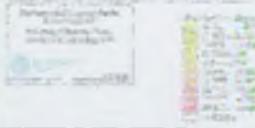
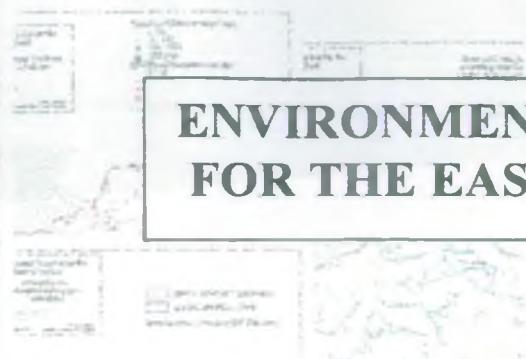


ENVIRONMENTAL SNAPSHOT FOR THE EAST OF ENGLAND



**THE ENVIRONMENT AGENCY
ANGLIAN REGION
JUNE 1999
VERSION 1.0**



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FOREWORD

We are entering a period of intense re-appraisal and change in the East of England with the emergence of a regional chamber and the East of England Development Agency.

The Environment Agency who has approximately 1600 staff and carries out £62,000k expenditure in this region is a major stakeholder in ensuring that future growth contributes to the goal of sustainable development.

To equip ourselves and others to consider the environmental consequences of differing development scenarios we have prepared this Environmental snapshot – which we hope will be an interesting and useful reference document to those preparing policies and strategies.



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Regional General Manager – Anglian Region
Environment Agency



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Alistair Sellers at the Farming and Rural Conservation Agency (FRCA) and Ian Smith at English Nature also provided advance versions of their regional reports.

Health Warning

We put this report together quickly and cannot be certain that we removed all inconsistencies and errors. In addition data for Hertfordshire is still being collected and will be included in subsequent versions of the snapshot. Please contact the Environment Agency – Anglian Region if you are interested in using or quoting any of the information contained in this report.

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INTRODUCTION

The East of England

The East of England Region¹ comprises of the counties of Cambridgeshire, Bedfordshire, Norfolk, Suffolk, Essex and Hertfordshire (see Figure 2 - 5).

This region has extensive, sparsely populated rural areas and coastline interspersed with metropolitan centres, around which urban populations and industry has developed.

The East of England is a centre of leading-edge technology, biotechnology and world class research. It has major ports at Felixstowe, Harwich and Tilbury. Its cultural, historical and tourist attractions bring in large numbers of visitors annually. Cambridge, in particular, has had a successful record in attracting inward investment.

The scope of the Environmental Snapshot

This report is a first step towards identifying environmental indicators and trends in the East of England. It is hoped that this reference document will be of use to:

- (i) The East of England Development Agency (EEDA) as it prepares and implements its Regional Economic Development Strategy (REDS) and corporate plans;
- (ii) East of England Local Government Conference and Regional Chamber as they tackle Regional Planning Guidance (RPG) and other issues;
- (iii) Any regional plan to support European bidding; and,
- (iv) Other stakeholders.

This is not a full State of the Environment Report. It is an indicator of the issues and has been quickly produced. We welcome its use in other strategies.

Sustainable Development and its indicators

We are all stakeholders in the future of the planet. Everyone has a role to play in ensuring *a better quality of life* today and for future generations – through integrating social, economic and environmental goals.

¹ (for government office, Regional Development Agency (RDA) and Voluntary Regional Chamber (VRC) purposes)
Environment Agency - Anglian Region

What is sustainable development?

This term has been frequently used in recent years - Figure 1 offers the most common definition.

Figure 1 Sustainable Development is:

MEETING PRESENT NEEDS

... economic security, food, health, education, contact with nature, etc.



WITHOUT COMPROMISING THE
ABILITY OF FUTURE GENERATIONS
TO MEET THEIR OWN NEEDS

... minimising waste and pollution, reducing use of non-renewable resources such as oil, etc.

"think globally, act locally"

As we approach the millennium, reflection on what the future holds is commonplace. But do we know where we are going or what a sustainable future may mean?

On a global scale our current reality is not a comfortable one. We are experiencing rapid socio-economic change and this looks set to continue. Society is changing whereby many traditional sources of personal security no longer operate. Information Technology and global markets are transforming our economy. However, in our efforts to improve material standards of living, we are rapidly transforming our environment and in the process destroying its ability to support us.

Moving forward and planning future change, sustainably, creates the future we want rather than allowing the future to 'happen' to us. This means both individual change and collective action.

The government is proposing a number of headline indicators to monitor the achievement of a more sustainable future. The following table gives the headline indicators and also suggests indicators relevant to the region. Also marked are those datasets which can be found in this report.

Proposed Government “Headline Indicators” of Sustainable Development

Maintenance of high and stable levels of economic growth and employment- so that everyone can share in high living standards and greater job opportunities, and to generate the income and wealth needed to pay for essential infrastructure and future investment.	
Economic growth	<p>National Headline Indicator: Total output of the economy (Gross Domestic Product GDP)</p> <p>Regional Indicator: as above; percentage of land under organic cultivation</p> <p>Source: FRCA/MAFF</p>
Social investment	<p>National Headline Indicator: Investment in public assets (transport, hospitals, schools etc)</p> <p>Regional Indicator: Average journey time or distance to work</p> <p>Source: Local Authorities</p>
Employment	<p>National Headline Indicator: People of working age who are at work</p> <p>Regional Indicator: as above; sustainable agriculture - percentage of region's employees in agriculture</p> <p>Source: FRCA/MAFF</p>
Social progress which recognises the needs of everyone – ensuring that better health, a good education and decent housing, are available to everyone in our society, no matter who they are and where they live.	
Crime	<p>National Headline Indicator: Level of crime</p> <p>Regional Indicator: as above; fear of walking alone at night</p> <p>Source: Home Office (annually), Criminal Statistics England and Wales</p>
Health	<p>National Headline Indicator: Expected years of healthy life</p> <p>Regional Indicator: as above; health-related trend (eg, cancer/heart disease/teenage pregnancy)</p> <p>Source: Health Authorities/NHS</p>
Education and training	<p>National Headline Indicator: Qualifications at age 19</p> <p>Regional Indicator: as above</p> <p>Source: Local Authorities</p>
Housing quality	<p>National Headline Indicator: Homes judged unfit to live in</p> <p>Regional Indicator: as above</p> <p>Source: Local Authorities</p>

Effective protection of the environment – limiting the emissions of greenhouse gases which are causing the global climate to change, ensuring that people's health does not suffer from poor air quality or other pollution, and protecting wildlife and the countryside.	
Climate change	<p><u>National Headline Indicator:</u> Emissions of greenhouse gases (see Section 2 Figure 9)</p> <p><u>Regional Indicator:</u> no regional data available need to use national trends (see Section 2)</p> <p><u>Source:</u> DETR/Environment Agency</p>
Air pollution	<p><u>National Headline Indicator:</u> Days of air pollution (see Figure 48)</p> <p><u>Regional Indicator:</u> no regional data available need to use national trends (see Figure 48); map-based data on pollutants, eg, NO₂, Ozone, Particulates (see Section 8 Figures 44 – 47)</p> <p><u>Source:</u> DETR/Environment Agency</p>
Transport	<p><u>National Headline Indicator:</u> Road traffic</p> <p><u>Regional Indicator:</u> as above; and air pollution data</p> <p><u>Source:</u> Local Authorities</p>
Water quality	<p><u>National Headline Indicator:</u> Rivers of good or fair quality</p> <p><u>Regional Indicator:</u> regional data on the above available (see Section 3 Figures 11 and 12)</p> <p><u>Source:</u> Environment Agency</p>
Wildlife	<p><u>National Headline Indicator:</u> Populations of wild birds</p> <p><u>Regional Indicator:</u> as above; native biodiversity species or habitat (see Section 5, Figures 34 – 36)</p> <p><u>Source:</u> RSPB/English Nature/Environment Agency</p>
Land use	<p><u>National Headline Indicator:</u> New homes built on previously developed land</p> <p><u>Regional Indicator:</u> as above</p> <p><u>Source:</u> Local Authorities</p>
Prudent use of natural resources – ensuring that we use resources efficiently and minimise waste.	
Waste	<p><u>National Headline Indicator:</u> Waste arisings and management</p> <p><u>Regional Indicator:</u> Waste disposed to landfill (see Section 4, Figures 25 and 26).</p> <p><u>Source:</u> Environment Agency / DETR / Local Authorities</p>

Environmental Snapshot for the East of England

 Environment Agency Boundary
East of England Region



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100 0 100 200 300 Kilometres

Figure 2

Environmental Snapshot for the East of England

Towns



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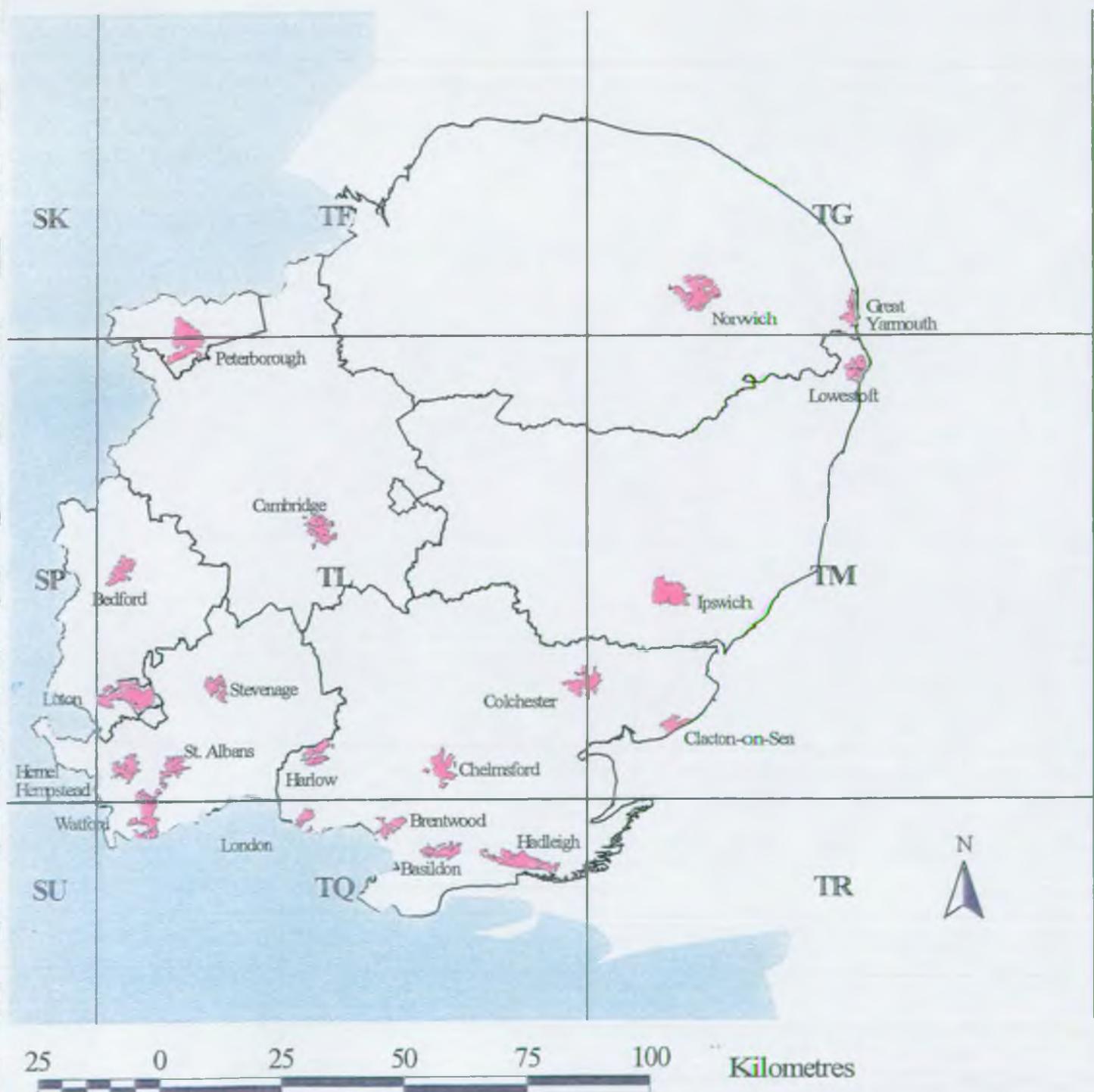


Figure 3

Environmental Snapshot for the East of England

Context



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- Motorways
- Primary Roads
- Railways
- Counties and Unitary Authorities
 - Bedfordshire County
 - Cambridgeshire County
 - Essex County
 - Hertfordshire County
 - Luton Unitary Authority
 - Norfolk County
 - Peterborough Unitary Authority
 - Southend on Sea Unitary Authority
 - Suffolk County
 - Thurrock Unitary Authority



Figure 4

Environmental Snapshot for the East of England

Local Authorities

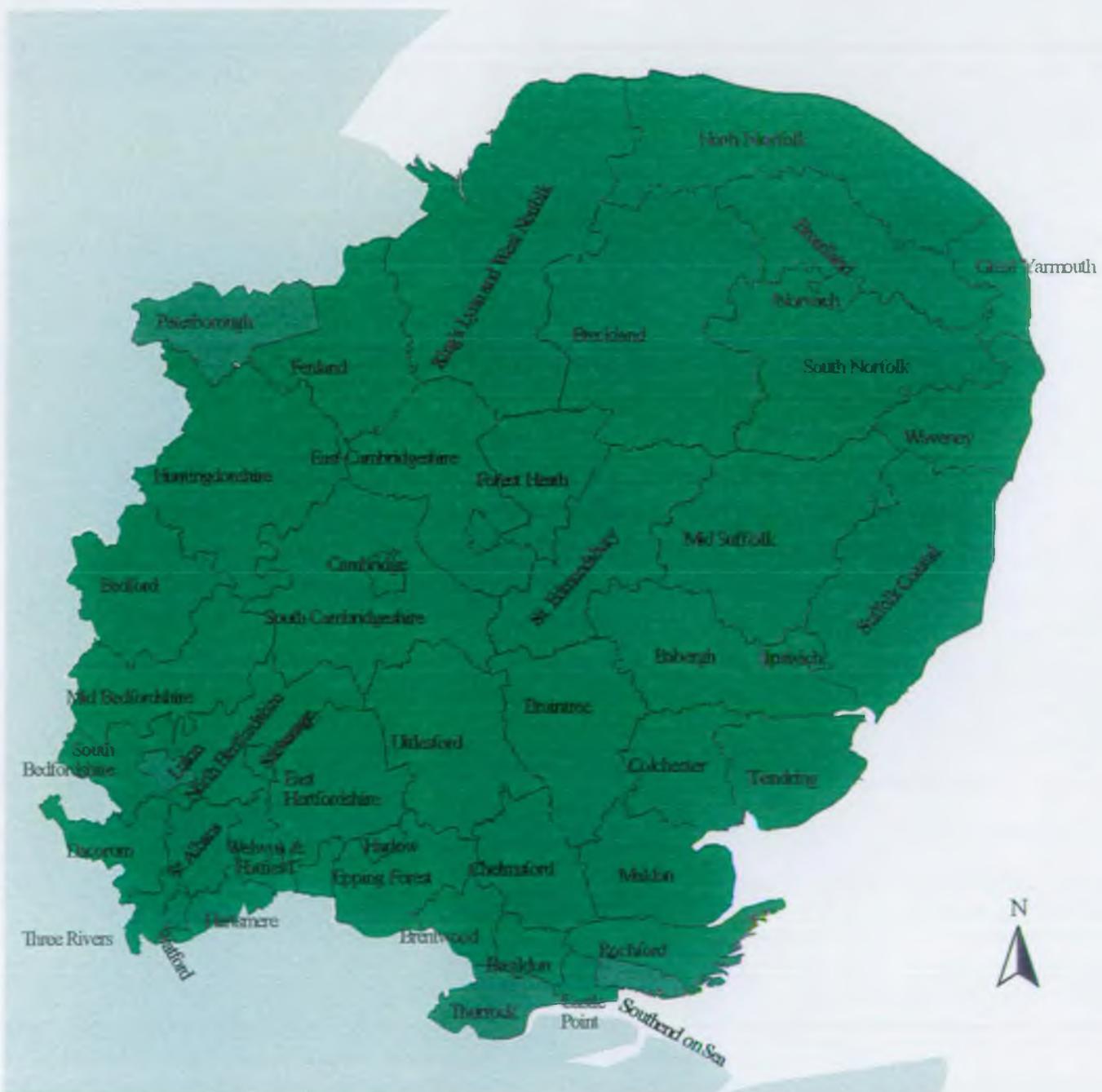


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Local Authority
District Council
Unitary Authority



25

0

25

50

75

100

Kilometres

Figure 5

SECTION 1 OVERVIEW AND ASSETS

1.1 Context

This section is a series of maps which shows the character of the East of England. The box below summarises the key environmental assets.

The East of England is rich in landscape, historical and cultural assets: such as

- Approx 505 kms of coastline including heritage coast;
- Bathing waters compliant with European Union standards;
- Area(s) of Outstanding Natural Beauty (see Figure 41);
- It boasts hundreds of ancient monuments and individual listed building, and has been celebrated in poetry, prose, painting and music.

The East of England also possesses a high quality countryside with a great proportion of some of the UK's rarest species and habitats:

- The floodplain of the Norfolk Broads has the largest expanse of species-rich fen in lowland Britain and the largest example in Britain of calcareous fens which support a number of rare species.
- The fens support the main British populations of nationally scarce plants such as fibrous tussock-sedge, marsh orchid and milk parsley, and the only English population of fen orchid.
- The largest reedbeds in England are in the Suffolk Coast and Heath areas.
- The Basingstoke Canal is the most species-rich freshwater system in England, containing half of Britain's native aquatic higher plants and 24 dragonfly species.
- Orton Pit (West Anglian Plain) supports the largest known population of great crested newts in the UK.
- The Chilterns have the most extensive area of native beech woodland in England.
- Most of the recent British records of the rare barbastelle bat are from Breckland.
- The farmed areas of the East of England support the majority of the English population of brown hare, and lowland farmland birds such as corn bunting and linnet.
- The Rex Graham Reserve in Breckland supports 95% of the British population of the military orchid.

We deem that the following are the key issues that need to be addressed through the various regional strategies.

Key Environmental Issues

- Ensuring the prudent use of natural resources in one of England's fastest growing regions
- Ensuring the sustainable water management in England's driest region
- Restoring the quality of degraded habitats and reclaim fen and reedbed habitats that have been lost.
- Considering climate change scenarios and the implication of flood risks.

1.2 Topography

Covering 7,380 square miles or 14.7% of England's land area the East of England is mainly low lying and open, but, with diverse landscapes.

The East of England has extensive areas of land that are suitable for cultivation. The highest ground is the Chiltern Hills that are 250m AOD (Above Ordnance Datum), however much of the land within the region is below 60m AOD. The almost level fens are the heart of the central lowland (see Figure 6).

Inland the peaty Black Fens, although originally 3-5m above sea level, have wasted over time following its conversion to crop production. As a result the peat has shrunk and eroded, leaving large areas at or just below sea level. Near the east coast there are more lowlands. These include the Suffolk Sandlings, the Broads and the North Norfolk Marshes.

1.3 Location

The region is well placed to take advantage of the strategic trans-european routes within the UK, and the growth of links between the European mainland and other areas of England. The eastern seaboard boasts several major ports. These include Felixstowe, Harwich and Ipswich, as well as Great Yarmouth, Kings Lynn, Lowestoft and Wisbech. An improved road network has increased access from these, through the centre of the region, to rural areas along those routes (see Figure 4).

