configuration of low-density growth.


NEW DEVELOPMENT IN EUROPE 1990 - 2000
Urbanized Areas, 1990
Urbanized Areas, 2000
Study Cities
DUBLIN
MADRID
LISBON

Map 1

EUROPEAN URBANIZATION

With a population approaching 455 million in the 25 European Union countries, urbanization is expected to almost double the land covered by urban land-uses by 2030 while population will show only a modest increase. Population change will come mainly from internal migration between Eastern European countries and the economically stable states to the West.

The decade between 1990-2000 was one of intense urban growth especially in the countries that showed marked improvements in their national economies. Such growth is not only based on internal building booms that resulted from higher living standards but also from "tourist migration" that saw North European residents enter the housing market of South European countries such as Spain and Portugal. This particular wave of migration has seen expansive residential areas grow around coastal and natural beauty regions. The population however is not permanent and moves, according to the season, between the North and South.

COMPARATIVE BACKGROUND OF STUDY-CITIES

The total population of the extended European Union of 25 states was estimated at 455 million in 2005, giving an average population density of approximately 118 inhabitants per km^2. This is approximately quadruple the density of the United States that in 2005 stood at about 32 inhabitants per km^2 [18]. Until 2030 the population is expected to increase only moderately while the population residing in urban areas is expected to increase from 73.3 % in 2005 to 78% in 2025. If all else stays equal this will mean 28 million additional inhabitants that in their majority will tend to settle in existing or new urban areas. The pressure for "sprawl" will be considerable especially if, as the World Bank expects, the area covered by urban areas in Europe nearly doubles by 2030 from 120,000 km^2 to 215,000 km^2.

The primary site of investigation is the region of East Attica to the east of the conurbation of Athens, capital of Greece. In order to form a better understanding of the conditions shaping urban "sprawl" in this area, three additional cities were chosen to compare and contrast with Athens. So as to form comparative conditions between Athens and the other cities, capitals of other E.U. states with similar, above average economic growth were selected. Urban cultures were also considered, especially to the extent of their influence on residential preferences. For this reason two of the selected cities fall into the Southern European city category as defined by Hall and Hay[19], with a similar cultural propensity for centralization as Athens. Nevertheless, the suspected "Mediterraneanization" of North European cities (a simultaneous extension of the city on the urban edge with re-investment into the central core) as evidenced by Couch and Leontidou allowed for a member of the North European city group to be used[20].

The selected cities were each examined on the basis of existing written evidence, data available from their national statistical agencies, and supplementary measurements from the CORINE Land Cover dataset published by the European Environment Agency. The spatial dataset available electronically for Geographic Information Systems, collected land-cover data between 1990-2000

18 Couch et al., *Urban Sprawl in Europe*, 2007. pp. 39-66
19 Hall & Hay, *Growth Centres in the European Urban System*, 1980. pp. 226- 227.
20 Couch et al., *Urban Sprawl in Europe*, 2007. pp. 263.

City	Total resident population, 1991		Total resident population, 2001		City population as % of LUZ population, 1991 (%)	City population as % of LUZ population, 2001 (%)	Population change 1991-2001 (%)	Change in % of LUZ population in the core city 1991-2001 (%)
	City	LUZ	City	LUZ				
Athens	772 072	3 072 922	789 166	3 894 573	25.1	20.3	+26.7	-4.8
Dublin	478 389	1 341 661	495 781	1 535 496	35.7	32.3	+14.4	-3.4
Madrid	3 010 492	4 947 555*	2 957 058	5 423 384*	60.8	54.5	+9.6	-6.3
Lisbon	663 394	2 266 202	564 657	2 363 470	29.3	23.9	+4.3	-5.4

LUZ Larger Urban Zones

* Figures for the Communidad Autonoma de Madrid

Source: Instituto Nacional de Estadistica

(Source: Couch et al, Urban Sprawl in Europe, 2007)

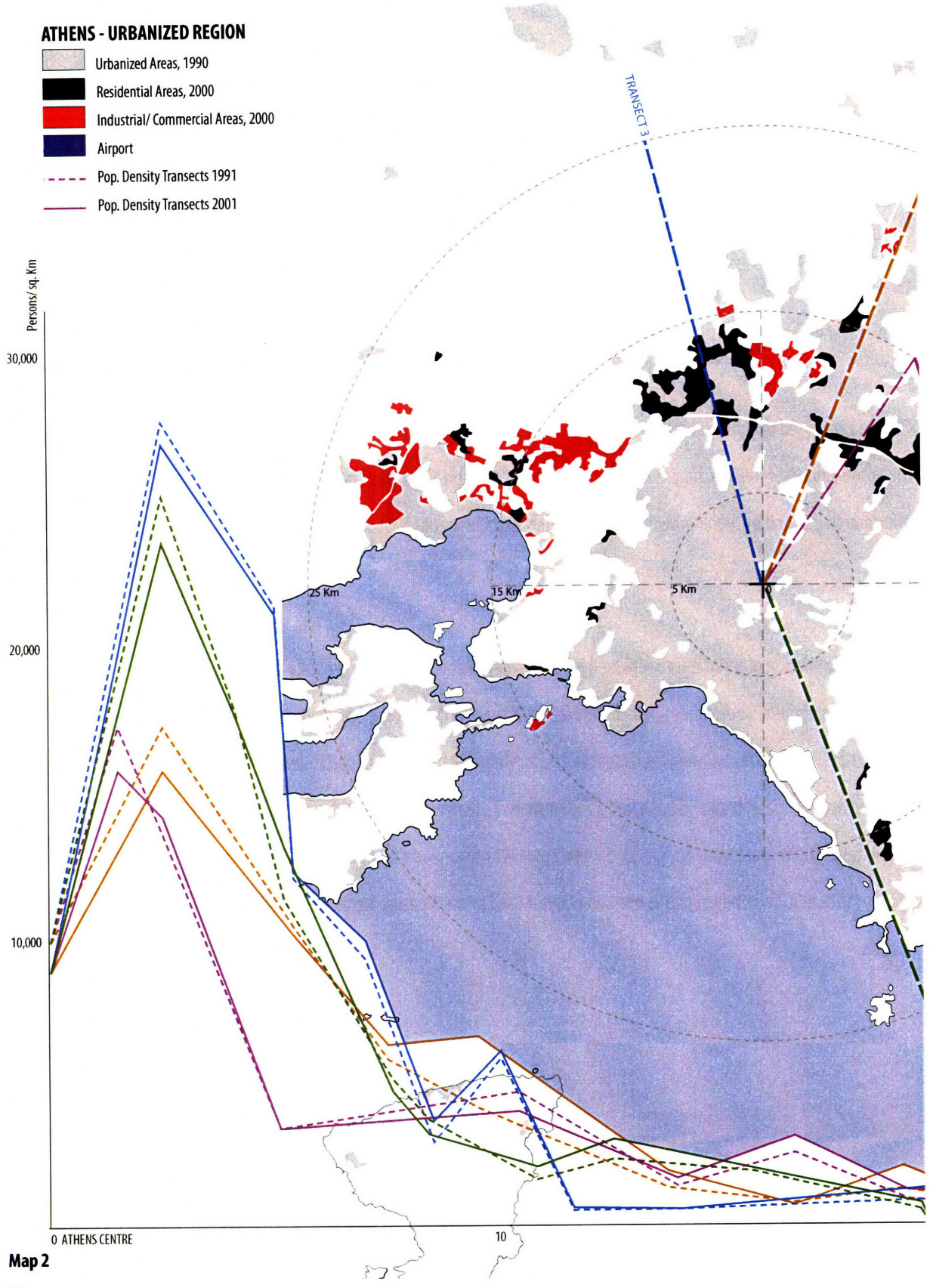
Table 1 Patterns of growth in Study-cities

with a layer devoted solely to the changes in land-cover within that decade.

The data was used to construct maps covering an area 70 by 70 kilometres with the central city in the approximate centre. The maps employed a technique of displaying both spatial and statictical information inspired by Alan Berger's studies of American cities in the 2006 publication, *Dross-cape*[21].

The major limitation of this dataset appeared in its inability to document the finer scale of low-density development since it measured continuous built space at distances closer than 200 m. This meant that single-family buildings at distances greater than 200 metres from each other were not recorded as built space at all and appeared as open space instead which distorted the data in most cities. Tracing built space from Google Earth went some way to amend this situation in the region of East Attica in Athens, however this method was not used in the measurements recorded in this section.

21 Alan Berger, *Drosscape, Wasting Land in Urban America*, 2006


ATHENS - URBANIZED REGION
Urbanized Areas, 1990
Residential Areas, 2000
Industrial/ Commercial Areas, 2000
Airport
Pop. Density Transects 1991
Pop. Density Transects 2001
TRANSECT 3
Persons/ sq. Km
30,000
20,000
10,000
25 Km
15 Km
5 Km
0
0 ATHENS CENTRE
10

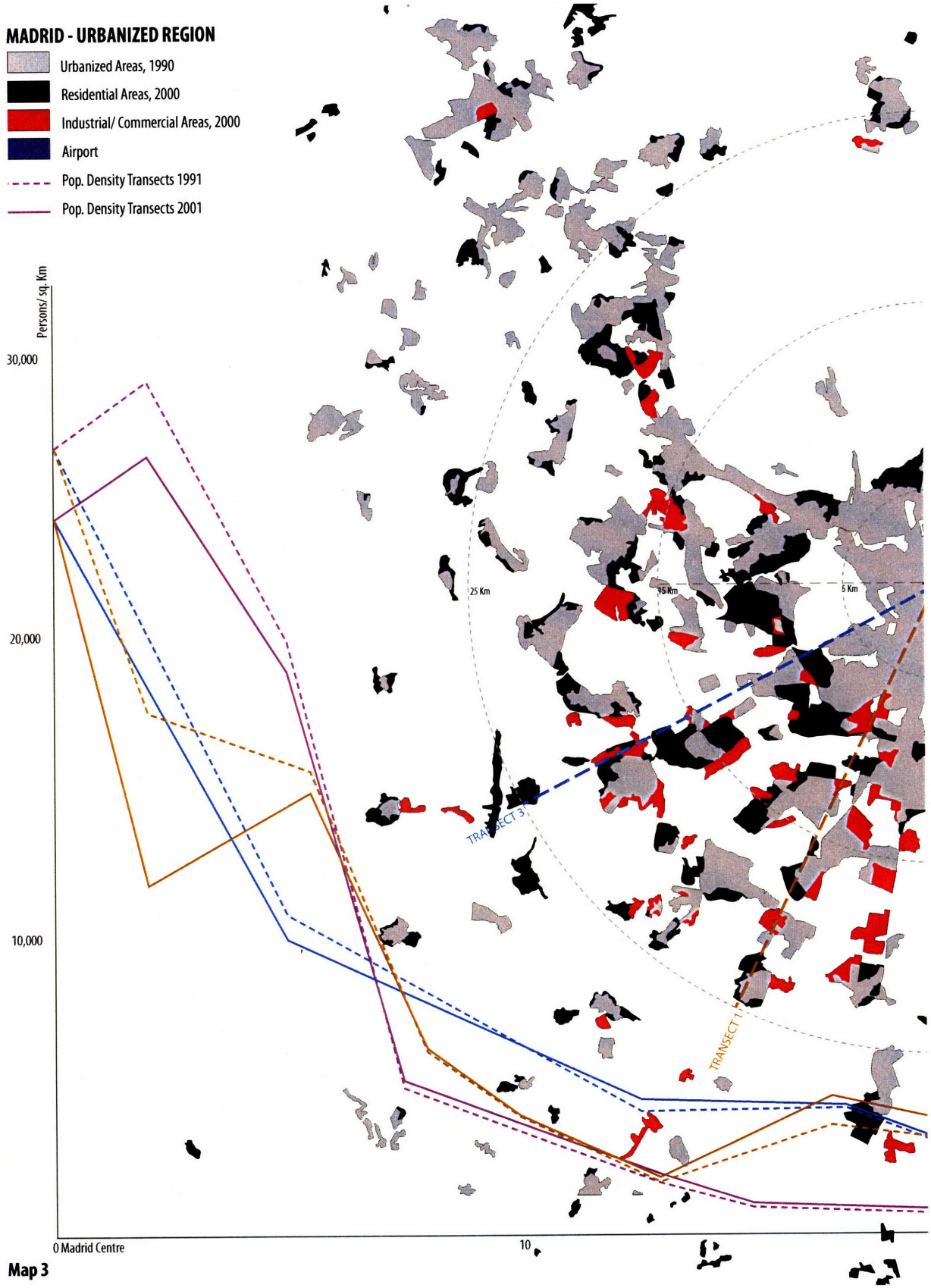
Map 2

(Sources: National Statistical Service of Greece, European Environment Agency)

ATHENS

Athens and the metropolitan region of Attica are home to around 4 million people or 39% of the population of Greece. In the 20th century Athens has been subject to major urban restructuring processes, a result of consecutive waves of migration and illegal self-built housing on cheap suburban land. Since the early 1990s the city and specifically its eastern edge (East Attica) have received considerable investment in public transportation infrastructure, a fact that has triggered a housing boom on what was predominantly agricultural land. After 2000 illegal building continued as speculative investment on second homes, with population and industry following the new transportation infrastructure created in anticipation of the 2004 Olympics while extremely weak or non-existent planning policy has intensified problems of congestion, resource depletion and pollution.

Planning for the Olympics took a significant turn from other South European countries hosting similar mega-events (Barcelona, Lisbon, Genoa), in that it did not concentrate on revitalizing the degraded core. Instead, sports infrastructure was spread throught the area of Greater Athens in a series of local regenration projects that have not proved as successful as was intended.


MADRID - URBANIZED REGION
Urbanized Areas, 1990
Residential Areas, 2000
Industrial/ Commercial Areas, 2000
Airport
Pop. Density Transects 1991
Pop. Density Transects 2001
Persons/ sq. Km
30,000
20,000
10,000
0 Madrid Centre
10
25 Km
15 Km
5 Km
TRANSECT 3
TRANSECT 1

Map 3

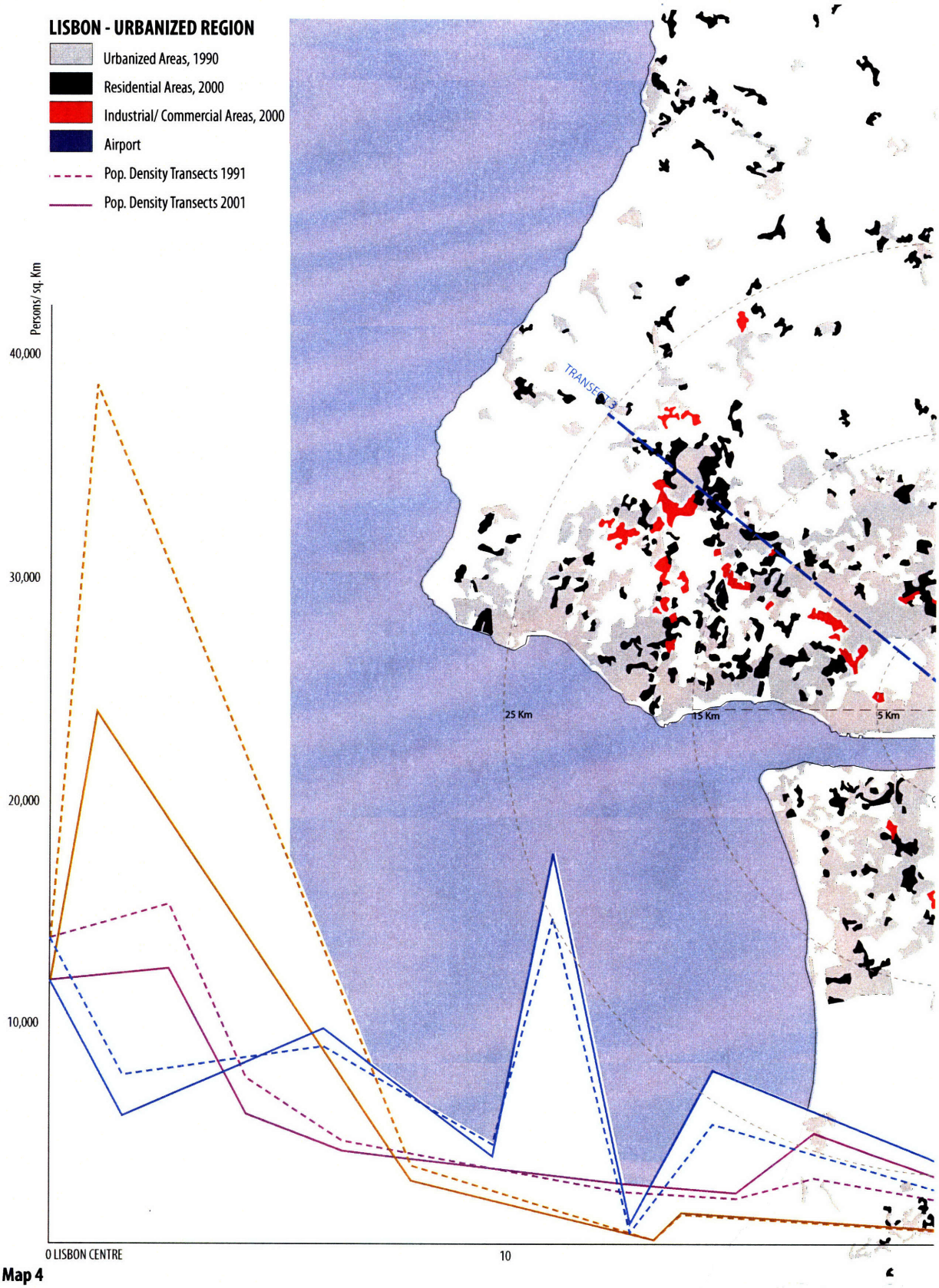
(Sources: Instituto Estadistica de Espana, European Environment Agency)

MADRID

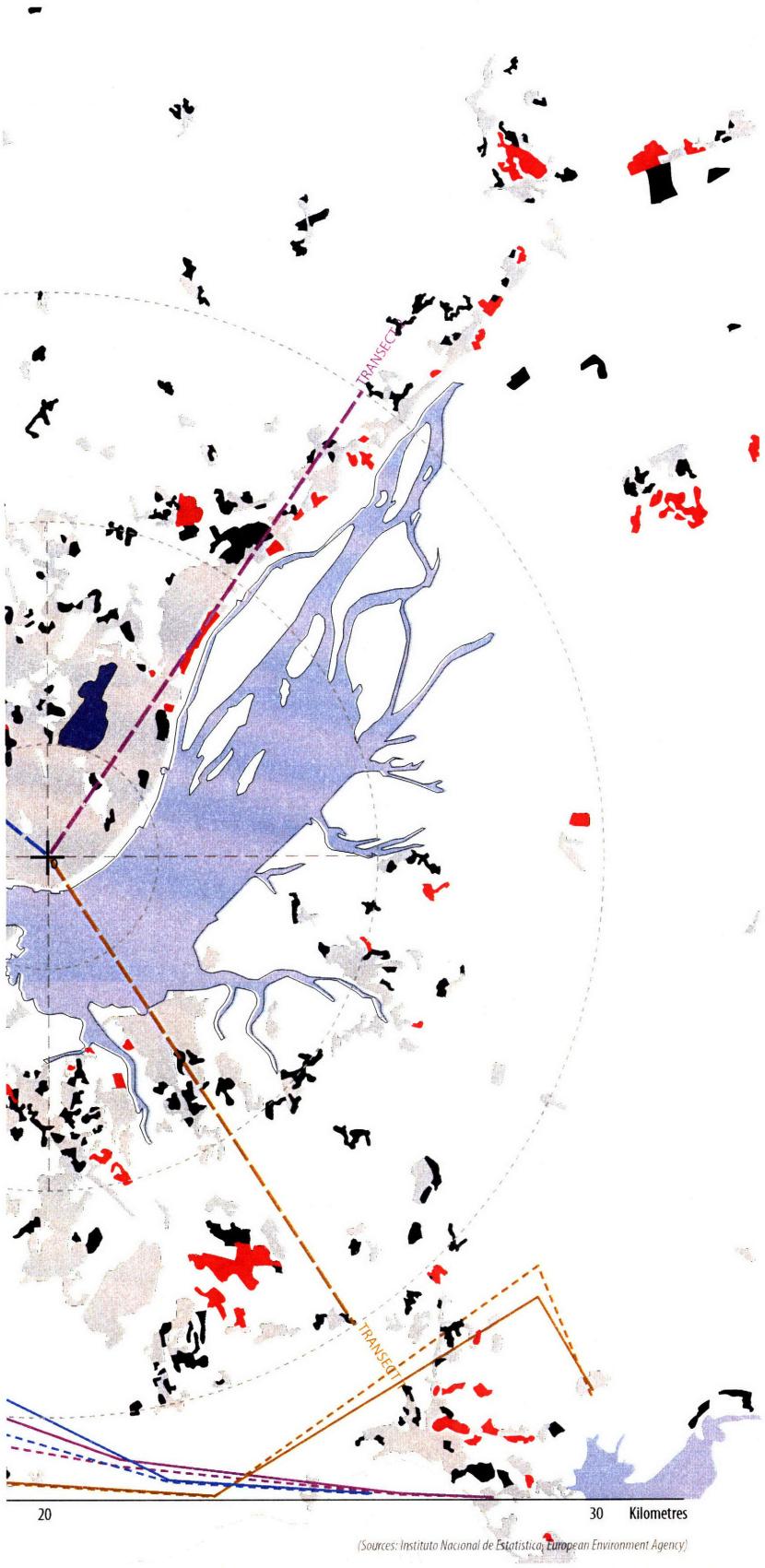
In the immediate post-war period, Madrid's urban development was relatively modest and channelled under the patronage of the Francoist regime. The 1946 Plan General was the first to envisage a radial concentric pattern of transport infrastructure, which created a framework for the rapid growth of the 1960s onwards at nodal points to the south of the city[22]. The planning agencies of Madrid produced numerous guidelines for development but no plans while excessive centralization of industrial activities attracted thousands of workers from rural areas causing a housing boom of informal settlements.

Accession to the E.U. in 1985 allowed for new investment into infrastructure using the EU Cohesion Fund, which contributed to high economic growth and a building boom. Between 1990-2000 513,000 new houses were constructed in the metropolitan area even though the population increase for the same period was only 240,000. This effectively doubled urbanized land during the 1990s.

22 Phelps et al., *Post-suburban Europe*, 2006. pp. 95-119.


LISBON - URBANIZED REGION
Urbanized Areas, 1990
Residential Areas, 2000
Industrial/ Commercial Areas, 2000
Airport
Pop. Density Transects 1991
Pop. Density Transects 2001
Persons/ sq. Km
40,000
30,000
20,000
10,000
0 LISBON CENTRE
10
TRANSECT 3
25 Km
15 Km
5 Km

Map 4

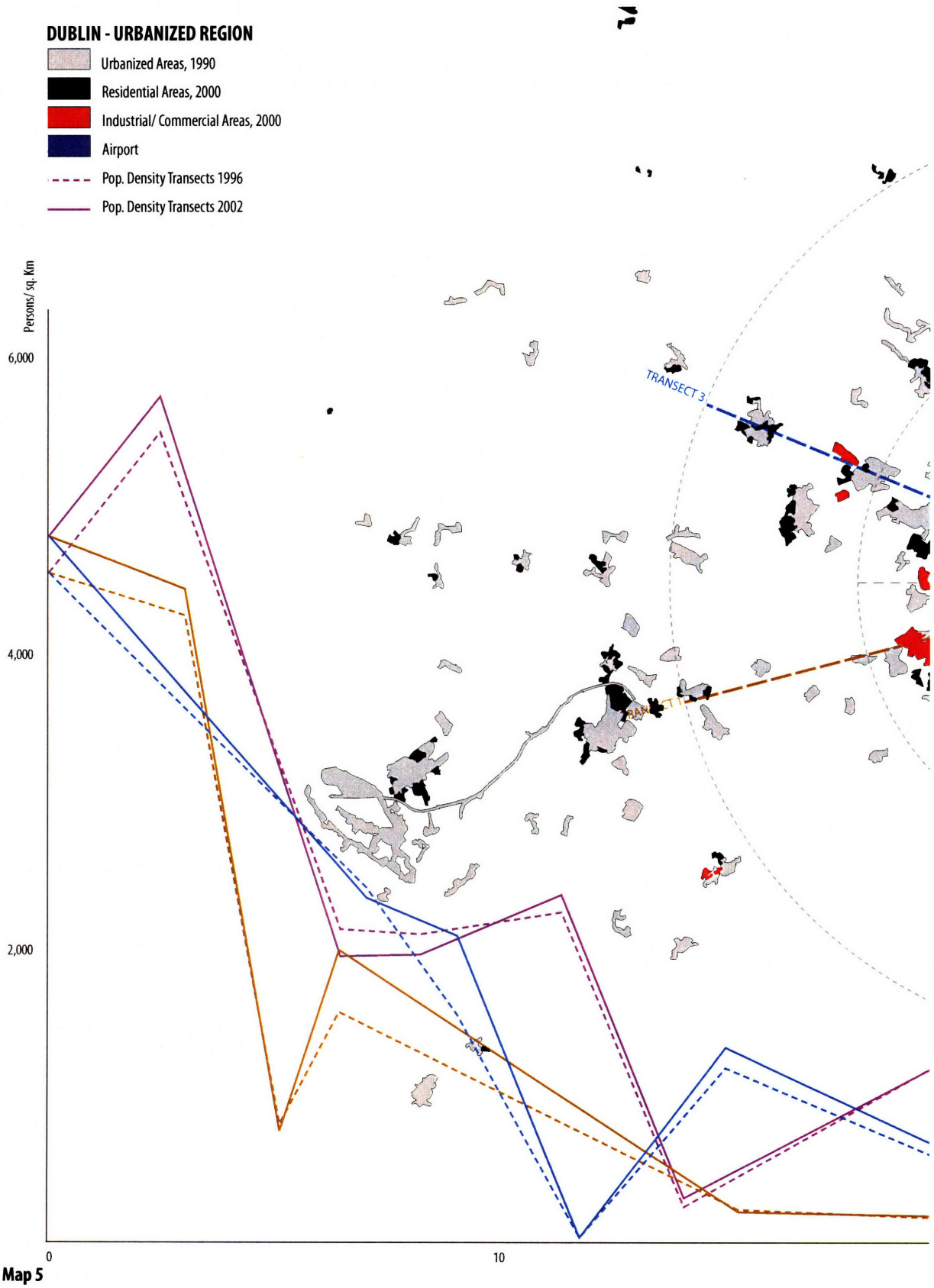


LISBON[23]

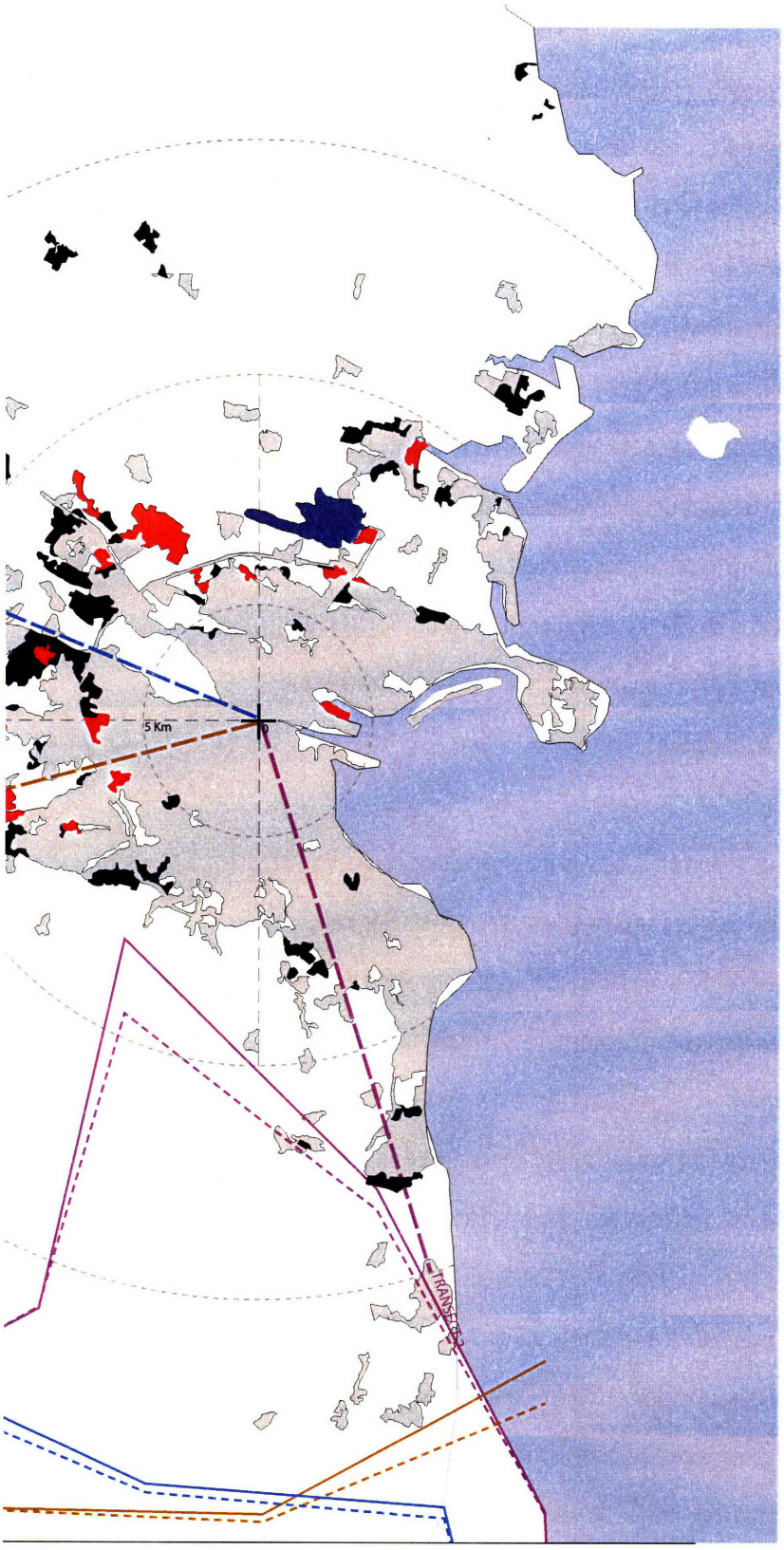
While not strictly Mediterranean, Lisbon displays many of the properties of other Southern European cities, such as a history of centralized form and illegal settlements on the edges of the central city. Since the fall of the dictatorship in 1976 the inner city has seen a decline in its population. This is especially true for younger people that have found prices in the historic core too expensive, preferring to settle in new cheaper housing within the wider metropolitan area.

In terms of infrastructure, partially as a result of EXPO 98, both the city of Lisbon and the surrounding area experienced an ambitious programme of improvement including the construction of a new bridge over the Tagus (Vasco Da Gama bridge), a new railway link between both margins of the Tagus, the construction of a network of peripheral motorways and the extension of the underground network. As well as improving the accessibility and mobility within the Lisbon Metropolitan Area, this transportation infrastructure also allows traffic in the North-South axis to avoid the central area of the city. Preparation for EXPO 1998 also included renovation programmes for areas in the historic core and the docks.

23 Alden and Pires, *Lisbon, Strategic Planning for a Capital City*, Ctries, Vol. 13, No. I. pp. 25-36.


DUBLIN - URBANIZED REGION
Urbanized Areas, 1990
Residential Areas, 2000
Industrial/ Commercial Areas, 2000
Airport
Pop. Density Transects 1996
Pop. Density Transects 2002
Persons/ Sq. Km
6,000
4,000
2,000
0
10
TRANSECT 3
TRANSECT 1

Map 5



(Sources: Central Statistics Office Ireland, European Environment Agency)

DUBLIN[24]

By European standards Dublin is a relatively small city that nevertheless dominates the urban pattern of Ireland as its population holds about 40% of the total Irish population. At present rates of growth, the EEA estimates that the Greater Dublin Area will need to accommodate over 400,000 additional inhabitants by the year 2020. Small apartments in the city centre and the predominance of the Anglo-Saxon pastoral ideal have pushed for the construction of new single-family houses in the open countryside, a trend facilitated by the planning regime which imposes few constraints on the conversion of agricultural to urban land.

Dublin dominates urban development in Ireland and major growth is expected to occur along the corridor connecting the city to Belfast within the next few years.

24 European Environment Agency, *Urban Sprawl in Europe*, 2006

EXISTING SETTLEMENTS

The pattern of European urbanization has, broadly speaking, entailed a number of semi-independent settlements incorporated over time into a single formal entity. Derived from the need for trade, villages and towns rarely developed more than one day's walk from each other, and most often less than that distance. Christaller accounted for the proliferation of settlements in such close proximity in the formation of Central Place Theory (CPT) using the network of North European towns and villages. Although CPT has been criticised as unable to perform as a general theory of the urban system, it is useful in pointing out the homogenously distributed urbanized terrain of Europe. Thus today, embedded in London's urban form for example, we find a number of former villages scarcely a few hours walk from the centre that although once physically separate, have become inextricably linked in what today we identify as London. This repetitive process of urban growth between discrete settlements saw the European city grow outwards, at each stage absorbing the centrality of the previously autonomous town.

The network of evenly dispersed centres has important effects on the organization of low-density development, as within an urbanized region there is a high likelihood that new development will be situated within relatively close distance of a secondary centre, as the urbanizing terrain in which the majority of "sprawl" occurs extends to regions between these centres.

Research of the effect of existing settlements on the form of "sprawl" concentrated on three types of development associated with urban growth: peripheral accretion extending from the central city, growth of secondary centres and "leapfrog" development. Of the three, leapfrog development has most often been associated with the processes of low-density city-growth, described as development which "skips over" empty land leaving enclaves of open space. It often takes the form of low-density single-family houses that come from the conversion of agricultural land into urban space. In this study leapfrog growth has been identified as new development that is at a distance of 500 metres or more from any existing built space. Peripheral accretion extending from the

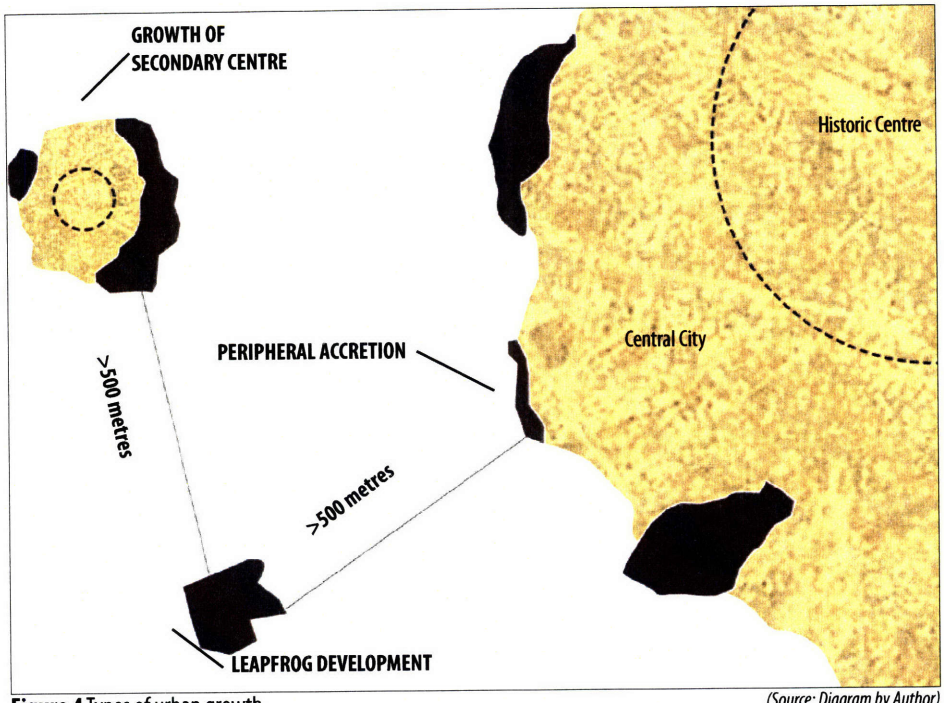


Figure 4 Types of urban growth *(Source: Diagram by Author)*

central city is perhaps the most common type of city growth. The available data does not identify the residential density of this development relative to existing inhabited areas and thus cannot be automatically described as "sprawl". It is therefore considered as a counterpoint to "sprawl" since addition to already built areas can easily accommodate extended infrastructure, limiting the negative effects of "sprawl".

Growth of secondary centres can be considered as the most interesting growth pattern of the three and potentially the most influential property of urbanizing terrains affecting low-density growth. On the one hand the position of this development within the terrain can be regarded as sustainable since, like peripheral accretion it allows for the continuous extension of existing infrastructure. However, the limited existing capacity of this infrastructure in both utility provision and transportation can often lead to negative effects on traffic congestion and the environment. Growth around secondary centres is also more likely to be low-density, since smaller regional centres have different planning codes and FAR requirements than the central city.

The CORINE dataset was analysed to determine the percentage of each type of growth relative to

the total amount of new development between 1990-2000. The three types of development were distinguished by their location relative to the continuous built area extending from the central city, existing built spaces and existing secondary centres centres that were researched using Google Earth and historical maps of each city. Additionally a series of three "rings" representing distance from the centre were used to determine any potential correlation between the position of new development and distance from the city centre.

The results show that peripheral accretion accounted for 11-30 % of all new development in the three Southern European cities while Dublin displayed a greater amount of cohesion with more than half of new development extending from the existing built space of the centre. This measurement suggests that land available for new development on the edges of existing built space around Athens, Madrid and Lisbon is probably limited by high prices or topographic conditions which push the greatest majority of construction beyond its limits. It can also be seen that with such low amounts of newly built space extending from existing built space, these cities are more likely to experience "sprawl" type development.

Leapfrog development (according to the definition given above) accounted for a relatively low percentage between all four cities: 9-18% of all new construction in the period 1990-2000 (both residential and industrial/commercial). This does not support the usual conception of "sprawl" as a type of development that leapfrogs over open space to leave gaps of agricultural and other open space in its wake. It is here however that the limitation of the dataset not showing development under a certain size may be greatly distorting the measurements. Even if this is were case though, residential and industrial "islands", that would require an expensive extension of utility and transportation lines are far from the norm.