The East of England Region shares borders with the East Midlands (Lincolnshire and Northamptonshire), London, and the South East (Buckinghamshire). A quarter of the economically active population commutes into London.

The region is served by Luton and Stansted airports, and airports also exist at Cambridge, Norwich and Southend. The second phase of the Channel Tunnel Rail link into central London with stations at Ebbsfleet and Stratford, will bring trade links to mainland Europe and enhance the economic potential of the East of England.

North of the A14, the transport infrastructure in the region is in particular need of enhancement. Both the east-west and north-south road links are inadequate, and this has led to problems around Great Yarmouth, Lowestoft, north Norfolk and Norwich. There is also a need to improve its east-west rail links. In parts of the region there is significant congestion on the roads (due to increased use of the private car). This poses a threat to economic prosperity and to the environment through air pollution with consequent public health problems.

Environmental Snapshot for the East of England

Topography



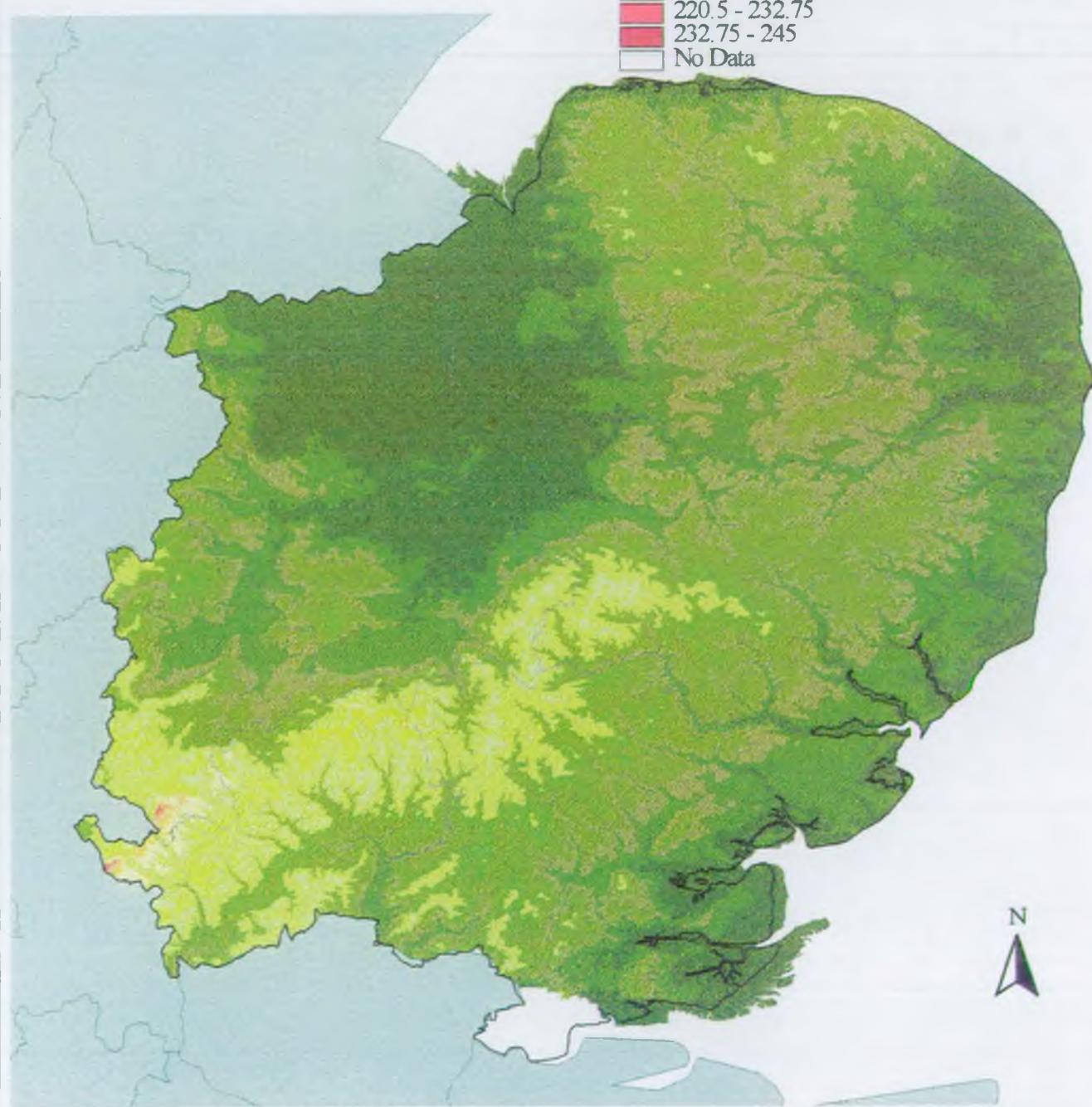
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Topography (meters)

0 - 12.25
12.25 - 24.5
24.5 - 36.75
36.75 - 49
49 - 61.25
61.25 - 73.5
73.5 - 85.75
85.75 - 98
98 - 110.25
110.25 - 122.5
122.5 - 134.75
134.75 - 147
147 - 159.25
159.25 - 171.5
171.5 - 183.75
183.75 - 196
196 - 208.25
208.25 - 220.5
220.5 - 232.75
232.75 - 245
No Data



25

0

25

50

75

100 Kilometres



Figure 6

1.4 Soils

The Farming and Rural Conservation Agency (FRCA) have analysed the region's soil types as follows:

Soil	Area found in	Characteristics and crop types
Fen Silt	North Cambridgeshire and west Norfolk	Most productive – good for horticultural and fruit crops
Peats and Skirt Soils	North east Cambridgeshire and west Norfolk	Variable due to oxidation of peat - but good for sugar beet and potatoes
Lowland clays, boulder clays and clays with flint	Widespread throughout the region	Variable flexibility – are among the most productive for cereals
Chalk and Limestone	North Hertfordshire, south east Cambridgeshire and north Norfolk	Cereal crops characterise these soils
Sands, loamy sands and sandy loams	Found principally in the Breckland area	Benefit greatly from irrigation and a wide range of crops can be grown

1.5 Rainfall

Climatically, the East of England is influenced by its low relief and proximity to the continent. Figure 7 illustrates the rainfall contours over the East of England. At 595mm/year, the East of England has an average rainfall only two thirds of the national average (see also Figure 19)

A Ministry of Agriculture Fisheries and Food (MAFF) funded project at Cranfield University has examined future agricultural demand for irrigation water. The project suggests that there has been a growth of between 2 and 3% per year in the volume of water applied to agricultural land. There is more intensive irrigation of high value vegetable crops. There has been increasing demand for irrigation and on-farm storage.

Environmental Snapshot for the East of England

Average Annual Rainfall (1997)

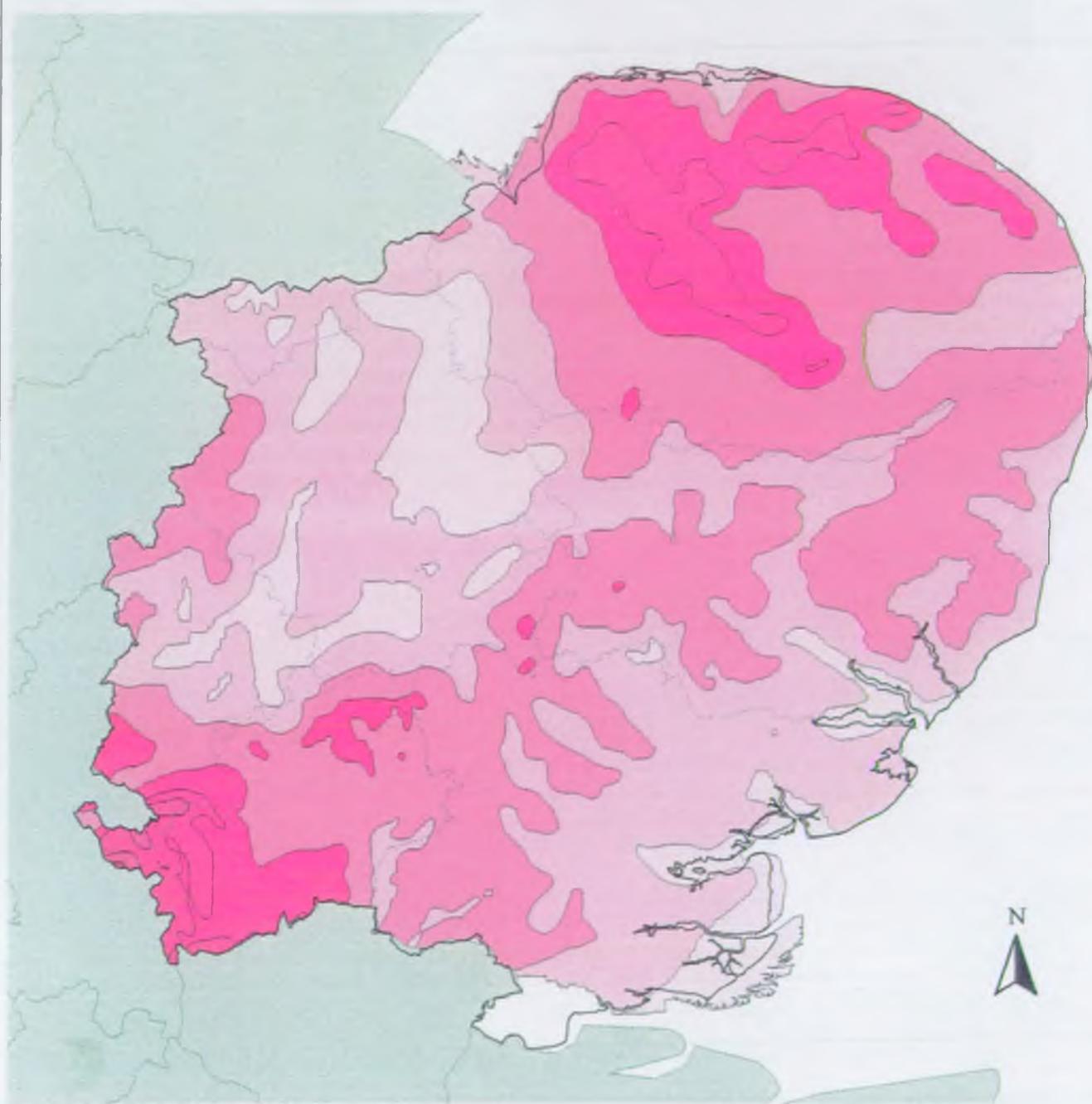


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Average Annual Rainfall (mm)



25

0

25

50

75

100 Kilometres



Figure 7

1.6 Navigation

Figure 8 identifies the navigable rivers and enclosed waters in the region (see Appendix A3.8 water level management).



Boating on the River Ouse

Environmental Snapshot for the East of England

Navigable Watercourses



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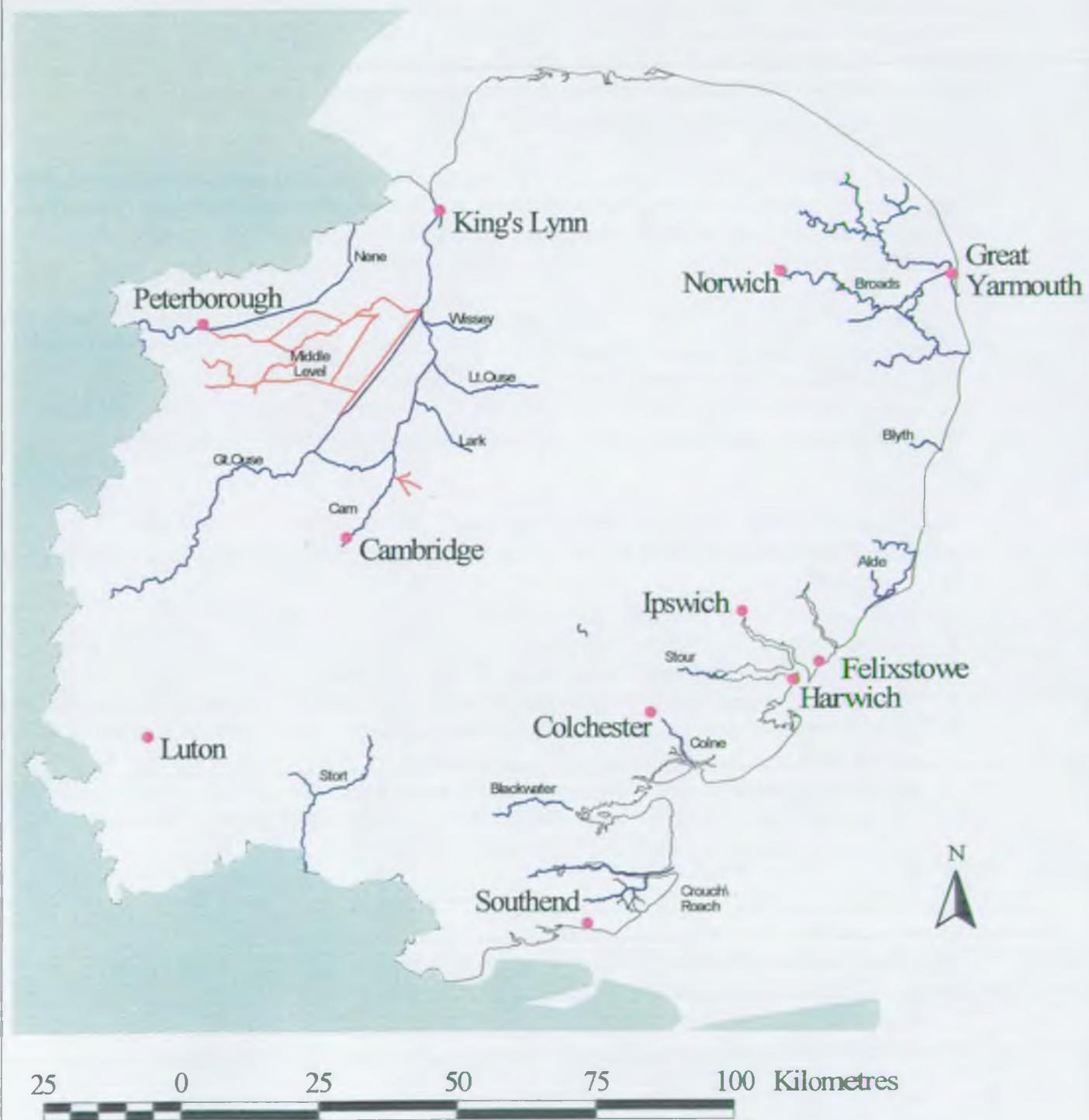


Figure 8

1.7 Development and growth in the East of England²

The region has had one of the most rapidly growing populations in the country, mainly because of its proximity to London. Concerns about the outward development of London led to the establishment of the Metropolitan Green Belt, which covers the southern third of Essex and much of Hertfordshire. Similar concerns led to the later designation of Green Belts in south Bedfordshire and around the city of Cambridge.

The need to accommodate population overspill from London led to the creation of a number of new towns ringing the capital, including Basildon, Harlow, Hemel Hempstead, Stevenage, Peterborough New Town, and town expansion schemes, for instance at Haverhill, Huntingdon, Thetford and Witham.

Although the region has performed well economically in comparison to the rest of the UK, its Gross Domestic Product (GDP) currently ranks sixth among the UK regions and ranks 42nd out of the 77 regions of the European Union. Parts of the region suffer from economic disadvantage – high unemployment, job losses and economic restructuring – and this has been recognised in European and national designations.

Parts of Cambridgeshire, Norfolk and Suffolk receive European funding to address problems resulting from the decline in the agricultural and fishing industries (Objective 5b), and parts of all six counties receive it to address the impacts of changes in the defence industries (KONVER).

The decline in the traditional seaside holiday has led to problems for many of the region's seaside towns, in particular Clacton, Great Yarmouth, Lowestoft and Southend. Clacton and Great Yarmouth, together with Harwich and Wisbech have Intermediate Assisted Area status in recognition of their employment problems. A substantial part of Norfolk and parts of north Cambridgeshire, north east Essex and east Suffolk are designated as Rural Development Areas.

There are a number of priority areas for economic regeneration. These include:

- The Thames Gateway – which includes the Essex bank of the Thames as far east as Southend;
- The Coastal towns of Clacton, Great Yarmouth, Harwich and Lowestoft;
- Luton, Dunstable, Houghton Regis, parts of Ipswich, Norwich and Peterborough which suffer from high unemployment and acute deprivation;
- The remote rural areas of the north and east of East Anglia, including the Rural Development Areas, and the Tendring Rural Development Area in Essex. These parts suffer from isolation, poverty and a serious lack of opportunity as well as poor access to amenities and services. Their problems are compounded by a lack of employment prospects due to a decline in traditional areas of employment, such as agriculture and the defence industries, and a lack of affordable housing.

Spatial development is increasingly being addressed at an European level where the emphasis is on identifying and addressing problems common to a number of member states. For these purposes the East of England falls within the North West Metropolitan Area, which covers the whole of the UK, and East Anglia is also within the North Sea Area, which covers the east coast of the UK, northern Germany, the Netherlands and parts of Scandinavia.

² The information for section 1.7 and 1.8 have been taken from the SCEALA and SERPLAN document – Towards an East of England – Regional Planning Framework.

1.8 Regional Planning

The East of England has a complex regional planning arrangement where Norfolk, Suffolk and Cambridgeshire are covered by Regional Planning guidance for East Anglia prepared by the Standing Conference of East Anglian Local Authorities (SCEALA) and Bedfordshire, Hertfordshire and Essex are the North East Petal of the South East Regional Planning Conference (SERPLAN). However, with the event of the East of England Local Government Conference and Regional Chamber this is increasing consensus that future regional planning guidance should be prepared on a six county (i.e., East of England) basis.

The East of England Local Government Conference have produced a regional planning framework (Feb 1999) which outlines the similarities and difference between SERPLAN and SCEALA approaches. A summary of their findings are shown below:

The starting point for the SERPLAN Strategy (April 1998) was the identification of sustainability principles and objectives. These also form the basis of the Sustainability Appraisal Framework, which was set up to assess the Strategy and assist in drafting policies. Their principles are as follows:

- The need to produce a more sustainable pattern of development, i.e., development focused on the main urban centres assisted by their regeneration and renewal;
- The identification of priority areas for economic regeneration;
- The development of transport strategies which aim to reduce the need to travel and increase opportunities for travel by means other than the private car; and,
- The need to protect and enhance key areas of environmental importance.

SCEALA produced a regional strategy in 1989, which was re-issued as a draft Regional Planning Guidance (RPG) in 1991. Both SCEALA and SERPLAN's strategies indicate that there are patterns of development that are being followed. Two of the main trends are, to:

- (i) Focusing on the larger urban areas; and,
- (ii) Limit and, make appropriate, development in rural areas.

SERPLAN introduces a principle, not found in SCEALA's Strategy, that the release of land for employment-related uses should be related to the capacity in the local labour and housing markets at the broad scale.

SERPLAN indicates that the region's existing network of larger town centres should be the primary focus for new development.

Both Strategies adopt a sequential approach to development (where certain types of development and locations are encouraged before others) and indicate that development should be discouraged in areas at risk from flooding. SCEALA also identifies the issue of areas at risk from coastal erosion.

SERPLAN puts forward a 'plan, monitor and manage' approach to housing provision – following government guidance. Regional Planning Guidance for East Anglia is expected by the end of 1999 and South East's draft RPG will undertake public examination in May 1999.