The final type of development investigated proved to be the most prolific in all the Southern European cities accounting for between 53-71% of new construction and a substantial part

of Dublin's pattern of new development. This type of growth accumulated on the periphery of existing secondary centres or rural villages that are a prominent feature of the urbanizing terrain. The high probability of new development to aggregate in these areas suggests that this network of centres has an influential effect on the form of "sprawl", attracting new residents and employment. Furthermore, the three Southern European cities displayed a high accumulation of growth in centres that were between 15-25 kilometres from the city centre, and all four cities showed the lowest accumulation in areas at a distance beyond 25 kilometres. This is especially interesting as it suggests that areas closer to the centre (5-15 kilometres) are not as attractive to residents and employers as areas further out from the core perhaps because of higher land prices or their more urban and congested character. Towns closer to the centre may also see a more intense housing market within their existing limits, becoming poles of gentrification and re-urbanization in their own "downtowns".

EEA reaserchers have stressed that in the case of Dublin, urban-rural migration has led to the and villages at the expense of the City of Dublin. Secondary centres accessible by public transportation and new roads seem to be the favoured locations for commuters employed in the central city suggesting a preference for rural living. Their research points to the development of towns along the Dublin- Belfast corridor with cities such as Newry and Drogheda more than 30 kilometres from the centre being affected.

Intense development activity around secondary centres can also explain the formation of "secondary cities" by groups of towns in geometric relationships to each other. These groups of secondary towns with common environmental or cultural relationships can create separate civic identities from the central city and in such a way brand them as unique residential environments that may attract even more inhabitants at the expense of the core. Such town "coalitions" seem to be forming in both Athens and Madrid and to a lesser extent to the northwest of Lisbon. In the Athenian example the four towns of East Attica that dominate the Mesogeia Plain saw unexpectedly high

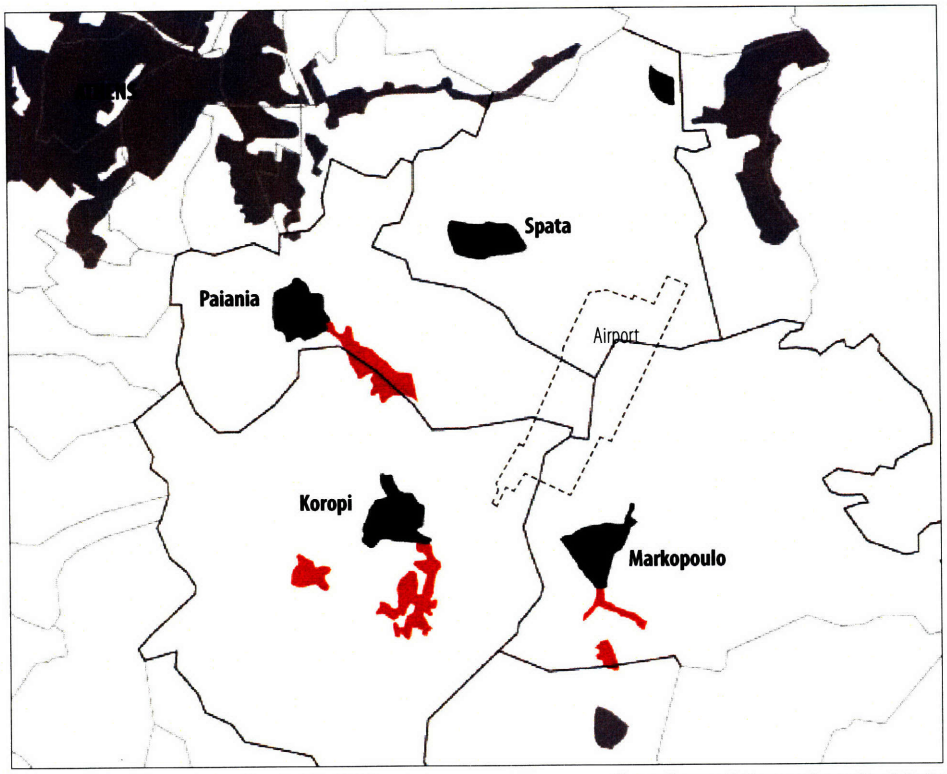


Figure 5 Secondary centres- East Attica, 2000 *(Source: European Environment Agency, Google Earth)*

growth in their population that overall doubled during the 1990s. An exodus of industrial and manufacturing activities from the city centre followed, to establish Mesogeia as a competitive employment pole to Athens. The four towns, Koropi, Markopoulo, Spata and Paiania share a similar semi-rural history while three of them were connected to the city centre by a railway line until the mid 1950s. The recent development of the new highway, light-rail line and airport within the same region has consolidated the ties between the towns that now share the consequences of uncontrolled urban growth in degradation of agricultural land and water pollution.

A similar association of towns can be seen to the south of Madrid where a group of six municipal centres have become known as the Gran Sur or City of the South. Mostoles, Leganes, Getafe, Fuenlabrada, Parla and Alcorcon form a semi-official partnership that during the 1990s managed to attract major public and private investment that led to a rapid increase in both population and surface coverage. Sharing a background as industrial centres serving Madrid, they formed a shared identity with similar political backing from socialist mayors and grassroots movements that through protests drew attention to the lack of facilities. The Gran Sur now forms a "city within

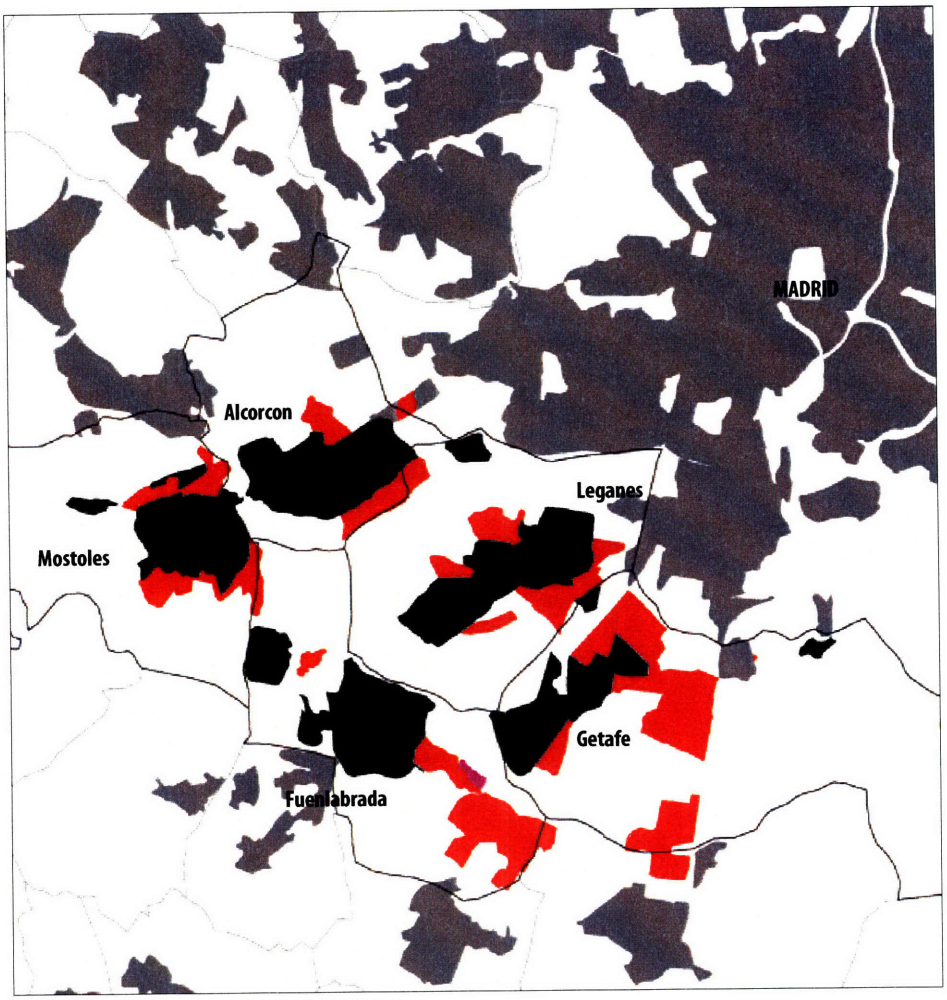


Figure 6 Secondary centres- South Madrid, 2000 *(Source: European Environment Agency, Google Earth)*

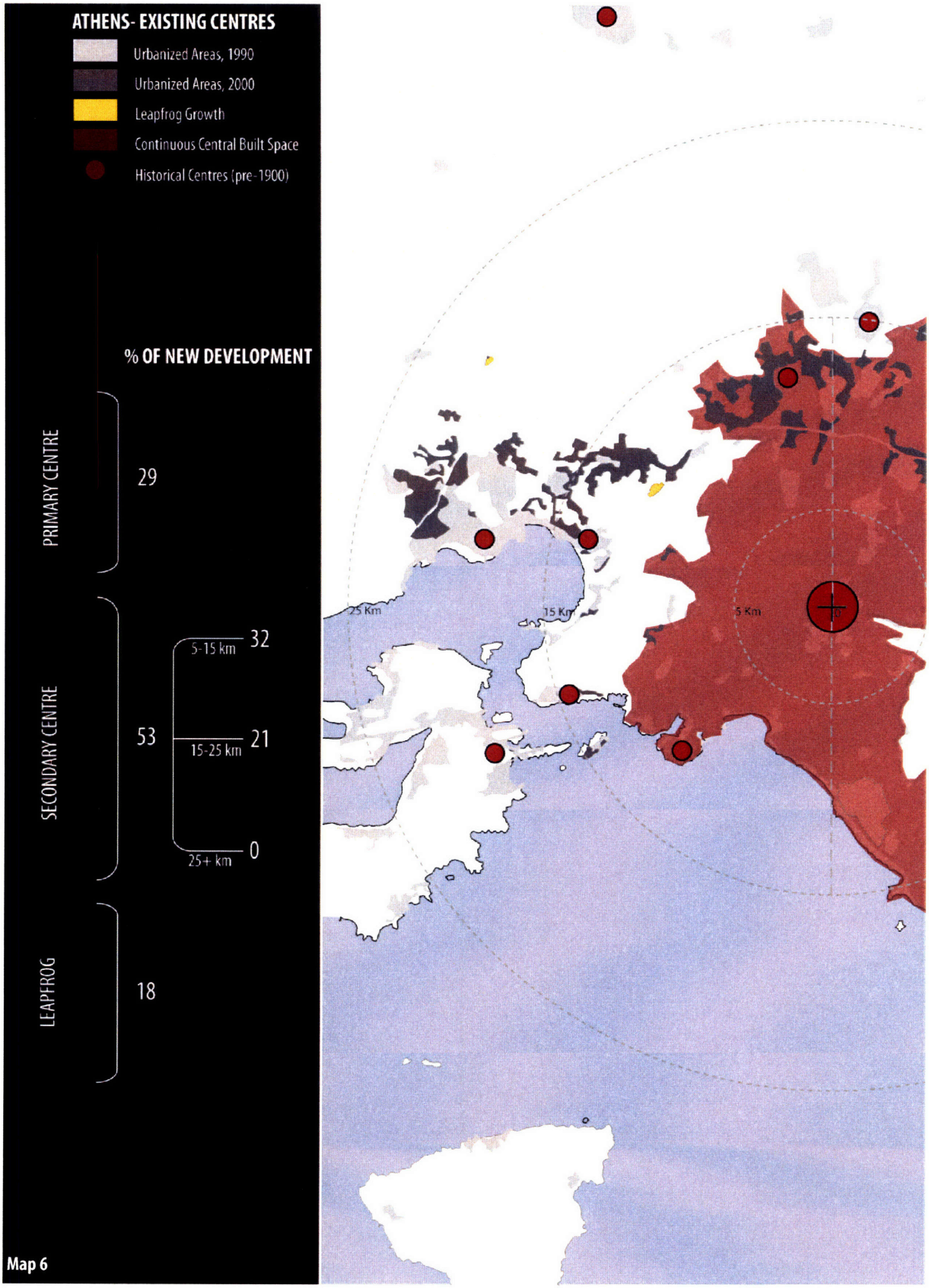
a city" intensifying the poly-central diagram of Madrid. Comparable areas in Greater Lisbon can be seen around the conurbation of Algueirao-Mem Martins and Sintra to the northwest of the central city that expanded greatly over the 1990s to become one of the densest towns in Portugal.

Munarin and Tosi identify this defining structural layer of urbanization in the Veneto region as a middle ground between the main urban centres and the dispersed system of private residences, villages and other smaller centres scattered over the region. They proclaim that this sequence of "medium-sized centres, market roads, small centres and industrial zones" is the stratum where the changes have been greater in territorial urbanization. Sieverts describes the German equivalent by writing:

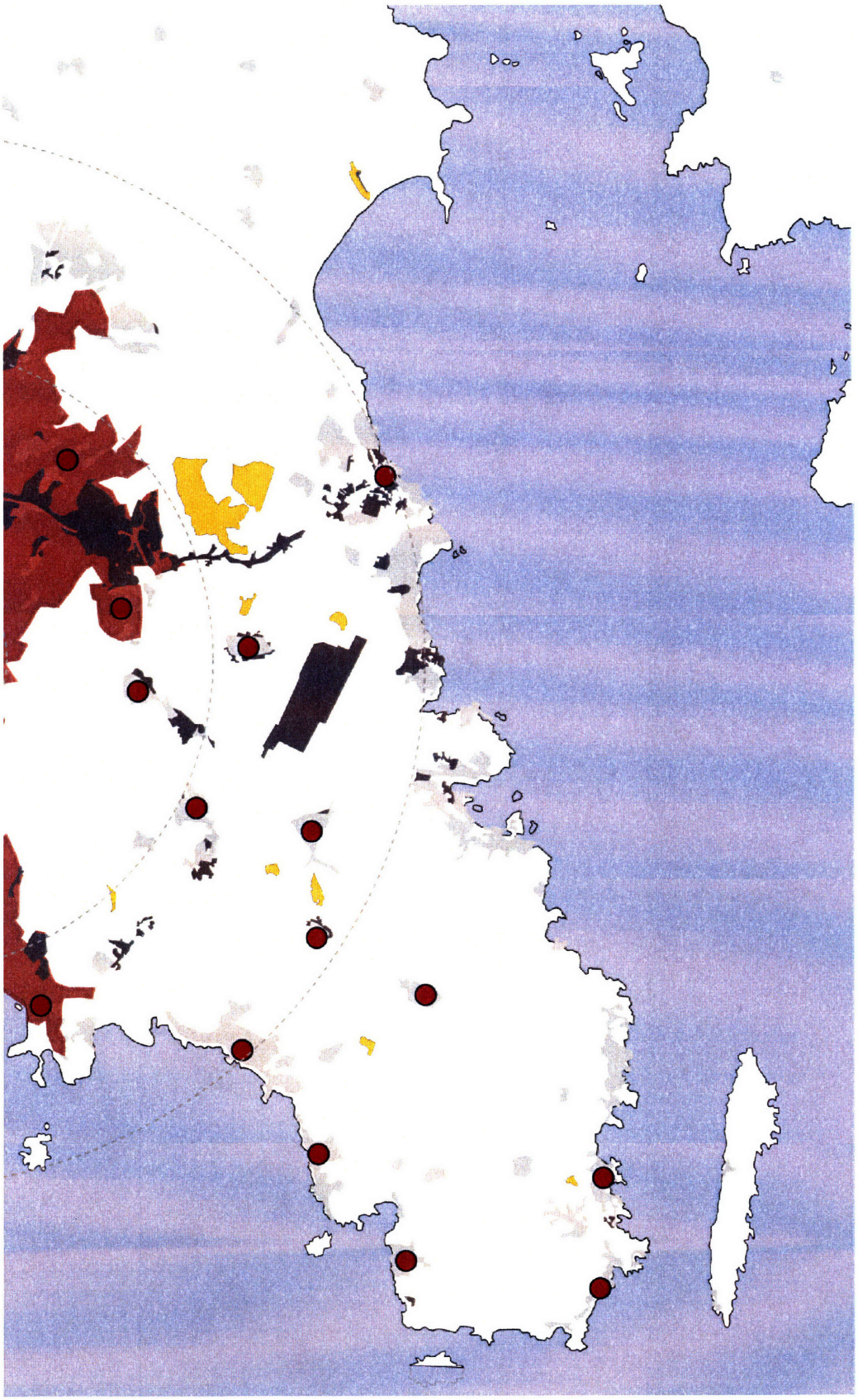
. . . it is not so much the small towns, the central places prescribed for this purpose by town planning, which attract new inhabitants, but rural communities on the periphery of 'central places'.[25]

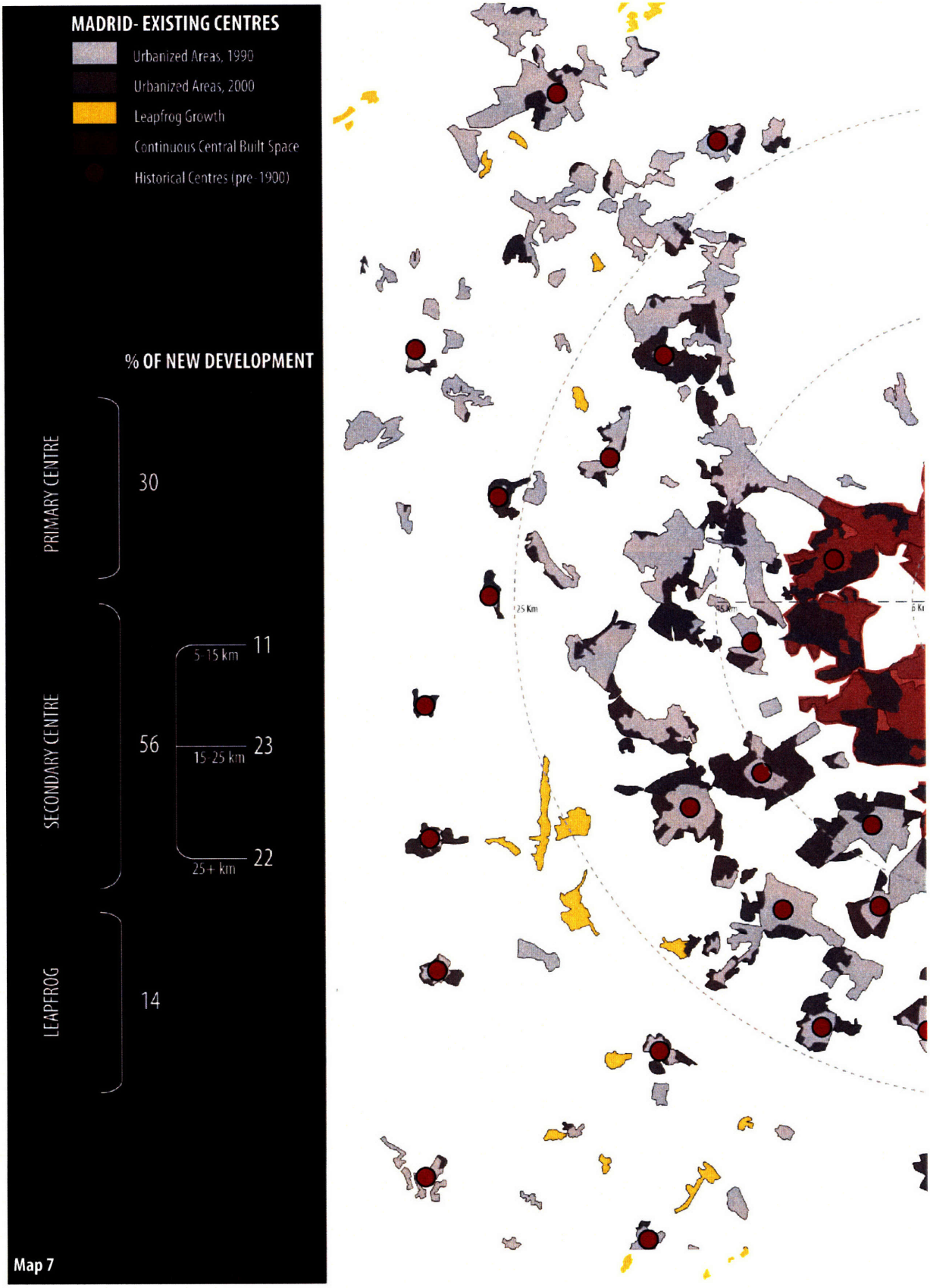
Secondary towns can therefore be seen as important affecters influencing the form of "sprawl" within the urbanizing terrain, to a greater extent than the central city and allow cities to develop from mono-centric to polycentric relationships with neighbouring towns. Within the urbanizing terrain, smaller towns, villages and rural communities that are characteristic of European urbanization exert a magnetic pull on new development that in its majority is not constructed as urban "islands" but as part of an existing system of settlement.

25 Munarin and Tosi in *After-Sprawl*, Xaveer de Geyter Archiectrs ed. pp. 168-170.

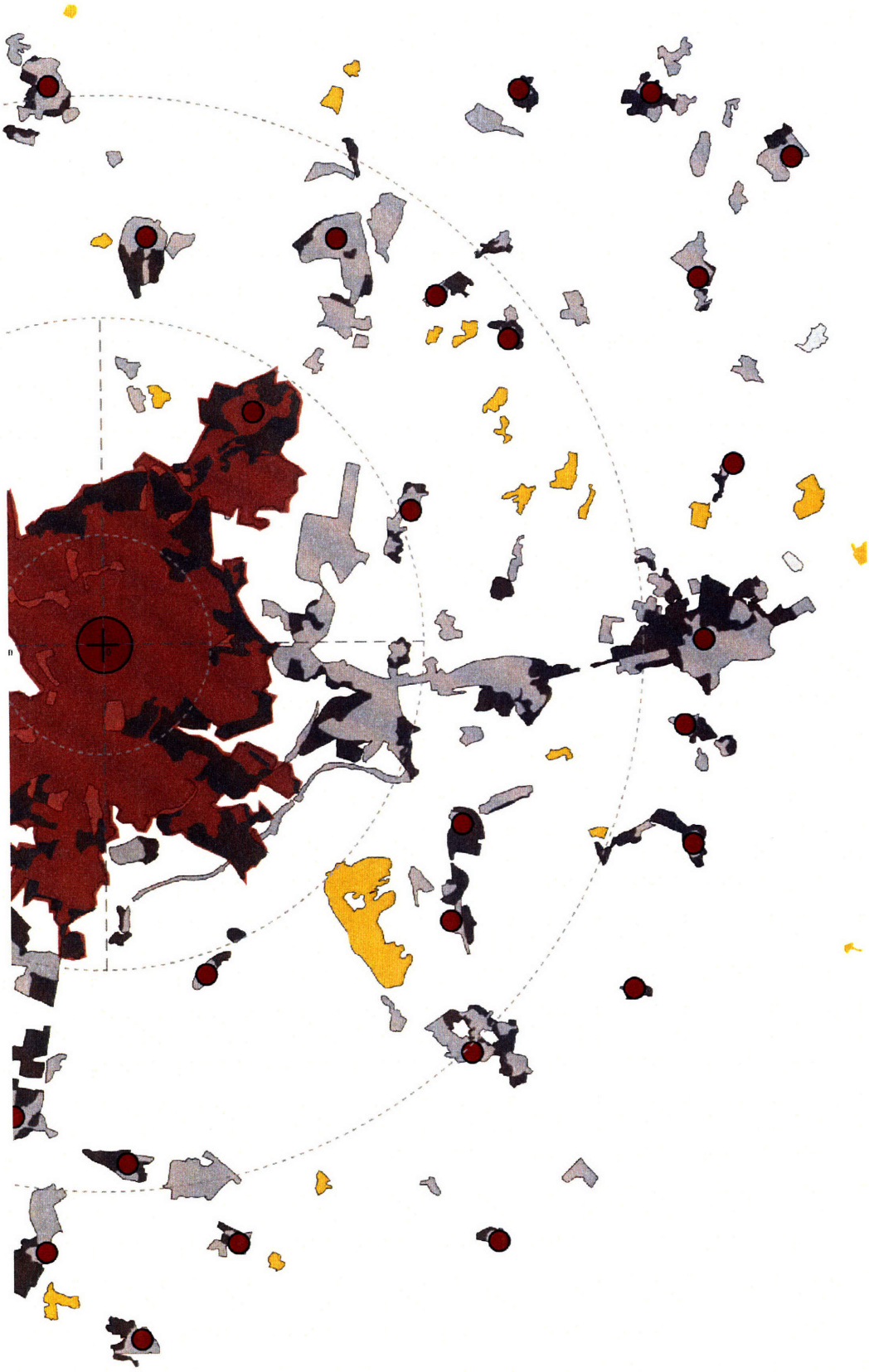

ATHENS- EXISTING CENTRES
Urbanized Areas, 1990
Urbanized Areas, 2000
Leapfrog Growth
Continuous Central Built Space
Historical Centres (pre-1900)
% OF NEW DEVELOPMENT
PRIMARY CENTRE
29
SECONDARY CENTRE
53
5-15 km
32
15-25 km
21
25+ km
0
LEAPFROG
18
25 Km
15 Km
5 Km

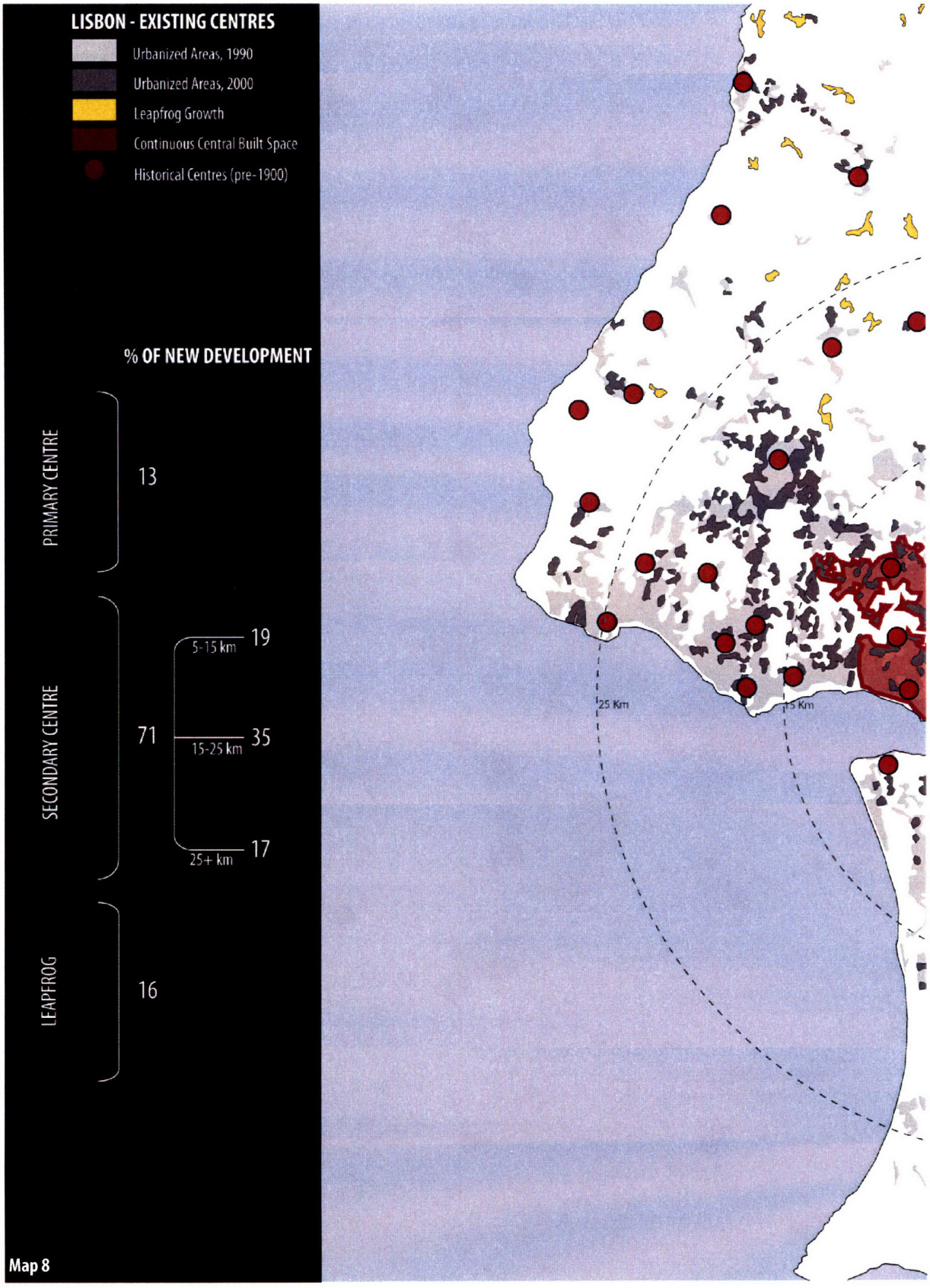
Map 6

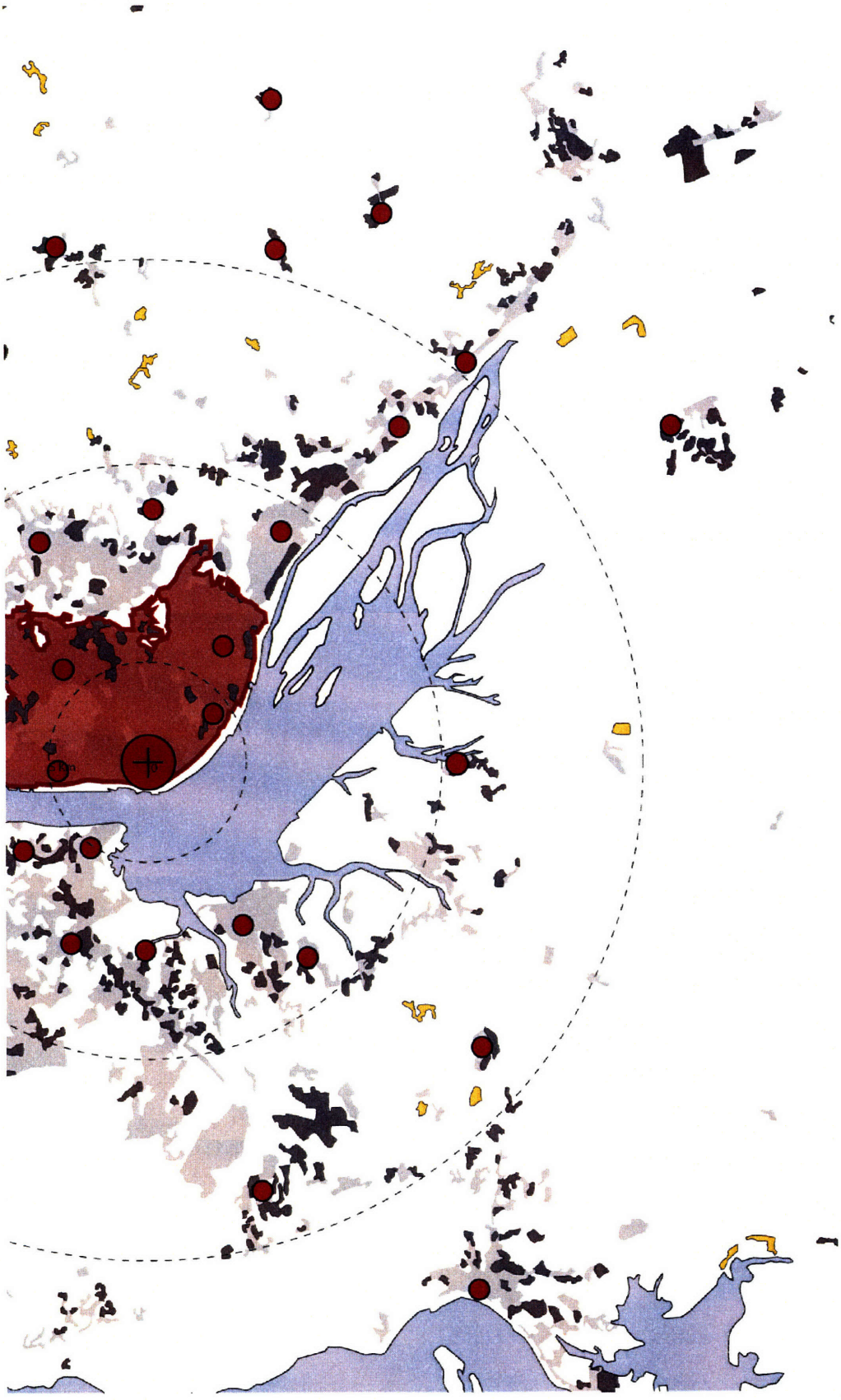


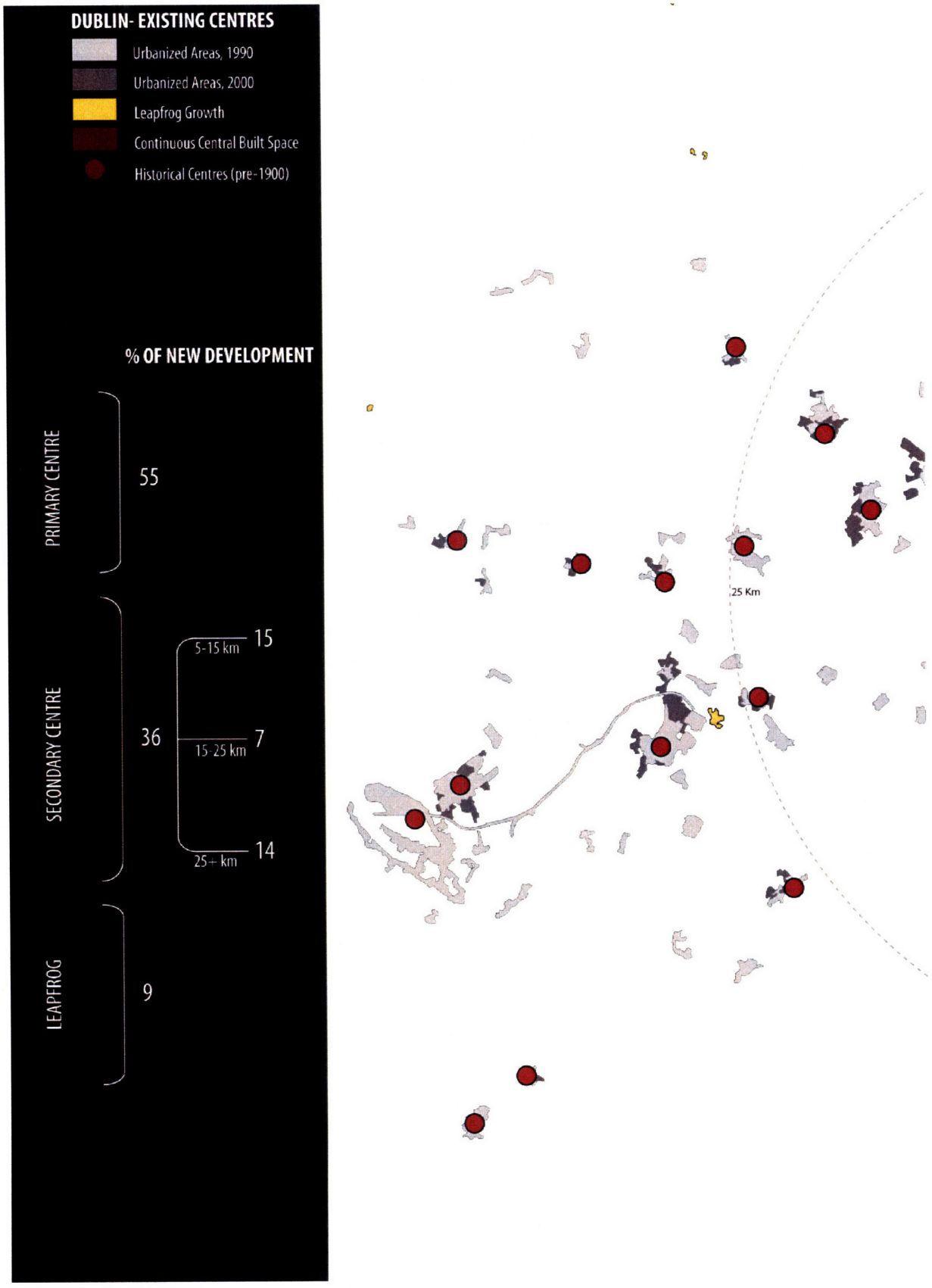

MADRID- EXISTING CENTRES
Urbanized Areas, 1990
Urbanized Areas, 2000
Leapfrog Growth
Continuous Central Built Space
Historical Centres (pre-1900)
% OF NEW DEVELOPMENT
PRIMARY CENTRE
30
SECONDARY CENTRE
56
5-15 km
11
15-25 km
23
25+ km
22
LEAPFROG
14
25 Km

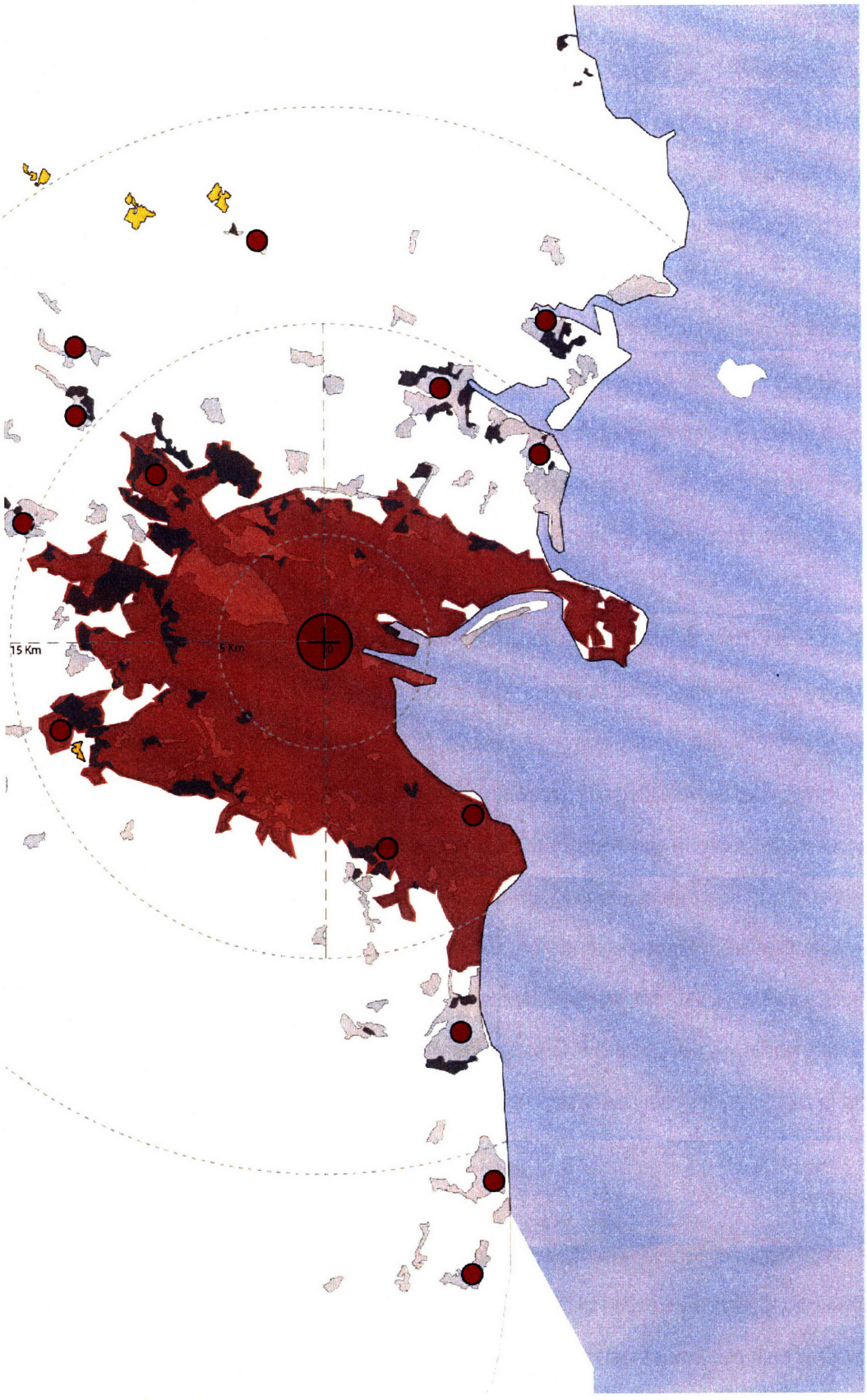
Map 7




LISBON - EXISTING CENTRES
Urbanized Areas, 1990
Urbanized Areas, 2000
Leapfrog Growth
Continuous Central Built Space
Historical Centres (pre-1900)
% OF NEW DEVELOPMENT
PRIMARY CENTRE
13
SECONDARY CENTRE
71
5-15 km
19
15-25 km
35
25+ km
17
LEAPFROG
16
25 Km
15 Km
Map 8




DUBLIN- EXISTING CENTRES
Urbanized Areas, 1990
Urbanized Areas, 2000
Leapfrog Growth
Continuous Central Built Space
Historical Centres (pre-1900)
% OF NEW DEVELOPMENT
PRIMARY CENTRE
55
SECONDARY CENTRE
36
5-15 km
15
15-25 km
7
25+ km
14
LEAPFROG
9
25 Km


15 Km
5 Km

ADMINISTRATIVE UNITS

The problem of the relationship between cities and their suburbs and surrounding areas is by no means new. At least since the major expansion of European urban areas began under the influence of the industrial revolution, there has been in general a discrepancy between the administrative boundaries of cities on the one hand and the real extent of the agglomeration on the other. **(Council of Europe, 1993)**[26]

The rise of city regions within many European nations can be characterized in terms of a series of central government-led administrative settlements. Typically, European cities flow imperceptibly across these administrative units, merging municipalities in a continuous built space. Decision-making in these environments therefore has strong impacts not only within individual administrative boundaries but is likely to affect much wider areas.

Municipalities and public development agencies have a crucial role in the process of new development and the conversion of agricultural or natural land to space for housing or commercial development. Throughout the EU countries they have the responsibility for land use management, which remains invariably divided between these different administrative units. This fragmentation of management however, frequently exacerbated by the political tensions of neighbouring municipalities can lead to incoherent and uncoordinated land-use strategies that in the context of peripheral areas can greatly influence the development patterns of low-density growth. In contrast to the core cities, suburban municipalities in many European countries are prone to promote urban "sprawl"[27] as they tend to use their competence for spatial planning to attract investors seeking a suburban location, often neglecting the future social and environmental costs of such development.

Multi-directional competition among municipalities for new income generating jobs and services can tempt municipalities to relax controls on the development of agricultural land and offer subsidies on land prices in employment areas thus encouraging commercial and industrial

26 Council of Europe, *Major Cities and their peripheries: Co-operation and co-ordinated management,* 1993. Council of Europe, Strasbourg.
27 European Environment Agency, *Urban Sprawl in Europe*, 2006.

enterprises to invest in their area. Their competition forms the basis for the tendency to exploit the advantages of the peripheral location against the settlement centres and to plan for residential and commercial areas, which only drive forward the process of settlement expansion with all its consequences. As such metropolitan development practice remains powerless as long as municipal development conceives itself as "local authority planning".

While no direct measurement of the effects of municipal management on local planning in Europe can be referenced for this study, it is interesting to note that increased cooperation between administrative units within metropolitan regions has produced local groups of municipalities that share similar histories. The concept of Edge City, for example, which has become a standard reference for certain commercial developments in the United States has few good approximations in European peripheral urban areas. Nevertheless, a group of municipalities throughout Europe have recently formed the Edge City Network, identifying themselves with the notion of a US-style "edge city" even though few of them share all of Garreau's five defining features[28]. The existence of these transnational city networks highlights the importance attributed to self-identification by peripheral municipalities within the context of their own metropolitan region, even though the adoption of the Edge City label can be considered as opportunistic. As the 1996 meeting of the network declared:

. . . whilst the Edge towns and cities may have different patterns of development, what they all have in common is their proximity to the capital and the consequent need to develop a strategy which is based on a synergy with the capital city, but which also establishes their separate identity. . . (Edge Cities Network, 1996)[29]

It is not surprising therefore to find amongst members of the European Edge Cities representative municipalities from the majority of capital cities in the EU-15 (Loures in Lisbon, Getafe in Madrid, Fingal in Dublin amongst others), the EU being favourably disposed towards local authorities, as a means of reducing the "democratic deficit" held to be affecting the Union's legitimacy. Funding

28 Phelps et al., *Post-suburban Europe*, 2006. pp. 95-119.
29 ibid. pp 51.

secured by the network from the EU (RECITE I & II) would have been deemed impossible without the actions of a representative group such as the network, and in any case extremely difficult as an individual local authority.

Another way in which municipal governments seek to expand their influence across their respective boundaries is by enlarging their "zones of engagement." The concern of local authorities to transcend their jurisdictions into the wider metropolitan space either individually or through coalitions is evident today. This can be observed in the development of "clusters" or macro-regional groupings of geographically neighbouring economies to facilitate co-operation in the fields of place marketing, cultural and educational facilities, infrastructure developments etc. Local and central state and the public sector more broadly play a much more important role in economic development strategy at the urban scale, as local political elites in European cities have rarely been able to exert their autonomy independently from actors operating at higher administrative levels. This contrasts with American public-private partnerships, which frequently vest most power in the private sector, European public-private partnership experiments remain fairly limited and city councils still have strong capacities for initiative and control.

The prime example of this can be seen in the actions of the Getafe Municipality, south of Madrid, and its mayor in particular, who successfully lobbied central government authorities for investment that led to the creation of a new semi-official regional entity. Getafe was one of the most accessible existing settlements within the wider metropolitan region and was chosen as a major site to house new industry and workers, growing from a small satellite town of Madrid with a population of 12,500 in 1950 to 150,000 by 2001. Taking advantage of favourable political winds, the mayor of the municipality successfully added new stations from the proposed expansion of Madrid's metro system (Metrosur) within his area of jurisdiction, gaining additional funding to sink the line along other parts of the town. Effective lobbying and promotion of the municipality gave Getafe an advantageous position with respect to its neighbours that formed the loose coali-

tion of six local authorities known as Gran Sur. Within this group Getafe was given the (unofficial) title of Capital, leading attempts by the coalition to draw additional funding and more importantly creating a new separate identity for Madrid's southern region[30].

A similar situation is starting to occur between the municipalities of East Attica in Athens where a shared concern about the effects of rapid urbanization is spurring cross-municipal cooperation. This has already been the case with local planning authorities, which until recently were only available in Markopoulo that consequently had jurisdiction over most of the Mesogeia plain. However, this has been an uneasy partnership, especially because of the lack of enforcement of planning regulations by both municpal and planning authorities.

As Phelps and Parsons note, Getafe does not follow the same formal model as US-style edge cities. It nevertheless consolidated speculative private-sector developments that were central to its rapid growth as dormitory suburb through the addition of employment, leisure, transportation and educational land uses emerging as "capital of the south" and showing that it is quite possible for low-density areas to remain largely dependent upon central city economic activity while simultaneously exerting their own economic effects laterally upon other suburban areas.

While the fragmentation of administrative units is a key characteristic of the urbanizing terrain, its effects on the form of urban "sprawl" are not direct. Management of growth processes by local authorities can influence the pattern of growth within an existing spatial planning strategy, which the municipal government can guarantee. Ideally groups of concerned, neighbouring local governments could go a long way to manage their shared resources and environments, but in practice this is not always successful due to competing demands. Solutions based on the size of local government administration can prove to be important as the bigger they are the less likely they are to be reliant on one particular investment or project. However, the role of the municipality still remains in the realm of policy as it affects form and not in the dictation of form itself.

30 Phelps et al., Post-suburban Europe, 2006. pp. 95-119.

AGRICULTURAL PATTERNS

Urbanization and agriculture have traditionally maintained a standard relationship by which the former consumes the latter. In the European context agricultural activities have been sustained both socially and politically through subsidies and protectionist policies that promote the diversity of regional farming products. But while the era of industrialization maintained and supported agriculture as one of the sources of wealth and raw material, the period of urbanization considers agricultural land on the city's periphery as the potential ground for urban expansion.

Motivated by the difference in land prices between zoned lands inside the city and agricultural land on the city's periphery, both farmers and developers secure substantial financial benefits from the sale of farmland and its conversion to new housing or other urban developments. In the era of urbanization the intensification of this activity and the change in the patterns of inhabitation evident in peripheral low-density residential areas have created a new bond between rural and urban that is substantially different from that seen in previous generations.

The importance of farmland on the city's periphery adopts two important functions that differentiate it from that of traditional food-production. On the one hand the farm subdivision becomes the minimum developable site for new construction- as new built areas adopt the metrics of the farm, its size, directionality and its cultivating infrastructure (roads, irrigation) are adapted to habitational use. On the other hand the abundance of unbuilt farmland, often surrounding smaller developments ceases to be perceived only as a commercial asset or food-producer and becomes the open space site for residents reflecting the openness of inner city parks and gardens. However a fundamental factor differentiates the agricultural field from the park- and that is the restrictions on access. Whereas the park is most often a public space maintained by state or municipal authorities, farmland remains a private holding and in this sense can only emulate public open space in its current form.

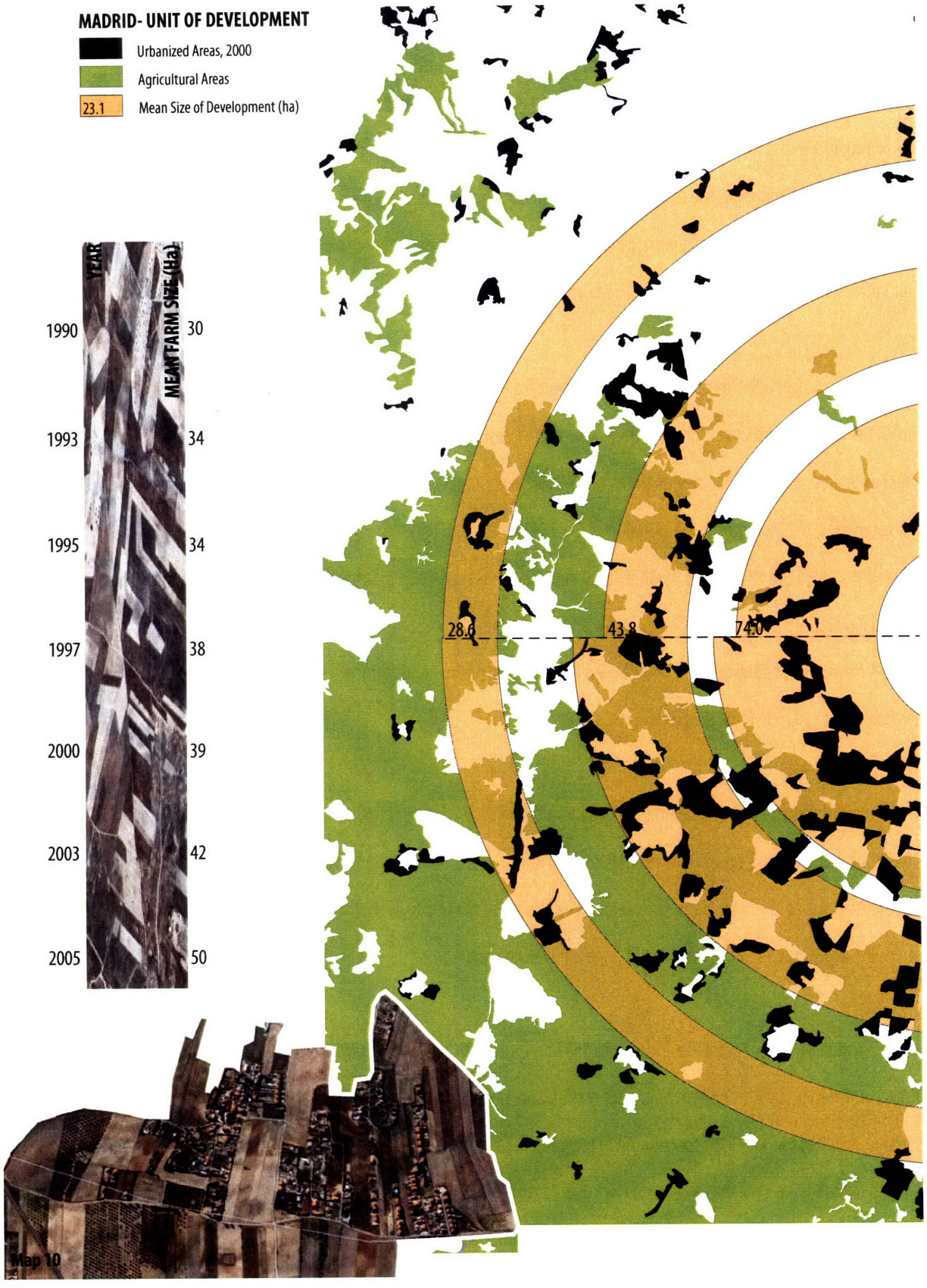
The Unit of Development

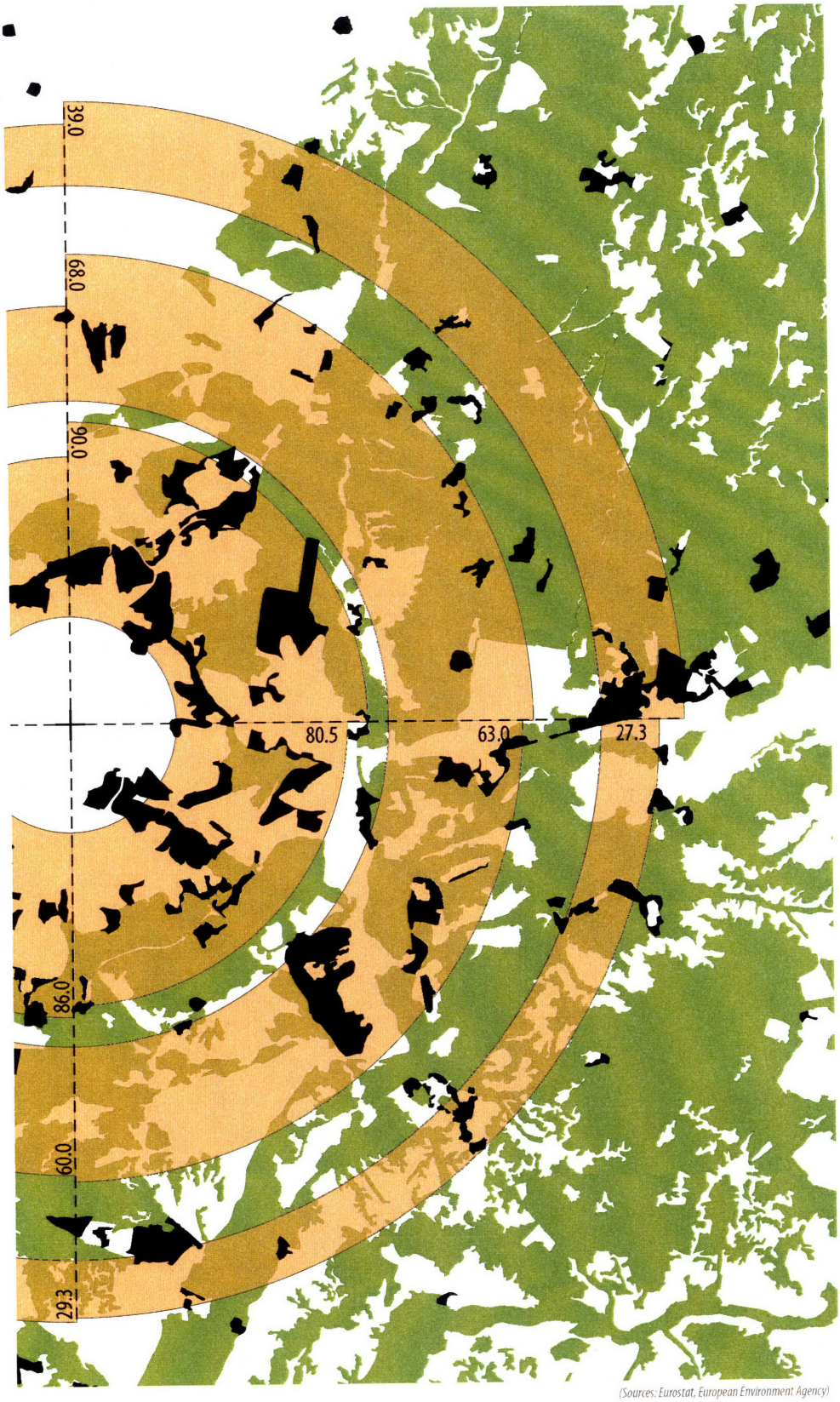
The appropriation of farm holdings by expanding urban zones has been the predominant method of city growth since the industrial period. The reasons are self-evident: farming for city resident consumption always took place in proximity to the city to minimize transportation costs while maximizing the potential market. At the same time the best farmland surrounding the city, accessible and mostly flat was ideally suited for the construction of new residential and commercial areas. What perhaps is not so clear is the insistent relationship between the size of residential and other development and the size of the farm itself.

The correlation between these two variables is revealed in the four European metropoles under study. Data collected from the CORINE Land Cover survey included the area measurement in hectares of each single new development that appeared in the "Land Cover Changes 1990-2000" layer of the dataset, and its taxonomy according to distance (3 categories: 5-15 kilometres, 15-25 kilometres, 25 kilometres to edge of map) and location (4 quads in the cardinal directions) from the city centre. The individual developments were then grouped according to the taxonomy and the mean development size for each category was found. The results were then plotted on separate charts according to city. A mean size of development was derived for each of the nine sectors of the city by calculating the average area in hectares of all individual developments.

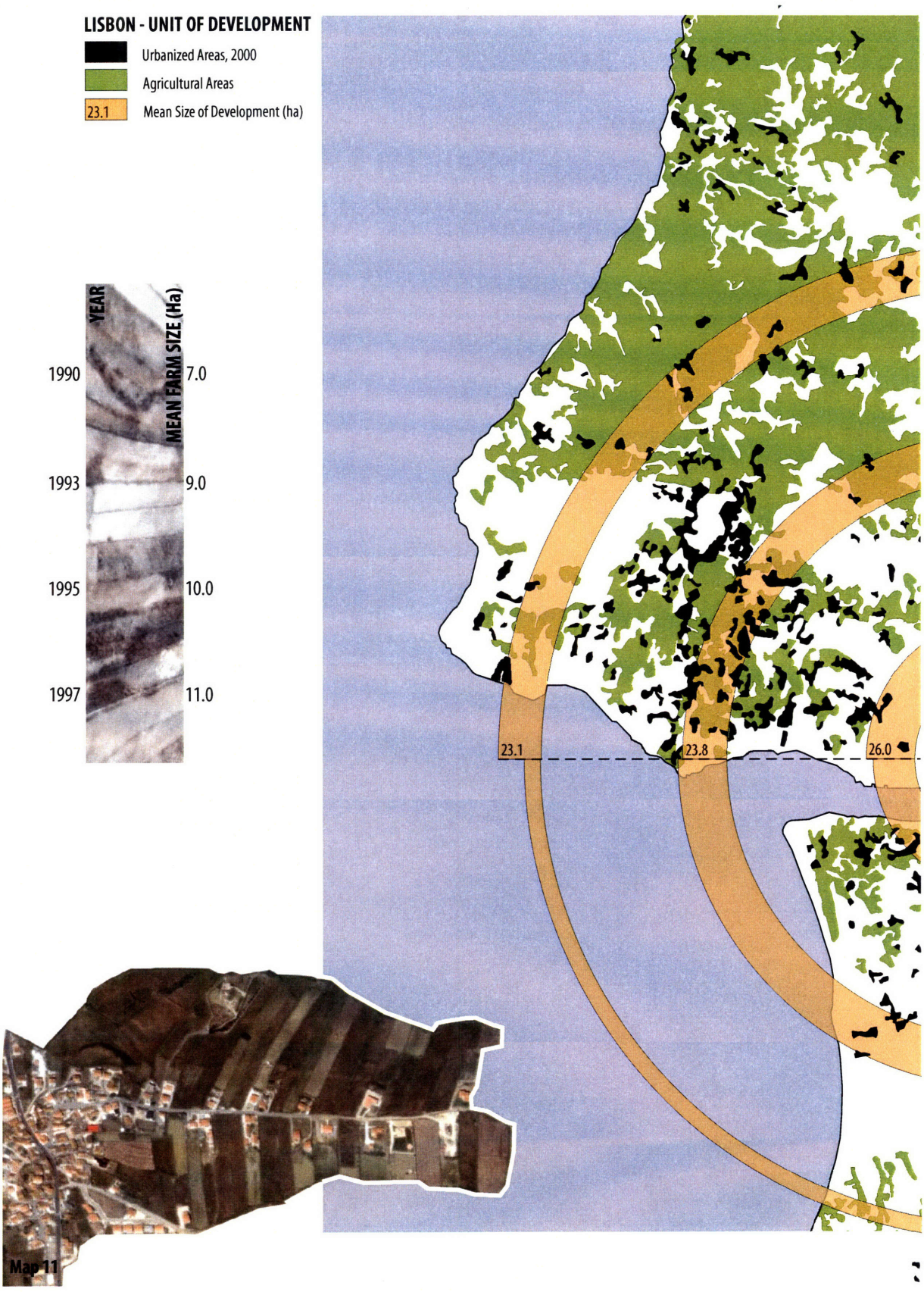
At first glance the data shows a remarkable general trend in all four cities: the mean size of development decreases with distance from the centre. This result is counter-intuitive as common sense would expect smaller sized developments closer to the more densely developed central areas of the city, were the expectation is that fragmented unbuilt sites would provide a finer grain of new development.

Areas closer to the city (in this case less than 15 kilometres from the centre) have a greater propensity to be developed on a larger scale in spite of the higher cost of land, possibly because of the higher value of the investment. In some cases, like Madrid, land speculation in previous decades has led to large tracts of land on the city's periphery being acquired by single developers for low costs as land banks. The 5-15 kilometre zone is after all not within the inner city, so there is a high likelihood that large developments for new residential areas would eventually take


MADRID- UNIT OF DEVELOPMENT
Urbanized Areas, 2000
Agricultural Areas
23.1
Mean Size of Development (ha)
YEAR
MEAN FARM SIZE (Ha)
1990
30
1993
34
1995
34
1997
38
2000
39
2003
42
2005
50
28.6
43.8
74.0
Map 10



(Sources: Eurostat, European Environment Agency)


LISBON - UNIT OF DEVELOPMENT
Urbanized Areas, 2000
Agricultural Areas
23.1
Mean Size of Development (ha)
YEAR
MEAN FARM SIZE (Ha)
1990
7.0
1993
9.0
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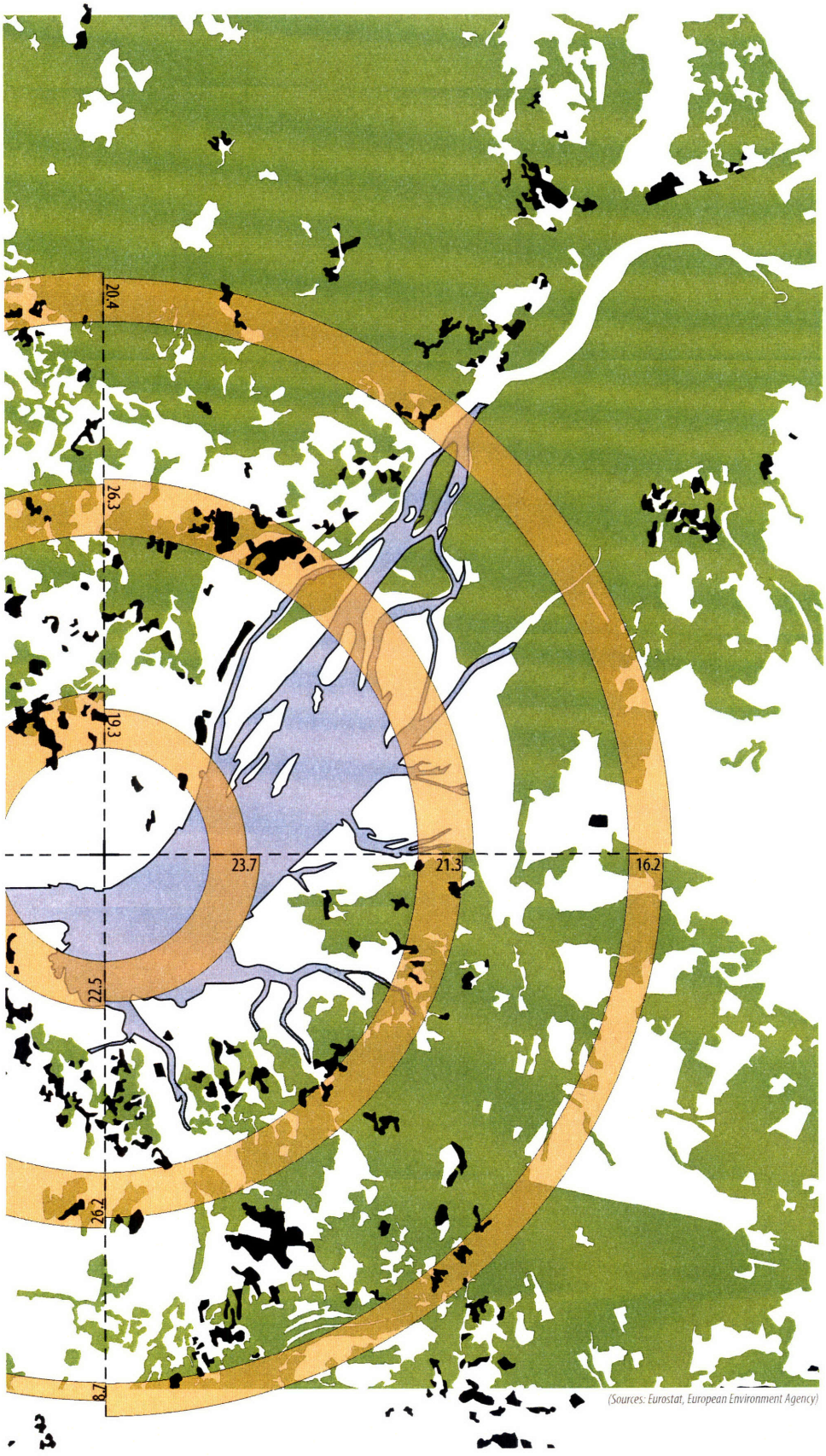
Map 11



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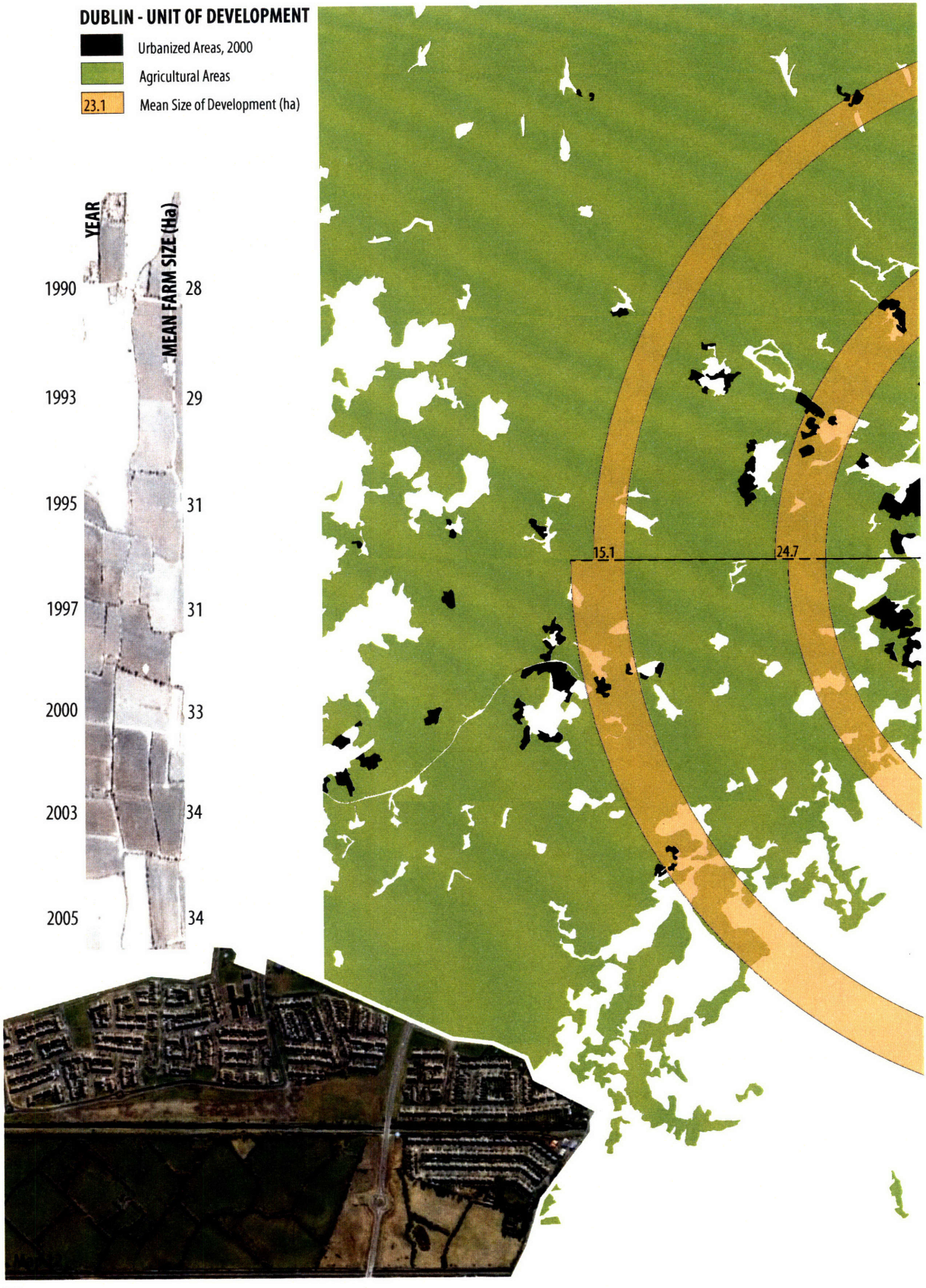
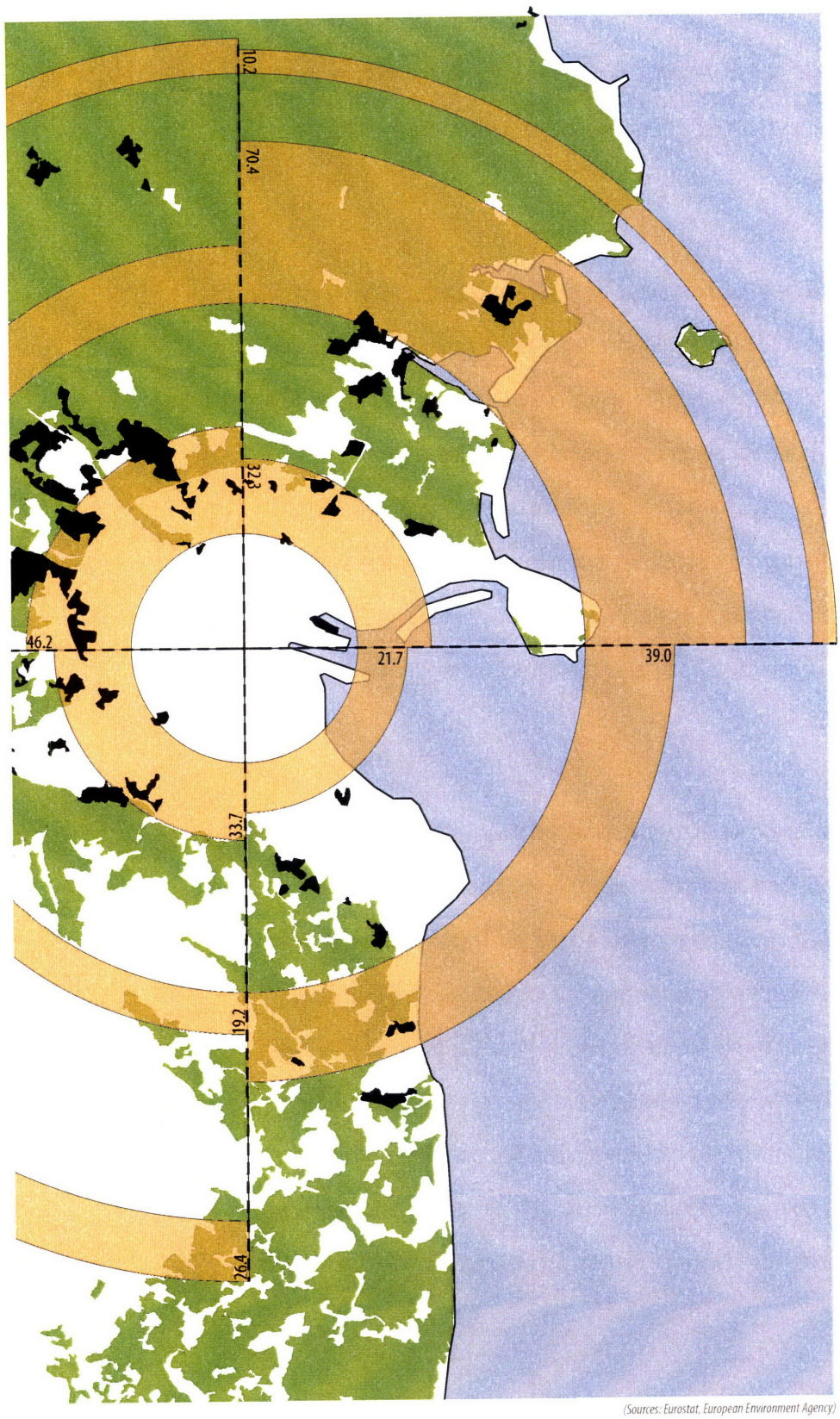

DUBLIN - UNIT OF DEVELOPMENT
Urbanized Areas, 2000
Agricultural Areas
23.1
Mean Size of Development (ha)
YEAR
MEAN FARM SIZE (Ha)
1990
28
1993
29
1995
31
1997
31
2000
33
2003
34
2005
34
15.1
24.7



(Sources: Eurostat, European Environment Agency)

place on these sites. Areas at a further distance from the centre would after all not warrant very large developments because of a lower demand for both residential and industrial/commercial space. As such this would easily explain the differences between mean development sizes according to distance from city centre

However a different development mechanism can go some way to explain the smaller newly built spaces in the two outer zones. With increasing distance from the centre, the predominant land use ceases to be strictly urban to become a mixture of rural and urban. At this point there is higher tendency that the land on which either residential or industrial developments are constructed will be agricultural, with existing topographic limitations as well as resistance by neighbouring community groups for developments that disrupt local population balances, thus limiting their average size. It can therefore be assumed that the basic metric of development in this zone becomes the existing size of farmland, which for larger construction can become the consolidation of several agricultural fields.

Regional data on agricultural land in the study cities shows that the mean farm size has been steadily increasing since 1990. The main reason for this has been a steady fall in the number of individual holdings rather than any significant increase in the size of farmland. A fall in holdings indicates that agricultural land is gradually coming under the ownership of fewer individuals simultaneously increasing the number of farms larger than the mean size. In the outer reaches of the metropoles this brings mean farm size at a similar or smaller scale to the mean size of development. So while the comparison of the two data sets does not offer immediate and conclusive evidence of the correlation between farm and development size it strongly suggests that in areas where there is a predominance of rural land uses, the unit of development becomes the size of the farm.