SECTION 2 CLIMATE CHANGE

2.0 Climate changes naturally, but man's impact on this process is now evident and believed to be causing more marked effects than would occur naturally. Since the industrial revolution (18th century), there has been a rise in the global-mean surface air temperature of 0.6°C (Viner & Hulme 1997). 'Global warming', as this is now known, is potentially one of the most serious global environmental problems facing society.

2.1 Possible consequences of climate change

The UK Climate Impacts programme is mobilising research in this country. Its predictions are that:

- temperatures will increase by 1.5 - 3.5°C over the next century - if greenhouse gas emissions continue to rise at the present rate;
- there will be a greater frequency and clustering of extreme events;
- water-dependent activities such as agriculture will feel the effects more. Ecosystems are particularly vulnerable and species may have to shift 50 - 80km per decade in order to survive; and,
- some sectors of the economy could benefit, e.g., forestry and tourism.

Latest climate change forecasts for the East of England

Temperature: Increase by 0.5°C over the next 30 years.

Rainfall: Increase by 1 - 5% over the next 30 years.

However, more will fall, with greater daily intensity, between November and March - increasing run-off and flood risk. Less rainfall from April to October will make the summer water resources more limited.

Evapotranspiration: Increase by 10% over the next 30 years.

Soil Moisture Deficit: Higher in autumn. Therefore, less water available for the winter recharge of the region's chalk aquifers.

If, as predicted, there is a rise in global mean temperature, there would probably be a rise in mean sea level. This would be caused by the thermal expansion of the oceans and the melting of glaciers and land ice sheets. The predicted rise is about 20cm in global mean sea levels by 2030 and 65cm by the end of the next century.

Regional variations, are far more difficult to predict as other factors such as vertical land movements add to the problem in some areas. The south east of England is slowly sinking into the sea, so any sea level rise increases this problem (it is estimated that East Anglia will have sunk by 9cm by the 2050s (Hulme & Jenkins 1998)).

The effects of 'coastal squeeze' should also be considered. This occurs as habitats cannot move landward as sea levels rise, and they become squeezed between flood defence structures and the rising seas. These intertidal areas dissipate wave energy and ensure less energy reaches the shoreline – nationally an estimated 10,000 hectares of mudflats and saltmarshes are acting as natural sea defences, a large proportion in this region. Latest predictions of the

rise of sea levels put these valuable, wildfowl-supporting habitats at risk. If such areas are eroded, flooding may increase as higher waves with more energy and erosive power reach the upper shore (see Appendix 2). Low lying areas such as the Fens would obviously be the most affected in the UK but it is likely that the most severe consequences will be in the heavily populated coastal areas in the developing world.

Globally, the most widespread effects could be on the type and distribution of natural vegetation and agriculture. Again, regional impacts are difficult to predict. Half of the UK's grade 1 agricultural land is below the 5m contour (including the East of England) and much could be affected by saline intrusion (due to sea level rise).

Existing habitats could be threatened because new species will follow the weather patterns. The crops that could be viably grown may also be subject to migration northwards. New diseases and pests may become prevalent in areas where climatic conditions previously limited their effect.

2.2 Actions to reduce climate change

In response to this, the scientific community is considering climate change predictions in management and land use plans, e.g., the Agency's water resources strategy, and its flood defence work. Ultimately, the Government's commitment to Carbon Dioxide (CO₂) reduction will be delivered locally. Local Authorities have been working to raise awareness of the issues, e.g., through schools and Local Agenda 21 (LA21), energy efficiency and transport initiatives, CO₂ reduction strategies, and audits of the use of energy and production of CO₂.

The UK has a legally binding target under the Kyoto Protocol to reduce emissions of the 'basket' of six greenhouse gases by 12.5% below 1990 levels by 2008-2012. It has also set itself a tougher domestic goal of reducing CO₂ emissions by 20% below 1990 levels by 2010 (see Figure 9).

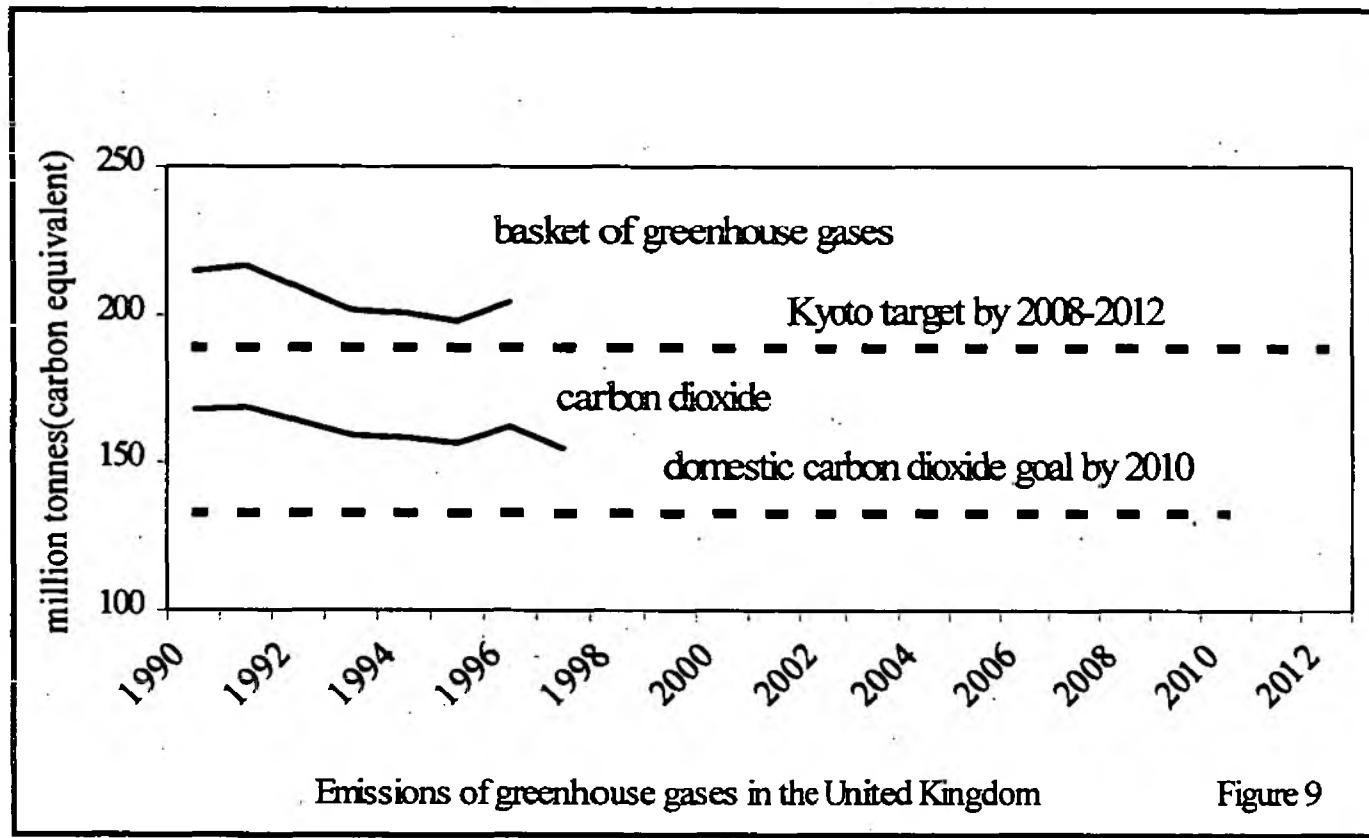
CO₂ emissions are mainly driven by energy consumption. Transport has been the fastest growing source in the UK as a result of a sharp increase in road traffic, and accounts for about a quarter of all CO₂ emissions. These are forecast to continue to rise. People can help by reducing their dependency on the car and using other modes of transport.

For business and the public sector, which account for almost half of the total emissions, there is considerable scope to use less energy and save more money. Households, responsible for about one quarter of all CO₂ emissions, can also reduce emissions and save money by being more energy efficient; by insulating their homes and using more energy efficient appliances.

2.3 Climate Change and the Agency

The Agency supports the Government's efforts to develop a comprehensive strategy to reduce greenhouse gas emissions.

As well as considering climate change in relation to water resources, flood defence and landfill management, the Agency is also responsible for the regulation of processes which give rise to about 50% of the emissions of greenhouse gases from man-made sources. At present, it is not possible to give an accurate estimate of the amounts of greenhouse gases emitted by Agency regulated processes, in the East of England. The new Inventory of Source and Releases being compiled by the Agency should shortly be able to do this. However, the amount is known to be less significant compared with other regions, and will therefore be less important in the East of England, than the emissions from transport and households.



SECTION 3 WATER

- 3.0** Water is vital to the well being of people and the environment. The aim of this section is to describe water quality and quantity considerations in the East of England - which depend on both nature and man's activities.

WATER QUALITY

3.1 Location and size of Sewage Treatment Works and Industrial Discharges

The investment plans of the Water Companies depend on its Periodic Review of the prices they can charge customers for water. The outcome of the latest Review will mean that planned growth need not be constrained by deficiencies in the sewage infrastructure. Neither will planned development be constrained by water quality problems in rivers and to sea caused by sewage and sewage treatment works (STWs).



Sewage Treatment Works on the Ely Ouse System

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Location and size of Sewage Treatment Works and Industrial Discharges



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Trade Flow (Cubic metres per day)

- 0 - 10
- 11 - 100
- 100 - 1000
- 1000 plus

STW Flow (Cubic metres per day)

- 0 - 10
- 11 - 100
- 100 - 1000
- 1000 plus

Main River

Unclassified Discharges
(No flow data in time available)



25 0 25 50 75 100 Kilometres

Figure 10

3.2 Chemical and Biological General Quality Assessment - 1997

- 3.2.1** The Agency has a method for classifying the water quality of rivers and canals, known as the General Quality Assessment scheme (GQA). This provides a consistent assessment of the state of water quality across England and Wales and any changes in this over time (Figure 11). The Chemical GQA describes quality in terms of three chemical measurements (ammonia, dissolved oxygen and biochemical oxygen demand) which detect the most common types of pollution, including discharges of treated organic wastes from sewage treatment works, agriculture and industry. It allocates one of six grades (A to F) to each stretch of river (see table below)

Grades of River Quality for the Chemical GQA

Chemical Grade	Likely Uses and Characteristics
A - Very Good	All abstractions; Very good salmonid fisheries; Cyprinid fisheries; Natural ecosystems.
B - Good	All abstractions; Salmonid fisheries; Cyprinid fisheries; Ecosystem at or close to natural.
C - Fairly Good	Potable supply after advanced treatment; Other abstractions; Good cyprinid fisheries; A natural ecosystem, or one corresponding to a good cyprinid fishery
D - Fair	Potable supply after advanced treatment; Other abstractions; Fair cyprinid fisheries; Impacted ecosystem.
E - Poor	Low grade abstraction for industry; Fish absent, sporadically present, vulnerable to pollution; Impoverished ecosystem.
F - Bad	Very polluted rivers which may cause nuisance; Severely restricted ecosystem.

The Chemical GQA indicates the absence of severe problems at present in the East of England Region but also shows the scarcity of Very Good quality waters. The dominance of 'Fair' to 'Fairly Good' quality to some extent reflects the natural conditions of the rivers in this area, but also the intensity of past development, agriculture, water use and low flows in rivers.

See Figure A4 for water resource constraints.

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Chemical River Quality 1997



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River and Canal Quality
According to the General
Quality Assessment (GQA)
Scheme

- Grade A
- Grade B
- Grade C
- Grade D
- Grade E
- Grade F
- Unclassified



25

0

25

50

75

100 Kilometres

Figure 11

3.2.2 The Biological GQA is another measure of quality, based on a comparison of the groups of small animals (such as mayfly nymphs, snails, shrimps and worms) found in a river with those expected if the river were unpolluted (Figure 12). It also allocates one of six grades (a to f) to each stretch of river (see table below). The majority of rivers in the East of England are of 'Good' or 'Very Good' biological quality despite rivers, as assessed by the Chemical GQA, not being of the highest chemical quality.

Grades of River Quality for the Biological GQA

Biological Grade	Characteristics
a - Very Good	The biology is similar to or better than expected for an average and unpolluted river of this size, type and location; High diversity of Families, with several species in each; Rare for dominance of any one Family.
b - Good	The biology falls a little short of that expected for an unpolluted river of this size, type and location. Small reduction in Families sensitive to pollution; Moderate increase in Families tolerant of pollution (like worms and midges)
c - Fairly Good	The biology is worse than that expected for an unpolluted river of this size, type and location. Many sensitive Families are absent or numbers of individuals is reduced; There is a marked rise in the number of individuals in the Families that tolerate pollution.
d - Fair	The biology show big differences from that expected for an unpolluted river of this size, type and location. Sensitive Families are scarce and contain small numbers of individuals; A range of Families that tolerate pollution and some of these may have high numbers of individuals.
e - Poor	The biology is restricted to animals that tolerate pollution with some Families dominant in terms of the numbers of individuals. Sensitive Families will be rare or absent.
f - Bad	The biology is limited to a small number of very tolerant Families, often only worms, midge larvae, leeches and the water hoglouse. These may be present in large numbers. Even these may be missing if the pollution is toxic. In the very worst case there may be no life present in the river.

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Biological River Quality 1997



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**General Quality Assessment
(GQA) Scheme**

- Grade a
- Grade b
- Grade c
- Grade d
- Grade e
- Grade f
- Unclassified
- No data available



25 0 25 50 75 100 Kilometres

Figure 12

3.3 River Quality Objective compliance - 1997

The Chemical GQA provides an absolute measure of quality and is designed to show trends. A river in a 'good' grade will generally be a good fishery and a suitable raw material for the supply of drinking water (Figure 13). This cannot, however, be guaranteed because a use can be affected by pollutants that are not assessed in the GQA.

We use River Quality Objectives (RQOs) to plan the actual improvement to river quality; RQOs ensure that river quality is checked against all the quality standards needed to support certain uses. Each river stretch has a group of uses and the amalgamation of the standards for all these uses gives a set of water quality standards for that part of the river. The Agency uses Local Environment Agency Plans (LEAPs, see Appendix 1) to consult on RQOs and to prepare plans for meeting them.

RQO failures that are due to Anglian Water, or which might have been caused by the company in the next five years, will be addressed by the Periodic Review. The remaining risk to water quality is from the intensity of land use and agriculture. It is clearly desirable that any future development should not worsen water quality or undermine the ability to meet agreed RQOs.



Backwater of the River Nene at Nassington

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River Quality Objective
Compliance 1997



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RQO Failures
 RQO Compliant Stretches



25 0 25 50 75 100 Kilometres

Figure 13

3.4 Rivers supporting Surface Water Abstraction Directive points

Figure 14 illustrates that almost all catchments in the East of England support public water supply. Development has to be carefully planned in order to exclude risks to public water supplies and public health. New European standards are a possible influence in the future. See also section 3.5 Nitrate Vulnerable Zones (Figure 15).

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Main Rivers Supporting Public
Water Supply Abstraction Points 1998



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River Supporting Public Water Supply
Abstraction Points



25 0 25 50 75 100 Kilometres

Figure 14

3.5 Nitrate Vulnerable Zones and Sensitive Areas (Eutrophic)

The pollution of rivers and underground waters by nitrate from agricultural sources can pose risks to human health and the environment. Nitrate Vulnerable Zones (NVZs) are designated under the Nitrate Directive. They require nitrate pollution in both surface and ground waters to be tackled. In designated areas, farmers are required to follow a set of guidelines to ensure the careful management of fertilisers and manures. This may act as a constraint on the development of agriculture so that water supplies are protected. There is a large land area in the East of England Region designated as NVZs reflecting the intensity of agriculture in the area (Figure 15).

There are a number of Sensitive Areas (Eutrophic) designated under the Urban Waste Water Treatment Directive. This reflects the impact of STW discharges on the nutrient concentrations found in rivers. Under the Urban Waste Water Treatment Directive, Anglian Water has invested and will invest resources, under the Periodic Review, to address the impact of nutrients in these rivers and lakes. This is to protect public water supply and to reduce the undesirable disturbance to water use caused by eutrophication. Navigation, recreation and biodiversity are all affected by the extreme growth of plants and algae caused by eutrophication. Diffuse inputs also contribute to eutrophication and it is possible that the control of these may place additional constraints on agriculture.



Detergent pollution from industrial site at Kings Lynn

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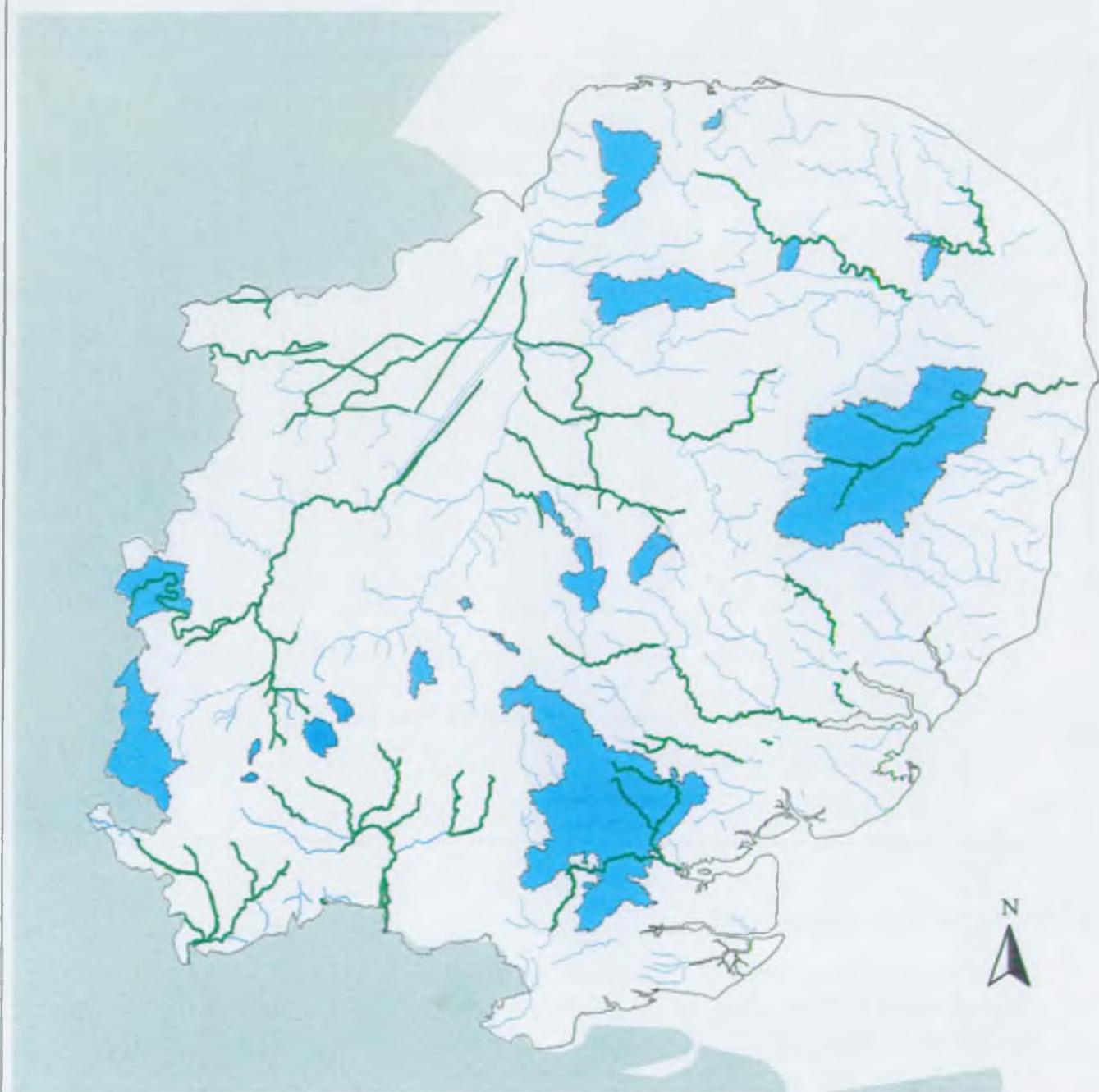
Nitrate Vulnerable Zones and
Sensitive Areas [Eutrophic], 1998