As Sieverts describes it, the urbanized landscape of low-density growth appears at first sight as

"diffuse and disorganized with individual islands of geometrically structured patterns, a structure without a clear centre" and goes on to say that in the Zwischenstadt "the ratio of open landscape to built up areas has frequently been reversed; the landscape has changed from being an all-inclusive "background" to being a contained "figure" in which "settlement has acquired something of the character of the surrounding landscape"[31]. The similarity between landscape and settlement suggested by Sieverts however has nothing to do with the idea of resemblance; the correlation between low-density development and surrounding open space is not merely the exegesis of form but a deeper structural relationship. As such what Sieverts is referring to, albeit instinctively, is the superposition of two fields of organization: built space and agriculture.

Couch and Leontidou come to a similar conclusion when discussing the hybrid landscapes of urbanizing terrains. They assert that "...hybrid landscapes are the rule, that is, landscapes undergoing mutations, but to a larger or lesser extent keeping the characteristics of previous states of being."[32]Thus, the disordered collection of developments that evolve "without following any pattern in advance" is underlined by an agricultural order that has already established a particular relationship with topography, climate and rural society, which the newly built segments unconsciously appropriate. And while on one level we may accept Sieverts' suggestion that the "unplanned" impresion has arisen out of "innumerable individual and-considered on their own-rational decisions" the framework in which these decisions are applied to the peripheral landscape is anything but unplanned. As Paul Claval describes the agricultural land of Europe:

Traditional fields had generally more or less geometric forms: even if grid patterns like those in the United States were exceptional, the rural world was made of squares, rectangles and trapeziums. Field dimensions were smaller than the size of the smallest natural units. With enlarged optimal scales, the whole fabric changes and loses its rigidity wherever landforms and soils units are small ones: fields end when slopes get steeper and when hills interrupt flatter country.[33]

Agricultural holdings therefore embody a deep connection with locale, adapting constantly to

31 Thomas Sieverts, *Cities without Cities*, 1996. pp. 6-18.
32 Couch et al., *Urban Sprawl in Europe*, 2007. pp. 242-243.
33 Paul Claval, *European Rural Societies and Landscapes, and the Challenge of Urbanization and Industrialization in the Nineteenth and Twentieth Centurie*, Geografiska Annaler. Series B, Human Geography, Vol. 70, No. 1, Landscape History. (1988), pp. 27-38.

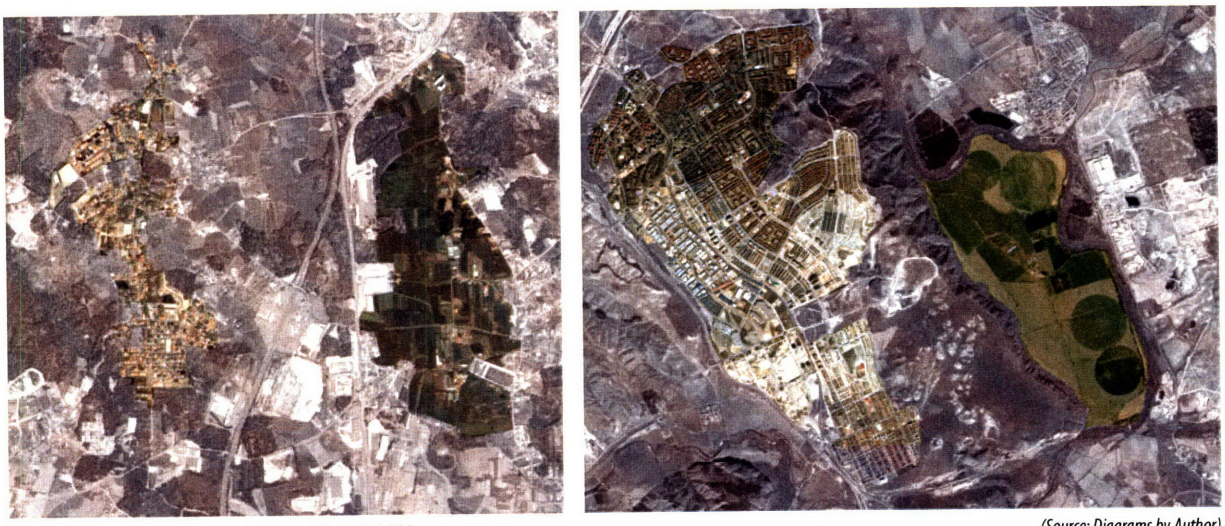


Figure 7 New developments- Lisbon, Madrid, 2000
The agricultural character of the land conforms to existing topography. Urban development that follows is just the latest articifical layer to occupy the same spatial unit.

(Source: Diagrams by Author)

new conditions while retaining a logic of continuity through geometry and repetition. Claval's reference to the natural unit indicates that in terms of microclimates and soil conditions the landscape contains an innate physical subdivision on which the farmland is itself artificially imposed. Therefore the newly urbanized landscape constructed on appropriated farmland becomes simply the newest artificial layer to occupy the same spatial unit, a theme expressed by Lieven De Boeck that describes European "sprawl" as "a kind of constructed naturalness".[34]

As has been indicated one of the main critiques of low-density development has been its aesthetic awkwardness, especially when compared to the predominantly rigorous order of the city. William Whyte's 1957 attack on American "sprawl" gave the impression of an unsightly smear across a productive countryside, neither urban nor rural but an in-between hybrid condition. What Whyte was partly reacting to in his essay was the town/country dialectic that this new urban condition had so blatantly breached. Sieverts' description of the urbanized landscape and the underlying agricultural pattern lends this assessment further credibility, especially when we consider the disruption between rural and urban. This relationship, embodied within the symbolism of the first city wall had been part of urban mythology since the earliest Mesopotamian towns where the stability of the town was pitted against the unpredictable *physis*[35] of nature. It is important to understand

34 Lieven de Broek in *After-Sprawl*, Xaveer de Geyter Archiectrs ed. pp. 21-32..

35 The term derived from the Greek for "nature", is employed extensively by Heidegger to describe the changeable constitution of natural processes.

therefore that until the Industrial Era what exemplified cities was this sharp distinction between the urban and rural way of life. The difference between inside and outside was not only formal (i.e. associated with the shape of the street or the density of built space) but also linked to inhabitant's perceptions that normally regarded themselves, and were regarded by the inhabitants of predominantly rural settlements, as a different sort of people.

The hybrid constitution of European urbanizing terrains can indeed be the cause of an aesthetic argument against this kind of development. Nevertheless the layered relationship between urban and rural in these environments is unable to return to the archaic dichotomy as the structural system producing it is wedged between these two conditions rather than part of either one. Here the city ceases to impose an abstract urban order as in the grid extensions of New York and Barcelona or the undulating street patterns of Olmsted and Howard's Garden Cities. Neither on the other hand does development assume a strictly rural organization in which natural units impose a local differentiation of crops (or their built counterpart). Instead both orders are merged in a new organizational system in which new development adheres to both the agriculture geography and the homogeneous building typologies of the city. Urbanizing terrains therefore appear to be greatly affected by the organizational pattern of agriculture, which in turn affects the physical

Figure 8 Grid road systems imposed on the existing agricultural subdivision- Koropi, Spata, 2008 *(Source: Google Earth)*
The resulting urban form is a hybrid between the two systems with buildings following the agricultural system in size and directionality.

configuration of the built and open space of urban "sprawl".

Open Space

One of the consequences of rapid urbanization in the last fifty years has been the rural depopulation that occurred in Europe's farming regions through migration to the cities. Both to strengthen these rural regions and to protect its main source of food European states implemented a series of farm subsidies through the Common Agricultural Policy which at first succeeded in forming the legendary "Butter Mountains" and "Wine Lakes" and subsequently failed in the face of economic competition from developing countries in East Europe, Asia and Africa. Consequently, agricultural land, closely associated with the aesthetic of the European landscape is no longer uniformly productive. This is true especially with farmland "trapped" between urban developments and increasingly enlarged secondary centres that suffer the effects of close proximity with human settlement in the form of higher levels of pollution, soil degradation and the banishment of certain types of agricultural processes deemed unhealthy.

As Bruegmann notes, the perception of agriculture has changed from that of a landscape concerned mostly with food production to an "aesthetic amenity for urban dwellers"[36]. The change in perception of rural landscapes owes much to the Enlightenment philosopher Jean-Jacques Rousseau who exalted the virtues of nature and the harmony of the traditional village in which farmers dwell virtuously and simply on the productive land. The aesthetic appeal for the rural as a landscape form, developed into an appreciation of the picturesque in England and of ordered rusticism in France as expressed in the Hameau de la Reine at Versailles. Beyond broader categorizations of cultures of urbanism that distinguish North and South Europe, this view of the pastoral ideal has been carried to our times but in two different forms that link the value of open space with natural ecology and human health. The impression that vegetative landscapes can mediate the polluting effects of urban environments while allowing for a Natural rhythm to infiltrate the human habitats has been one of the main reasons for the exodus of urban populations to areas on the

36 Robert Bruegmann, Sprawl: A Compact History, 2005. pp 132-133.

Figure 9 Marie Antoinette's cottage at Versailles, meant to recall the peasant dwellings of Normandy. *(Source: http://en.wikipedia.org/wiki/Petit_hameau)*

city's periphery. With a new sensitivity to the consumption aspects of life, the whole conception of rural areas changes. For the first time, farmers are considered as landscape gardeners more than as producers. In Switzerland, where tourism is a national resource, mountain farms are subsidized partly on these grounds, and public funds are also available in other countries for similar purposes.

Vegetative open space however comes only to resemble the natural environment. As natural systems are increasingly intruded upon by man-made systems linked to transportation and utilities, the geography of the landscape has lost its coherence as an opposing force to the city. Castells and Hall in discussing this hybrid "artificial ecology" see the city's transportation infrastructure as often the only unifying element across large regions that work as a single economy. The discontinuous built space of low-density growth allows natural and agricultural systems to penetrate into urbanizing areas, maximizing the interface between built-up area and countryside. The privatisation of the interface however with the predominance of private construction along the boundary does not secure its availability as a public resource and its part in the public realm of appearance. The two-way intrusion of built space into vegetative space and vice-versa calls for a different approach to the open spaces of the city that since the industrial era have been characterized by parks and gardens.

The contradiction between public and accessible open space surrounding low-density developments is often reconciled through visual appearance alone. In this, the view out of a small private garden adjoining a single-family residence is manipulated to provide precise relationships with surrounding farmland, giving the impression of the landscape as a continuation of the ordered private open space. Similarly playing fields surrounded by walls of trees, disguise the proximity to a highway or a neighbouring industrial complex, much in the way that inner city parks break their relationship with adjoining residential areas by heavily planting the perimeter. But while in the city the tactic would be employed to enclose and delineate open space in the low-density field it serves the opposite function, disguising the existence of buildings to give the impression of a continuous open space.

These new collective spaces as De Broeck describes them arrive through the existing organization of agricultural land. They are not however the "Gentleman Farm Belt" characterized by John Frazer Hart. Instead they are characterized by a mixture of meadows and woods which recall traditional 'bocages', but greens are golf links more often than pastures; there is practically no real agriculture, except for activities such as feeding horses, which are frequently raised in affluent mock-farms themselves designed in a wide variety of prized building typologies reminiscent of the pastoral ideal. At the same time there is a paradox in the search for public space within the urbanizing terrain that cannot be reconciled through traditional urban tools, revealing the crisis of traditional urbanity, of the modern concept of public space and the limits of a strongly individualized way of life.

TRANSPORTATION INFRASTRUCTURE

Writing during the height of state supported decentralization, William H. Whyte as well as other critics of low-density urban expansion saw the automobile as the main culprit behind the explosive growth of the "anti-city" (to use Mumford's characterization), which indeed it was. Improvements in transportation infrastructure such as road and rail connection are often the most highlighted causes for the trend towards low-density city growth in spite of inconclusive evidence to prove the causation. One arguement has pointed to the increasing levels of car use throughout Europe and the simultaneous correlation with a fall in residential densities without a clear understanding if lower-density settlements require higher levels of car-use or that the ready availability of cars makes lower densities possible. In either case the proposed Trans-European Transport Networks (TEN), the presence of high-speed interregional highways and the trend towards public investment in high-speed international rail has been celebrated by various writers as the important link that makes the networked, dispersed city functional.

What is undoubtedly true is that the rapid development of transport networks over the past 45 years has had strong impacts on the periphery of historic centres and that these new networks today occupy significantly more space than previous networks. Land-use and transport are interdependent in complex ways as new residential and commercial development influence mobility patterns while new transport links and nodes accompanied by commercial and industrial development facilitate the construction of new residential areas in their vicinity.

Arguments against low-density development accuse this pattern of growth of encouraging energy consuming car use rather than the more environmentally conscious public transportation, which is much harder to develop in areas where the residential and employment density falls below 100 people per hectare. In the few cases were the construction of mass transportation such as light-rail has preceded or has been simultaneous with new development, there is a tendency to increase housing densities around access points. Wu's analysis has shown that households

make choices between residential areas, taking into account the price of housing and the price of commuting between workplace and home. When travel costs fall below a certain threshold and income reaches a certain level the rate of low-density urbanization accelerates and unsurprisingly it is more prevalent in regions where incomes are high and commuting costs are low[37]. According to Couch and Nuissl there is considerable evidence that investment in public infrastructure stimulates development and therefore "sprawl"-type development by altering this balance in an urban region. This is especially true for transportation infrastructure making it one of the most contested policy-fields influencing changes in development patterns. They give the example of rapid rail transit supported by park and ride facilities that enhance the attractiveness of suburban locations as compared to inner cities by making journey to the urban core more convenient. On the other hand improvements in public transportation shift the modal split away from the motor vehicle and improve inner-city environments by reducing car traffic.

An example of the effects of such an upgrade in transportation infrastructure can be seen in the extension of the Metrosur light rail line in the south of Madrid. As has been discussed, the

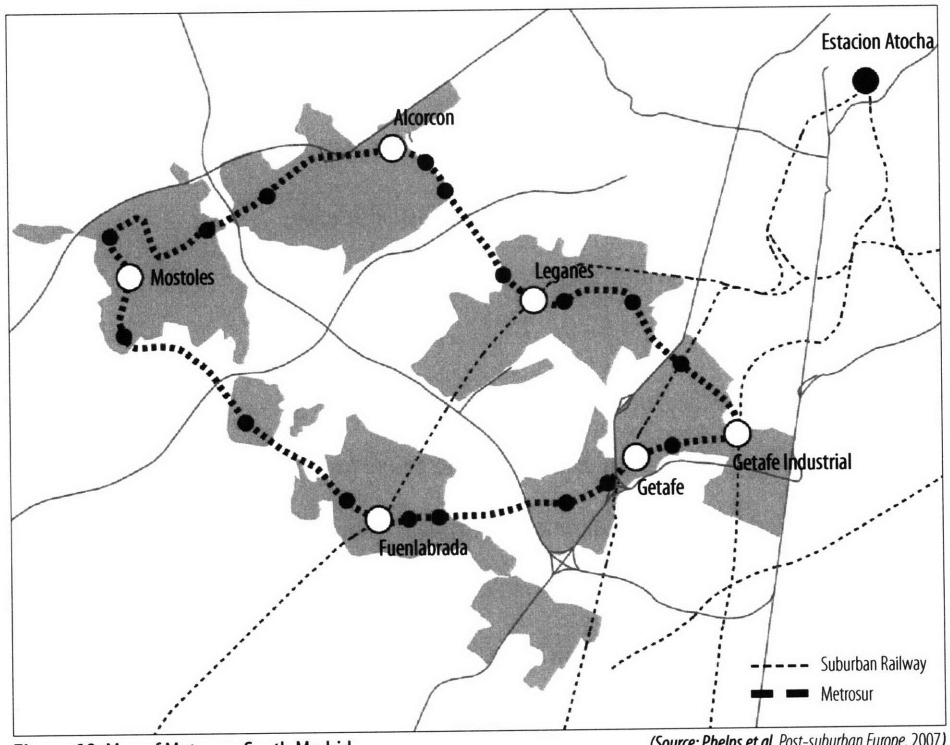


Figure 10 Map of Metrosur, South Madrid *(Source: Phelps et al, Post-suburban Europe, 2007)*

37 European Environment Agency, *Urban Sprawl in Europe*, 2006.

proposal by the Autonomous Community of Madrid to connect the Gran Sur to the core city was successfully supported by the municipality of Getafe that in exchange received a "gift" of extra access points in its jurisdiction[38]. The construction of the line enabled for the first time the configuration of the Gran Sur to emerge as a near autonomous entity next to the central city as the suburban line connected all six members of the coalition. At the time of construction the planning of the Metrosur represented 20% of the total Madrid metro network but served only 5% of its users, suggesting that commuting and access to the centre were not the only factors dictating its form.

Leontidou has pointed out that in most Mediterranean cities, the limits of the city were defined by popular land colonization until at least the mid 1970s. This kind of unplanned settlement was related to infrastructure with residents settling as close as possible to roads, electricity posts and water pipes, "stealing" from them if the opportunity arose. In most cases "official" infrastructure arrived at a much later date and long after legislation dealing with permanent squatter settlements integrated some communities into a city plan. The case of Madrid's Gran Sur can therefore be considered as a case of transportation infrastructure at first following these spontaneous developments and later attracting them.

38 Phelps et al., Post-suburban Europe, 2006. pp. 95-119.

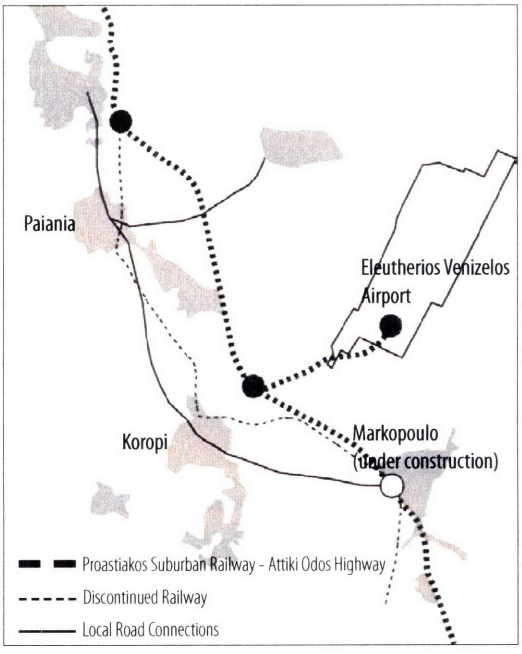


Figure 11 Map of Proastiakos

(Source: Diagram and photo by Author)

The East Attica region of Athens has also seen major changes in urban form initiated by the construction of Attiki Odos highway and suburban rail line. Infrastructure-attracting urban development in post-war Athens was considered normal practice as those seeking a place in the labour market of the city would reside as close as possible to the urban agglomeration, usually on the edges of town were housing was affordable. Illegal building practices would then pressurize state authorities to legalize these settlements without however an automatic provision of necessary utilities[39]. This trend came to a stop towards the end of the 1980s to be reversed by the turn of the new millennium as the Mesogeia plain became accessible to city through the construction of the highway. East Attica is now subject to a construction boom on former agricultural land fuelled almost exclusively by transportation infrastructure. By contrast drainage and sewage have not been provided and these networks still not serve the East Attica region.

The situation is even further compromised by a network of agricultural roads that give the entire region almost homogeneous accessibility from the highway, allowing construction of new residences and industrial units in almost any location. This also allows the conversion of second homes into main ones intensifying the demand for more infrastructure to cater for a greater population of permanent residents. The phenomenon of conversion has spread since the 2004 Athens Olympics but the cost of commuting is still considerable and inaccessible for low-income groups, as is the cost for private cars through the new toll highways and bridges.

The most obvious case of infrastructure-driven sprawl are ribbon developments along the highways. Ribbon development is primarily initiated by actors with transport-dependent urban activities such as warehouses, commercial exhibition spaces and superstores that dominate adjacent views from the car. Through time these ribbons have tended to get interconnected into grids that have formed densely built-up post-suburban clusters with detrimental effects on ecosystem fragmentation and surface sealing already initiated by the infrastructure itself.

The new transportation infrastructure that has emerged as an important driver for regional

39 Leontidou et al, in Cuoch er al., *Urban Sprawl in Europe*, 2007

growth, as far as commercial and service orientated operations are concerned, has been the airport. The Aerotropolis, John Kasarda's idea of cities built around international airports, has been gaining ground as firms desire to better position themselves for global trade and competitiveness. In Kasarda's reasoning if the airport is the mechanism making that possible, everything else-factories, offices, homes, schools-will be built in relation to it. "This is the union of urban planning, airport planning, and business strategy," Kasarda says. "And the whole will be something altogether different than the sum of its parts."[40]

In three of the four study cities development around the airport defies the standard isolation of airports as noisy and polluting centres. Across from Athens' new airport in Mesogeia that opened in 2001, a series of large superstores have opened in areas under the control of Hochtief, the airport's management company. These neighbour a small number of hotels, a business park and logistic warehouses all served by the highway and local bus transport from the airport's light-rail terminal. The airport has therefore emerged as a new subcentre in the region rivalling the commercial activities of the local towns. With the airport and its immediate area serving as a multimodal transportation and commercial nexus, a new economic geography is taking shape: property near the airport commands high prices that are higher than the surrounding region. With the construction of a new terminal scheduled for 2012 and the increased passenger service it is expected to bring, the new Athens airport will become a major pole of development in the region.

Athens is but one example of how major airports are beginning to drive business location and urban development in the 21st century, much as highways did in the 20th, railroads in the 19th, and seaports in the 18th. As aviation-oriented businesses cluster at and near major airports, Kasrda asserts that the Aerotroplois is emerging as a new urban entity that may eventually replace the central city as the seat of the central business district. Additionally, with the concentration of other modes of transport around airports to serve passengers, commercial development has all the more reason to relocate in its vicinity. Nevertheless the possibility of large scale residential

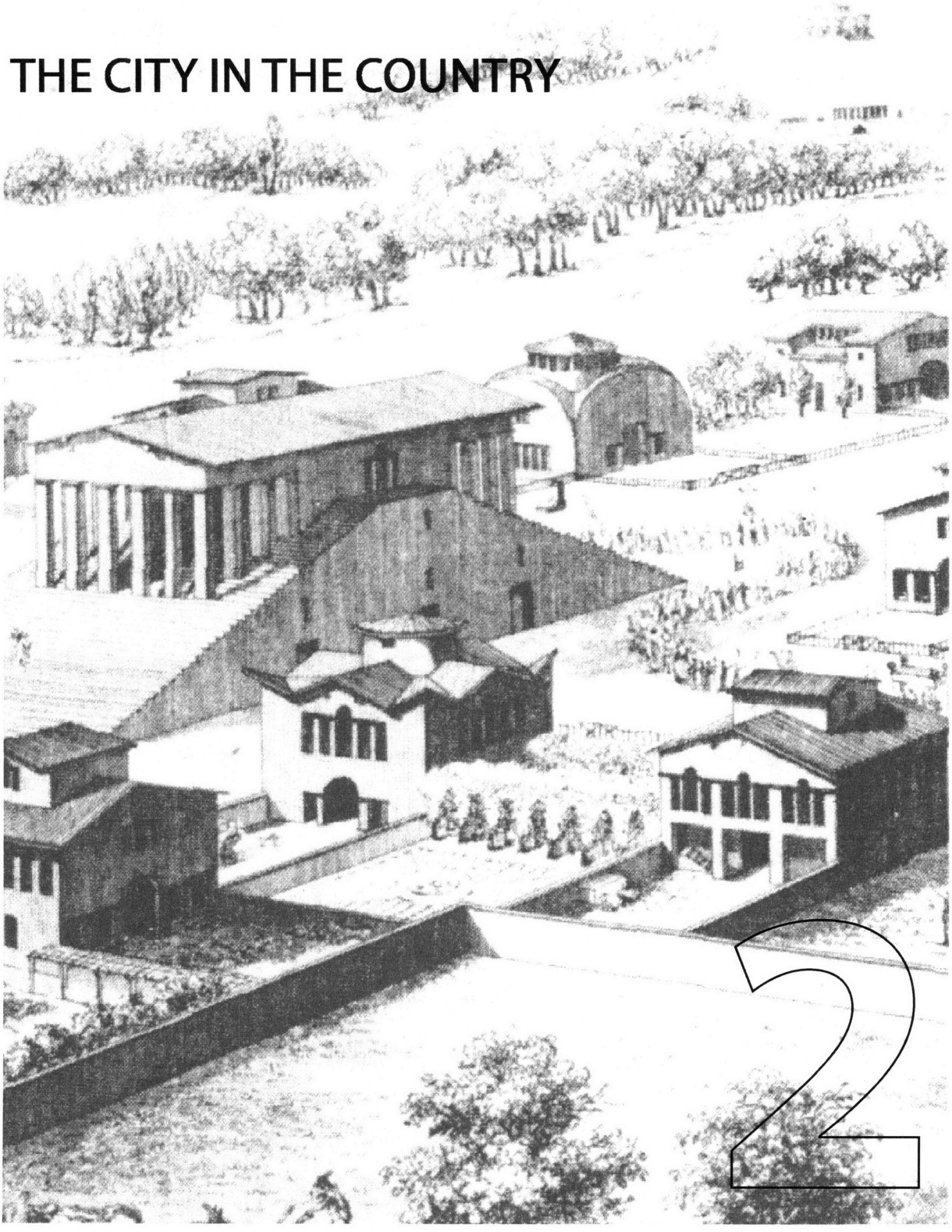
40 John Kasarda, *The Rise of the Aerotropolis*, Issue 10, Transportation, Spring 2006 .

areas being constructed so close to these facilities will require further improvements in both aircraft noise technology and in the building industry, especially in countries were outdoor living is favoured by climatic conditions.

Transportation infrastructure plays an important role in the spatial configuration of low-density development. This is not only true of metropolitan, regional and national systems constructed by central state authorities but also for local systems such as farm roads that provide an even allotment of access throughout the urbanizing terrain. Location choices therefore increase making them more attractive for residents that have easy access from home to anywhere in the region. The system does not only produce the obvious patterns of ribbon development but a more undifferentiated distribution that works in conjunction with the existing subdivisions of agricultural land and secondary centres to form low-density development that is neither entirely urban nor rural, but an organizational pattern affected by properties inherent in the urbanizing terrain itself.

Chapter 2

THE CITY IN THE COUNTRY



EUROPEAN CITIES IN THE URBAN ERA

In the history of the city we can identify three broad periods that have affected the form of urban zones. The first is roughly defined by the delineated cities of antiquity through to the beginning of industrialization and the tearing down of city walls. Until that time cities had been defined spaces within which specifically urban activities took place. Unable to expand beyond their borders as continuous built space, urban expansion took place through colonization and the foundation of new towns or the redrawing of external limits and the construction of new city walls. Cities of this period such as ancient Athens and the merchant settlements of North Europe, have had strong repercussions on our current psyche and mental image of the "ideal" city, being both suitable to the human pedestrian scale and having clear distinctions between public and private property. Most importantly they established the tradition of the urban/rural dichotomy through which finite civilized space contrasted and opposed the boundless wilderness of nature.

Figure 1 Classic model of city growth *(Source: Diagram by Author)*

The second period is characterized by the Industrial Revolution and two major changes in city form: the gradual erasure of limits to city growth and the introduction of new modes of transportation. The elimination of limits came about primarily through the destruction of city walls that became obsolete when artillery was introduced to modern warfare. Improvements in transportation saw the introduction of train stations on the edges of cities that could transport urbanites to new suburban developments beyond the traditional boundaries of the city. Trains, and eventually automobiles distorted the perception of accessible space, greatly expanding the distance between places of work and residence and encouraging a definition of the city that came to include areas that were not part of its continuous built space. Equally important however became the change in attitude towards the city itself. Crowded and polluted central cities created representations of cities as spaces of vice or risk in industrially advanced North European geographical imaginations, and the escape to the countryside was sought by those that could afford it. By contrast Mediterranean societies continued to depict the city as a space of virtue, culture and creativity, and the affluent classes chose to live closer to the historic core[1].

1 See Carl Schorske, *Fin-de-Siecle Vienna: Politics and Culture*, 1981 and Couch et al, *Urban Sprawl in Europe*, 2007.

The third period in which we now work and live can be better understood by adopting Henri Lefebvre's term, of Urban Revolution. The beginning of this period can be roughly pinpointed at the end of WWII with the destruction and rebuilding of major European cities and the relative worldwide peace. Rapid population growth immediately following the war along with further improvements in transportation technology that increased the accessible area and an affluent middle class desiring more residential space saw many cities double their size in new suburban areas surrounding the core. The pattern of expansion is expected to continue, with cities across the continent doubling their urbanized space within the next 25 years. Pressure for growth however will not come from demographic change. Instead, consolidation of the pattern of settlement within the extended area surrounding the city and intense economic interdependence between smaller regional centres and the historic core as well as enhanced work and residential connectivity enabled through affordable transportation have steadily worn away the old city-versus-suburb dichotomy giving rise to an extended notion of the city. Castells describes these extended areas as Metropolitan Regions stating:

. . . urbanization is concentrated disproportionately in metropolitan areas of a new kind: urban constellations scattered throughout huge territorial expanses, functionally integrated and socially differentiated, around a multi-centred structure.[2]

Urban models such as those constructed by Park and Burgess to describe Chicago's growth in the 1920s still operate as an assumption within urban studies to describe the process of city growth[3]. According to them the city grew outwards by accommodating additional populations moving from the central city in an exterior ring. The model neatly stressed residential preferences of affluent populations for the city edges and in part could be applied to the successive waves of suburbanization seen in North Europe and especially Britain since the Enlightenment. The enlarged scale of contemporary urbanization however and with it the growth of low-density areas bears only a partial resemblance to the Chicago school's radial and concentric geometric depic-

2 Manuel Castells, *Space of Flows, Space of Places: Materials for a Theory of Urbanism in the Information Age*, 2006.
3 Robert Bruegmann, *Sprawl: A Compact History*, 2005. .

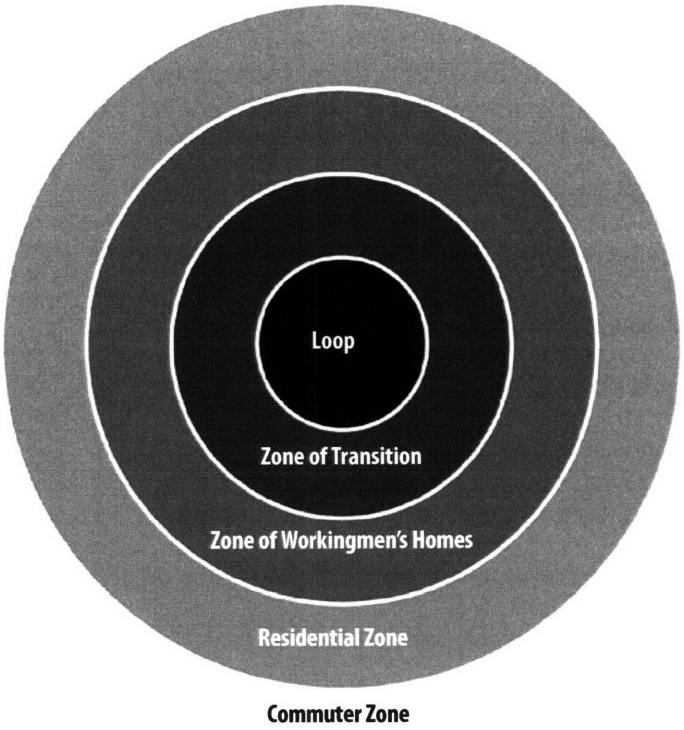
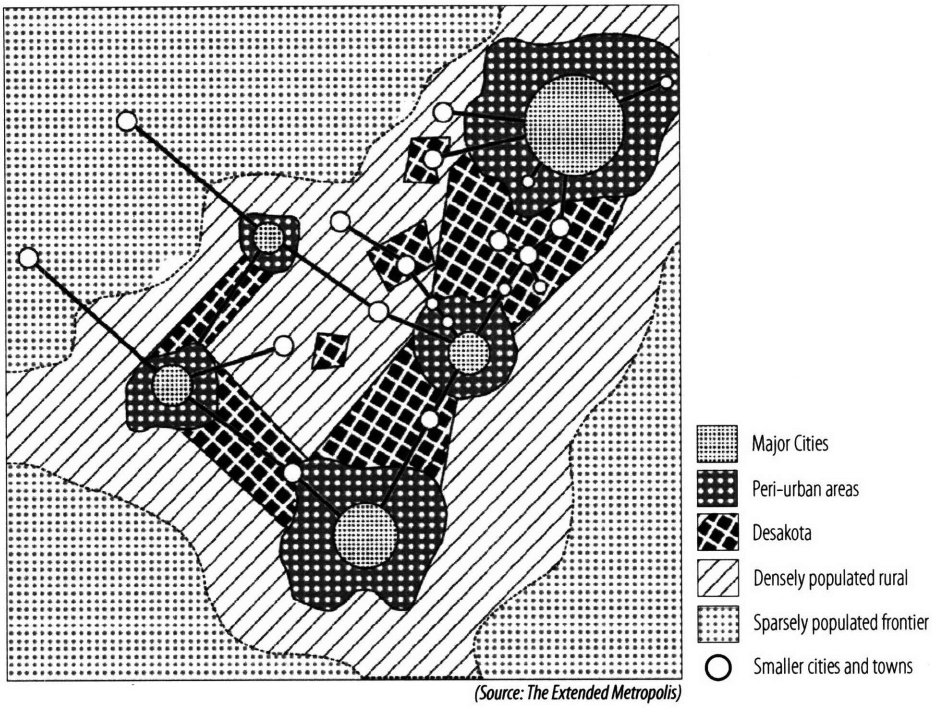


Figure 2 The Parks- Burgess Model of city growth,. circa 1920. *(Source: Diagram by Author)*

tions. Instead of the concentric model of urban space the notion of a nodal fragmented pattern of relationships with diversely dimensional cores and peripheries seems to be taking hold.

In this sense the pattern of European urbanization is beginning to resemble the findings of McGee in East Asia' rice-growing regions where large urban centres become the focal point of regional and global activities surrounded by a continuous carpet of densely inhabited rural areas. Although greatly different from European processes of urbanization, McGee's model offers some useful characteristics that transcend the geographical divide. One of the possible similarities comes from the multi-centred structure surrounding and including core city areas. These peri-urban zones extending from the centre, envelope smaller cities and towns to create large agglomerations within daily commuting reach. The spatial configuration offered by McGee is dependent upon a central city "acting" to economically stimulate surrounding agro-economic zones, eventually changing their basic qualities from rural to a hybrid of urban and agricultural, in essence a new zone that is distinguishable from both. The implication espoused by McGee is that a particular urban system does not result from a pre-existing agroeconomic system but that instead the existence of



(Source: The Extended Metropolis)

Figure 3 Spatial Configuration of a hypothetical Asian Country

agroeconomic systems provides the possibility for certain urban systems to emerge[4].

MORPHOLOGY OF EUROPEAN CITY

Existing research into European city growth implies an enlargement or extension of the central city's economic influence into its hinterland[5]. The area of central city influence however is hard to determine, as the definition of "city" within Europe and by extension what constitutes the "periphery" differs between nation-states and regions. What can be ascertained is that it does include a region in which commuting times (as opposed to distance) play an important role and can thus be broadly determined by the paths of transportation infrastructure that radiate from the core.

The vast majority of this extension however is not deliberate or planned but a pattern that arises out of economic forces operating on the landscape surrounding the central city. In terms of urban form therefore the resulting spatial configuration can often appear as random and "ugly" as it is not the product of collective effort by city authorities but the result of numerous rational individual decisions. By contrast both the 1811 Commissioner's plan for New York and Cerda's plan

4 T.G. McGee, *The Emergence of Desakota Regions in Asia: Expanding a Hypothesis* from Ginsburg et al *The Extended Metropolis: settlement transition in Asia*, 1991.

5 Hoggart et al, *The City's Hinterland, Dynamism and Divergence in Europe's Peri-Urban Territories*, 2005.

for Barcelona stand as the most successful ways of speculatively extending a city's limits before pressing demands for residential space overcome existing physical boundaries. Towards this end both plans laid out a grid of public infrastructure within which private ownership of land and development were allowed. The application of the grid as the prime mechanism for expansion dates to the proto-cities of the ancient world and as has been characterized by Pope as being so deeply ingrained in urban mythology that the grid itself becomes the symbol of the city. Thus, the layout of the city forms a distinct and often separate order from that of the surrounding "nature" in which it is placed, the mathematical abstraction of the grid becoming a human/urban terrain on which city life can take place.

The advantage of the grid or at least of designed urban expansion is that the city as civilized living space remains identifiable with a certain conceptual perception of space. As such the delineation of what constitutes city-space is determined by the extent to which this conceptual perception either as rectangle or other defined pattern is imposed onto the landscape. In this way the limits and therefore the entrance into the city are clearly identifiable allowing the urban to emerge as a unitary entity that acts as a social collector and organizer for human life. This conceptual perspective, made possible through the physical layout of the city's constituent elements claims a vital place in the association between the citizen/resident and the city itself in that it creates a common public space shared by all.

Hannah Arendt developed the relationship between citizen and city-space into what she named a "space of appearance". In her 1958 book The Human Condition, the "space of appearance" came into being with public social interaction, a public realm in other words in which the city's resident (as citizen) participates in the communal. Writing about the organization of the Athenian polis, she defines:

The polis, properly speaking is not the city-state in its physical location; it is the organization of people that arises out of acting and speaking together, and its true space lies between people living together for this purpose, no matter where they happen to be[6]

6 Hannah Arendt, *The Human Condition*, 1958. pp 199.

But while here there is a suggestion of a diffused spatial structure to the polis, she later identifies the importance of the wall as the formal stabilizing boundary drawn around an already existing pubic space, physically securing the organization of the city. The spatial limits therefore preserved and sustained the existence of the city as a ground for collective activity, making the city "visible" to the citizen as a single, shared entity.

In the myths regarding the foundation of the Athenian polis, the synoikia or co-habitation of different identities within the city is exemplified by the creation of the Thesean synoikia in which the twelve towns that took part in the foundation of Athens were nominally dissolved to create Athens[7], with a consequent loss of separate identity in the formation of the polis. The merging into a new centralized entity, spatially distinct and socially collective can be seen in the formal structure of the city, organized as it was around the Acropolis hill, with a central public meeting space in the Agora. The polis of Athens was functionally and spatially fragmented throughout the region of Attica, with a second core in the port-city of Piraeus to the south, the Platonic Academy to west, the olive groves of Attica to the east and the extended concept of Athenian citizenship which encompassed smaller surrounding settlements and the colonies.

It was nonetheless the centrality of Athens that made the other dispersed functions appear as part of the same city, not geographically as Arendt suggests, but by belonging to the same political unity sharing the same public space. Sparta, the political rival of classical Athens, while sharing the same devotion to collectivity, constructed the relationship in a different way. Thucydides, writing in the 5th century describes the formal identities of the two city-states.

Suppose, for example, that the city of Sparta was to be deserted, and nothing left but the temple and the ground plan, distant ages would be unwilling to believe that the power of the Laconians was at all equal to their fame. Yet the Spartans occupy two-fifths of the Peloponnese itself but also numerous allies beyond its frontiers. Their city is not built continuously, and has no splendid temples or other edifices; it rather resembles

7 Joseph Ryckwert, *The Idea of a Town*, 1988. pp 33-34.

a group of villages, like the ancient towns of Hellas, and therefore would make a poor show. If, on the other hand, the same thing would happen to Athens, one would conjecture from what meets the eye that the city had been twice as powerful as in fact it is. We have no right therefore, to judge cities by their appearances rather than their actual power. . . [9]

The observation implies that the poly-nuclear dispersal of Sparta in the Peloponnesian landscape had significant effects on its appearance as a unified political entity in spite of its obvious functional integration. Underlying Thucydides is the idea of the polis as a city with a highly centralized spatial pattern, the absence of which can deny the existence of its very being and its emergence as a "space of appearance". Rousseau saw in Sparta the archaic dream of integrating the individual and the collective, which symbolized "civic morality, patriotism and devotion to collectivity." But cannot the same be said about Athens with its equally high emphasis on these issues? Without sweeping away the political differences of autarchy and democracy between the two poleis, it is possible to imagine two similarly disposed collective expressions of the city that differ diametrically in their formal and cultural expression.

The archetypes of Athens and Sparta can be conceptually equated with the gradual extension of the contemporary European city from a centralized spatial configuration, clearly perceivable as a unitary entity to a diffused poly-central structure with ambiguous visibility. This transformation has become increasingly apparent with the intensification of new construction in areas that were once considered exclusively rural and the rapid growth of secondary centres. Outward expansion of urban space however has coincided with processes of gentrification seeking to re-urbanize the central core. Reconquering the inner city has been describe as "Mediterraneanization" in North Europe, leading affluent social strata to return to urban living[10]. The resulting formal organization has been described as highly ordered on a local scale, with a sequence of distinct neighbourhoods structured around transportation and retail nodes composing the majority of urban areas. At a metropolitan scale on the other hand it has become disorganized and chaotic. Infrastructural

9 Thucydides, *History of the Peloponnesian War*. Trans. Rex Warner, 1954.
10 Couch et al, *Urban Sprawl in Europe*, 2007. pp. 94-95.

elements such as highways, communication systems and railways have come to replace within residents' imagination the connecting material tissue that was once composed of a hierarchical urban structure and continuous built space. So while local identity, as a means of differentiating space and the individual's association with it remains strong, the weakness of metropolitan form and its intelligibility as a unitary entity inhibits the same individual's participation in the city as a whole. The consequences of unplanned low-density development are therefore not limited simply to the deterioration of the urban and rural environment, increased traffic and economic costs but to a fundamental dissolution of the city as a recognizable urban form.

THE URBANIZING TERRAIN

As the research from the first chapter showed, low-density development is concentrated in areas beyond the continuous built space of the city. These areas have been hazily identified by the majority of urban "sprawl" researchers as the "urban fringe", the "periphery" or "edge" without

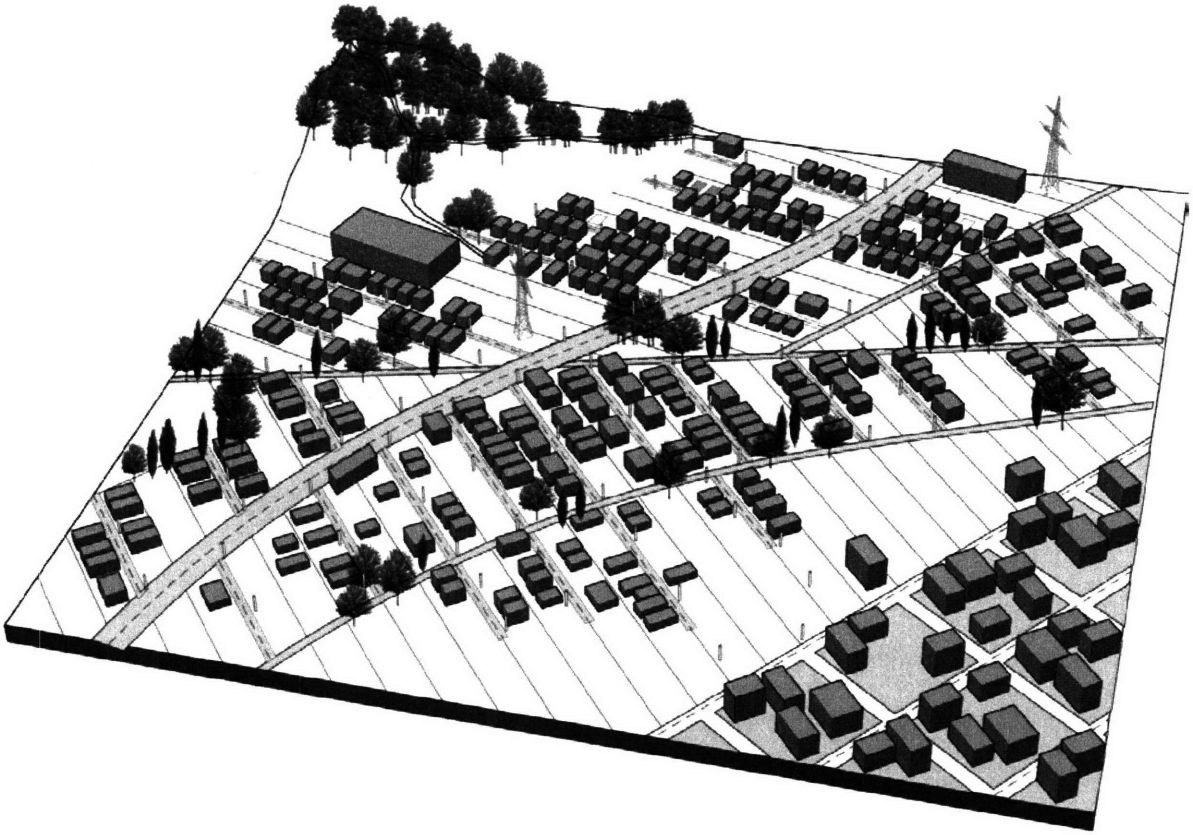
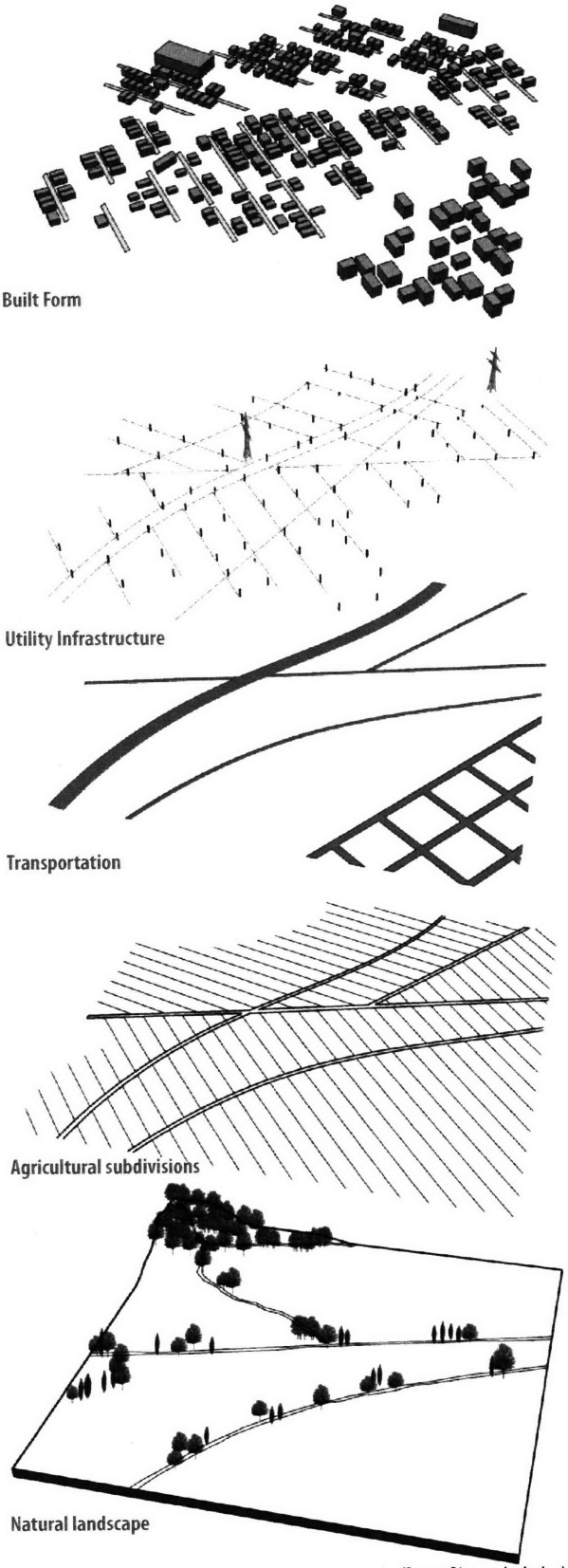


Figure 4 The urbanizing terrain

(Source: Diagram by Author)

direct reference to the properties of this urbanizing landscape, which are thus often assumed to consist of mainly natural land encroached upon by urban land-uses. As a consequence the form of new development has been associated with an unplanned and therefore "chaotic" appearance, in contrast to the traditional city's rational ordering of space. The research has exposed the necessity to re-evaluate this assumption. The land on which urban "sprawl" is constructed is embedded with morphological possibilities derived from a rural order made accessible by an existing transportation system. Furthermore these areas are influenced by an existing network of secondary centres that attract new urban growth to their vicinity, as they are able to substitute for the centrality of inner core within an agricultural landscape. These secondary centres and the land surrounding them are acted upon by an administrative system that seeks to maximize its own influence and competitive edge by attracting new residents and employment, thereby forming zones of intensive development which adopt the characteristics of existing agricultural organization.

The urbanizing terrain can therefore be seen as a foundational substructure infused with an existing series of properties that enable a specific pattern of urban form to emerge. In architecture, the concept of a substructure that enables variations of built form materializing from processes of human habitation engaged several architects during the post-war years. The project exemplifying this approach was the Free University of



(Source: Diagram by Author)

Figure 5 Consituent Elements of the urbanizing terrain

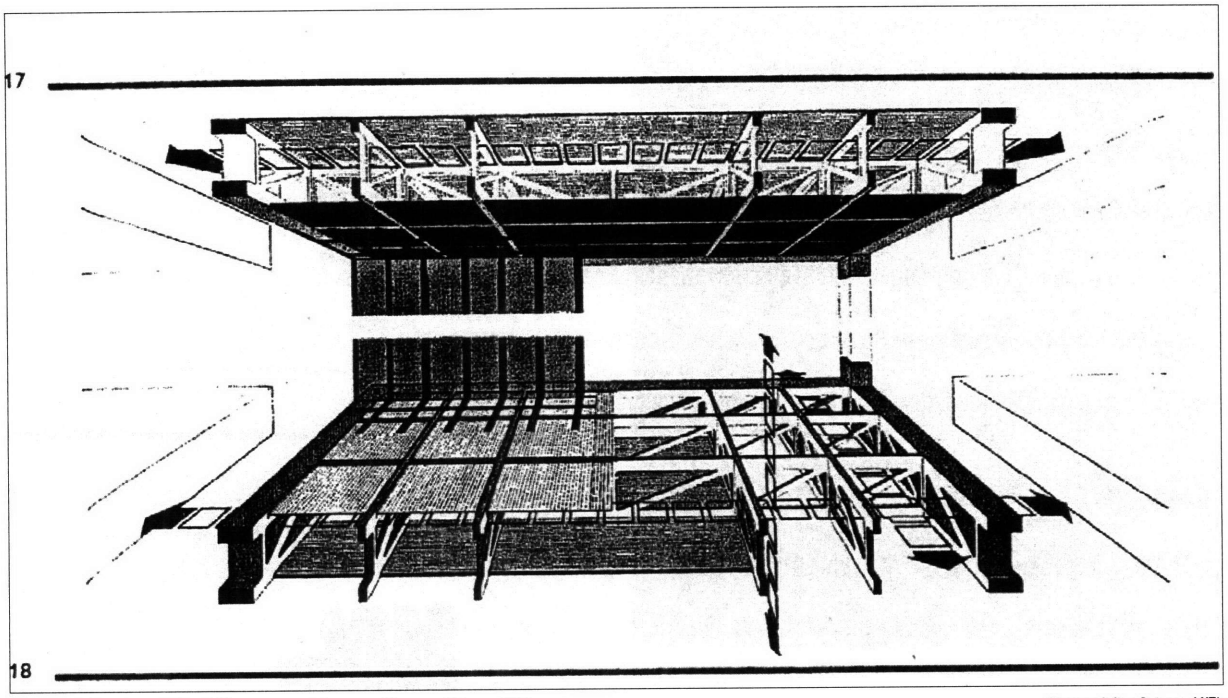


Figure 6 Section of the infrastructural base and moveable partitions. University of Loughborough Competition Entry. *(Source: Julian Beinart, MIT)*

Berlin, designed by Candilis, Josic and Woods. Conceptually it consisted of a permanent layer of building infrastructure enclosed within the ceiling and floor and a series of moveable walls and partitions. The architects designed a structure permeated by all necessary building services that could permit flexible reconfiguration of internal spaces to suit different uses such as lecture halls and meeting rooms. Except for a few permanent spaces, the rest of the university remained without a specific allocation of functions so as to allow students and professors to construct their own spaces according to their needs. Special attention was attached to the design of the interface between the "infrastructural layer" and the moveable components so as to maximize variations and grant internal spaces a stable appearance. Likewise, the architectural fantasies of Archigram and Superstudio imagined an extended landscape saturated with invisible electricity and telephone lines that would allow for a nomadic existence as its residents would be able to "plug-in" to the network at every conceivable location, freeing them from the necessity of a permanent location. In these examples form is not specified by a particular material presence. Instead it is created by user interaction within a framework of infrastructure, replacing in this way the need to dictate physical form.

These ideas can inform the conceptualisation of the terrain on which urban "sprawl" is constructed. Areas adjacent to the city are permeated with roads, electricity lines and subdivisions that came about as a result of their former agricultural uses. While not as densely distributed as the central city, these infrastructures are replicated through private initiative that gradually expands the network to cover increasingly larger area. In addition a series of permanent spaces such as smaller towns and landscape figures create a secondary framework and mark navigable space thus allowing new residents to immediately appropriate space without regard as to specific location.

The key difference between the adaptability of the urbanizing landscape and the idea of an underlying "infrastructural layer" is that while the former has been the deliberate effort of numerous designers seeking to enable possibilities of inhabitation, the latter is not premeditated, occurring instead as an accumulation of elements, such as roads and farms that are gradually integrated into the terrain. The resulting dynamic condition is often regulated through a series of constraints such as land-use zoning that are managed by local authorities in an attempt mediate the various negative consequences of low-density urbanization. The conditions under which these regulations operate however are not the same as in an inner-city area, where development takes place within a clear established urban order. In the urbanizing terrain, zoning has to regulate multiple owners with multiple motivations for development seeking to take advantage of the locational flexibility provided by the terrain. In addition the simplicity of zoning plans do not account for the complexity of the terrain. This simplicity may reflect common descriptions of the urbanizing terrain as "fringe" or "periphery" that address only the relationship between edge and centre and view its area as a neutral space, much like any other development zone in the city. As a consequence the very certainty of zoning plans has been unable to provide a comprehensive framework that organizes the uncertainty and mixed-uses of low-density growth.

DESIGN IN THE URBANIZING TERRITORY

The capability of large-scale structure planning in the form of zoning and land regulation, to mediate the consequences of urban "sprawl" development can be questioned, not least because the processes of design on such scales are coupled with the difficulty created by the many actors involved in decision-making. Urban design in these terrains intervenes in an environment of uncertainty, in which market decisions dictate the development paths to be taken by private initiative and so apply intense pressure on formal zoning regulations. It is therefore not surprising that regulatory authorities, and especially local planning boards that shoulder the main responsibility of control, often break down under these conditions[11]. Belgian urban designer and academic Marcel Smets comments, that in the end these planning methods have very little effect on the actual physical environment that ensues, due to their lack of a clear concept of spatial configuration[12]. On the other hand a "softer" approach to the problems created by urban "sprawl" has generally been the domain of policy, seeking to remedy its consequences by motivating concerned actors to shift expectations and desires and change the cultural view of town and country. As Atkinson and Oleson advocate:

Instead of attempting to replace one urban spatial structure with another structure as master planning often does, we should seek to alter incentives and the dynamical path we are on[13]. **(Atkinson & Oleson, 1996)**

Physical urban design has come closer to this "soft" approach by addressing the material structure of the urbanizing terrain. As Smets and others have argued the composition of the landscape can be the source of an ordering system that both structures future development and addresses the possibility of an intelligible metropolitan form. Within this field of design, landscape architecture has acquired a prominent role, as it deals with the physical environment as a process of constant change rather than a fixed final product. As landscape architect Adriaan Geuze has proclaimed:

Architects and industrial designers often see their designs as a final product of genius, whose aesthetic en-

11 European Environment Agency, *Urban Sprawl in Europe*, 2006.
12 Marcel Smets, *Grid, Casco, Clearing and Montage* in Topos Landscape Architecture Journal, 2002.
13 Couch et al, *Urban Sprawl in Europe*, 2007. pp. 94-95.

tirety originated in their minds. A design like that is thrown off by the slightest damage. Landscape architects have learned to put that into perspective, because they know their designs are continually adapted and transformed. We have learned to see landscape not as a fait accompli, but as the result of countless forces and initiatives.[14] **(Adriaan Geuze, 1994)**

The advantage of this lies as much in this "gardener logic" as it does in the methodological approach. Smets has identified three useful categories of such spatial design interventions:

GRID an abstract form, unrelated to the natural topography that provides an underlying structure for development within pre-established regulations.

CASCO a frame derived from the natural and agricultural morphology of the landscape that acts as a permanent receptacle for development.

CLEARING a backdrop composed of natural features such as trees or grass that unifies disparate new developments through its consistency.[15]

Many of the designs advanced by these methods do not seek to control every aspect of future development, but to provide an armature within which market-orientated development can expand. In this way design incorporates a permanent form that addresses the legibility and identity of a

14 Bart Lootsma, *Biomorphic Intelligence and Landscape Urbansim*, in Topos Landscape Architecture Journal, 2002.
15 Kelly Shannon, *From Theory to Resistance: Landscape Urbanism in Europe*, pp. 141-161, from Charles Waldheim et al, *The Lansdcape Urbanism Reader*, 2005.

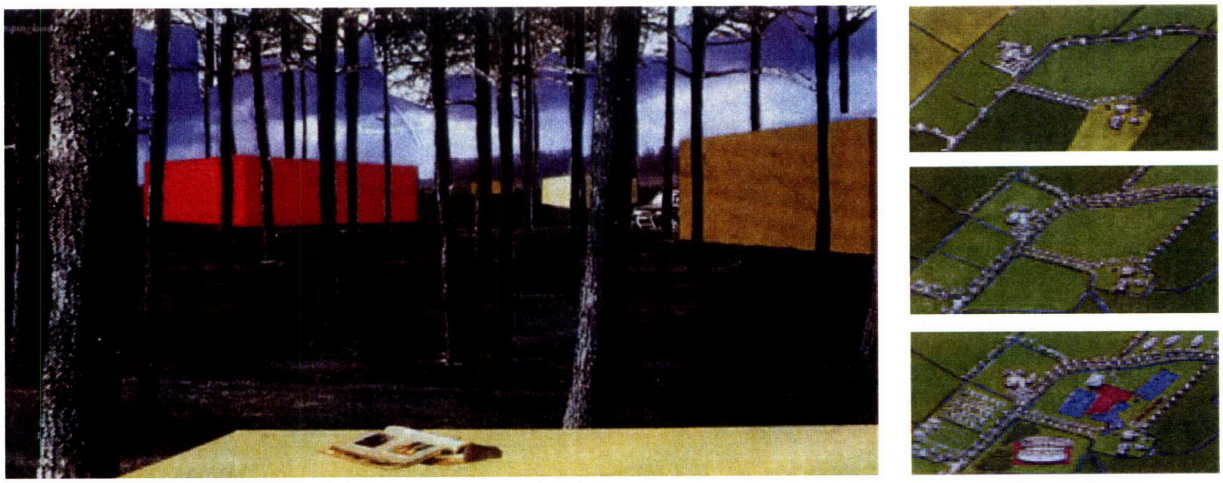


Figure 7 Left: CLEARING- Pine forest compose the unifying backdrop of urbanization, MVRDV.
Right: CASCO- Existing agricultural structure reinforced as a frame for new development, West 8. *(Source: Marcel Smets, Topos Landscape Architecture Journal)*

larger setting with the indeterminate nature of new development. All three employ a strategy of empty space to structure the urbanizing environment, supplying only the frames that can integrate an existing geographical logic with the proliferation of new urban land-uses.

The overarching strategy is to find ways to express a territorial order that can recuperate the loss of legible metropolitan form while accepting that design alone is incapable of controlling the entire urbanization process. As such design has accepted the role of research in an attempt to rethink the relationship between elements that can compose a new metropolitan form. The research into the Veneto region in North Italy carried out by Bruno Secchi and Paola Vigano at the University of Venice has come close to creating a new image for the region based on its constituent elements. The Veneto region has been subject to development pressure since antiquity that has resulted in a diffuse urban form composed of scattered towns, villages and single-family homes within an ancient agricultural landscape. To this end the team has identified water and asphalt as the predominant structural elements of the environment that have supported the scattered pattern of inhabitation.

Their process of design, which involves the identification of elements and their naming, attempts to distinguish between traditional ideas of "sprawl" as an extended city and the infrastructures that enable dispersed configurations of inhabitation. As Paula Vigano asserts:

There are similarities between sprawl and the territories of dispersion, but the process of diffusion, the extended use of the territory and the mix of functions differ: ancient as opposed to recent; horizontal instead of vertical; integrated more than juxtaposed.[16]

In this sense their research into these enabling conditions has two purposes. Fisrt to provide a framework in which design can operate at both a local and metropolitan scale while still retaining its coherence as part of the same territorial entity, and second to re-brand the Veneto in the

16 Paola Vigano, *Water and Asphalt, The Project of Isotropy in the Metropolitan Region of Venice* in Architectural Design Journal, *The Dispersed City*, 2008.

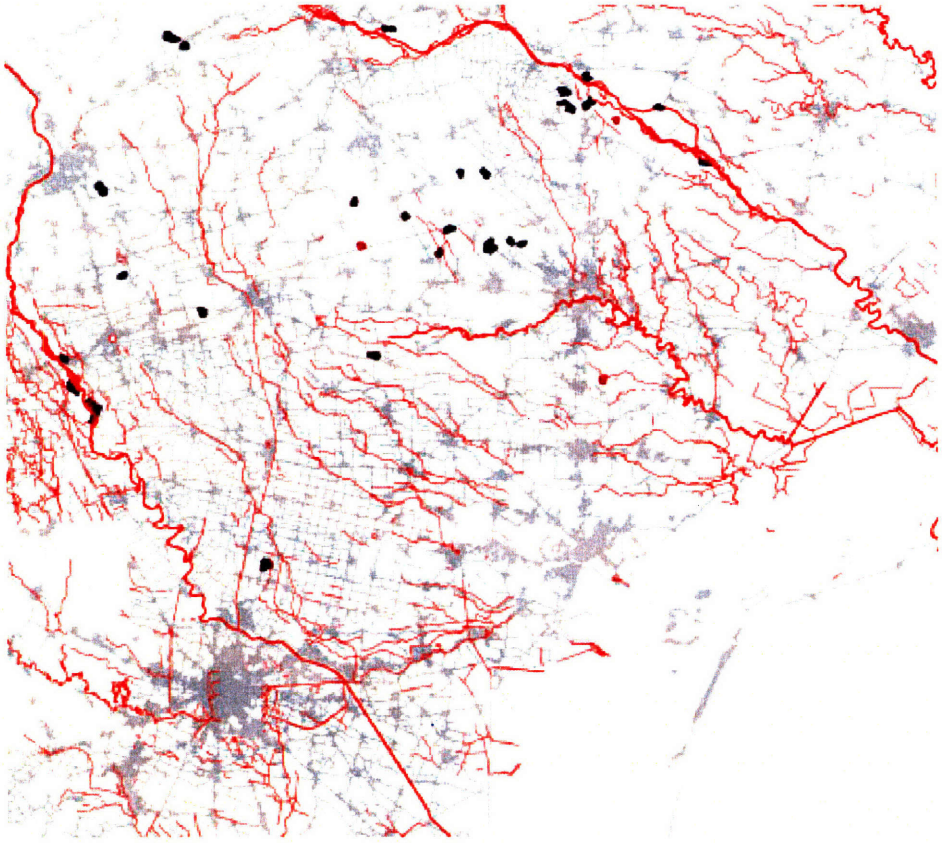


Figure 8 Water (red) + asphalt (grey) + pits and dumps (black). In the metropolitan region of Venice, water and asphalt define the isotropic conditions Water and Asphalt B Secchi, P Viganò and students. *(Source: P. Vigano, AD Journal, 2008)*

popular imagination as an area with distinct characteristics. This strategy of engaging with design therefore does not seek to impose strict controls on land-uses but instead to involve inhabitants with issues of water pollution and agricultural degradation through an understanding of the permanent features of their environment. It also seeks to redress another major imbalance in the urbanization process: the inability of private development to spontaneously produce public space. The presence of accessible public space within centralized urban figures is the feature that lends the city its civic order and makes it available for social activity. Although the presence of secondary cores in the form of existing towns and suburban retail centres go some way to replace the need for additional public spaces, it is an inherently weak structure, often not well connected or under the control of the private sector. Vigano and her team consider this collective space a missing element within the urbanizing terrain, and something in which the public sector with its increasing disengagement from urbanization process should still be involved. However in their opinion

it must sought beyond the traditional urbanistic tools of squares and piazzas, but in the moments that reveal the mechanics of the landscape itself, such as abandoned mines, irrigation devices and public transportation nodes.

The issue of a structured open space as a unifying device for unplanned built space is also the starting point for a series of conceptual design interventions by Xaveer De Geyter in the Flanders region of Belgium[17]. De Geyter follows the logic that although European city-regions display very different patterns of built space, the scattered forms of city growth display a similar abundance of open space, which he calls negative space. By considering only the negative space left over by development and structuring this into a consistent form, open space can replace the built fabric as a new device that lends metropolitan form a new coherence. To this end his team experiments with a series of concepts that aim only at addressing these left-over areas through the addition of a variety of structuring devices, which however have little to do with the existing topographical conditions. Amongst these the grid and the frame become prominent methods of organization usually in the form of planting and irrigation.

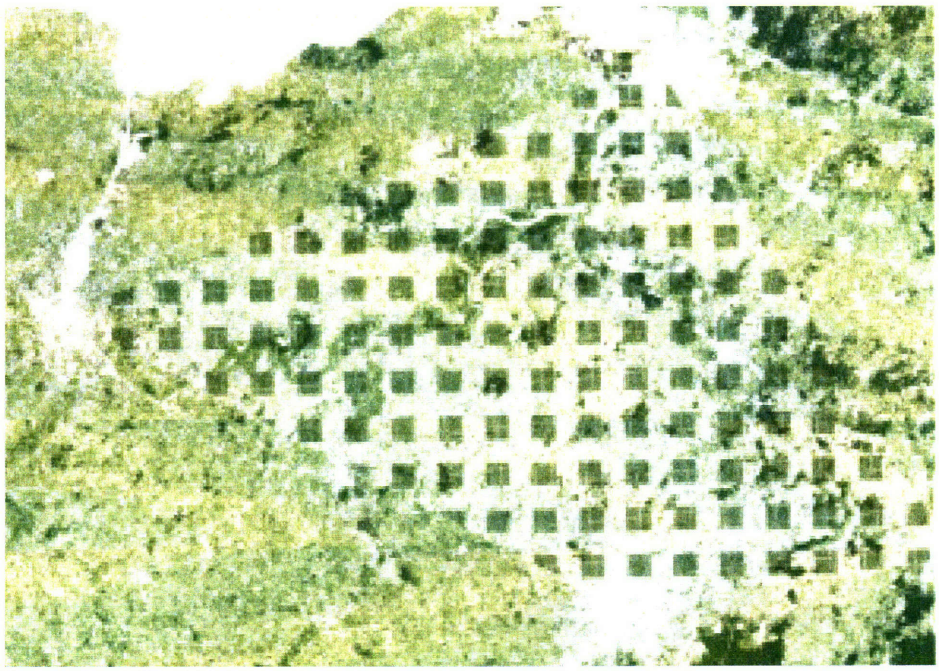


Figure 9 A new structure of open space is introduced to the Flemish Diamond. Array, Xaveer de Geyter Architects. *(Source: After Sprawl, Xaveer de Geyter Architects, 2003)*

17 Xaveer De Geyter Architects, After Sprawl, 2003.

The constant recurrence of the grid as an organizational template has been consistently analysed in both urban design and landscape architecture literature. In the European context of urbanizing terrains however it acquires a new meaning, especially as a method of mediating between the city and the surrounding agricultural landscape. The link between urbanization and agriculture as a concerted system probably goes back to the Greek colonies of South Italy that produced an organizational pattern of long thin rectangular strips to describe the form of agricultural holdings[18]. It was only systematically implemented however by the Romans after the 4th century BC in a process of land survey called centuriation. This process subdivided the landscape into basic units of 2400x2400 feet, each of which would accommodate one hundred smaller plots (centuriae) for farmsteads and agriculture[19]. The survey was conducted with a datum at the crossing point of two axial roads from which the centuriated plots were drawn in parallel. The lines of centuriation parallel to the axes were usually called decumani and cardines referring directly to the two crossroads that constituted the central spines of Roman townships: the Cardo and Decumanus. The centuriated grid would therefore be aligned with the streets of the town itself, giving the impression that the basic unit of the town extended into the countryside, impregnating the landscape with civic potential. We can assume from this evidence that the surveying system had a direct link with the process of territorial urbanization even though the relationship established by the grid was primarily rural. Nonetheless the centuriated grid laid out a similar order in planning and landscape, marking out roads, drainage systems and plot subdivisions that are still visible from the air today and respected in daily use.

The idea of a permanent organizational system of infrastructure and a changeable infill can also address development practices in the urbanizing terrain in a more subtle way. The extension of the city through low-density growth has, as we have seen in the first chapter created a new form of development called leapfrogging. This process by which developers and private individuals construct in areas that are at a distance from any other built spaces, has resulted in patches of open space, usually in the form of agriculture, remaining empty and eventually surrounded by

18 The Oxford Classical Dictionary.
19 Spiro Kostoff, The City Shaped, 1991.

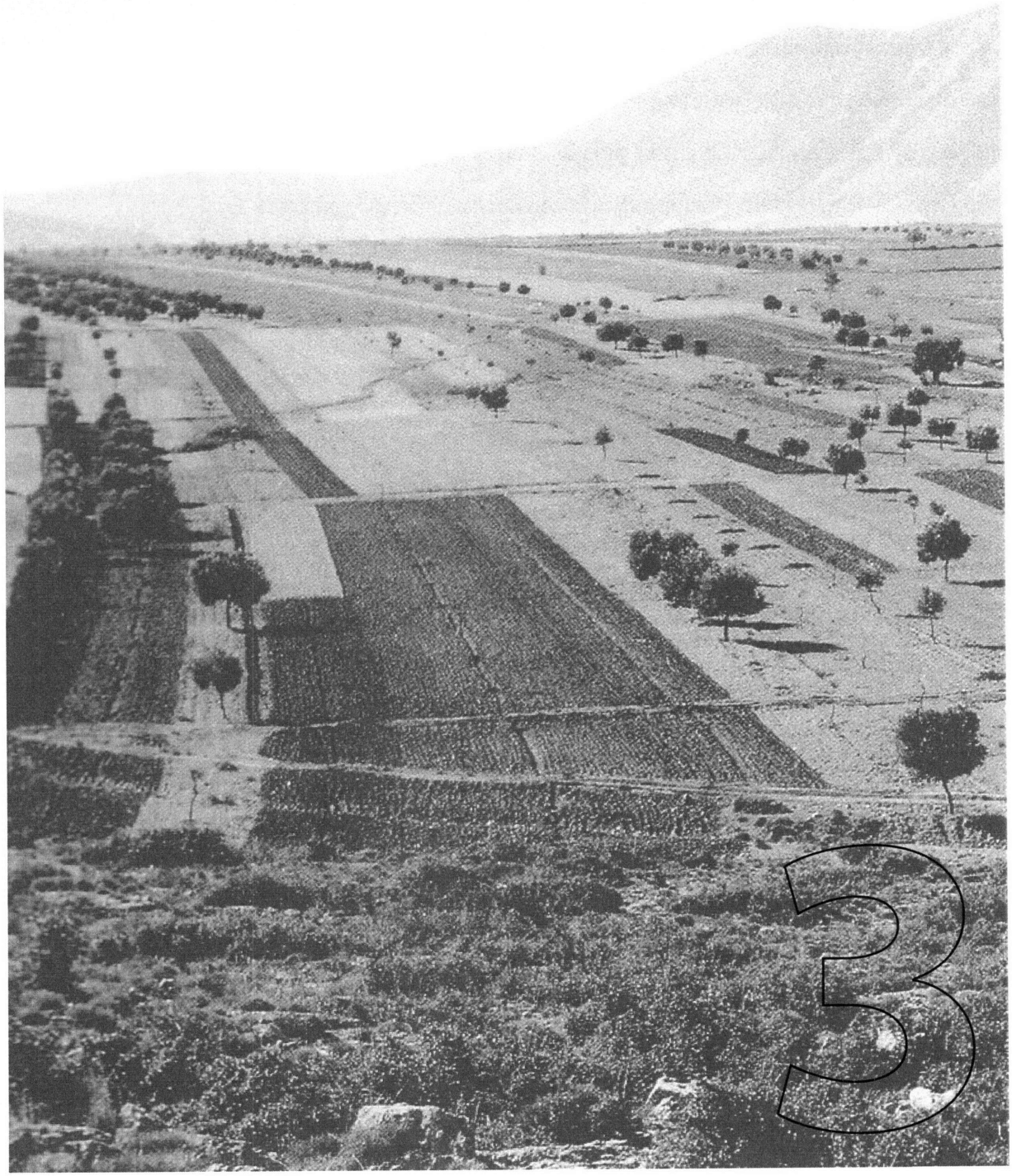
built space. The latent possibilities of this leftover or "wasted" space produced during the process of urbanization are seen by theorists such as Frampton and Berger as the potential ground for the possibility of future transformations of the dispersed territory. Frampton calls for the need to conceive of such spaces as a remedial landscape "capable of playing a critical and compensatory role in relation to the ongoing commodification of the man-made world."[20] As such he encourages a Taoist strategy of "acting by not acting" until a time when the appropriate use for such land is found. Taking into account the generally unplanned nature of new urban growth, "leapfrogging" leaves space for new development of a public nature to occur in the remaining open spaces such as schools or churches, something that would be hard to achieve amongst continuous built space. To low-density areas such ground can become a valuable asset, especially when a new trend for residential densification may arise, or simply left as a void, which in its current condition can substitute for the lack of planned open public spaces.

The planning of the urbanizing terrain advocated by these designers is therefore fundamentally different from that espoused by modernist zoning practices. Even though the practice of land-use zoning is gradually becoming more flexible as recent developments concerning a system of tradable permits to legally dedicate land for urban use in Germany have shown, wider considerations that involve both the legibility of the metropolitan region and the uncertainty of future construction can be addressed by direct involvement into the constituent elements of the urbanizing terrain. In this sense the properties of the terrain explored in the first chapter become relevant as attributes that urban design can employ to organize the a sustainable form of low-density growth.