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25 0 25 50 75 100 Kilometres

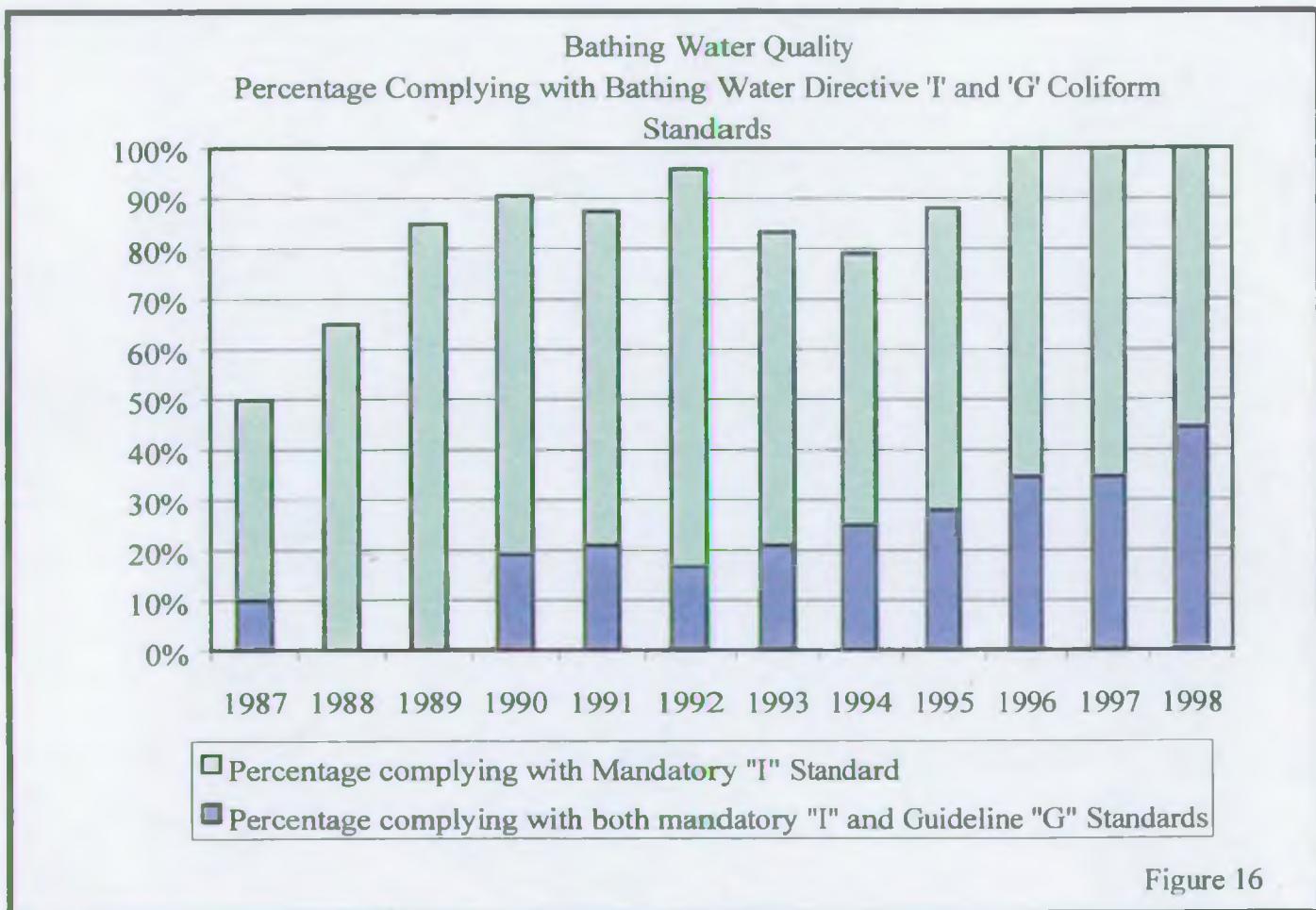
Figure 15

3.6 Bathing Water Quality - 1998

Bathing water quality has shown a continued improvement since 1987. Indeed, in 1997 and 1998 all bathing waters in the East of England Region complied with the standards in Bathing Water Directive.

Figure 16 shows the percentage of bathing waters in Anglian Region complying with the Bathing Water Directive, for each bathing water season, since 1987. The compliance against the stricter guideline standards in 1998 has also improved, with nearly 50% of bathing waters complying.

This improving quality represents an opportunity to further tourism in the East of England Region.



3.7 Pollution Incidents - 1997

The Agency keeps records of reports of pollution incidents. These are categorised according to the severity. We follow up reports of pollution and attempt to catch and prosecute people who cause incidents.

In the East of England, 13 substantiated incidents were Category 1 (major) – 6.5% of the total number of Category 1 incidents in England & Wales and 72 were Category 2 (significant) – 5.5% of the total number of Category 2 incidents nationally (Figure 17). More information on this can be found in Appendix A3.2.

Environmental Snapshot for the East of England

Category 1 and 2 Pollution Incidents
1997



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Pollution Incident By Type

- * Chemical
- Organic
- ★ Oil
- + Sewage
- ▲ Other

■ Major Towns

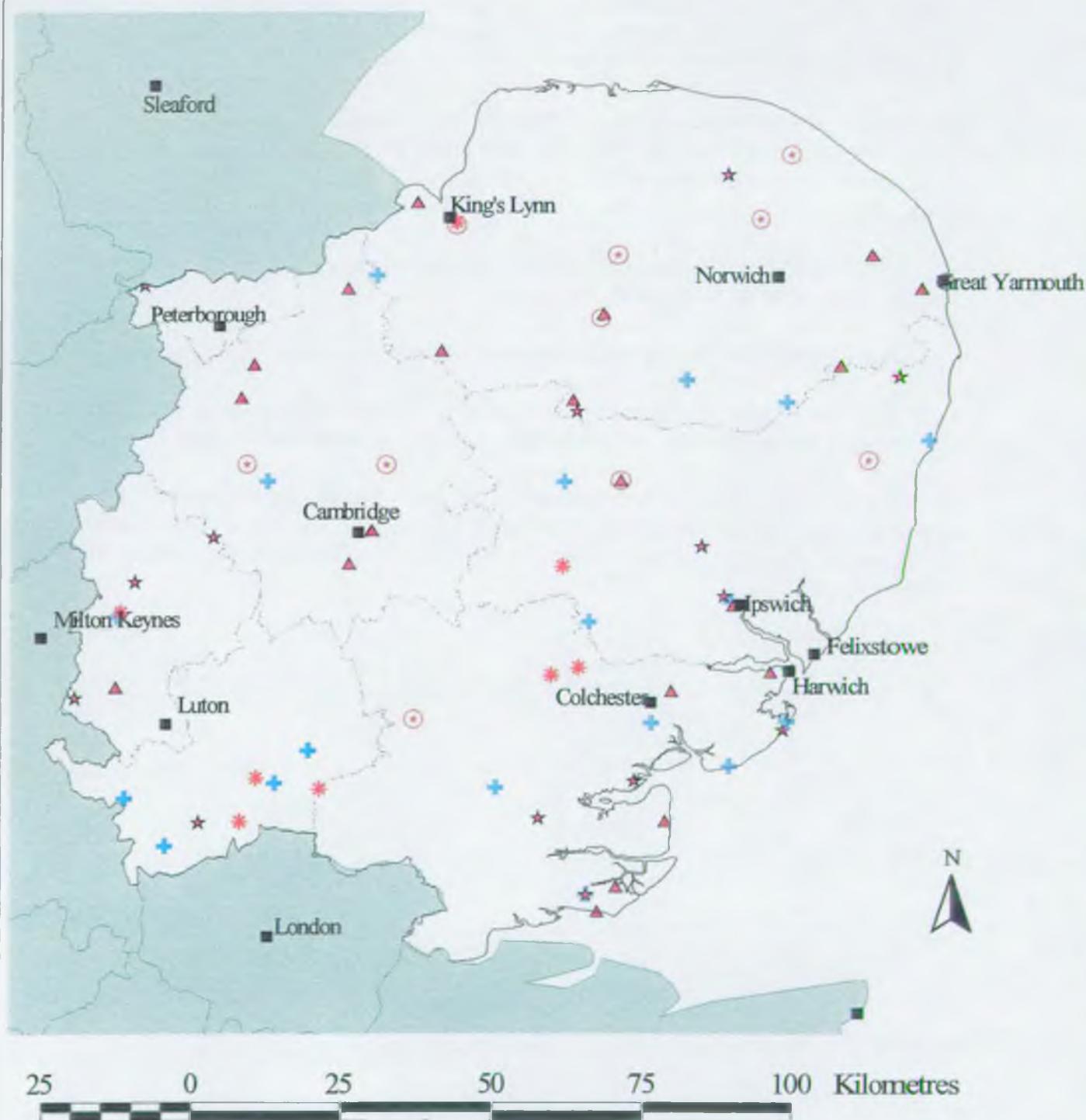


Figure 17

3.8 Groundwater Protection

Groundwater provides nearly half of Anglian Region's water supplies, and is very important in maintaining river flows and wetlands.

In order to protect groundwater, the Agency has defined sets of protection areas. The Agency seeks to restrict certain types of development in these areas.

Figure 18 shows groundwater protection areas, sub-divided into two types:

(i) **Resource protection areas** cover all the land draining the groundwater resource. These areas are important for supporting river flows, wetlands, and small, unlicensed supplies of groundwater. In order of importance for water supply these are the major aquifers (e.g., Chalk, Woburn Sands, Carstone, Jurassic Limestones), minor aquifers (e.g., fluvio-glacial sand and gravel deposits, Bagshot Beds, Thanet Sands) and non-aquifers (e.g., London Clay, Gault Clay, Oxford Clay).

(ii) **Source protection zones** around existing major abstractions (of 90,000 m³ per year or more) for public or industrial supplies that hold an Act abstraction licence. Around 400 abstractions of groundwater of this size are currently licensed in the six counties. Smaller licensed sources are important too, but their locations have not been shown on the maps.

- Zone 1 represents the area within which it takes 50 days or less for water to travel through the water table to the point of abstraction.
- Zone 2 represents the area equivalent to a 400 day time of travel through the water table.
- Zone 3 is equivalent to the total catchment of the abstraction, which means that all water reaching the water table will eventually reach the point of abstraction.

In 1996/97, 'Groundwater Protection' maps (for the Agency's Anglian Region) were explained and handed to representatives of every Local Planning Authority, for information and strategic planning purposes. Basically the Agency seeks to prevent certain developments in these zones.

Environmental Snapshot for the East of England

Categories of Groundwater Protection Areas 1998



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Zone 1
Zone 2
Zone 3

Minor Aquifer
Major Aquifer
Non-Aquifer

No data available

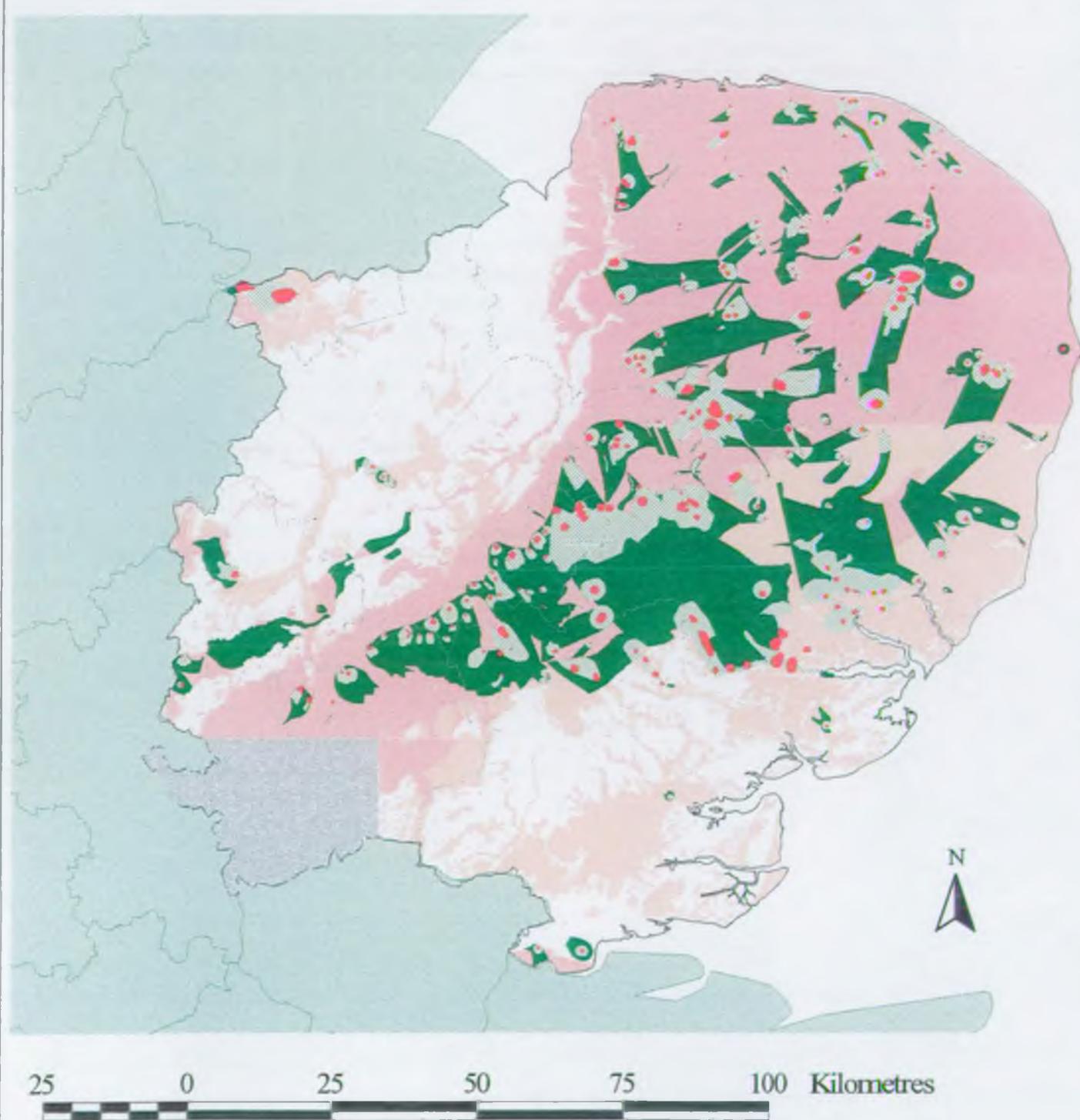


Figure 18

WATER RESOURCES

3.9 Water Resources - context

The East of England is the driest part of England & Wales (see Figure 19) and efficient use of water resources is vital if future development is to be sustainable. The water environment (rivers, streams, wetlands and estuaries) of the East of England Region is a valuable one, containing many important wildlife sites of national and international importance. The Agency recognises this, and is working with the water companies, English Nature and other organisations to ensure that abstractions do not take place to the detriment of the environment.

It is important that there is a good understanding between the regional planning fora, local authority planners, the Agency and water companies to ensure integrated planning to ensure the provision of timely infrastructure and resources in relation to new development. Regional Planning Guidance and the Regional Development Agency's Regional Economic Development Strategy could help in promoting the efficient use of water in new developments and within the business community as a whole.³

3.10 Uses of water

The main sources of water are rainfall, rivers and groundwaters. These sources supply man's needs for domestic water supply, agriculture and industry as well as a number of recreational and amenity uses. At the same time, water is needed to sustain many aspects of the environment, both rivers and its habitats - wetlands and associated wildlife. All these uses are important and valuable to the East of England, but often these needs can conflict.

Rivers and streams require sufficient water depth and velocity throughout the year to keep them free from silt and to maintain the diversity of plants and animals. There are also various types of wetland (see Figure A4) which are dependent upon groundwater. Many of these habitats support rare or threatened plants and animals.

The Environment Agency calculates available water resources, identifies water users and their requirements, allocates water through the abstraction licensing system and plans strategically for the future. Work has already commenced on the next national and regional Water Resources Strategy (due to be published in December 2000). Please see Appendices A3.4 and A3.5 for more information on surface and groundwater availability.

³ Please Note: For more detailed explanation of some of the terms used in this section please refer to the water resources glossary in Appendix A3.8

Environmental Snapshot for the East of England

Average effective rainfall
(Rainfall minus evaporation)