20 Kenneth Frampton, *Toward an Urban Landscape* from Columbia Documents of Architecture and Theory, vol. 4, 1995.

Chapter 3

EXPORTING ATHENS TO THE COUNTRYSIDE



THE GROWTH OF ATHENS

Successive waves of internal migration and illegal settlement on the edges of the city have marked the urban development of Athens in 20th century. What had until the 1830s been a relatively small settlement in the Ottoman Empire, quickly gained importance as the capital of the new Greek state leading to a growth in its population. The city showed a modest development pattern extending outwards from its two main cores in the historic centre of Athens itself and the port-city of Piraeus. This stable growth however was disrupted in the 1920s and later in the years following WWII and the civil war with massive migration, in the former by refugees fleeing Asia Minor and in the latter by rural populations seeking jobs, social infrastructure and amenities for a better living. In both cases migrants could not afford to inhabit the central city, but tried to settle

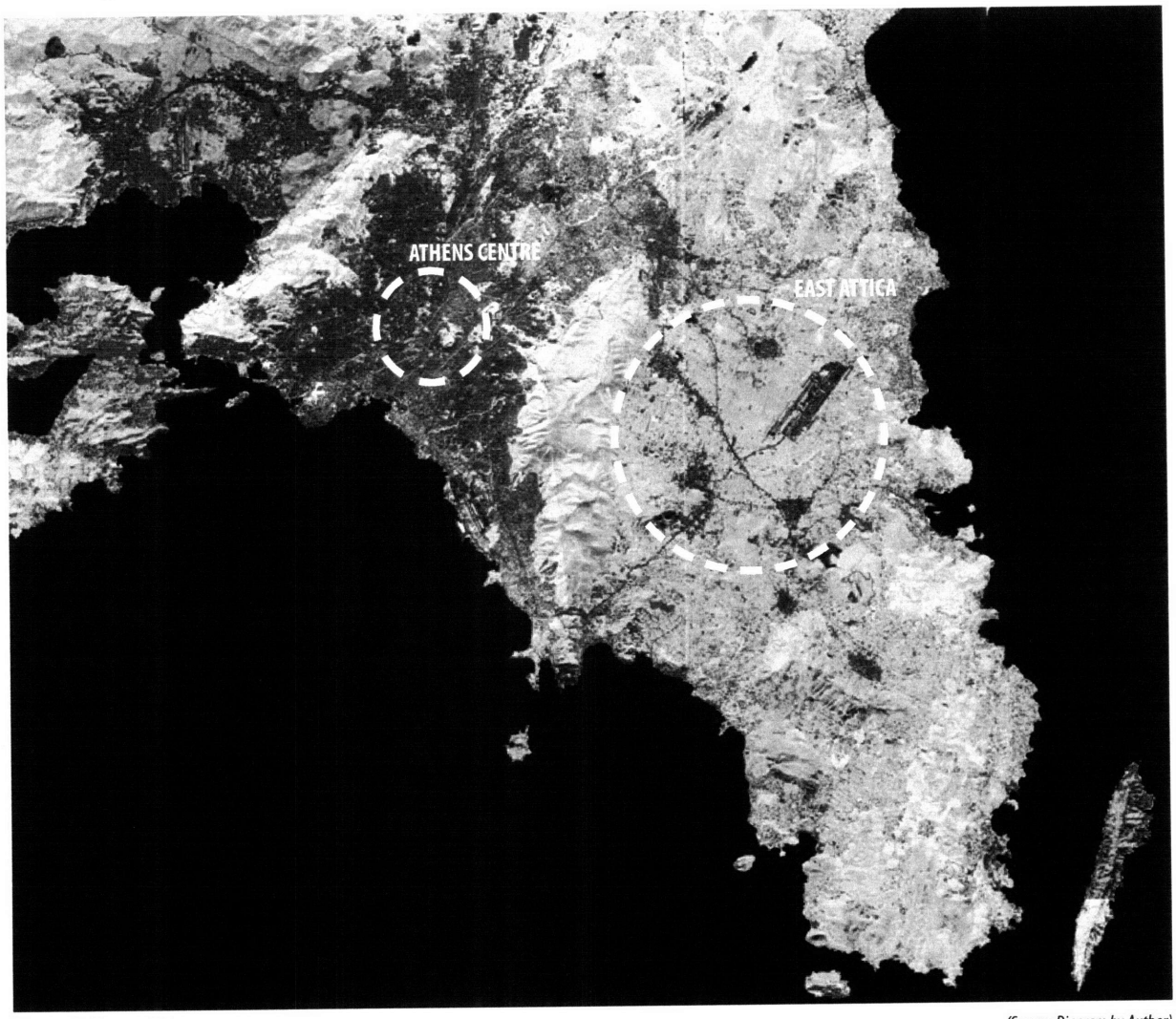


Figure 1 Greater Athens
(Source: Diagram by Author)

as close as possible to it, following infrastructural developments[1].

Especially in the post-war years, development usually consisted of small plots that were bought rather than invaded and built in violation of the building code and planning legislation, which forbade residential building on agricultural plots outside the city plan. The uneven distribution of population that ensued was influenced by segregation, fiiltering and the formation of social enclaves. As such many of the areas constructed in this period remained without public utilities for significant periods, usually "stealing" electricity from existing lines that produced severe deficiencies in infrastructure during the second half of the 20th century[2]. Districts without water and sewage and without approved street layouts or public transportation facilities were sometimes impossible to reach by extended infrastructure due to the nature of the landscapes of illegal settlements driving environmental degradation and social exclusion. The two most prominent forms of building production in both the authorized and illegal sector were self-building- under the responsibility and supervision of each family and exchange-arrangements with developers build-

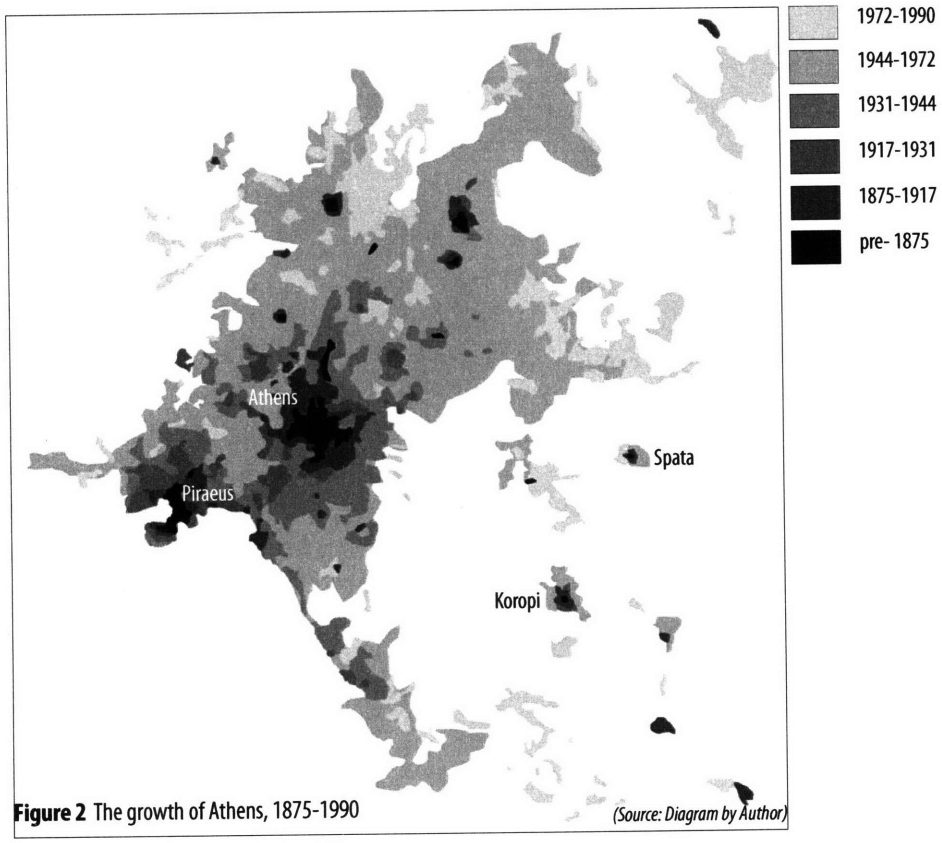


Figure 2 The growth of Athens, 1875-1990 *(Source: Diagram by Author)*

1 Lilia Leontidou, *The Mediterranean City in Transition*, 1991.
2 Lilia Leontidou et al, *Infrastructure- related Urban Sprawl: Mega-events and Hybrid Per-urban Landscapes in Southern Europe*, pp. 71-10, from Couch et al, *Urban Sprawl in Europe*, 2007.

ing on land provided by the family in exchange for some flats. Illegalities such as additions of an extra floor to a existing structure or converting balconies into rooms further increased densities, congestion and air pollution and spurred a massive problem with on-street parking space.

All these processes, even when they complied with the nationwide building code, defied planning in the sense of organized rather than individualized urban development. Institutional change and laws have therefore been the consequences of unplanned development rather than its cause, with spontaneous urban expansion followed by "legalization" of settlements that sought to integrate new residential areas into the city plan. The accession of Greece to the European Union in 1981 was the year in which the primacy of Greater Athens peaked, holding over one-third of the entire Greek population. By this time internal migration to Athens slowed and by the 1990s had stabilized with urban "sprawl" and illegal building continuing albeit in a different context.

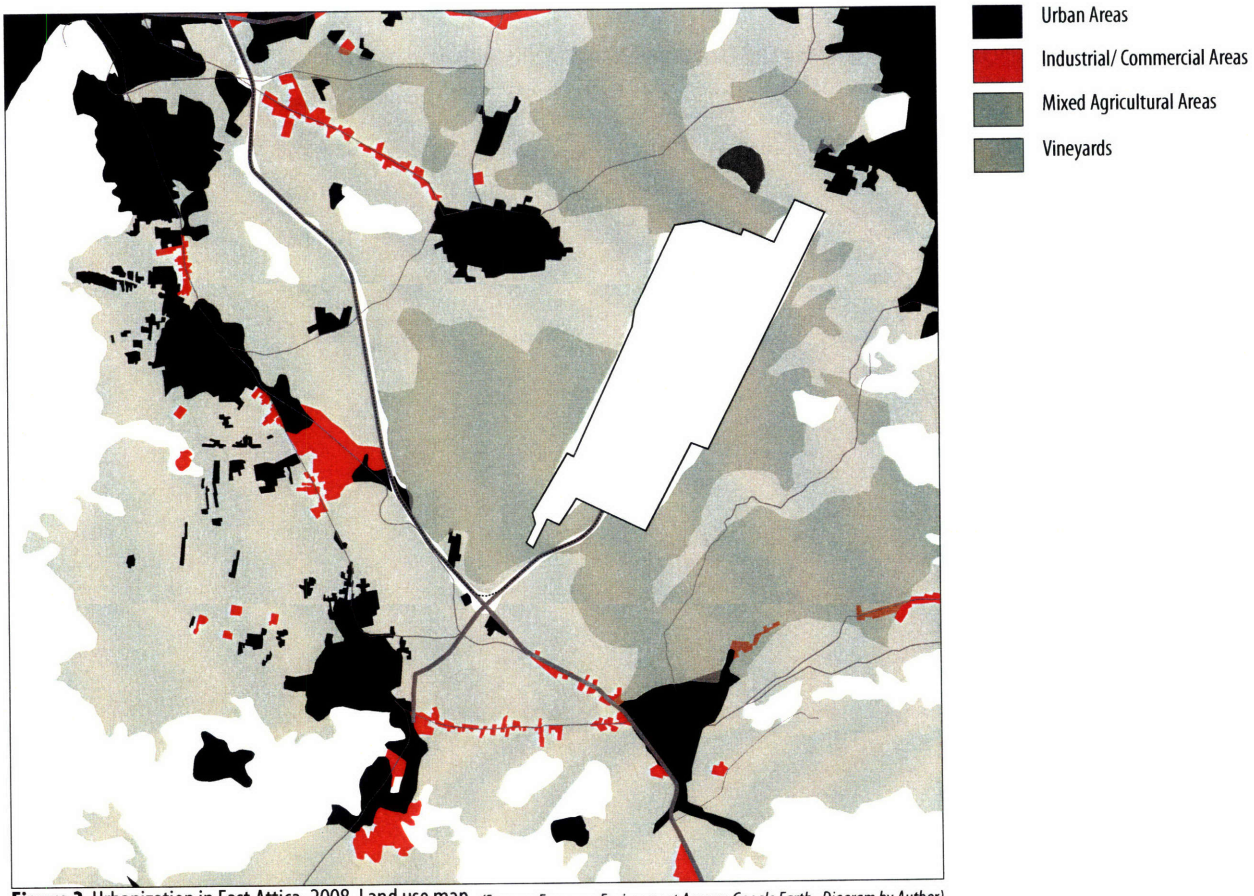


Figure 3 Urbanization in East Attica, 2008. Land use map. *(Sources: European Environment Agency, Google Earth, Diagram by Author)*

EAST ATTICA

Land policy emerged in Greece after the departure of the dictatorship. Planning legislation included regulations on plot exploitation sizes and land-use and the first Ministry of Regional Planning, Housing and the Environment was founded in 1975. In 1983 the Ministry ratified the first Structure Plan of Athens that channelled new development towards the East Attica region[3], physically separated from the rest of the conurbation by the Hymettus Mountain. Two transportation axes connected the main settlements of East Attica to the centre of the city that at the time remained a relatively agricultural area with olive groves and vineyards defining the character of the Mesogeia Plain. The main drivers for new development in the region consisted of two industrial parks close to the towns of Paiania and Koropi that were included in a wider restructuring of employment proposed by the Structure Plan. The preparation for the 2004 Olympic games in Athens that began in the mid 1990s further intensified population growth and industrial re-location within region as extensive new infrastructure projects increased its importance relevant to the centre and made existing settlements more accessible. Since then the Mesogeia Plain has become a spillover area for the rest of the agglomeration that is now beginning to suffer the consequences of "sprawl".

Demographics

The population of the Mesogeia Plain of East Attica is concentrated in four towns each forming the administrative centre of a separate municipality. Since the 1990s the number of people residing in these settlements has increased sharply almost doubling the total of 1991. Mesogeia gained 26 207 inhabitants during the 1980s and 38 737 in the 1990s from physical change and migration. Local authorities estimate a further 30-40% population rise during the first few years of the new millennium, especially since the construction of the new transportation works.

Municipalities	1961	1971	1981	1991	2001
Koropi	7862	9367	12 893	16813	25 325
Markopoulo	5046	5399	9338	10499	15 608
Spata	5409	5814	6398	7796	10 203
Paiania	5032	6111	7285	9727	13 013

Table 2 Population growth of towns in the Mesogeia Plain *(Source: National Statistic Service of Greece)*

3 Lilia Leontidou et al, *Infrastructure- related Urban Sprawl: Mega-events and Hybrid Per-urban Landscapes in Southern Europe*, pp. 71-10, from Couch et al, *Urban Sprawl in Europe*, 2007.

The structure of population growth in Mesogeia provides evidence of the difference from the typical suburbia of North and West Europe, since unlike these there has not been any major relocation of families. The number of small households increased significantly during the 1990s, probably as a result of young male migrants from the Balkans (Albanian), Turkey (Kurds) and Southeast Asia (Bangladesh) seeking employment in the agricultural, service and construction sectors. The number of households increased by 135% between 1981 and 2001 while the average household size during the same period has fallen to half (from 3.33 in 1981, to 3.16 in 1991, to 1.34 in 2001).

Topography

The dominant topographic feature of Mesogeia is the Hymettus Mountain that also forms the physical barrier between the plane and the historic centre of the Athens. To the north, the Pendeli

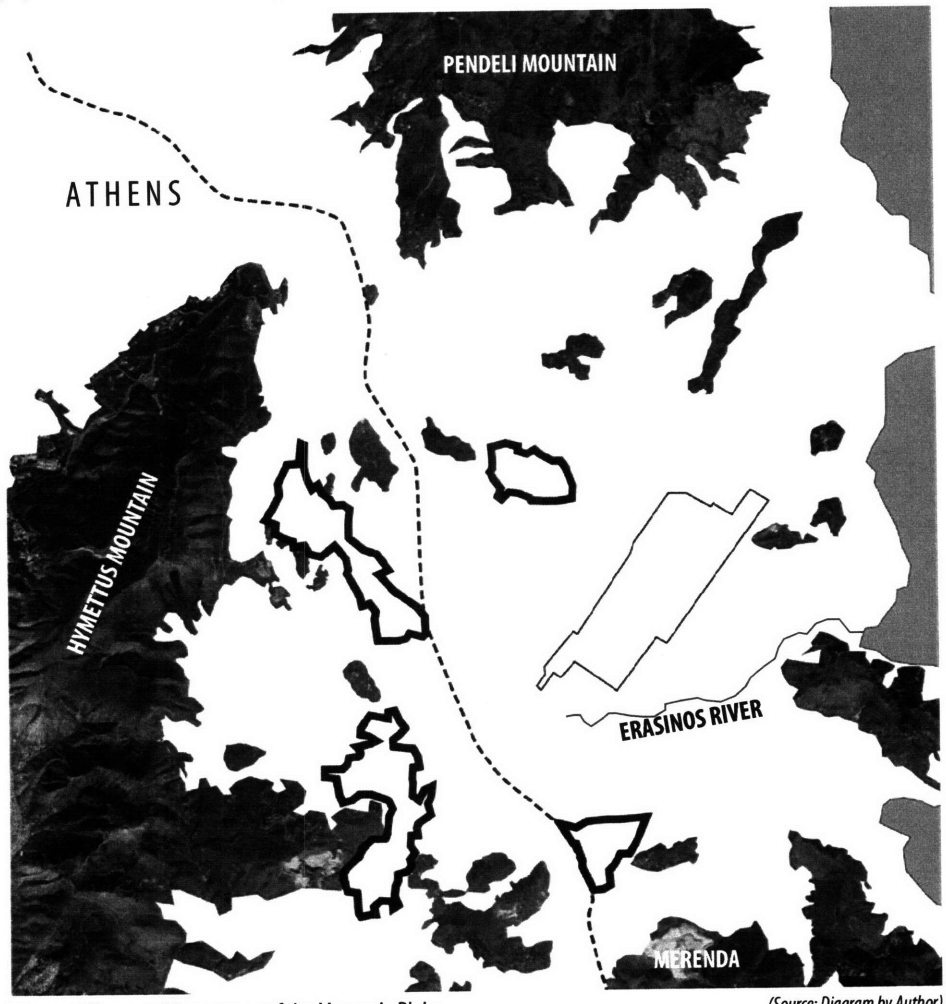


Figure 4 Topographic structure of the Mesogeia Plain *(Source: Diagram by Author)*

Mountain, the main source of stone for the majority of building projects in antiquity, a series of lower hills to the east (dividing the plane from settlements along the coast) and south form the main geological space of Mesogeia. Lower hills dot the landscape creating a spatial system of small valleys in which the towns eventually formed.

The Erasinos constitutes the only major river of the plane, collecting the water running off the hills to the south and main bulk running down from Hymettus. The hydrological basin also includes a number of smaller catchments that flow from Hymettus that have in the past been blocked by residents constructing on or close to their base. Flooding caused by deforestation and forest fires as well as surface sealing has intensified the problems of managing runoff water, especially since the construction of the highway has restricted the natural flows towards the Erasinos.

More than 60% of the East Attica landscape is structured on an agricultural system that employs long thin rectangular subdivisions, approximately 20 metres wide and up to 300 m long and roughly in a north-south direction. These subdivisions form the dominant organizational pattern of the landscape and are used to grow the two primary farming products of the Mesogeia Plain:

Figure 5 East Attica agricultural landscape structure. *(Source: Thanassis Stavrakis)*

olives and grapes. Limited historical evidence traces the formation of the agricultural landscape to two causes: the distribution of holdings to refugees from Asia Minor in the 1920s by the national government and an ancient pattern of land survey employed by Athenians during the classical era (6th-4th century BC), evidence of which has been recorded in Athenian colonies of Magna Grecia in South Italy.

Planning Framework and Land-uses

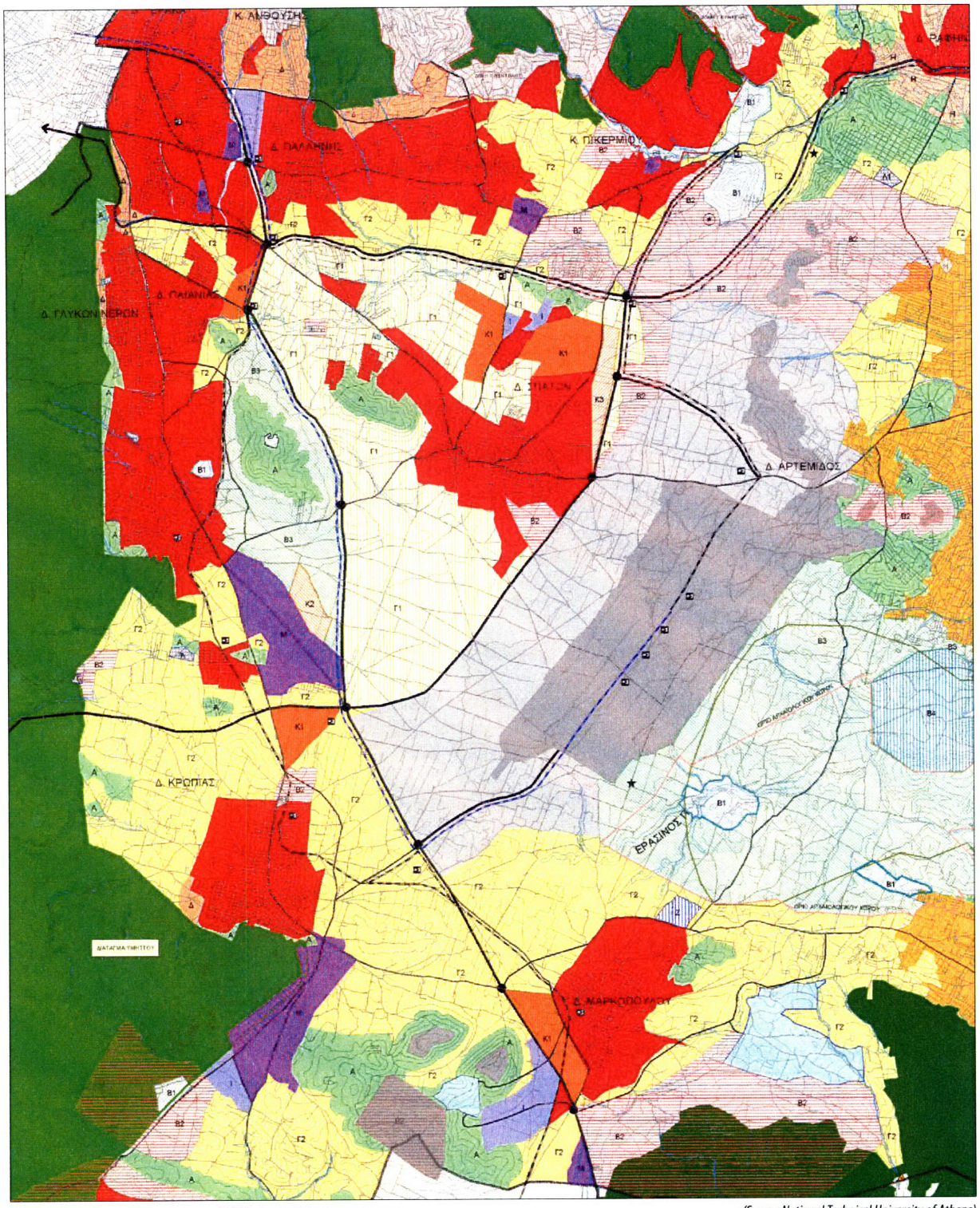
The current land-use plan dates from the mid-80s, modified at the beginning of the millennium to account for the rapid residential development that followed construction of the airport. It is therefore based on a regional plan of Attica, which include the city of Athens and had as its purpose the decentralization and decongestion of the centre by creating state-backed employment opportunities outside the Athens basin. The current plan consists of four major zones of development.

RESIDENTIAL High-density zones within existing town plans are delineated around existing central settlements in each of the four municipalities. Additional areas of permissible low-density construction are found around the coast. These are developable only as second homes.

INDUSTRIAL Two industrial areas that form extensions of the industrial parks delineated in the 1983 Structure Plan.

NO-BUILD ZONES These include a variety of different zones such as the mountainous areas of Hymettus and Pendeli, entered into the European NATURA programme for the protection of natural ecosystems; the Attica Park and the various other green areas that represent existing topographic features of significance; the archaeological zone to the south and east of the airport; the no-build zone to the north and west of the airport which forbids development until 2030.

AGRICULTURAL AREAS Composing the largest area of the plan and the substructure of many



(Source:National Technical University of Athens)

Figure 6 Mesogeia Zoning Plan (Ζώνη Οικιστικού Ελέχου-ΖΟΕ)

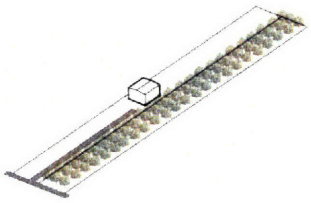
other areas (archaeological and airport no-build zones), agricultural areas are developable only under certain conditions and in any case not for residential purposes.

In legislative terms the "ekistic" law of 1979, influenced by the research of Doxiadis, stands as a paradigm of innovative planning legislation geared towards the specific conditions of Greek urban growth[4]. The law "about urban areas" introduced the idea of future inhabitants' contribution of land or money: a portion of their plot should be contributed to the public authority toward the development of infrastructure and the creation of public open spaces (parks, sports fields etc) and public utility installations. However the law became the most contested item of land use policy on sprawling areas as reaction by landowners against the money and land contribution prevented enforcement and at least one Minister was removed in the process, although the provisions of the law have remained within the nationwide planning code.

Organized urban development, planned according to legislation has been marginal and very rare in East Attica. The reasons range from the weakness of the plans themselves, which do not account for intense pressure by individual developers, to the inability (or unwillingness) of local planning authorities to enforce the regulations. The situation has often resulted in "legalization" of buildings after reaction by landowners focused on influencing political will and more infrequently demolition of illegal buildings. Within the last six months two prominent politicians of the current government have been publicly indicted for buildings that were constructed without regard to planning regulations. In such a political climate illegal building practices are therefore frowned upon but rarely lead to prosecution showing a general public tolerance. As a result most of the land protected as "no-build" by the zoning plan have been encroached upon by private development, essentially eliminating its value as a planning instrument influencing urban development.

The large proportion of development takes place within an existing framework of agricultural subdivisions that mark the landscape with a characteristic long rectangular pattern. Different land-uses have been remarkable in their adaptability to this existing pattern without the need to

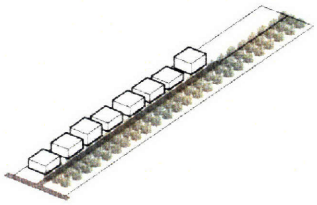
4 E. Marmaras, *Planning and Urban Space: Theoretical Approaches and Facets of Greek Urban Geography*, 2002 (in Greek).



SINGLE FAMILY HOUSE

Built space : 200 m^2 approx.

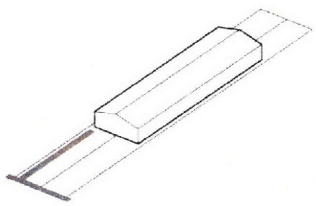
Farm plot coverage: 0.05



MULTIPLE SINGLE FAMILY HOUSES

Built space : 100- 200 m^2 each

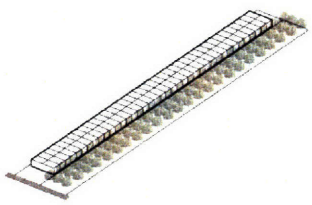
Farm plot coverage: 0.80



INDUSTRIAL INSTALLATION

Built space : 2000-2500 m^2

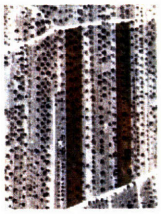
Farm plot coverage: 0.70-0.85

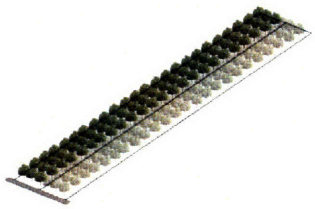


GREENHOUSE

Built space : 50-100 m^2

Farm plot coverage: 0.90





AGRICULTURE

Built space : 0 m^2

Farm plot coverage: 1.0

(Source: Diagram by Author)

Figure 7 Land use typologies on existing farmland subdivision

extend coverage into adjoining land. A large proportion of these however are illegal (anecdotal estimates bring the total illegal construction to 30% of the total), as they either violate land-use zoning or cover areas much larger than that allowed by the existing planning laws. One of the largest changes in land-use patterns that has been noticed is the relocation of industrial activities from an increasingly gentrified historic centre to the Mesogeia Plain (up to 70% of all relocation is taking place in this location[5]) and the conversion of second homes to main ones following the increased accessibility offered by improved transportation.

Transportation

Improvements of public transportation infrastructure have been the main driver for urban expansion into East Attica during the new millennium. In the past two main roads connected Athens with the centre, while until the 1950s a railway service connected the towns of Paiania, Koropi and Markopoulo with Athens to the west and the gold-mine town of Lavrio to the south. In the 1980s an extended area in the heartland of the Mesogeia Plain, Spata, was selected for the construction of the new international airport, and the land expropriated despite local mobilization to the contrary (the main dispute was economic as landowners desired higher prices for expropriation).

The major changes to the region arrived when Athens won its bid to host the 2004 Olympic Games. Several projects where started on the Mesogeia Plain attracting labour and population. The airport started operating in 2001, a year that also saw completion of another major infrastructure project, the Attico Metro subway train in the inner city. Two further transport projects, the suburban railway and the completion of the Attica Highway (Attiki Odos) both connected the new airport with the city centre and adjoining regions (Figure 9). The cost of commuting on these new infrastructures however is still prohibitive for low-income groups as is the cost for private cars utllizing the new toll highway.

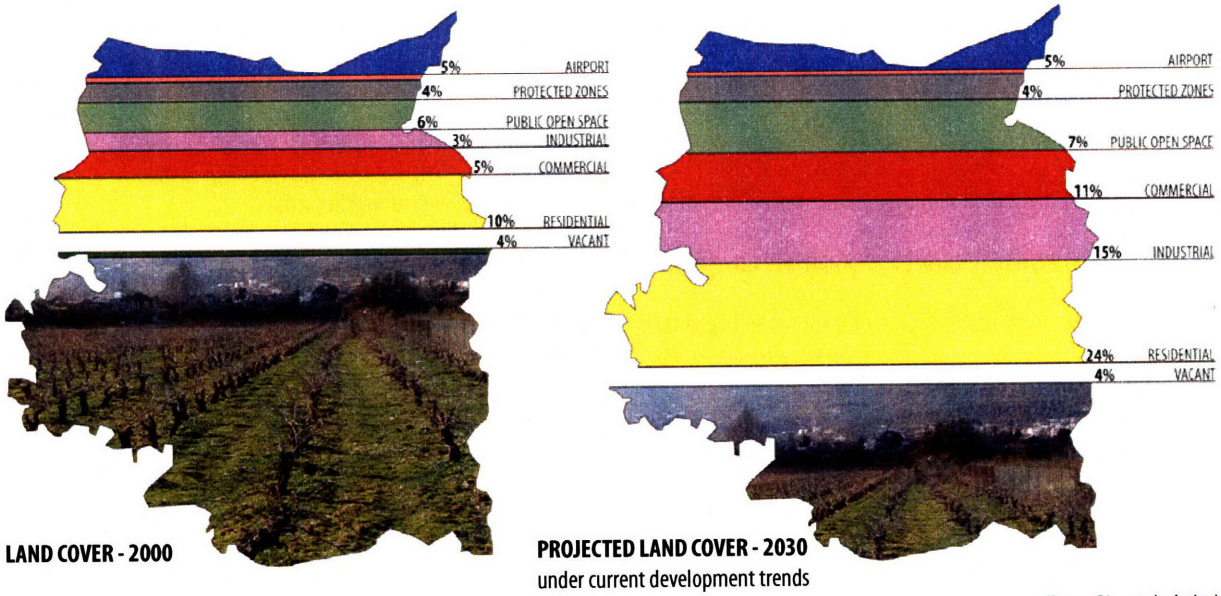
In spite of this Attiki Odos reached its planned limit of 240,000 vehicles per day within the first three years of operation and is now under threat of severe congestion especially during rush hour. The new airport has also reached its planned-for passenger limit, exceeding 12 million users per year and an architectural competition in March 2008 has given the go-ahead for a new terminal building to be constructed before 2011.

5 Ludwig Wassenhoven et al, *Planning and Organization of Industrial Parks in Attica Prefecture: Koropi- Vari and Metamorphosis Industrial Parks*, 1998.

DEVELOPMENT SCENARIOS IN EAST ATTICA

According to current estimations the population of the Mesogeia Plain exceeds 100 000 people and is likely to rise even further within the next 20 years. Whatever the population may actually be will not be discovered officially until the next national census in 2011. Until then however speculative development pressures will act as a major incentive to increase building supply in the area. Between 5000-7000 new buildings are added to the region every year since the end of the Olympics and this will likely increase given the planned urbanization of over 425 square kilometres in various Mesogeia localities. This in turn is leading to appreciation of property values in a vicious circle of development.

The effects of new construction as have been outlined before include degradation of the natural environment due to surface sealing and ecosystem fragmentation, increased costs in expanding vital utility infrastructure such as sewage and water to outlying buildings, and an increasingly unaffordable housing market that may lead to social exclusion. In addition there is a high probability that the unstructured growth will lead an already weakened metropolitan form to further destabilization, as the continuous built space spills over into the traditionally agricultural environment of Mesogeia, absorbing the settlements there into a homogenous urban fabric.



LAND COVER - 2000

PROJECTED LAND COVER - 2030
under current development trends

Figure 8 Land coverage in Mesogeia - Current and Projected

(Source: Diagram by Author)

Furthermore, the image of the region in relation to the city may lose the characteristics that have allowed it to remain identifiable as a separate but integrated region in Greater Athens. The transformation of farmland into urban land-uses could therefore have negative effects not only the physical environment but also on residents' mental image of their home.

SCENARIO 1- Following current development patterns

To understand the future effects of continued development a scenario was constructed that extrapolated current conditions in the construction industry and industrial relocation up to the year 2030. The scenario used the findings of the first chapter concerning the influence of the urbanizing terrain on the form of low-density development to construct a map and land-use pattern for the next 23 years. More specifically the assumptions were:

1 Construction activity continues at today's rate. Although most estimates predict an increase in construction activity, the study opted for a conservative approach as to new built space over the 23-year period. This still gave a substantial land-cover of about 10 Km2 calculated using only data for legal buildings for the years following the 2004 Olympics.

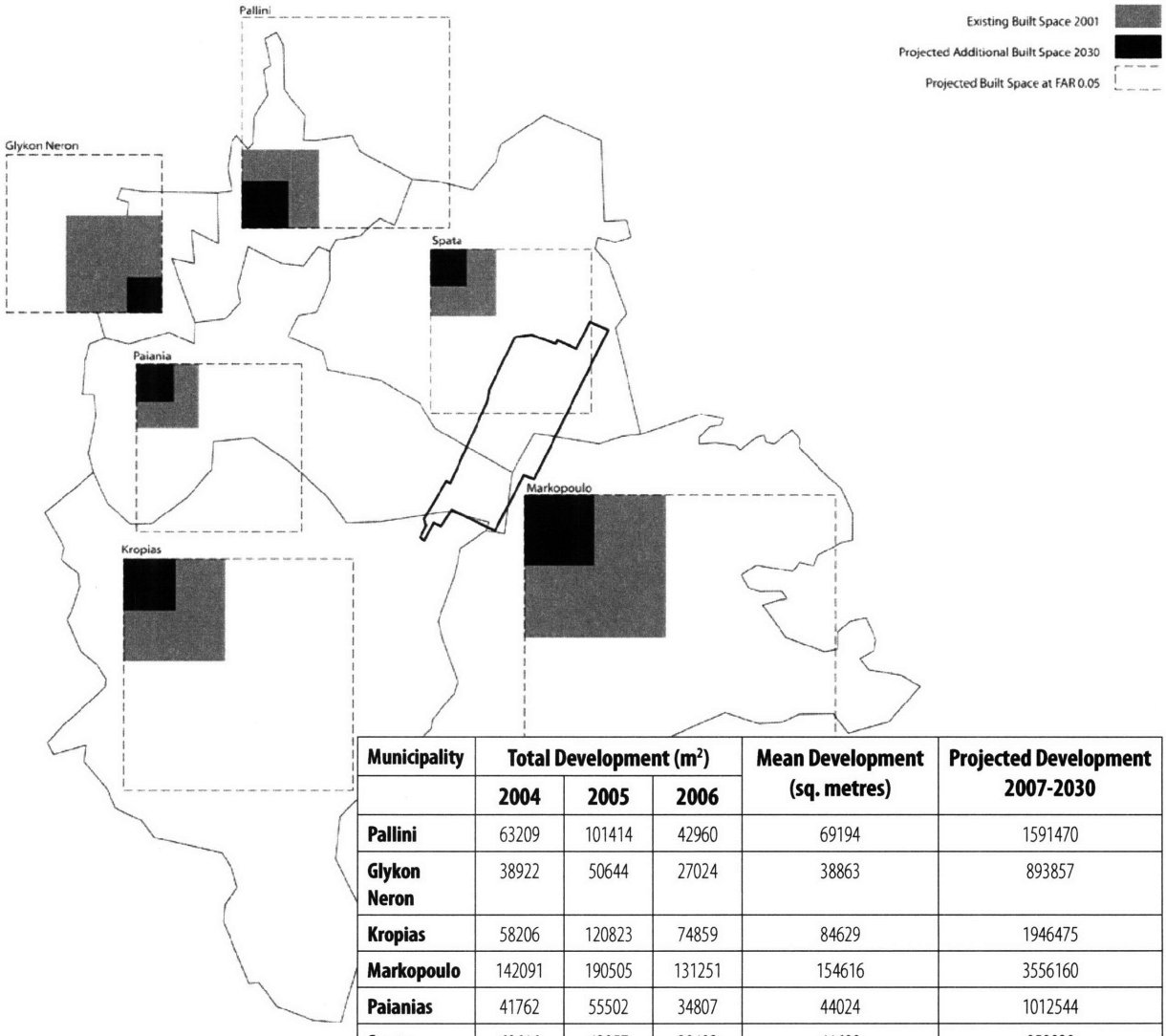
2 Building activity will be stronger on the outskirts of existing towns that will take the brunt of new development to gradually merge with the continuous built space of Athens.

3 The majority of illegal building activity in the form of single-family housing constructed according to the existing agricultural subdivision will take place in the areas between the existing towns. This is due to an even districbution of farm roads that enable access to nearly every part of the terrain. A proportion of this illegal construction will include industrial buildings that will concentrate on the farmland between Koropi and Paiania, as is already the trend.

4 Existing zones of industrial activity will expand especially those on the outskirts of Paiania and Markopoulo that are well connected with the highway for regional distribution of their product.

6. The existing transportation structure of the highway and suburban line will encourage ribbon development along its axes with a higher density of activity at access points (highway exits, rail stations). The airport expansion will also eventually lead to a greater number of regional facilities such as malls and large retail outlets concentrating around the airport to form a new aerotropolis.

7. Most development will concentrate in the municipalities of Koropi and Paiania rather than Spata and Markopoulo. This is not only due to proximity with the inner city but also with more favourable conditions as regards enforcement of existing planning regulations, which are less restrictive in the former.



Municipality	Total Development (m^2)			Mean Development (sq. metres)	Projected Development 2007-2030
	2004	2005	2006		
Pallini	63209	101414	42960	69194	1591470
Glykon Neron	38922	50644	27024	38863	893857
Kropias	58206	120823	74859	84629	1946475
Markopoulo	142091	190505	131251	154616	3556160
Paianias	41762	55502	34807	44024	1012544
Spata	60616	43957	20493	41689	958839

Figure 9 Projected built space in East Attica *(Source: Diagram by Author, National Statistcal Service of Greece)*

Figure 10 Urban Form of East Attica, 2008 *(Source: Google Earth)*

(Source: Diagram by Author)

Figure 11 Projected Urban Form of East Attica, 2030

SCENARIO 2- Designing with the properties of the urbanizing terrain

An alternative scenario was constructed which considered a number of interventions directly into the constituent elements of the urbanizing terrain. For this scenario, the same assumptions concerning the development rate of Mesogeia were considered but emphasis was given on intervening with elements that could mediate the negative consequences of increased construction activity as outlined earlier. The design interventions were considered on three separate layers that could then be integrated on the Mesogeia landscape to create a framework for future growth.

TRANSPORTATION

The current situation shows a well-distributed system of local farm roads within the region, a two-lane main traffic artery connecting the towns of Markopoulo, Koropi and Paiania and a regional transportation system in the form of the highway and suburban line. The two regional systems were considered adequate to form the main transportation axes between central city and the Mesogeia Plain even though only two exits (and a planned third at Markopolou) are in the vicinity of the towns.

The design considered the need for regional connectivity between the towns themselves as a way to concentrate construction activity within the already developed areas of the Plain and away from the more vulnerable ecosystems towards Hymettus Mountain. The existence of the rail connection, closed during the 1950s led to an exploration of alternative public modes of transportation that could be integrated into the existing right-of-way. This publicly owned land-stretching north south along the west edge of the Plain was regarded as an excellent opportunity to introduce a fixed-track transportation system that could connect three of the four towns to the existing suburban rail system. The tram system was seen as the best method to provide:

1. Local accessibility along the route- with stops at distances of 500 metres or 5 minutes walk from each other.

2. Regional access between towns that are each about 5 kilometres distant from each other. Calculated at the speed of the new inner city tram system this means approximately 20-25 minutes between towns. While this is not competitive time-wise with alternatives such as the car, it is close to the time taken by other modes of public transportation such as buses that operate inter-regional services. A tram system is also more reliable in terms of speed (no competing traffic) and frequency.

Figure 12 Tram route with proposed stops

(Source: Diagram by Author)

3. Metropolitan access via the existing suburban rail station at Paiania and the planned new station at Markopoulo. Distance between the midpoint of the tram system and connection points at the two stations are calculated to take less than 35 minutes with all the advantages of reliability and frequency already outlined above.

In addition, and to enhance connectivity of all the towns with Spata and the potential new retail centre forming close to the airport a series of existing local roads have been picked out to act as direct transportation routes between the towns. Selection was made on the basis of roads that fit the closest direct path to the proposed destination and the existence of routes over or under the highway (bridges and tunnels). These new regional avenues could potentially become the main new movement corridors for goods between towns and a new regional bus service that can redistribute its resources away from the route taken by the tram.

Figure 13 Routes of new connecting avenues *(Source: Diagram by Author)*

BUILT SPACE

Current residential urban growth within the agricultural system has seen a specific pattern of illegal settlement emerge. This takes the form of a perpendicular subdivision of the rectangular farm plots into smaller units of about 300 square metres. These are large enough to construct buildings of about 150-200 m^2 on one floor, which is the preferred configuration of new development. While strictly outside Greek building regulations that only allow for a maximum of 200 sq. metres for each plot above 4000 metres squared, this new settlement pattern, derived from market conditions of supply and demand is substantially more sustainable than the "legal" pattern as it can allow a much higher density of people to occupy a single agricultural subdivision.

Figure 14 Inhabiting the agricultural land. Koropi, East Attica, 2008. *(Source: Google Earth)*

Figure 15 New subdivsions within agricultural plot.

This system of inhabiting the agricultural land works within the infrastructural network of the terrain. The following process is followed:

1. A new road is created along the length of the agricultural plot.
2. New subdivision is created perpendicular to original plot, apporximately 20x20 metres.
3. Electricity is provided by joining the existing network.
4. Individual owners purchase and construct their homes. This is done without planning permission.

As such an average agricultural plot can house over 15 new houses, marking a possible new density of about 100-120 people per hectare. This is significantly denser in terms of residents than the legal density that only allows a single house or about 8-10 residents per hectare and can thus be considered more sustainable in that it uses existing land more economically. However, the pattern is detrimental to productive agricultural on the rest of the plot. It also allows very little flexibilty for an increased density that would potentially permit other forms of infastructure such as sewage and public transportation.

To become sustainable, both in economic and environmental terms, low-density development must have the goal of reaching residential densities above 150 people per hectare. Above this density, development can economically support mass transit public transportation systems such as buses that can bring down commuting costs for new residents and allow a wider range of

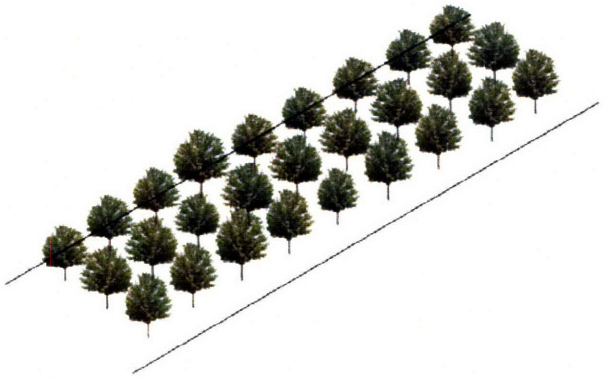
incomes to locate in these areas. Taking into account existing development conditions in the East Attica landscape, two strategies are proposed to eventually reach the desired level of residential density, assuming that new development is subject to illegal building practices and is therefore vulnerable to demolition and high fines if planning authorities decide to enforce existing legislation.

TYPICAL SUBDIVISION

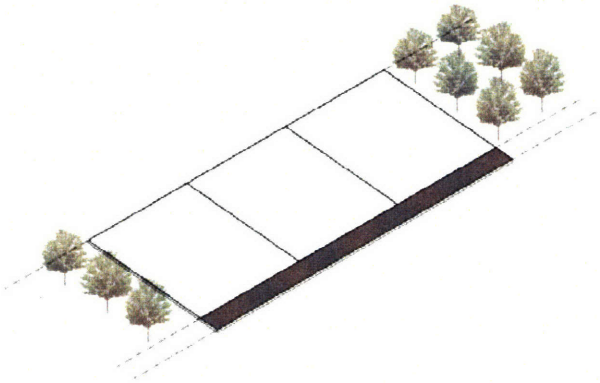
The process for densifying residential areas constructed on a typical, market-derived subdivision of the agricultural plot fo 20 x 20 metres takes into account the spaces between house and plot boundary and inserts a reinforced concrete construction wall which can be utilized as a base for residential additions such as rooms, garages etc. The wall is estimated at a cost of about 2500 euros for each plot and will burden the household owner as a means to legalize the home. Its purpose is to addtionally serve as a common interface between adjoining plots that will establish the wall as the new boundary between holdings and lend developments a stability of appearance by becoming a permanent feature between which the house is constructed.

NEW SUBDIVISIONS

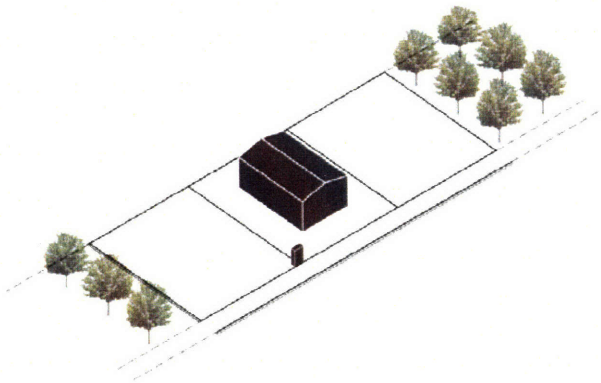
While typical subdivisions are derived from the market they do not maximze the interface between utility infrastructure provision such as water and electricity by having extended areas along the street edge. The new subdivision aims to double the number of dwellings within the previous 20 x 20 metre plot, converting it to 10 x 20 metres with the short edge along the street. This will double the number of houses to which the same utility infrastructure can economically reach bringing down the costs of its provision which can be shared by adjacent home-owners. The burden for the new subdivision will fall on the developer of the agricultural plot who will be able to legalize the new residential subdivisions by following the new process.



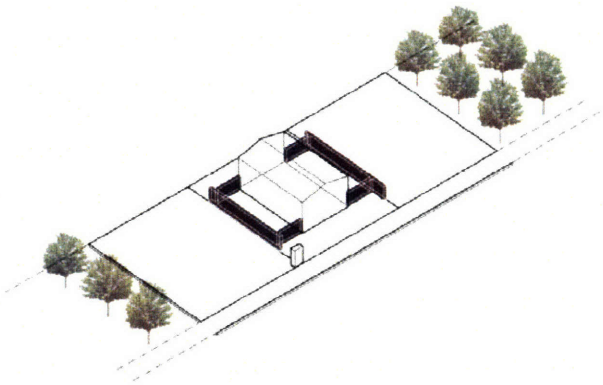
1 Original condition



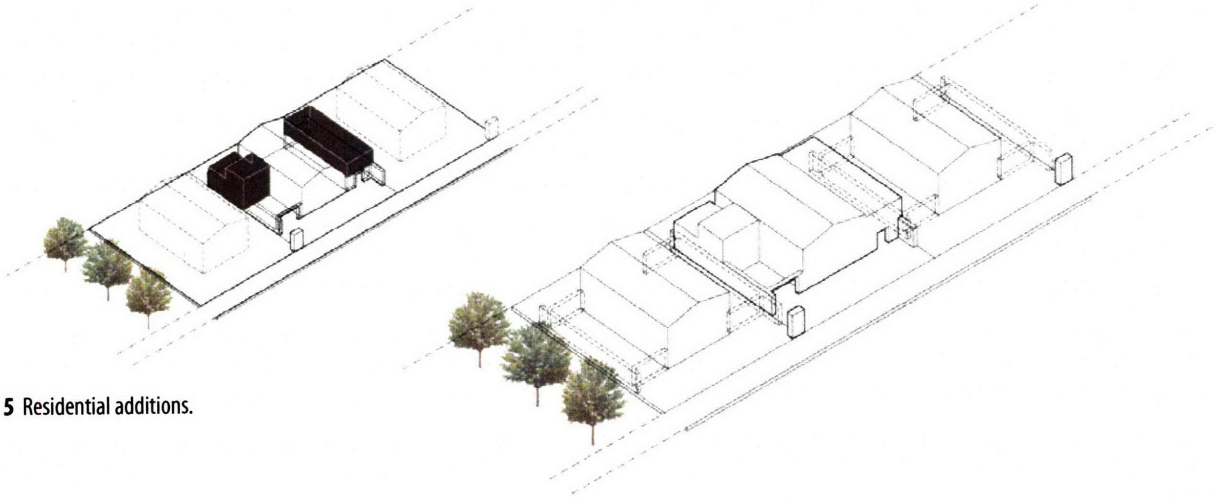
2 Typical subdivisions. Transformation of agricultural land into building plots approximately 20 x 20 m.



3 New construction. Individual owners build their own home and connect to electricity grid.



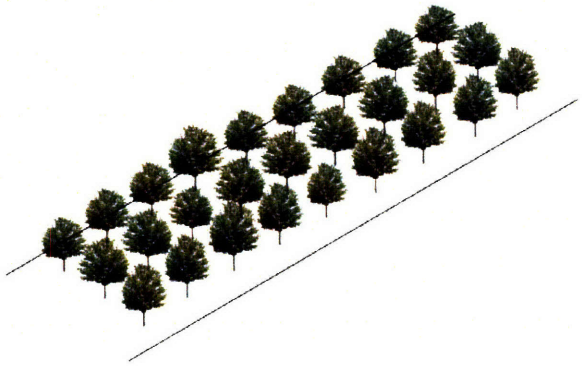
4 Construction wall. The walls frame an area between 50- 75 m^2 on each side of the house and are 2.50 m tall.



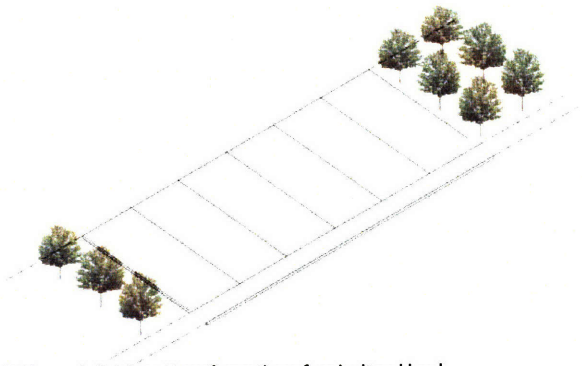
5 Residential additions.

Figure 16 Densification of typical subdivision.

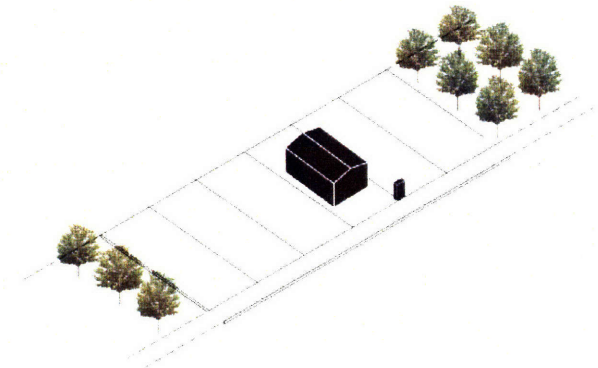
(Source: Diagram by Author)



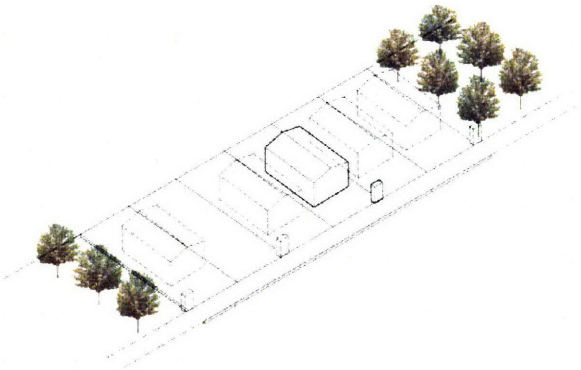
1 Original condition



2 New subdivisions. Transformation of agricultural land into building plots 20 x 10 metres.



3 New construction is requires a narrower building typology than that encountered today.



4 Construction of narrower buildings takes better advantage of infrastructure that can serve double the households than current subdivisions.

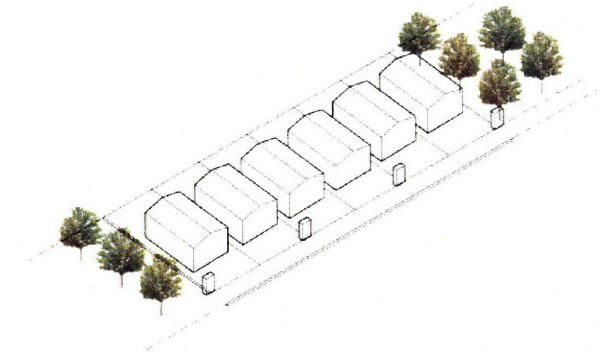


Figure 17 Densification with new subdivision size.

(Source: Diagram by Author)

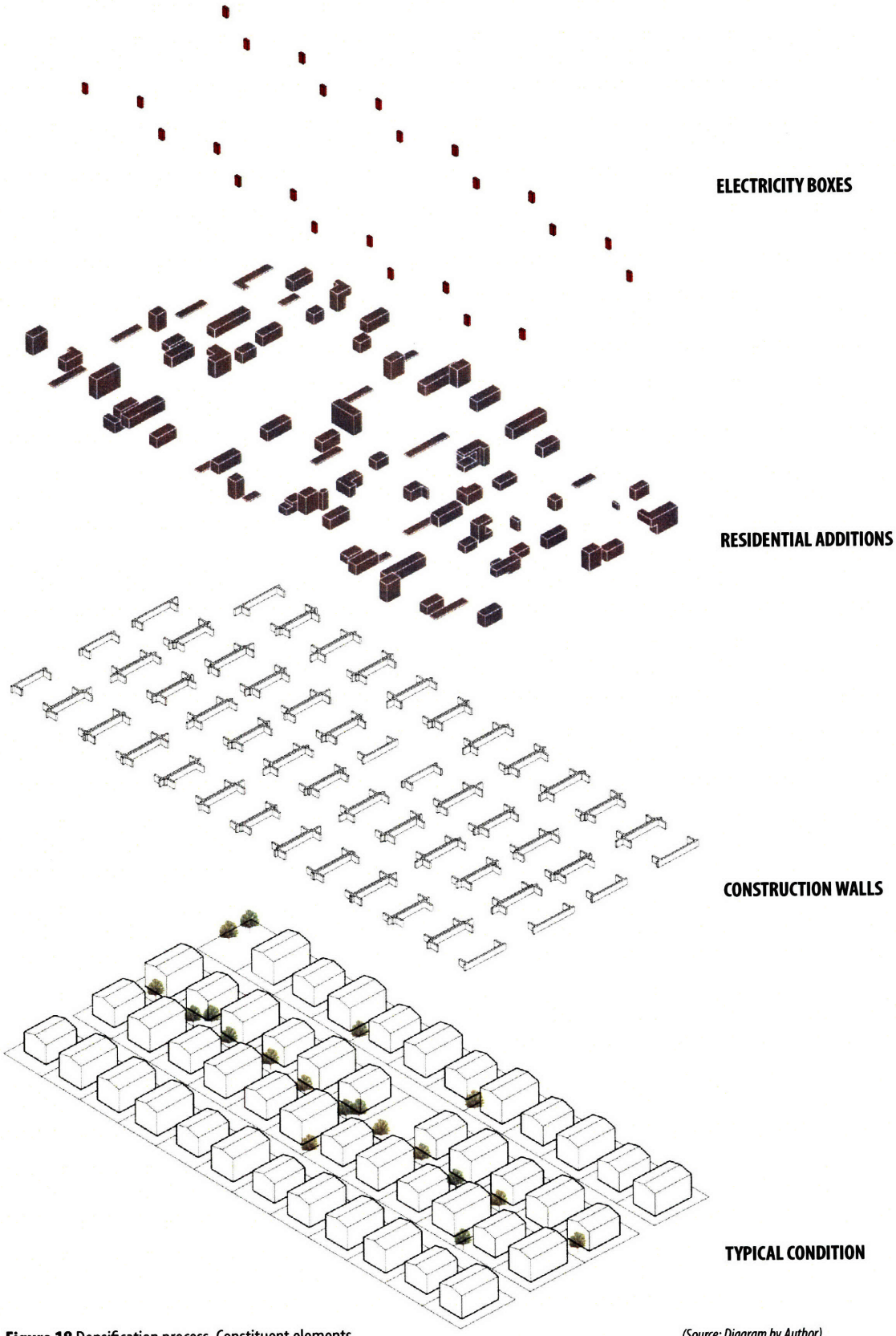


Figure 18 Densification process. Constituent elements. *(Source: Diagram by Author)*

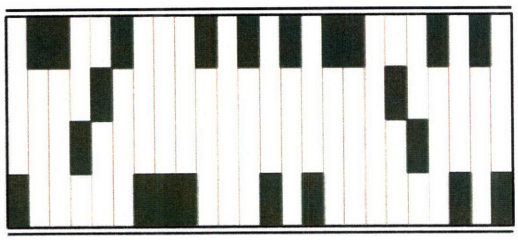
OPEN SPACE

The existing open space system is composed primarily of agricultural land that is under threat of disappearing due to the urbanization process. It currently accounts for over 60% of the total land-use of the Mesogeia Plain and is divided between olive cultivation and vineyards interspersed with fruit orchards and vegetable fields. The system of farm subdivision is a strong characteristic of the region with long thin strips of an average 20 metre width that do not exceed 300 metres in length in extreme conditions. Open space also includes the hilltops dotting the landscape and some patches of forest as well as the Erasinos river to the north of Markopoulo.

The open space strategy evolved took account of the strong identity-granting character of agriculture and need to preserve its presence in the face of scattered urbanization. It also considered the need to help reverse some of the current environmental problems facing Mesogeia such as flooding from blocked catchments, salination of the hydrological basin due to illegal wells for watering gardens and the fragmentation of farmland in increasingly smaller patches leading to its eventual deterioration. Open space was also considered as a vital space reserve for future public activities and uses in the sense espoused by Frampton. As such it was not considered necessary to provide open space that would necessarily be filled but that could remain empty until an appropriate use more important than agriculture is found.

Open space expropriation

The plan utilized the existing provisions of the controversial 1979 law that called for a portion of developable plots to be surrendered for public use. However the format of the law and its resistance by residents were incentives to alter the method by which it is applied to the existing landscape. As such the agricultural landscape was reconsidered in terms of sectors that bounded farmland within a framework of wide farm roads. Each sector potentially holds well over 10,000 square metres of agricultural subdivisions allowing for the largest amount of appropriation (30%). In addition, by considering the farms as sectors, fragmentation of open space into small plots can

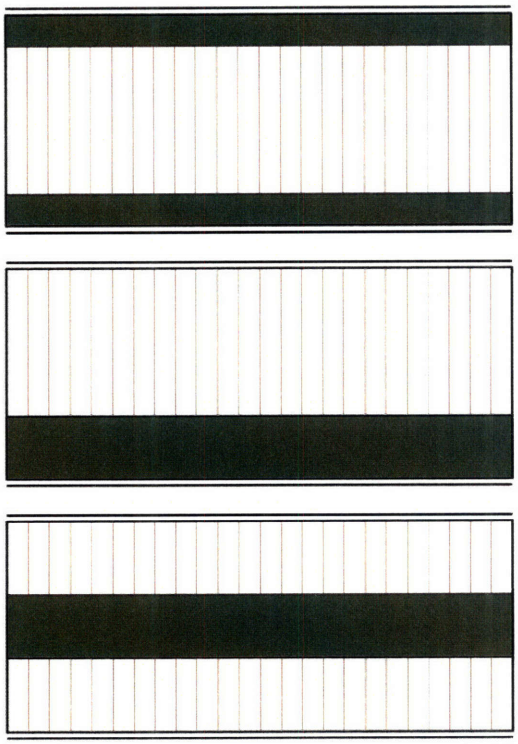


Appropriation by individual plot.

Dependent on current position of urbanizatio the traditional mode of appropriating by plot leads to a dispersed pattern of spaces for public infrastructure. (Average plot size 4000m^2)

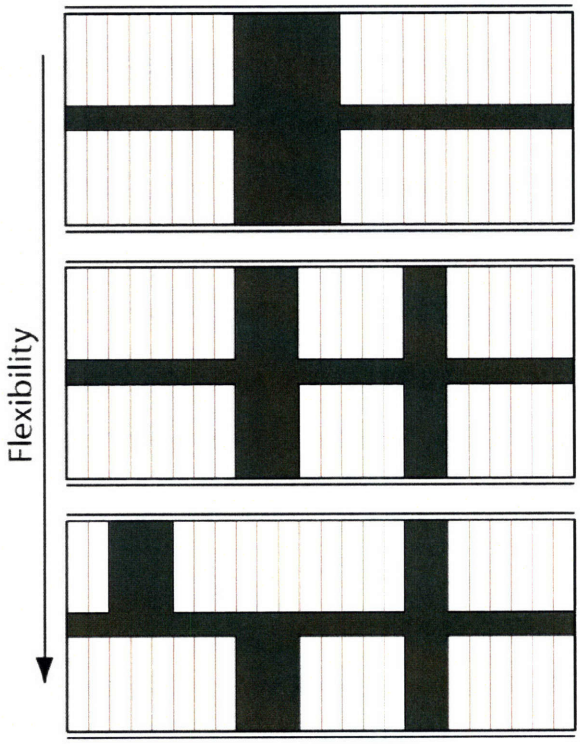
In "Ex-Urban"city zones, Greek planning legislation allows the appropriation of a certain percentage of developable plots by the State for the provision of public infrastructure. This is dependent on the size of the developable land:

250 m^2	5%	
250 - 1000 m^2	10%	
1000- 2000 m^2	15%	
2000- 4000 m^2	20%	**AVERAGE AGRICULTURAL PLOT SIZE**
4000- 10,000 m^2	25%	
10,000 m^2	30%	**AVERAGE AGRICULTURAL "SECTOR" SIZE**



Appropriation by "Sector" - Strips.

Each "Sector" includes all agricultural plots bounded by agricultural roads. This enables appropriation of continuous areas within each "Sector" between the geometric centre of the bounding roads (Average "Sector" size 10 000m^2+)

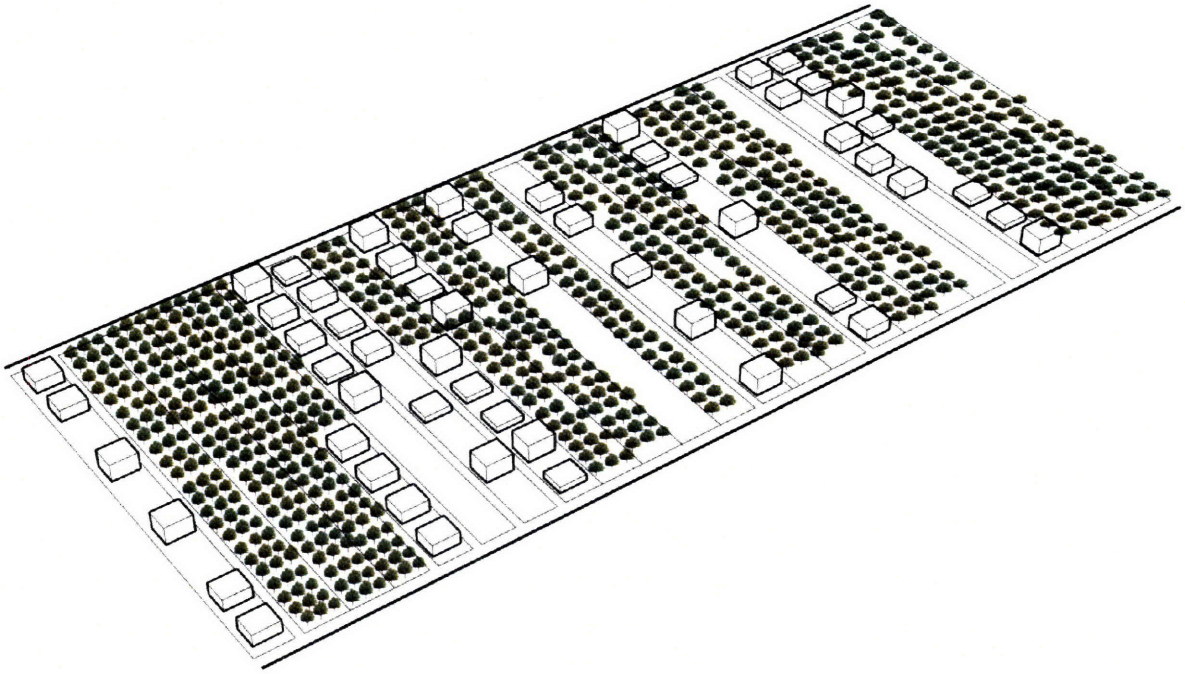


Appropriation by "Sector"- Conserving Farmland

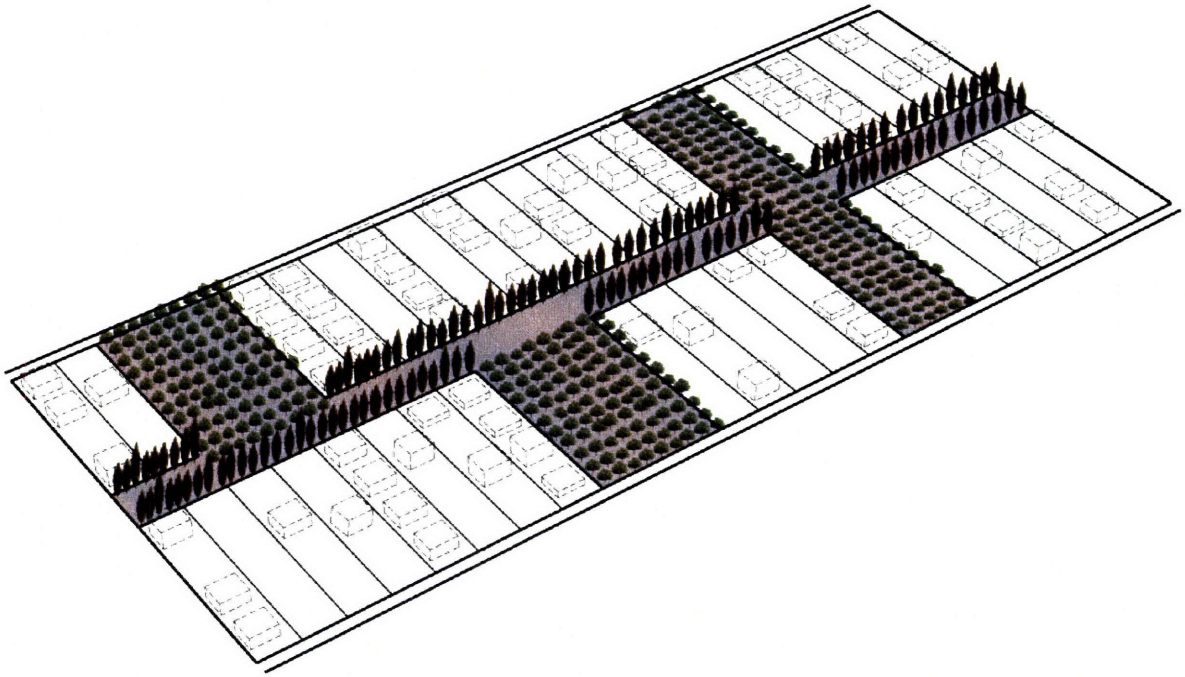
While longitudinal strips can provide a continuous public space a vertical system of appropriation, based on the current position of urbanization can facilitate the conservation of agricultural land that can remain connected to the continuous strip.

Figure 20 Open space system

(Source: Diagram by Author)



Existing Condition - Urbanization enroaching on agricultural land



Condition after appropriation of 30% of "Sector" for conservation of agricultrual land

Figure 21 Open space system

(Source: Diagram by Author)

Figure 23 Open space system - Possible configuration

(Source: Diagram by Author)

be avoided, in this way preserving land that can remain productive, as it will not always border on developed plots. The system of physical appropriation also had the necessity to be flexible and take into account the possibility that any number of plots in any location within the sector will be developed before it is enforced. Thus, only the longitudinal strip perpendicular to the farm plots is considered "standard", while the appropriation of the plots themselves can take place in any location and in as much continuity as possible. Longitudinal strips are considered as important devices for increasing future connectivity and for mediating some of the current environmental problems. The use of these strips will be different according to location within the region and will be directly connected with the sustainable development of the region. Four main uses are envisioned for these areas:

1 Protection of catchments

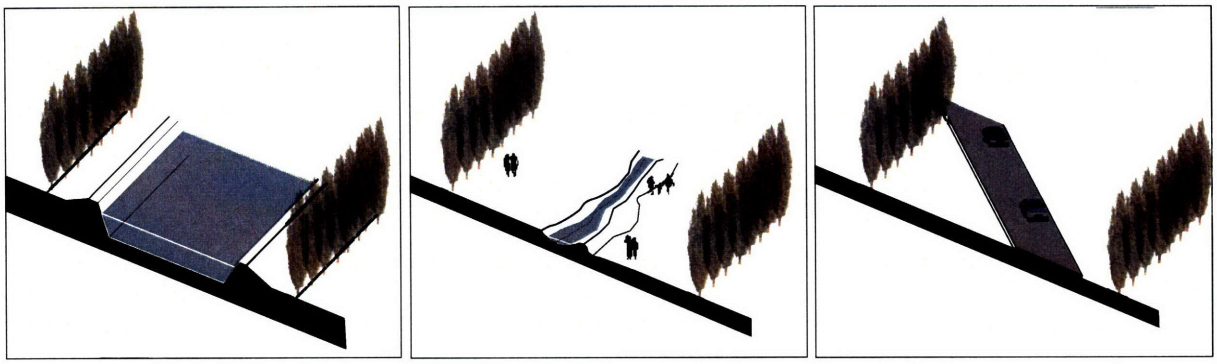
Currently a number of catchments are considered as under threat of being blocked by new development. Longitudinal strips can create protective public zones around the areas where the greatest danger of flooding from unplanned development is anticipated.

2 Replenishment of the hydrological basin

Excessive use of illegal wells drilled into the hydrological basin of the region has reduced the levels of fresh water to dangerous levels that are encouraging saline water from the sea tp replace it. Processes of replenishing the aquifer with rain and grey water can take place in several areas throughout the region by using relatively inexpensive techniques of wells filtered with natural soils. Preparation of these areas and annual maintenance will be the costs of this process.

3 Public walkways

These can act independently as recreational corridors connected to both agricultural and natural scenic routes. Walkways can act independently within each sector or as part of a larger interconnected system that will include several sectors.



Replenishing the Hydrological basin | Catchment Protection and ecological walkways | Connecting Roads

Figure 22 Uses of Appropriated Strips *(Source: Diagram by Author)*

4 Connecting roads

Constructing within the strips can fulfill the possibility of new roads being required during the urbanization process. As each strip cuts through the entire sector they can form a secondary access system for future residential development.

Land Trust

Another consideration for the open space strategy was the need to manage the preserved land in a way that would avoid losing its agricultural productivity while maintaining the possibility of a future public use. For this reason the Mesogeia Land Trust was suggested as an institutional mechanism to administer and collect the land with separate Booards for each of the four municipalities. The Trust would act as a mutually owned organization (like building societies in the UK) with voting members composed of the landowners that reatin deeds to their land, an which the Land Traust secures against developmental pressure, having the right to continue cultivation until such a time as it is necessary for a new public use to be constructed on their land. At the time when the land will be developed the landholder will be compensated at market price by the Trust. Voting members would have the right to elect two representatives on the Trust Board that would have the responsibility of communicating the interests of the landholder members to the rest of the Board. Additional Board members include a representative from the local municipality and a member from the local planning authority that would represent the interests of the citizens of the municipality. Advisory members to the Board, with no voting rights, will include a representatives

from the Technical Chamber of Greece, the Organization for the Structure Plan of Athens and an academic professor in Spatial Planning.

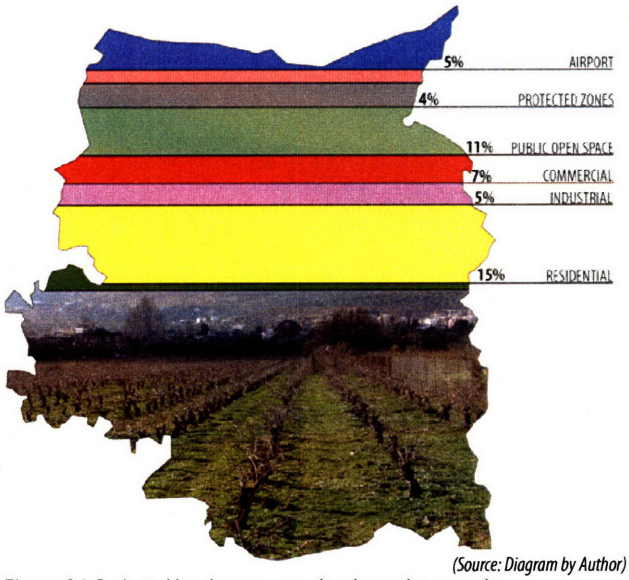
The responsibilities of the Board are to preserve and maintain the longitudinal access strips according to the uses assigned to them and to decide at the appropriate time if a new suggested use can be constructed on the conserved land. It will also be assigned the role of collecting funds for the maintenance of the open space corridors and compensation to the members. This will be made possible through the development of key plots under the supervision of the Trust that will confer funds through rent. Accountability of the institution is therefore considered extremely important. For this reason a two-way system of public accountability to both a higher tier of central government (Ministry of the Environment) and the landholding members is preferred through the bi-monthly publication of the Trust's activities and its distribution to its members. Finally the Trust will be set to operate for 25 years, which is considered a time that the developmental pressures will have receded.

The open space system will operate as both a physical presence in the landscape and an institutional mechanism. Physically it will have the ability to create a new physiognomy for the region by preserving and enhancing its existing identifiable features as well as accounting for the uncertainty of future development, while through the Trust open space, and thus perhaps environmental and development issues, will gain an official voice.

INTEGRATION

The layers developed from the properties of the urbanizing terrain researched in the first chapter and explored in the previous pages are integrated in the urbanizing landscape of East Attica. The alternative scenario, while respecting the development pressures of the first scenario can extrapolate a different pattern of urbanization that will be influenced by enhanced accessibility along the routes of the tram and connecting avenues, the increased density of residential areas using the currently illegal pattern of development and the configuration of conserved agricultural land with accessible strips running through the centre of the agricultural "sectors".

Taking these factors into consideration the land coverage of the region will see marked improvement in the availability of productive agricultural land that, by retaining its presence through a period of high development pressure, can re-brand the image of East Attica and potentially transform resident's geographical imaginations with an emphasis on the cultural benefits of ecology and the natural landscape. In addition an increased availability of public open space can be exploited as a reource for the benefit of municipal residents and the population of Greater Athens as a whole. Both industrial and commercial areas will be concentrated along the routes of greater accessibility within the region, as such reducing their impact on the natural environment by creating areas where partnerships between entrepreneurs can begin to form mutual infrastructural units such as water decontamination units and power production.