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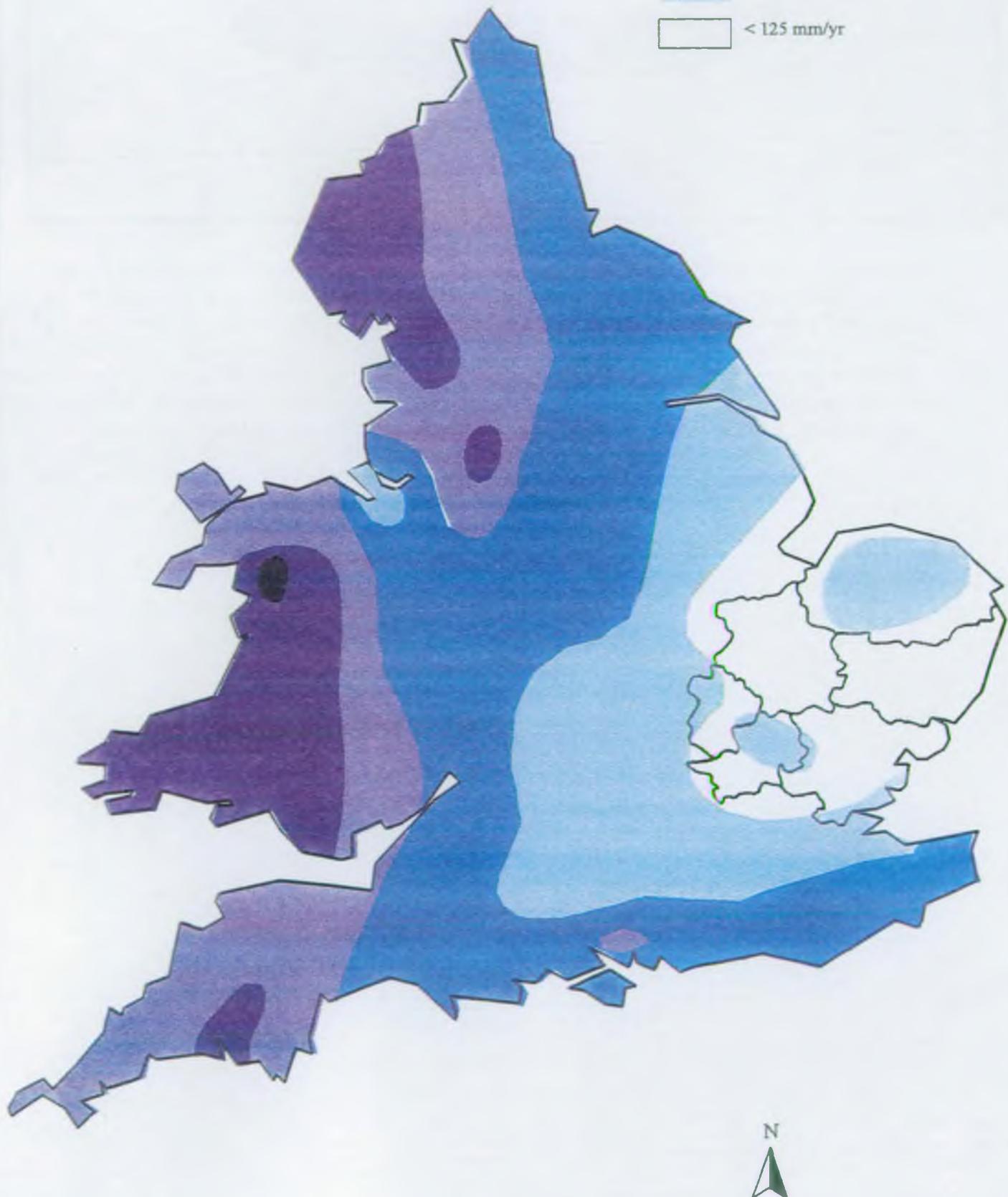
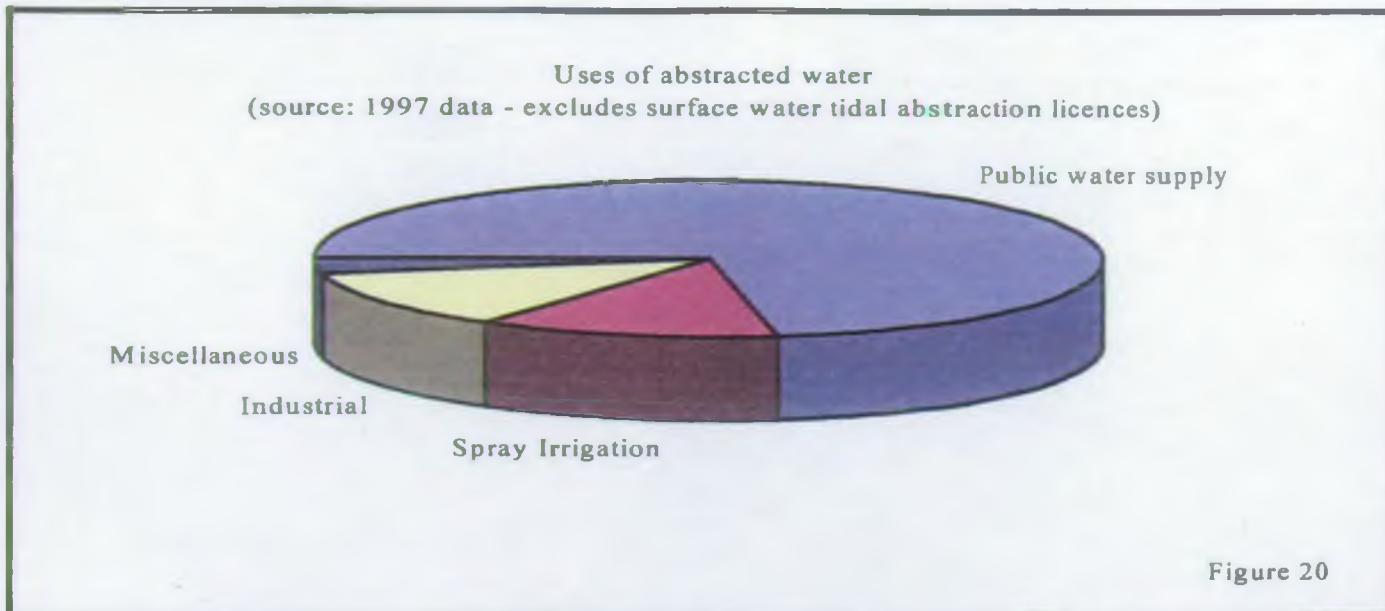


Figure 19



The Agency can provide detailed information on industrial, agricultural, and domestic water use. The general trend is that spray irrigation is on the increase, whilst general industrial use has decreased over recent years. Agriculture is very important to the rural economy of the East of England, and spray irrigation is needed to achieve high standards of crop quality. To ease supply problems in dry summers farm reservoirs have also been constructed. However, for the purposes of this snapshot, we will concentrate on public water supply information as it is the most significant abstractor from the water environment (see also paragraph 3.4).

Farm using spray irrigation to water the crops



3.11 Public Water Supply

Water companies are responsible for the provision of public supplies. They have duties to ensure the efficient use of water resources and the protection of the environment, and the Agency will insist that these duties must be vigorously pursued before any new resource developments are promoted. The companies have a duty to provide and develop public supplies and if new resources schemes are to be constructed in future, the companies would have the main role in the promotion and building of these.

The East of England Region includes five Water Companies (see Figure 21): Anglian Water Services, Cambridge Water Company, Essex & Suffolk Water, Tendring Hundred Water Services and Three Valleys Water. The water company boundaries are not consistent with planning authority boundaries.

There are numerous ways in which water companies can work, both through their own actions and in partnership with others, to meet and manage demands. The Agency expects companies to take the 'twin-track approach' of making prudent plans for new resources where these may be needed in future, whilst ensuring all efforts are made to manage demands. This should include leakage control, education and promotion of water conservation messages to both domestic and industrial customers and selective extension of metering, particularly to manage the discretionary use of water. In addition, there is scope for joint initiatives with housing and commercial developers and with appliance manufacturers to produce, market and install water efficient devices in new buildings.

Individual consumers also have a role to play, since even within the regulatory framework it is the cumulative effect of many personal decisions that can make the difference to future public supply demands. People have to be persuaded of the link between the environmental value of water and the importance of using water wisely in their lifestyles and decisions.

Environmental Snapshot for the East of England

Water Company boundaries

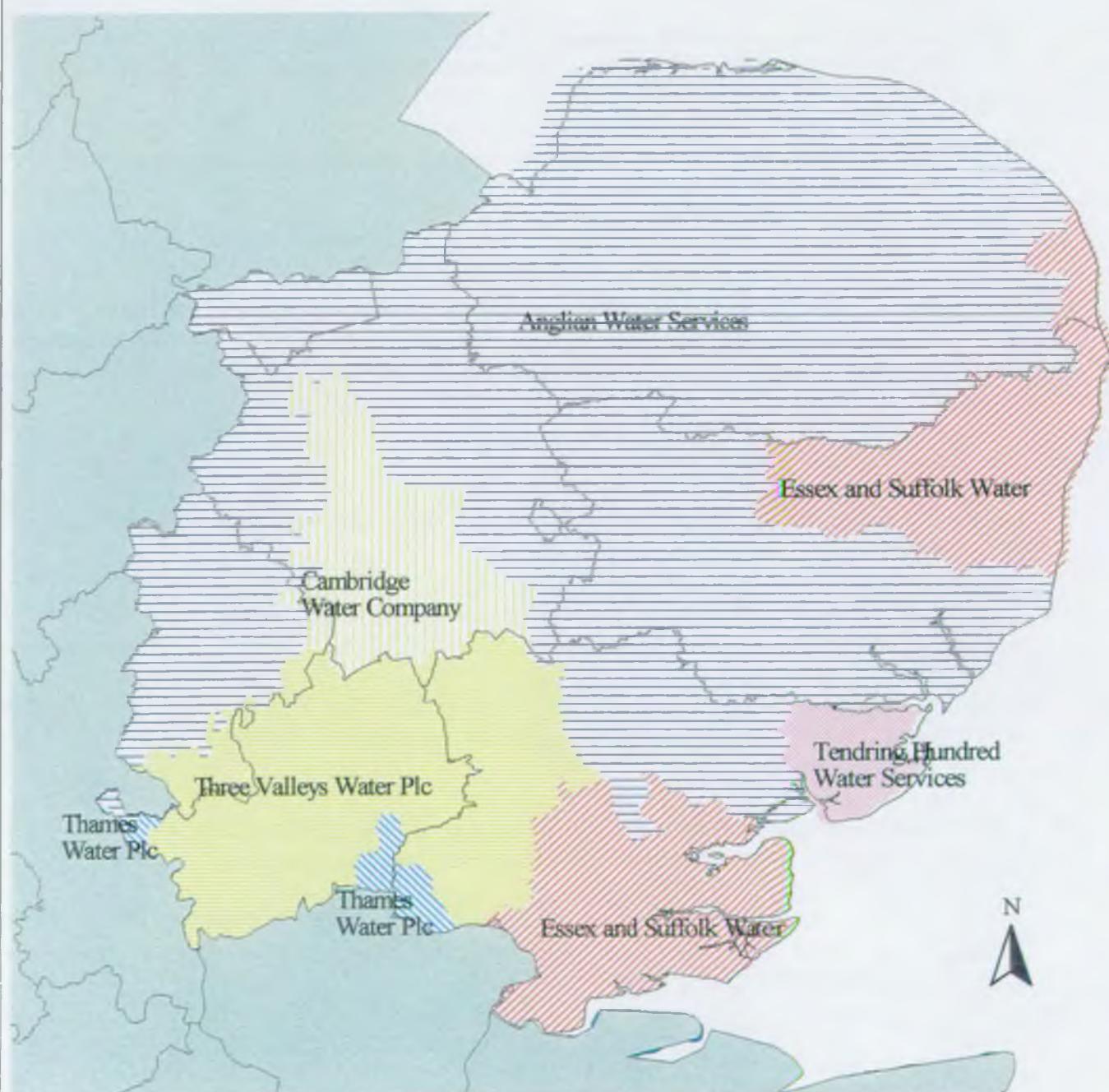


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25 0 25 50 75 100 Kilometres

Figure 21

3.12 Company Water Resources Plans

The draft Water Resource Plans required by the Agency cover the period to 2024/25. A national report was published in October 1998, and we are now following up with the companies on any further work needed. DETR expects the companies to submit plans which the Agency can agree by April 1999. The Agency expects companies to publish the plans or appropriate summaries at that stage.

Despite forecasting differences between the companies, the draft plans suggest that the companies can provide sustainably for the overall population and housing growth proposed in the draft Regional Planning Guidance (SCEALA and SERPLAN) provided that their demand management programmes are successful. However, there may be details of timing and infrastructure on a local basis that need to be considered.

It is important that all opportunities should be taken to promote water conservation and efficiency in new developments as an essential component of sustainable development in this region.

Companies are proposing higher rates of meter installation, and predict higher savings of water by metered customers. This is particularly so for Anglian Water Services. Companies have been set new and more stringent leakage targets which will also save water.

A reservoir has been proposed in Feltwell, Norfolk, for sometime. However this is not a preferred option in the draft plans. Alternatively, an increase to the size of Abberton Reservoir in Essex is included during the period to 2025. The effects of this on transfers from Norfolk will require further assessment. (More information of water resources planning can be found in Appendix A3.6).

3.13 Demand / Supply balance

Figures 22a and 22b show the public water supply situation for the East of England Region.

The 'Business as Usual' scenario (Figure 22a) shows the outcome if companies do not implement further measures to manage demands (leakage control, metering, customer assistance and incentives to encourage water efficiency, etc).

It shows that there would be a water supply problem without water resource developments and further measures to manage demands. Consequently, a deficit in target headroom is shown by about 2017.

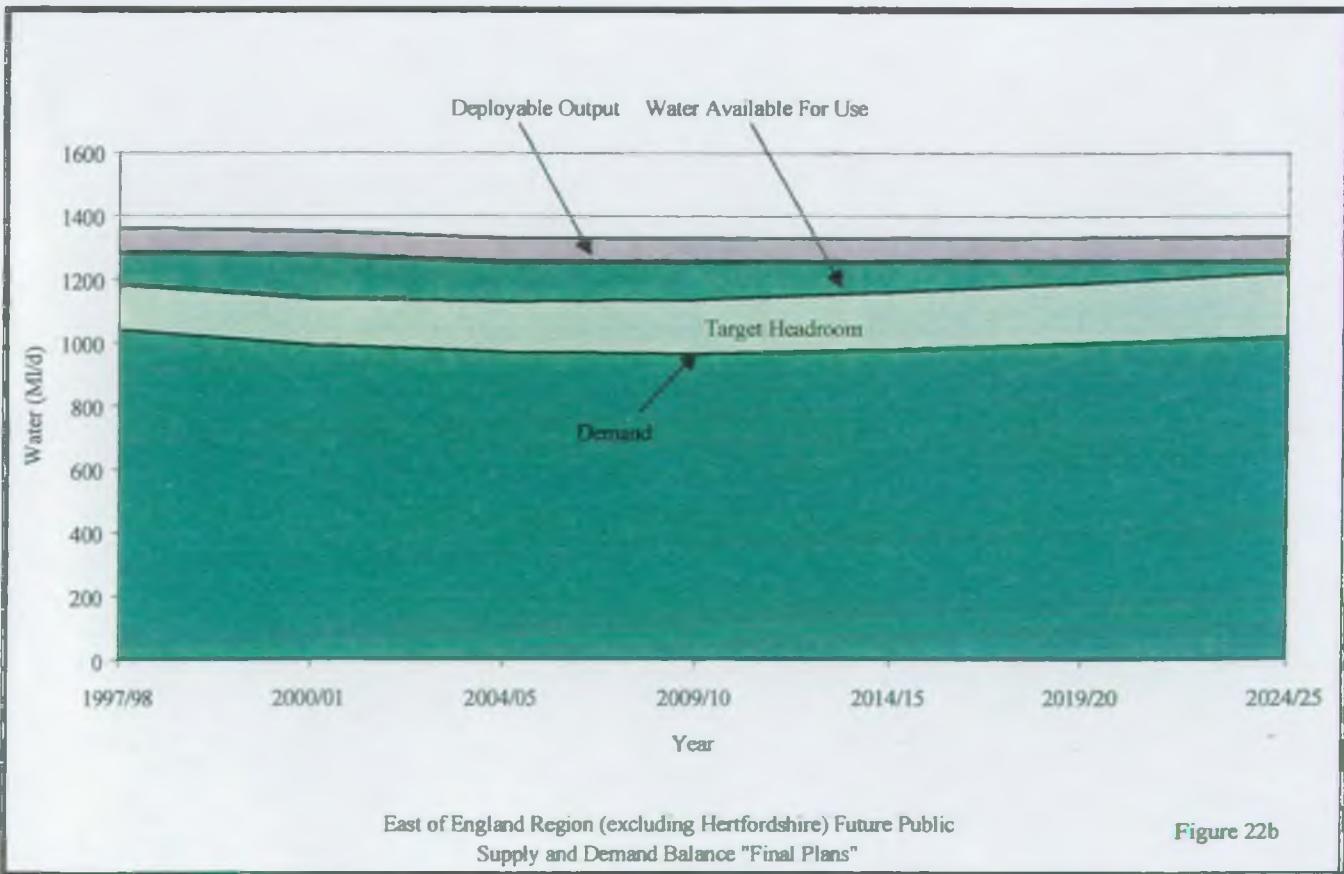
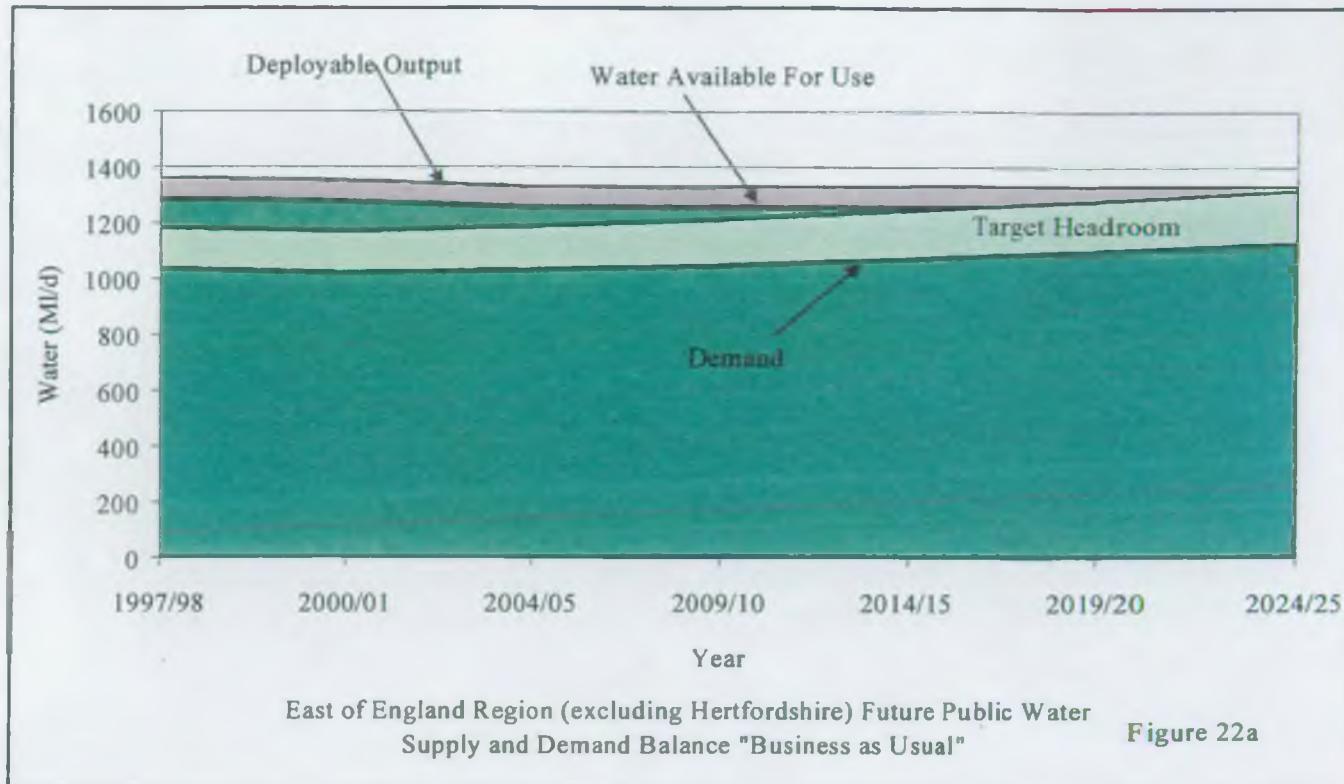
The 'Final Plans' scenario (Figure 22b) shows the expected future scenario which companies plan to implement. It includes increased measures to manage demands.

It shows how the deficit trend is countered by the introduction of greater demand management measures in the 'final plan' scenario, with the shortfall in target headroom delayed to after the 2024/25 planning horizon.

Notes

The graphs should be looked at in the following context:

- The resource zones on which water companies plan do not follow local authority boundaries, hence some assumptions have had to be made in allocating data between areas.
- The water company plans are still draft, and could be revised further.
- The definition of the terms used can be found in Appendix A3.10



3.14 Per Capita Consumption

Figure 23a shows the per capita consumption for measured and unmeasured households for the water companies in the region.

The average unmeasured per capita consumption is 159.5 l/hd/d.
The average measured per capita consumption is 141.5 l/hd/d.