(Source: Diagram by Author)

Figure 24 Projected Land coverage under alternative scenario

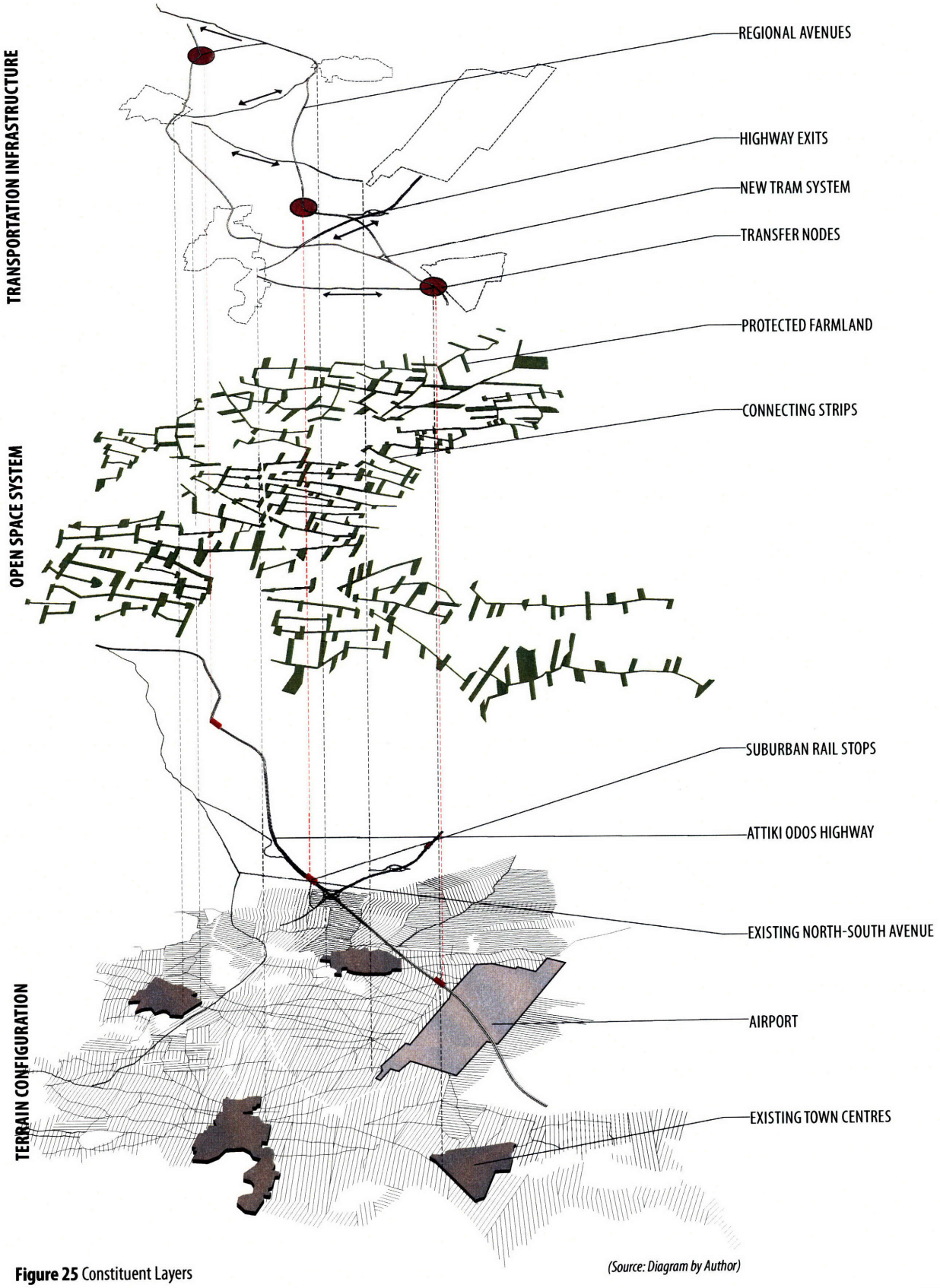
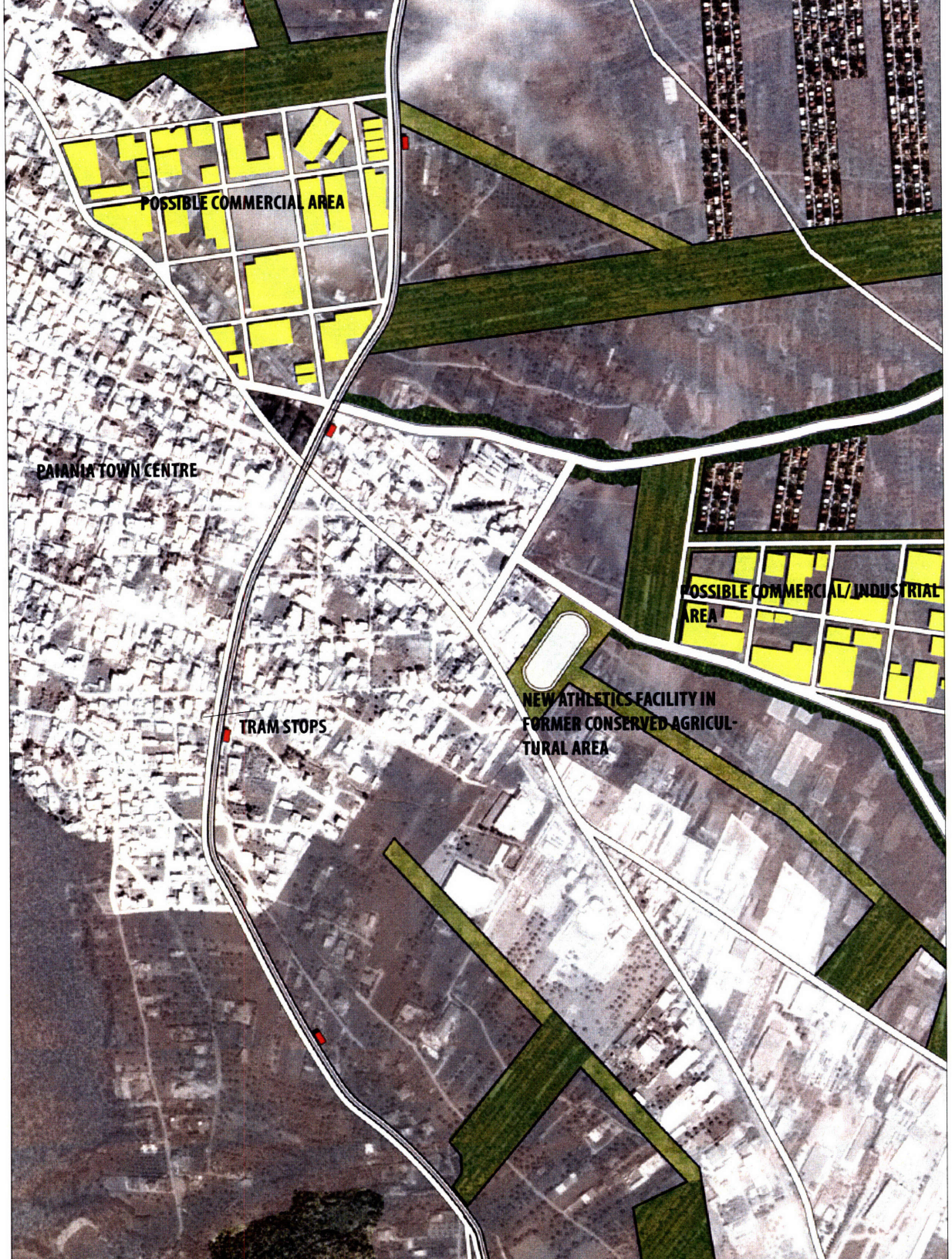


Figure 25 Constituent Layers

(Source: Diagram by Author)


POSSIBLE COMMERCIAL AREA
PAIANIA TOWN CENTRE
POSSIBLE COMMERCIAL/ INDUSTRIAL AREA
NEW ATHLETICS FACILITY IN FORMER CONSERVED AGRICULTURAL AREA
TRAM STOPS


POSSIBLE COMMERCIAL AREA
NEW REGIONAL AVENUE
ATTIKI ODOS HIGHWAY
NEW RESIDENTIAL AREAS
NEW RESIDENTIAL AREAS
NEW RESIDENTIAL AREAS
NEW REGIONAL AVENUE

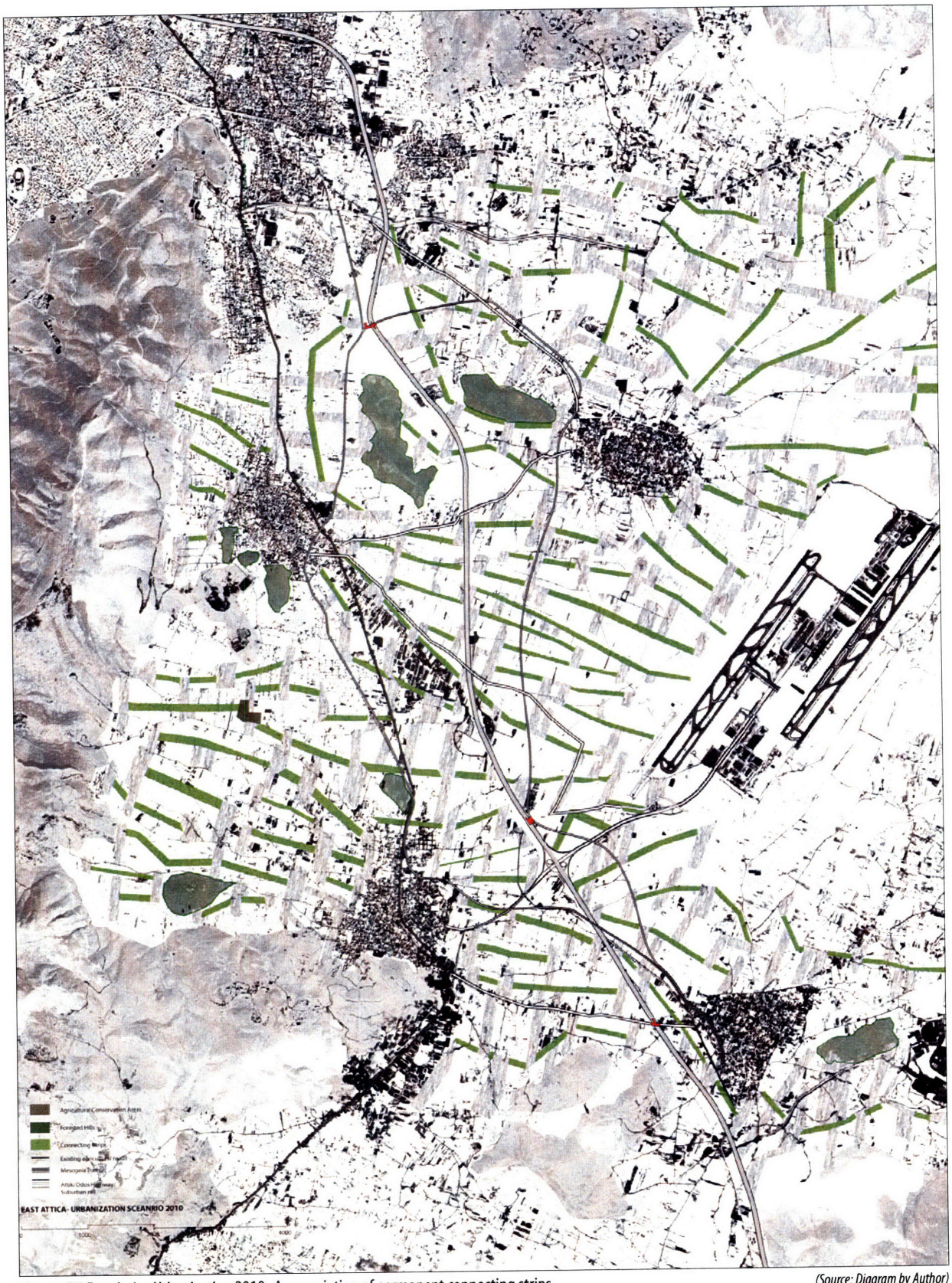


Figure 27 East Attica Urbanization 2010- Appropriation of permanent connecting strips

(Source: Diagram by Author)

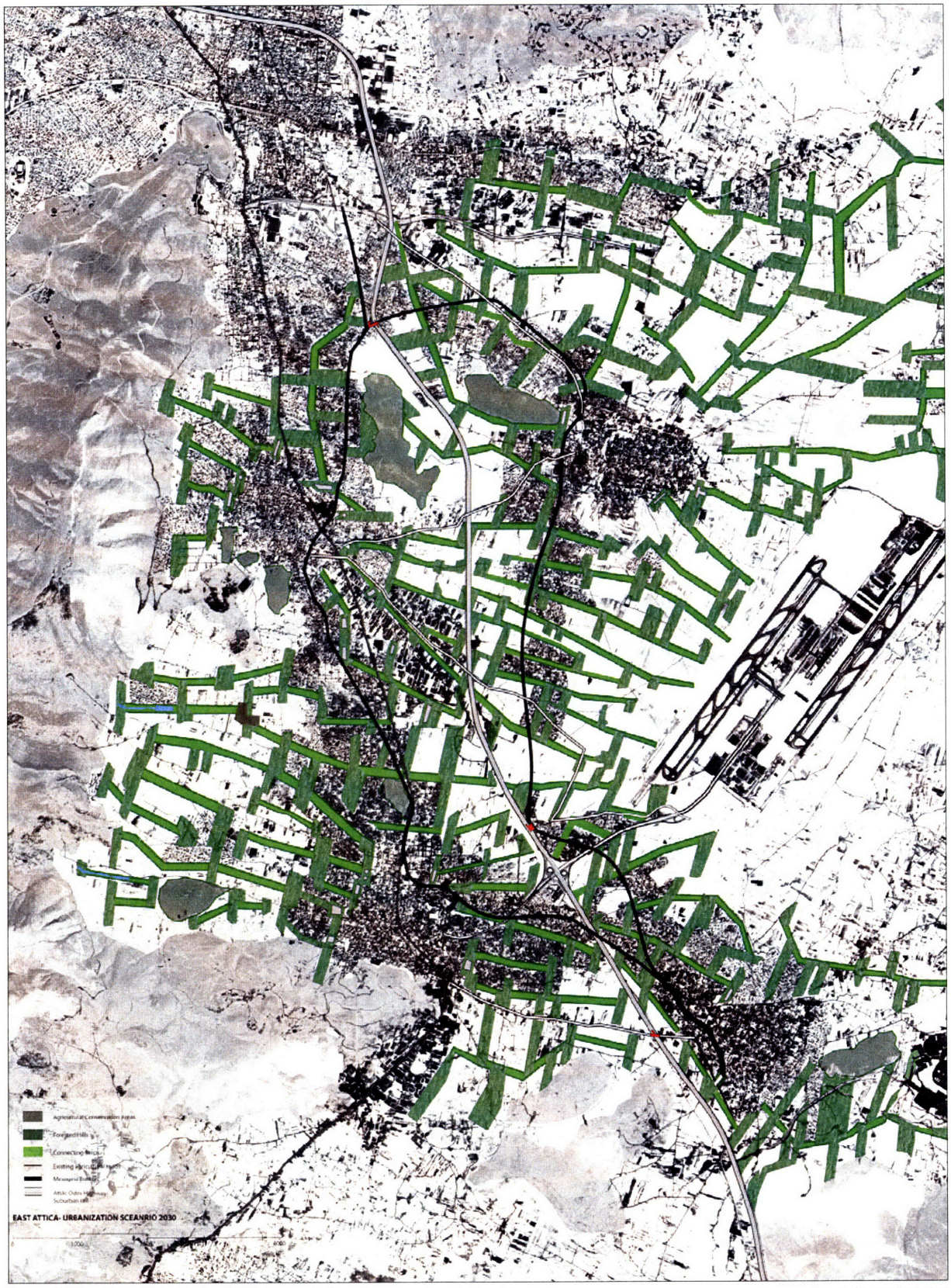


Figure 28 East Attica Urbanization 2030- Appropriation of conserved agricultural land *(Source: Diagram by Author)*

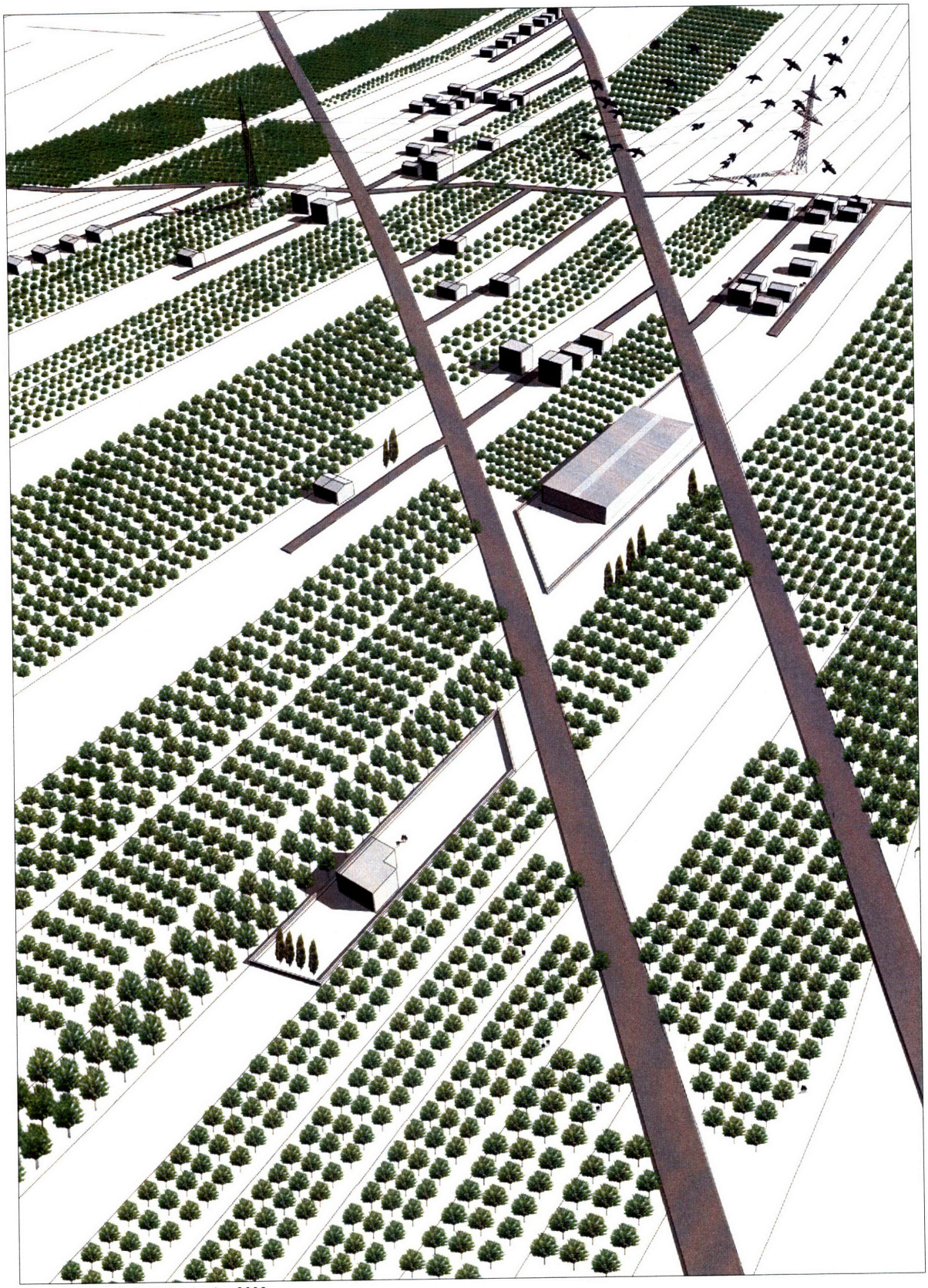


Figure 29 East Attica Urbanization 2008

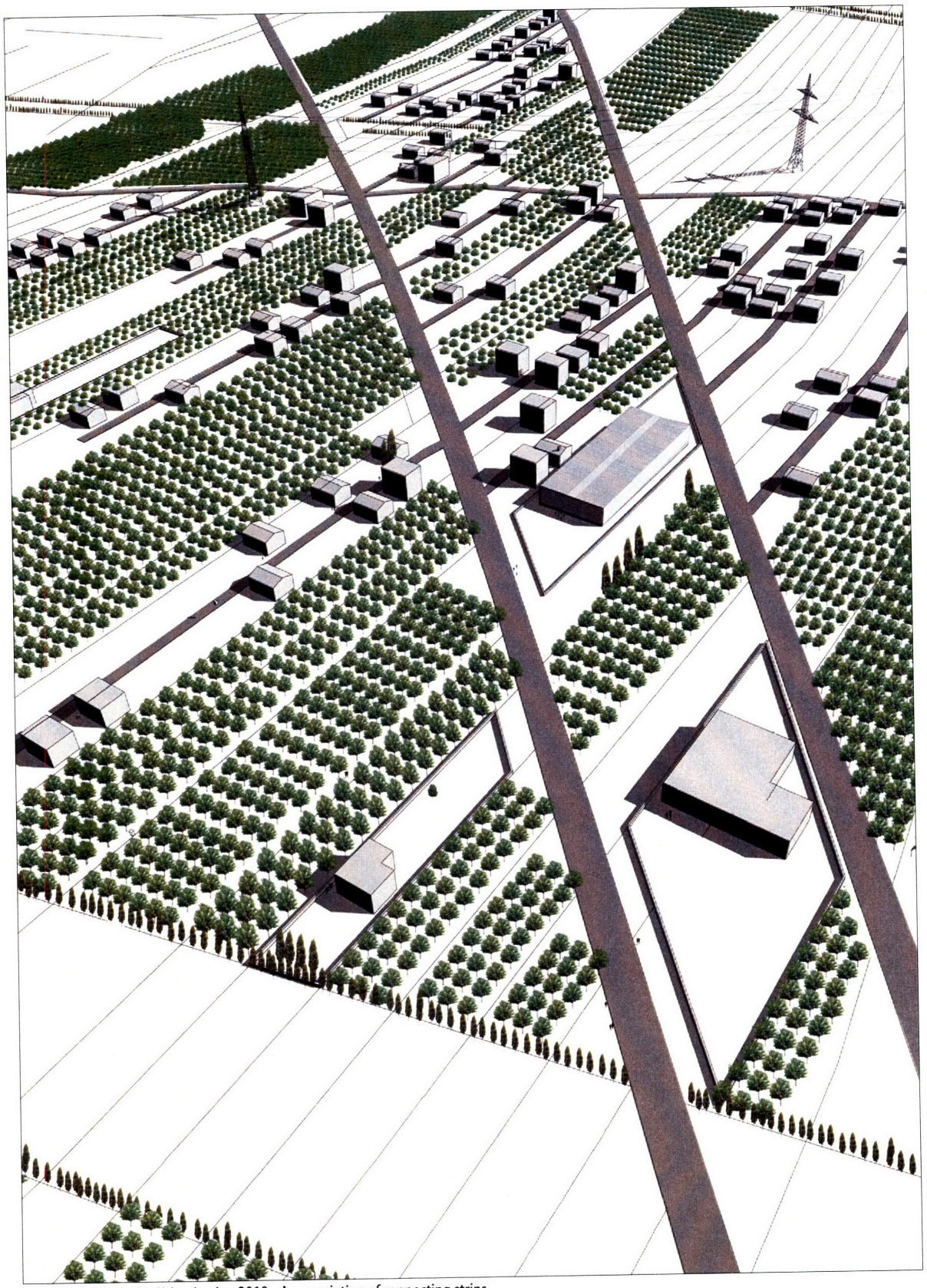


Figure 30 East Attica Urbanization 2010 - Appropriation of connecting strips

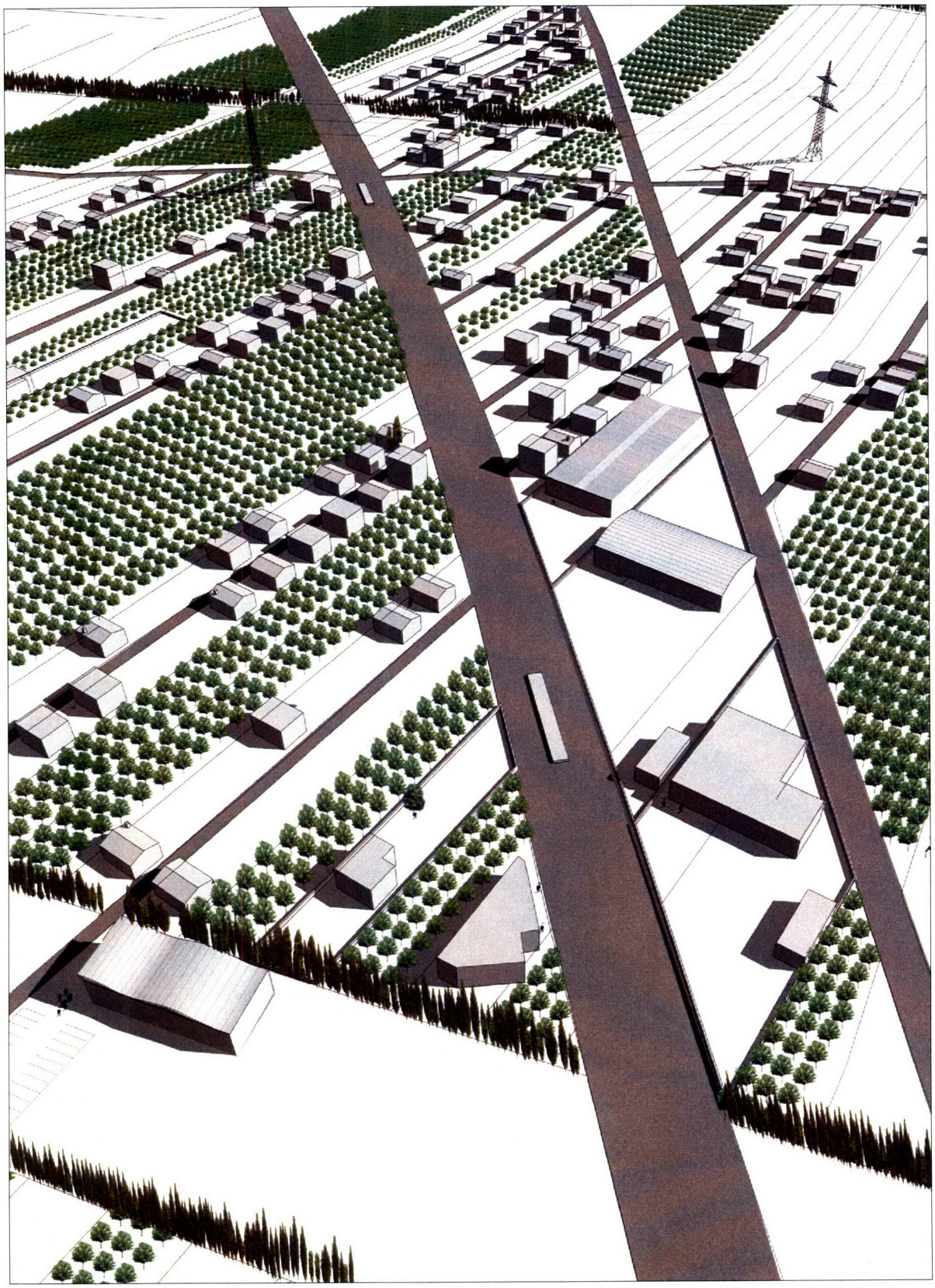


Figure 31 East Attica Urbanization 2012 - construction of new tram, new public programmes added in connecting strips

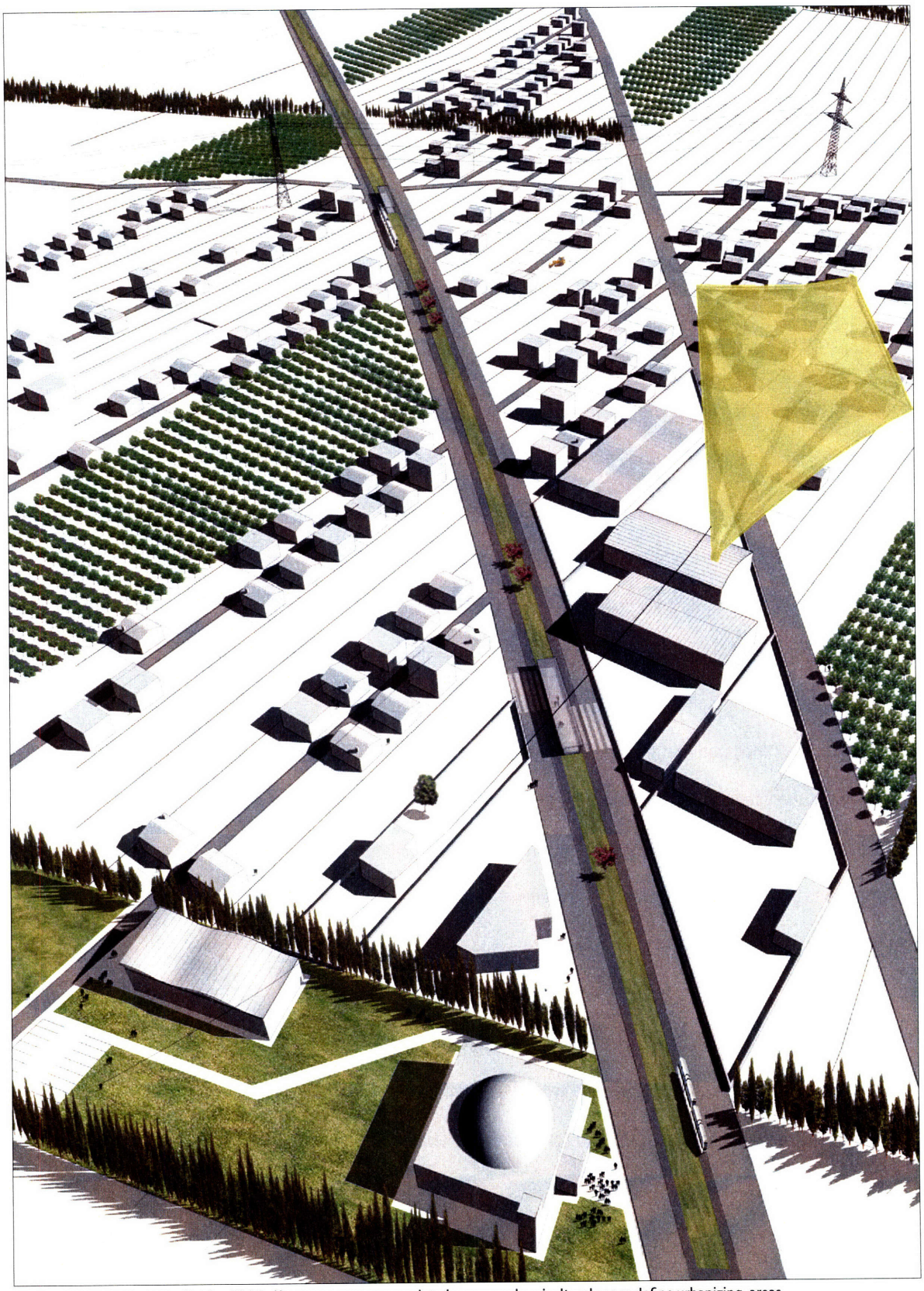


Figure 32 East Attica Urbanization 2014 - New tram system completed, conserved agricultural zones define urbanizing areas

CONCLUSION

The uncertainty that characterizes unplanned city growth in Europe is currently defining the pattern of urbanization on the periphery of the majority of European metropoles. This indeterminancy of urban form has resulted in an almost complete acceptance of market mechanisms as the means to define the spatial pattern of cities' furthermost areas, often with negative environmental and social consequences that have been attributed to low-density urban growth, known as urban "sprawl".

What this thesis has observed however is that ingrained in the landscape composing the majority of developable land on the metropolitan periphery, is a series of underlying infrastructural elements that permeate and affect built form. In this sense what is being witnessed with the proliferation of low-density development is not so much the uncertainty of what pattern built form is likely to take but an unwillingness to harness the properties of the urbanizing terrain and to utilize them to the advantage of current and future residents. The alternative scenario proposed for the region of East Attica attempts exactly this: by manipulating the properties of agricultural subdivisions; under-utilized transportation routes and rights-of-way; existing patterns of built form that have resulted from market conditions and systems of control and appropriation of public land already within current planning legislation it is possible to minimize the risk of future uncertainty and to propose a physical pattern of development that can share the benefits of the regions amongst its residents.

The proposal assumed a condition in which planning legislation, based largely on zoning and the prohibition of uses in certain areas is unenforcable by local authorities. The approach therefore adopted an opposite claim: rather than restricting development, enable development location anywhere within the region. Simultaneously, by enhancing accessibility through the creation of new public transportation and private automobile usage while protecting vulnerable resources such as agriculture through incentives, the enablement of location is shaped and formed creating

nodes of higher density. In this sense the proposal seeks to alter the existing development dynamics "from within" rather than adding a new artificial layer to the landscape. Throughout, the most visible layer of agriculture acts as a framework within which different uses at different scales can co-exist while still maintaining a regional clarity that lends East Attica a specific identity related to its past and the current constitution of its landscape. In these terms, the urbanizing terrain, when development pressures have subsided and it adopts the stable form of an urban landscape, will be a complement to the existing metropolitan landscape and a valuable constituent of the city.

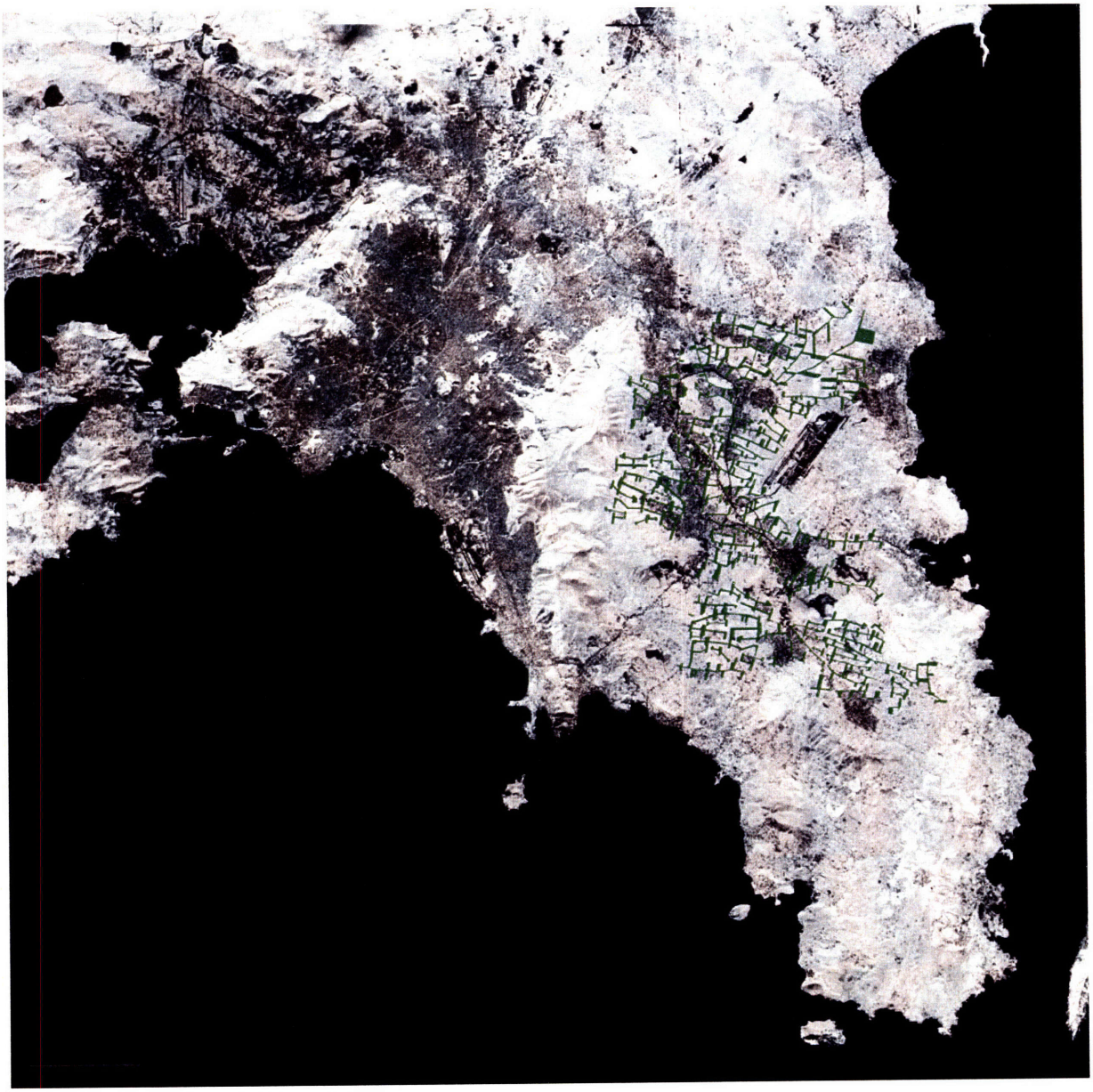


Figure 33 Greater Athens 2030 - Possible Configuration *(Source: Diagram by Author)*

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Statistics:
Greece: http://www.statistics.gr/
Spain: http://www.ine.es/
Portugal: http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_main
Ireland: http://www.cso.ie/

EUROSTAT: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL

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MAPS

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BIOGRAPHICAL NOTE

Christoforos Romanos was born in 1975 in Athens, Greece. He attended attended high school in Nicosia, Cyprus and studied architecture at the University of East London between 1992 -1998 obtaining a BSc in Architecture and a Diploma in Architecture. In 2003 he started his own architecture practice in Athens where he completed a number of residential and public commissions before coming to MIT in 2005 to explore an intense fascination with the city. Joining the SMArchS programme he quickly decided to extend his studies with the Master in City Planning as a means to delve deeper into the nature of urban systems and city environments.