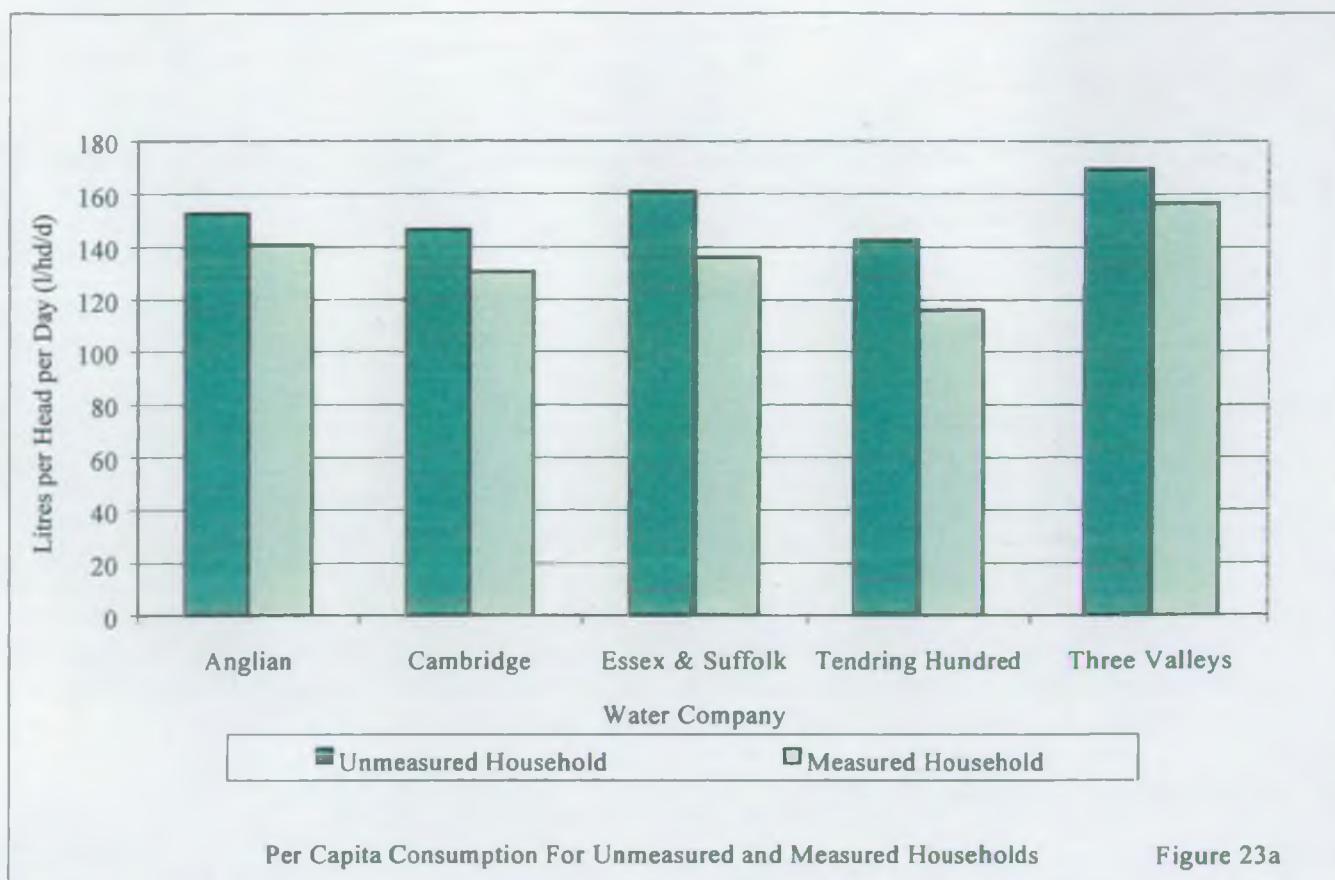
Clearly, the measured households use less water than those which are unmeasured.

3.15 Leakage

Figure 23b shows the average leakage in litres per property per day in the region as compared to the water industry as a whole.

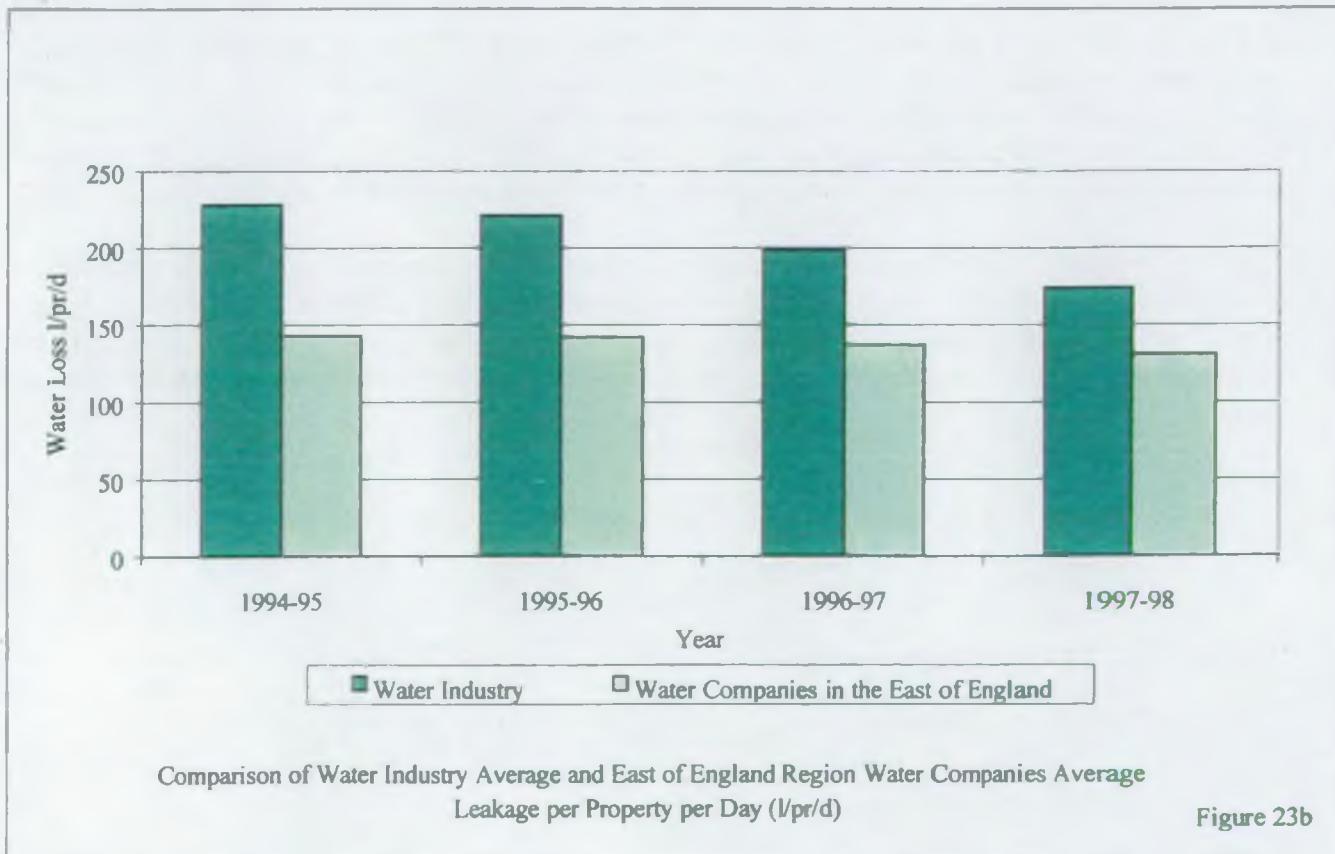
The average leakage is 131.2 l/pr/d.

The graph shows that the water companies in this region have a lower level of leakage than the national average. They are active in maintaining low levels and reducing leakage.



Per Capita Consumption For Unmeasured and Measured Households

Figure 23a



Comparison of Water Industry Average and East of England Region Water Companies Average
Leakage per Property per Day (l/pr/d)

Figure 23b

SECTION 4 WASTE

4.1 Waste Disposal Facilities

Figure 24 shows the location of the most important waste disposal facilities in the East of England. These facilities include landfill sites and incinerators.

4.1.1 Landfill Sites

The landfill sites marked on the map, as well as being of strategic importance, are those that:

- are open and operational;
- are 'open-gate' accepting household, commercial and industrial waste;
- are licensed by the Agency to accept in excess of 75k tonnes per annum;
- accept a wide range of wastes and not just inert/inactive materials.

The map shows that there is a relatively even distribution of landfill facilities across the East of England with each county possessing several important sites. The map does not show the relative significance of these sites, however, taking into account their size, life and transport infrastructure (see paragraph 4.3 on waste disposal in the region).

4.1.2 Incineration Facilities

The East of England does not possess any municipal waste incineration facilities. The availability of suitable old mineral extraction sites has led to landfill providing a relatively low cost waste disposal option for household, commercial and industrial waste compared with the relatively high cost (capital intensive) waste incineration. The relatively rural nature of the region, and the likely transport distances required to feed a municipal waste incinerator, add to the already high cost of disposal for this option. However, the cost of landfill is increasing dramatically as a result of landfill tax, land availability and more stringent pollution control standards. The changes required as a result of the proposed EC Landfill Directive will further increase the cost of landfill. This increase in landfill costs may well make alternative waste management options relatively more attractive in the future.

The region does, however, possess incineration facilities equipped to deal with specialist by-products from industrial and agricultural processes including chicken litter, clinical waste, straw and secondary liquid fuels (utilised by cement kilns as a supplementary fuel). These facilities are authorised by the Agency under Integrated Pollution Control regulations. The location of these facilities is also marked on Figure 24.

**Environmental Snapshot for the
East of England**

Waste Disposal Facilities (1999)



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- ▲ Major Landfill Site
- IPC Authorised Incinerator/Kiln



25 0 25 50 75 100 Kilometres

Figure 24

4.2 Regional Self Sufficiency in Waste Disposal

The EC Waste Framework Directive requires that the UK establishes an "integrated and adequate" network of waste disposal facilities, to prevent the long distance transport of waste and ensure that those who create waste take some responsibility for its management. In the UK this requirement is likely to be further disaggregated to the English regions. This will require each Regional Planning Body (RPB)⁴ to provide for sufficient facilities in its area for it to become "regionally self sufficient" in waste disposal. There will, however, always be a need for cross-boundary movements of more difficult wastes to specialist facilities throughout the country, as well as the cross-boundary movement of waste to the nearest suitable facility.

4.3 Waste Disposed to Landfill

The table below shows the quantities of inert (non-biodegradable) and non inert (biodegradable) waste disposed of in the region's landfill sites during 1996.

Landfill disposal in the region is characterised by the influence of London and the South East. The availability of landfill within the counties of Essex and Bedfordshire, and ease of transport between them and the Capital (by road, rail and water), mean that over many years these counties have taken significant quantities of waste from London and the South East. In 1996 (see Figures 25 and 26) approximately 40% of the waste disposed to landfill sites in Bedfordshire and Essex originated in London.

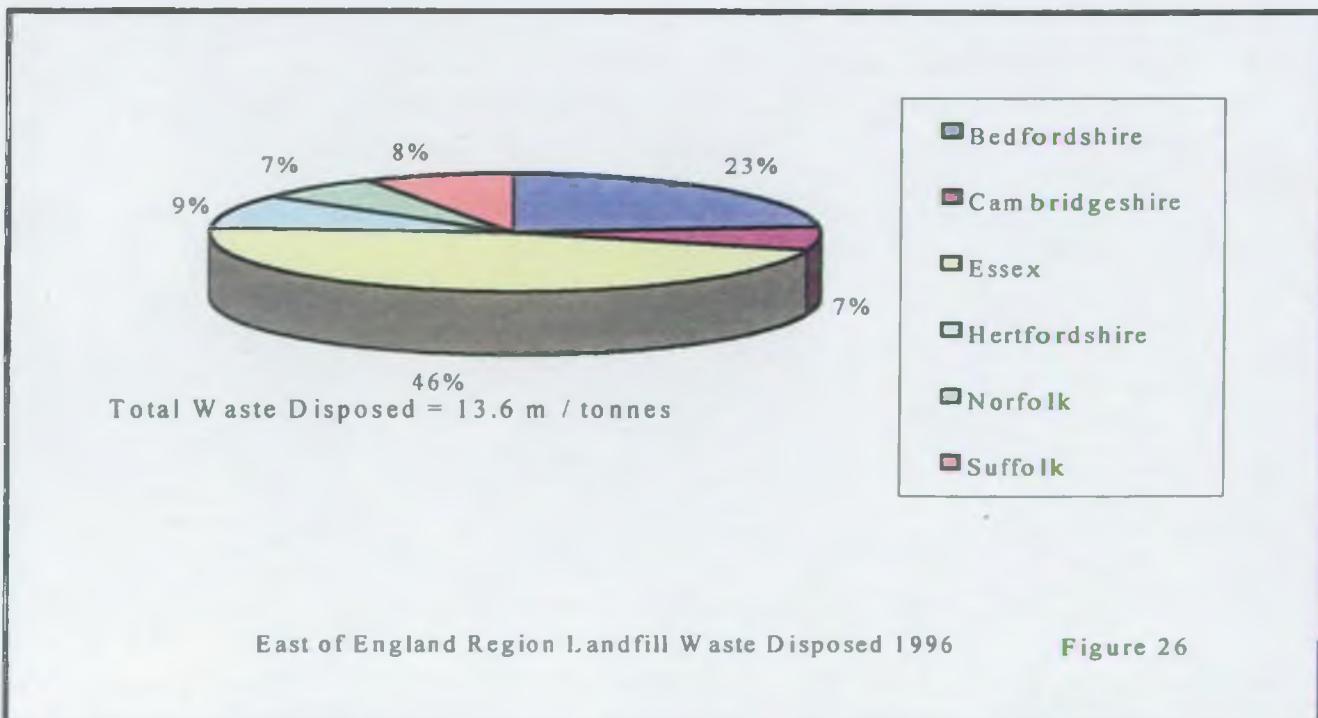
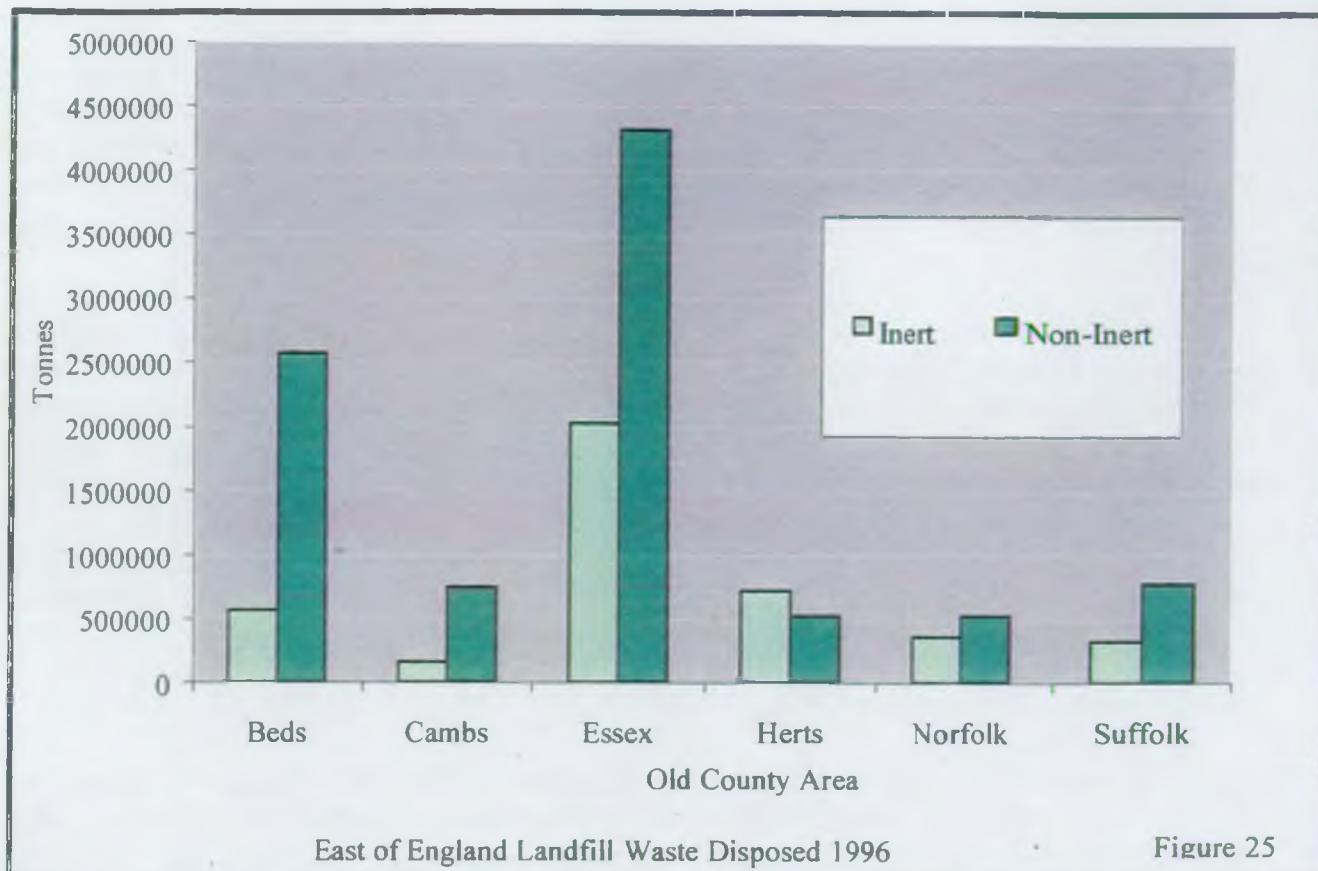
Total landfill disposal in the remaining counties – Cambridgeshire, Hertfordshire, Norfolk and Suffolk – is not so affected by London and the South East. Hertfordshire, whilst importing ½ million tonnes of waste from London, exports a similar quantity to Bedfordshire.

County Area	Inert (tonnes)	Non-Inert (tonnes)	Total (tonnes)
Bedfordshire	565100	2572200	3137300
Cambridgeshire	157600	743700	901300
Essex	2026800	4313900	6340700
Hertfordshire	718300	524200	1242500
Norfolk	361800	526400	888200
Suffolk	326600	778400	1105000
Total	4156200	9458800	13615000

Notes

- Figures for Suffolk relate to 1995
- All Figures collected through Waste Management Licence Returns except Norfolk, where figures are from Norfolk County Council records

⁴ Currently in the East of England, there are two RPBs: SERPLAN for the South East of England (which includes Essex, Herts and Beds) and SCEALA (Cambridgeshire, Norfolk and Suffolk). Regional Self Sufficiency for waste disposal is expected to be defined by these two Planning Regions until boundaries with the Regional Development Agency are harmonised. In the meantime, the Environment Agency will continue to collect waste information on district and unitary authority boundaries allowing publication to any planning body boundary.



4.4 Agricultural Waste Arisings

Figure 27 to 30 show the types and quantities of agricultural waste arising in the six counties of the East of England. These estimates derive from a recent work commissioned by the Agency and published in a 1998 report entitled 'Estimates of Agricultural Waste Arisings – Anglian Region'. The estimates were generated using known types and quantities of waste; determined by relevant factors such as type of agricultural land use and numbers and types of livestock.⁵

Across the region, in excess of 90% of agricultural waste arising is material derived from the keeping of livestock, including manures, slurries and bedding. Much of this material is used on agricultural premises for the benefit of agriculture. Other large components of agricultural waste are crop residues (silage effluent, straw, spoiled vegetable crops) and spent chemicals such as pesticide washing and oils.

Within the region, the counties of Norfolk and Suffolk account for approximately 70% of estimated agricultural waste arisings. This reflects the relatively rural nature of these counties and, in particular, the numbers of intensively reared livestock.

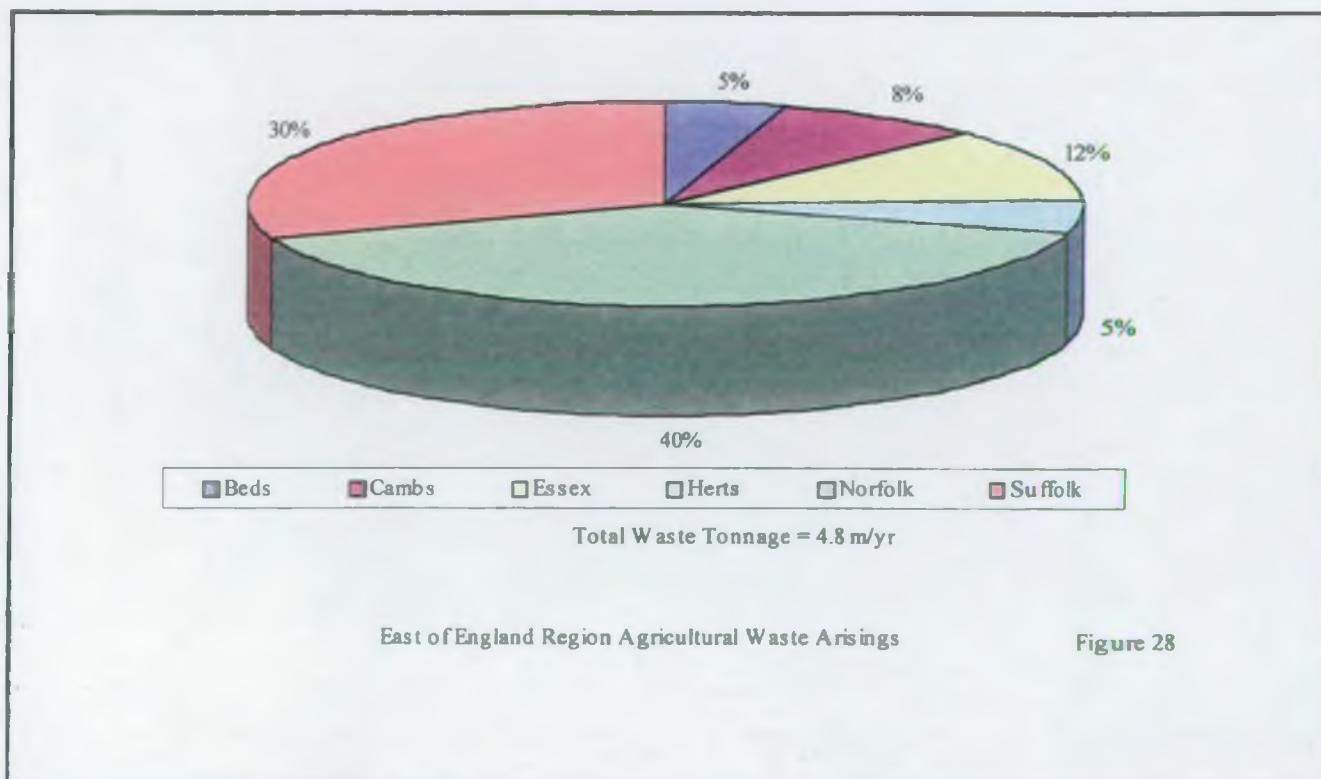
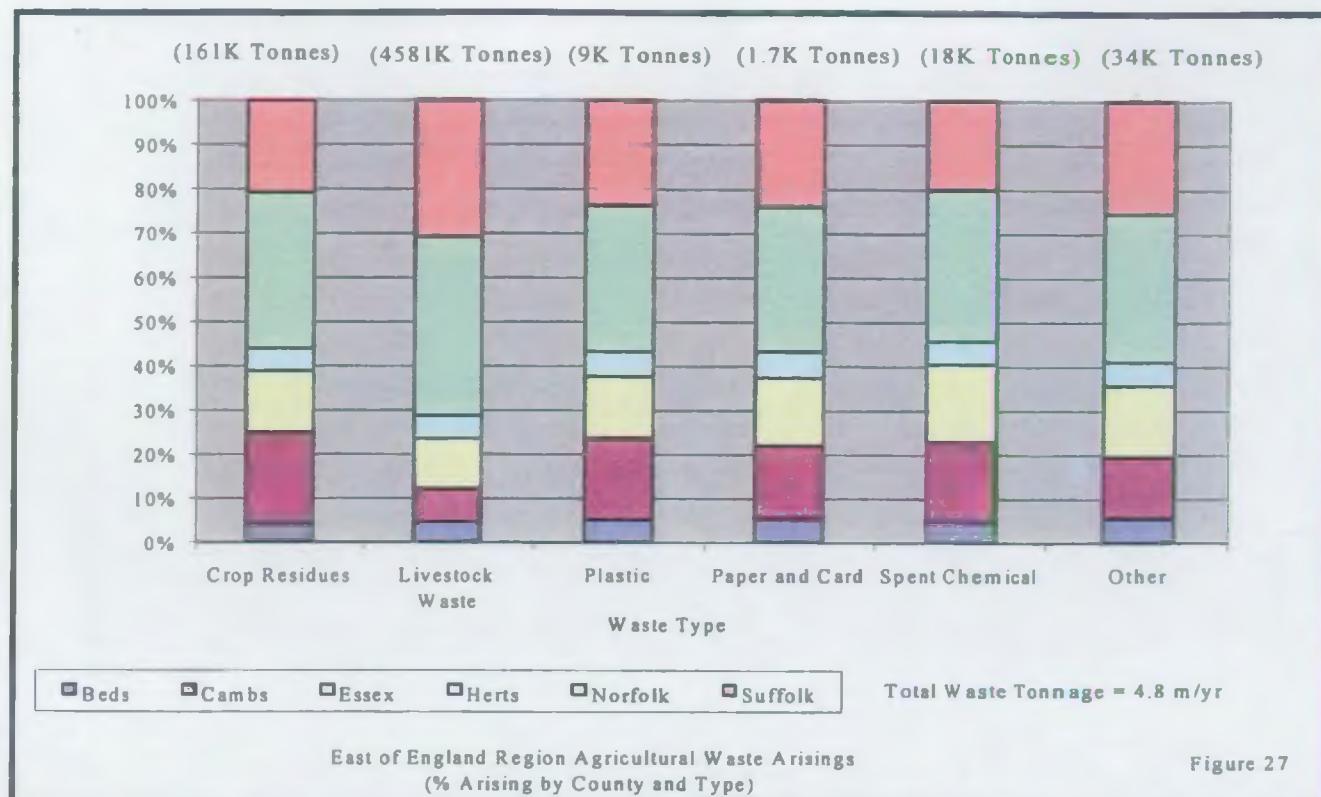
4.5 The Future for Agricultural Waste

Currently waste from agricultural premises is not controlled under UK waste management legislation. In effect this leaves agricultural holdings free to manage their own waste, subject to them not polluting watercourses, groundwater or causing a nuisance. This situation is expected to change in the next couple of years with waste management controls extended to agriculture as is required by the EC Waste Framework Directive. Once this has taken place, agriculture will be subject to the following requirements of waste management legislation:

- Waste management licensing;
- The waste management duty of care and registration of carriers and brokers; and,
- Special waste controls.

This will lead to significant changes to waste management in the agricultural sector, bringing them in line with other industries and commerce.

⁵ Please note: they are not the results of detailed field surveys or studies.



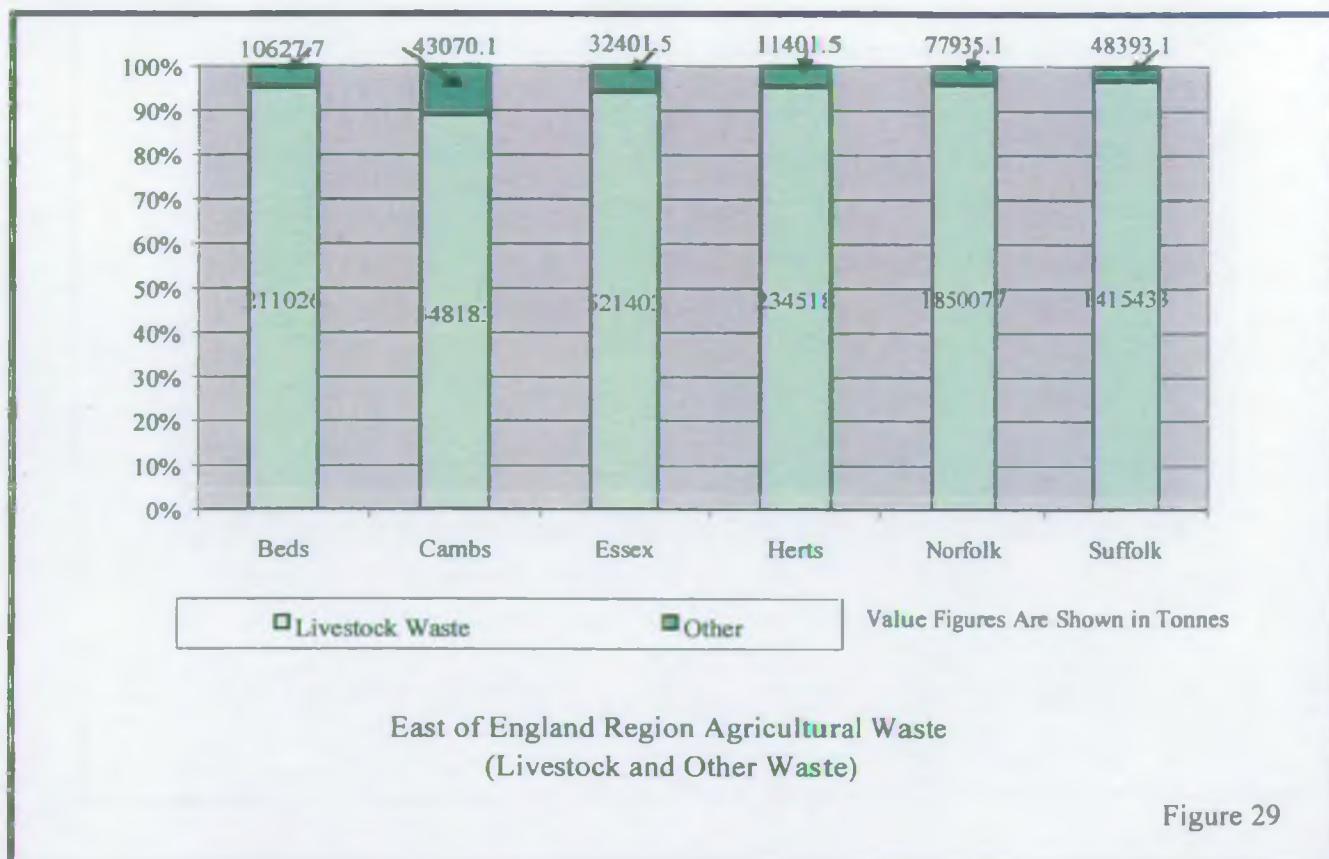


Figure 29

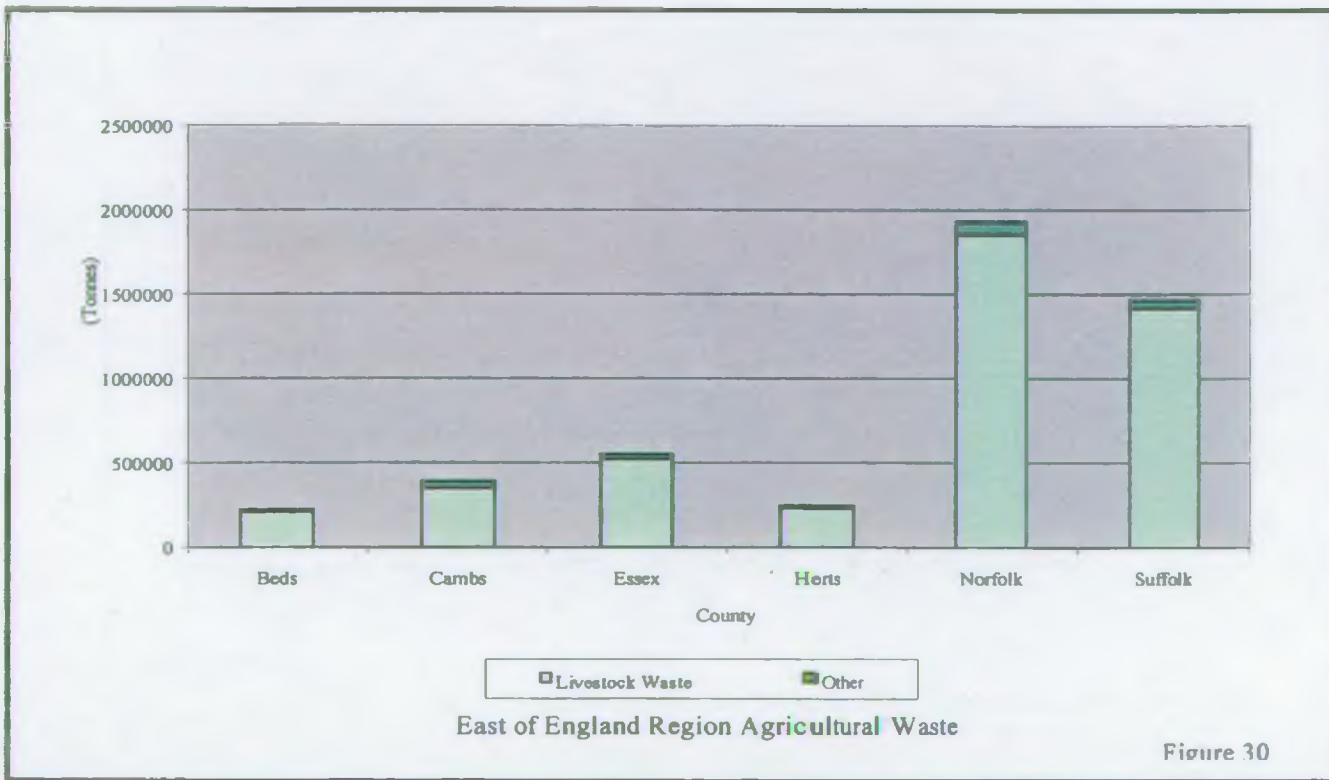


Figure 30

SECTION 5 BIODIVERSITY AND WILDLIFE

5.1 Natural Areas

Natural Areas, as identified by English Nature, provide a national overview of England's wildlife and natural features. They have been defined through the identification of locally distinctive areas, which are the result of interactions between various influences. The boundaries of Natural Areas are based upon the distribution of underlying geology, wildlife, natural features, land use patterns and human history. Within the East of England there are 15 Natural Areas which are diverse in nature ranging from the Fens, Breckland, the Chilterns to the Suffolk Coast and Marshes (Figure 31).

The purpose of Natural Areas is to provide a wider context for nature conservation action. Natural Areas provide a framework for the identification of the nature conservation resource of the wider countryside as well as statutory designated wildlife sites. For each Natural Area a 'profile' has been produced which describes this resource and sets objectives for action. The resource includes the characteristic habitats and species found in the Natural Areas, for example, species-rich lowland fen is characteristic of 'the Broads' Natural Area.⁶

⁶ Please note: More information can be found in the English Nature publication 'Natural Area's in the Eastern Region - helping to set the regional agenda for nature' (April 1999).

Environmental Snapshot for the East of England

Natural Areas



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Figure 31

5.2 Biodiversity, Wildlife and Earth Heritage

Biodiversity (biological diversity) is simply the wealth of wildlife.

The Government has made a commitment to protecting and enhancing biodiversity through signing the Biodiversity Convention at the UN Conference on Environment and Development held in Rio de Janeiro in 1992. This commitment has been taken forward by the UK Steering Group which have produced reports setting out priorities for action for habitats and species based on their current status, *Biodiversity: The UK Steering Group Report Volumes 1 and 2*. The following sections cover some species listed in the report.

Local Biodiversity Action Plans are being produced for the counties in the East of England. These identify habitats and species that occur within each county and set targets for action to either halt decline or increase the resource. The plans aim to describe where local action can contribute to meeting national targets for species and habitats as well as incorporating National Area Objectives.

Biodiversity (wildlife) is a key measure of sustainable development. This has been recognised as a key indicator in the Government's 'Sustainability Counts' consultation paper. Biodiversity is also important economically, socially and culturally.

The East of England is extremely diverse and rich in terms of biodiversity. There are a large number and area of non-statutory and statutory sites designated for nature conservation value such as Sites of Importance for Nature Conservation (SINCs), Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Special Protection Areas (SPAs) and candidate Special Areas of Conservation (cSACs). Figure 32 shows statutory sites. Such sites protect the best and rarest examples of biodiversity in the country.

Many areas within the region are recognised for their European (as well as national) importance for wildlife including the Wash-North Norfolk Coast (cSAC), the Broads (cSAC), the Nene and Ouse Washes (SPAs), Devils Dyke (cSAC), the Stour and Orwell Estuaries (SPA).

Wildlife, however, is not restricted to designated sites or areas and is found in the wider countryside. There are areas of the region where biodiversity is low due to unsympathetic land management, land drainage and fragmentation of sites, such as the Fens. Other areas of the region have high biodiversity where, for example, agricultural practices have had less impact. Some species in the region are restricted to designated sites such as rare lichens in the Brecks, others species, such as bats range wider than just designated sites and many other species such as farmland birds are dependant upon the agricultural landscape for survival.

The East of England is also rich in earth heritage, which encompasses geology and geomorphology. The deposits from the Pleistocene in north-east Norfolk are internationally recognised due to the discovery of important vertebrate fossils. Further inland, the West Anglian Plain is formed of Jurassic clays and limestones, which are covered by vast quantities of sand, gravels and clays, with extensive gravel terraces in the river valleys.

Environmental Snapshot for the East of England

Protected Areas
International and European
Designations



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Special Areas of Conservation

Special Protection Areas

(these designations also cover RAMSAR sites)



Figure 32

5.3 Fisheries

In addition to contributing to the rural economy, fish are excellent indicators of aquatic environmental quality, both directly in relation to water quality, and indirectly as a measure of habitat restoration and improvement. Fish frequently act as sentinels for pollutants, a role exemplified in water quality objective schemes and in the draft EC Surface Water Policy Framework Directive. In the area of fisheries habitat improvement, capital schemes to the value of some £300k have been completed in the last three years.

The East of England Region contains some 2000km of river and drain fisheries, plus many hundreds of still waters. The region's reputation for containing some of the finest of coarse and trout fisheries in the country is underlined by its consistent inclusion in the top three of rod licence sales areas.

Expenditure by the 200,000 anglers in the area represent an estimated £300million boost to the local economy

A snapshot of the fisheries resource in the region is given in the accompanying Figure 33, showing fish biomass data for all the rivers surveyed in the region. The data are derived from the routine fisheries monitoring programme, currently covering the region's rivers in a five year rolling cycle of surveys.

The biomass classification is as follows:

Fish biomass	Fisheries Class	Fishery Standard
$>20 \pm 2\text{g/m}^2$	A	Excellent/Good - Blue
10 ± 2 to $20 \pm 2\text{g/m}^2$	B	Good/Moderate - Green
5 ± 1 to $10 \pm 2\text{g/m}^2$	C	Moderate/Poor - Yellow
0 to $5 \pm 1\text{g/m}^2$	D	Poor - Red

The integrated catchment management approach adopted by the Agency ensures that the related needs of fisheries, conservation and the uses are identified and balanced. Hence, the high economic value of fisheries and fishing must continue to be instrumental in promoting biodiversity, and protecting fisheries and the aquatic environment from the impact of development and other pressures.

The East of England is also a stronghold for Spined Loach, especially within the catchment of the Great Ouse. This species has been recognised by the Habitats Directive as a species whose conservation requires the designation of a Special Area of Conservation, for example, the Nene Washes.

Burbot, was last found in the Great Ouse in Cambridgeshire in the 1970's, but it is now extinct from this river. Burbot is recognised in the national Biodiversity Action Plan as a species, which requires conservation action.

Environmental Snapshot for the
East of England

Fish Biomass



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- △ Class A - $\geq 20\text{g/m}^2$
- △ Class B - 10 to 20g/m^2
- △ Class C - 5 to 10g/m^2
- △ Class D - 0 to 5g/m^2
- △ No Biomass Data
- No Data



Figure 33

5.4 Biodiversity Action Plan Species - Crayfish

The white-clawed or native crayfish has been recognised as important by the UK Biodiversity Steering Group's Action Plan. Native crayfish are threatened by the spread of the introduced signal crayfish, as well as many other non-native crayfish, which have escaped into the wild. The signal crayfish poses another threat to native crayfish as it is the carrier of the virulent crayfish plague. In addition to spreading crayfish plague, non-native crayfish predate on native crayfish and compete directly with them for food and shelter.

Once widespread in clean streams, rivers and lakes in England particularly chalk rivers, the distribution of the native crayfish has declined sharply. In the East of England, the occurrence of native crayfish has declined as the signal crayfish have spread. Turkish and red swamp crayfish, both of which are non-native, have also been reported. Figure 34 shows the distribution of native and signal crayfish.



A native crayfish

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East of England

Crayfish Data



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Data up to and including 1984

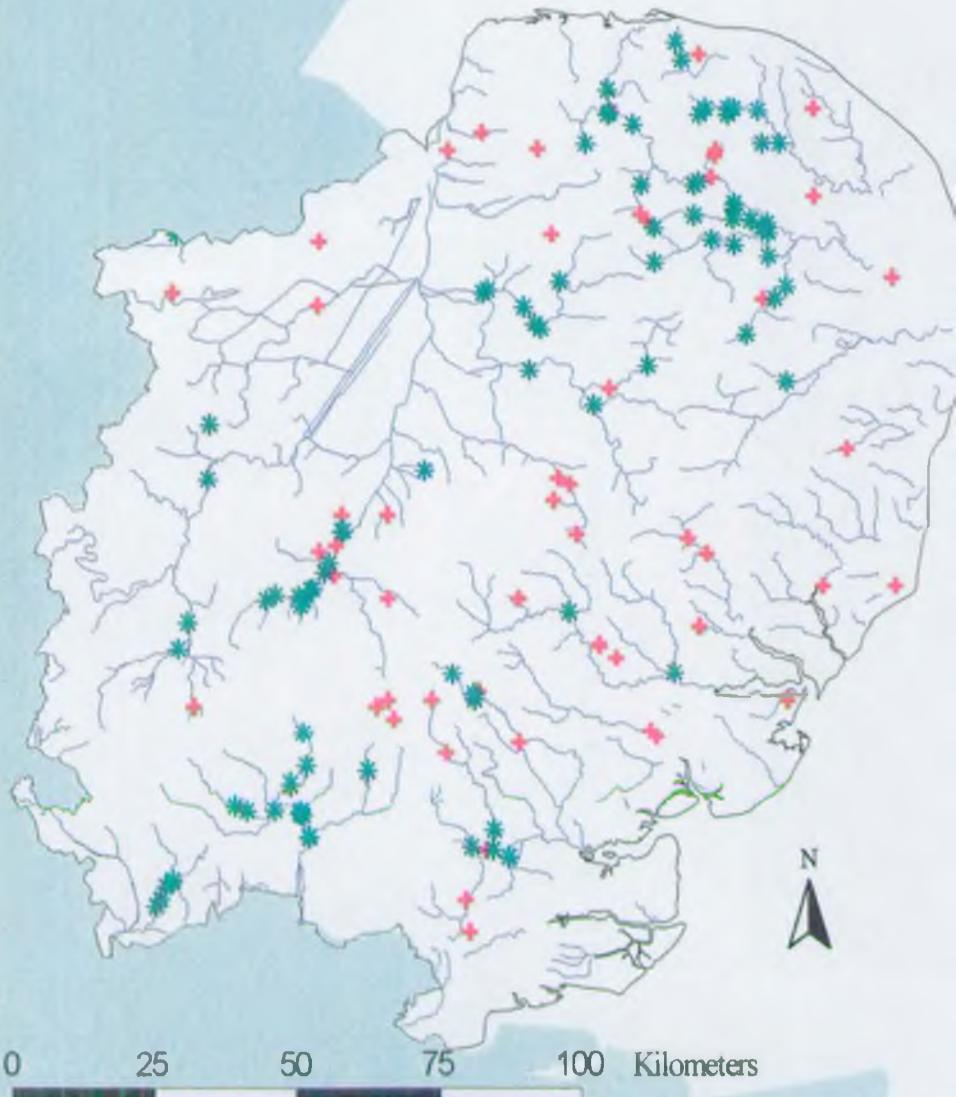
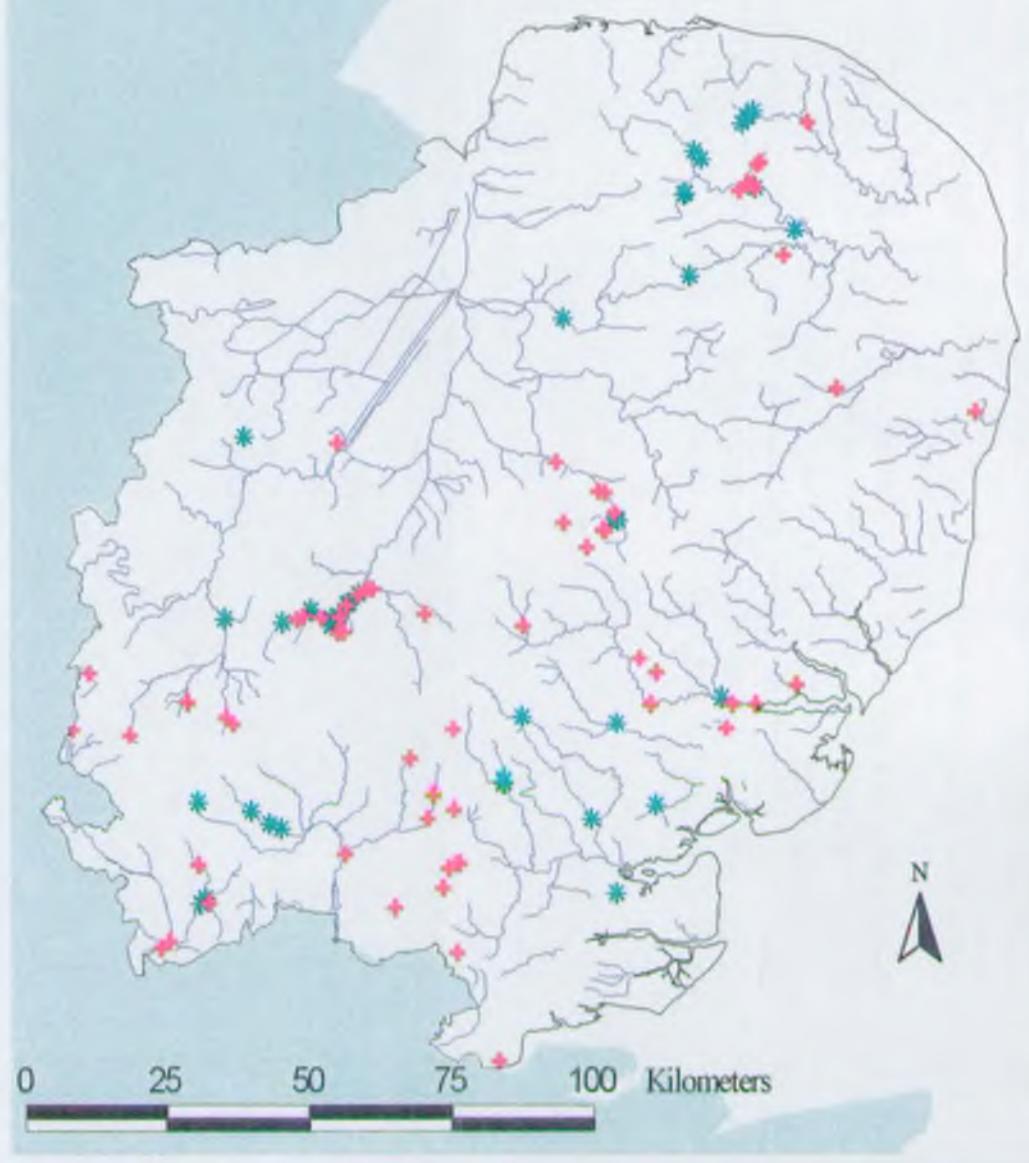


Figure 34

Native
Signal
Main Rivers

Data 1985 onwards



5.5 Water Vole and Otter Surveys

Water voles and otters have been identified by the UK Biodiversity Action Plan due to their declining populations. Surveys for these species have been undertaken through the region in collaboration with local Wildlife Trusts (see Figures 35 and 36). The information from these surveys can be used to identify and prioritise action in order to make habitat improvements such as river management. For example, where water voles are found enhancement measures can be made such as the establishment of a broad range of emergent and bankside plant cover.



The otter – now a declining population

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East of England**

Distribution of Water Voles



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● **Locations of Water Vole
activity (1996/7)**



25 0 25 50 75 100 Kilometres

Figure 35

Environmental Snapshot for the East of England

Distribution of Otters



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● Survey sites where otter
activity found (1996/7)

↗ Frequent records of
otter activity (1998)



Figure 36

SECTION 6 COASTAL AND FLUVIAL PROCESSES

6.1 Shoreline Management Plans (SMPs)

SMPs are part of an initiative, backed by the Ministry of Agriculture, Fisheries and Food, Association of District Councils, English Nature and the Environment Agency, to improve the future planning of our coastlines.

The objectives of SMPs are to:

- Improve our understanding of coastal processes;
- Work in partnership with all interests and organisations; and,
- Prepare an agreed framework for long term planning of coastal defences.

SMP production follows a two-stage process. The first being to collect information, ideas and to consult with interested parties. The second stage examines strategic coastal defence options and a final period of consultation prior to the production of the final SMP.

SMPs are considered as 'living documents' that benefit from further information collection, leading to a better understanding of the dynamic coastal processes in operation. As part of the implementation of SMPs new studies will be commissioned to enhance confidence and contribute to the review process. SMPs are normally reviewed at five yearly intervals, although this period may be reduced if major influences and changes are apparent within the area covered by an individual plan.

Figure 37 details the current and proposed long term options within the East of England.

Many of the nation's finest sites for nature conservation are located along the coast and are subject to the combined impacts of natural coastal processes, sea level rise and flood defence management schemes.

The coasts and estuaries of the East of England are home to sites protected under European legislation (i.e., Habitats and Birds Directives) and as such are afforded special levels of protection. Coastal conservation sites range in type from intertidal to freshwater and there is a duty on the UK Government to ensure that the integrity of European and internationally designated sites is maintained.

There is an inherent conflict in the management of the many parts of the East Anglian coast, as it may impact upon sites of nature conservation value (see also Section 2 on Climate Change); if the line of coastal flood defences are held as sea level rises, there may be a loss of valuable intertidal habitat (known as 'coastal squeeze'), if the flood defence line is re-aligned inland, there may be a loss of freshwater habitat which is currently protected behind coastal defences. In some situations, it will be desirable or necessary to create new habitat as compensation for sites lost in the coastal and estuarine zone.

The challenge for coastal management today is to recognise and deal with natural coastal processes in this situation and design options for coastal management which are both sustainable, environmentally sensitive and can be delivered at reasonable cost. The Environment Agency and other coastal authorities are developing this approach through the implementation of SMPs and the use of site-specific strategic studies.

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Shoreline Management Plan Policy Options



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Hold the line (maintain or improve the existing defence)

Retreat the line (managed retreat)

Do Nothing (except for safety reasons)

Further evaluation required

Landward represents current option

Seaward represents long-term option



Figure 37

6.2 Areas at Risk of Flooding

The information provided in Figure 38 represents the best available knowledge on the area at risk of flooding. This indicative floodplain represents land which lies beneath either the tidal 1:200 year or fluvial 1:100 year return period water level.

The Agency is currently undertaking a floodplain mapping exercise of areas which have been identified as being under greatest development pressure. These refined floodplain maps, known as Section 105 Maps, will provide planning authorities with an improved indicative floodplain produced via a consistent approach.

To accelerate the transfer of information to the planning authorities the Agency will provide indicative floodplain maps by September 1999. These maps will cover both statutory main and non-main rivers. These maps are an interim measure and will be replaced by more detailed (section 105) maps when those become available.



A flooded street in Northampton during the Easter Floods of 1998

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Indicative Floodplain



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**Indicative Flood Plain
Combined 1:100 Fluvial
1:200 Saline**



25 0 25 50 75 100 Kilometres

Figure 38

SECTION 7 LANDSCAPE AND LAND USE

Note: it may also be useful to refer to section 3 water quality and section 4 waste.

7.1 For this section we have collated the most readily available data. However, more detailed accounts of land use issues can be found in:

- County structure plans and state of the environment reports (see Appendix 9);
- Regional planning guidance for the South East and East Anglia;
- East of England local government conference's Regional Planning Framework; and,
- FRCA's agricultural and rural economy issues report for the East of England.

LANDSCAPE

7.2 Context

Through the Town and Country Planning system, the Government aims to regulate development and secure the most efficient and effective use of the land. Modern planning seeks to identify the land's 'carrying capacity' – that, if exceeded causes irreversible and, sometimes, undesirable changes.

The Government's consultation paper on sustainable development indicators, highlighted the need to measure the number of new homes built on previously developed land (brownfield sites). The government has set a target of 60% to be achieved by 2008 and this is likely to be an issue for the region. No data on this indicator is currently available.

7.3 Character Areas

The Countryside Agency (formerly the Countryside Commission and Rural Development Commission), English Nature and English Heritage have identified Character Areas. Character Areas are purely a landscape definition based on locally distinct areas which have developed from the interaction between land use, wildlife, natural features, human impacts and the built environment (Figure 39).

Nature and wildlife are an integral part of the landscape. Character Areas are the building blocks of Natural Areas (see 5.1 and Figure 31). For example, the East Anglian Plain Natural Area consists of four Character Areas. There are few differences in the wildlife and natural features between adjacent Character Areas, whereas landscape differences are enough to define a different Character Area. Descriptions for each Character Area are available from the Countryside Agency, and this initiative has been used to promote village design statements.

The landscape in the region is varied ranging from the unique character of the fens in the north, to the chalk areas of the Chilterns in the West, to the coastal areas such as the Greater Thames Estuary. The landscape of the region (see Figure 41) has been recognised and certain areas are statutorily designated such as the Broads National Park (which is internationally important for wildlife) and the Chilterns Area of Outstanding Natural Beauty (AONB). The other AONBs are Dedham Vale, the Norfolk and Suffolk coasts and heaths. Opportunities for landscape conservation and enhancement outside these designations are great and often benefit other interests such as wildlife and the conservation of 'earth heritage' (geological) features.

Environmental Snapshot for the East of England

Character of England



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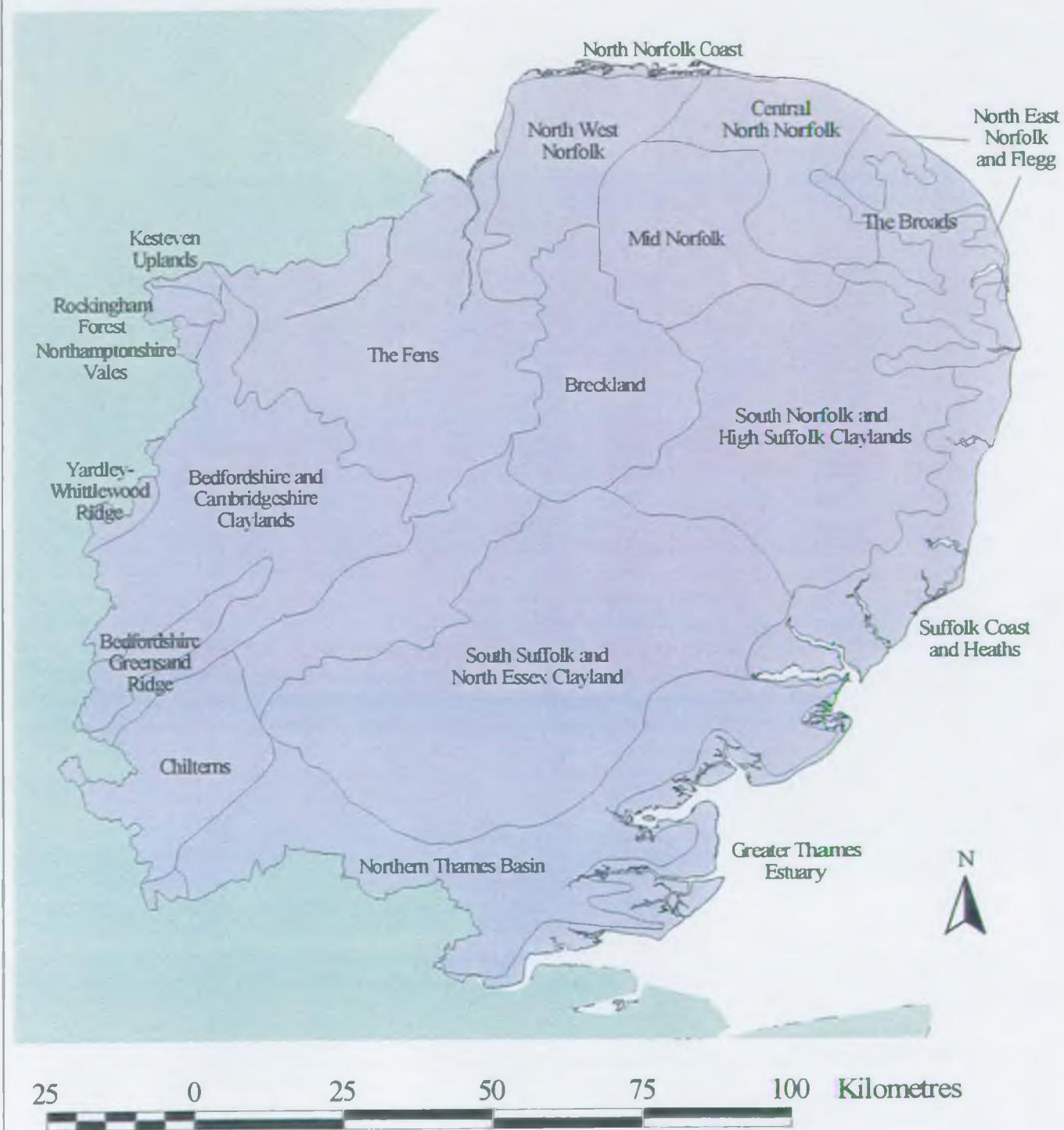


Figure 39

7.4 Land management and protection

The Government has stated its commitment to the conservation and enhancement of the countryside, and to its enjoyment by the public. Figures 40 and 41 shows the wide expanse of protected areas and sites in the East of England. These are recognised within the Town and Country Planning process and are also subject to active management by the various agencies that regulate them.

Particularly key to this is the role of farmers, not only as food producers, but, also, as custodians of the countryside. Agricultural and environmental objectives need to be reconciled and action supported by guidance and financial incentives. More information of agri-environment schemes can be obtained from Farming and Rural Conservation Agency and the Ministry of Agriculture Fisheries and Food.

Environmental Snapshot for the East of England

Protected Areas
National Designation



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- National Park
- Green Belt
- Scheduled Ancient Monument

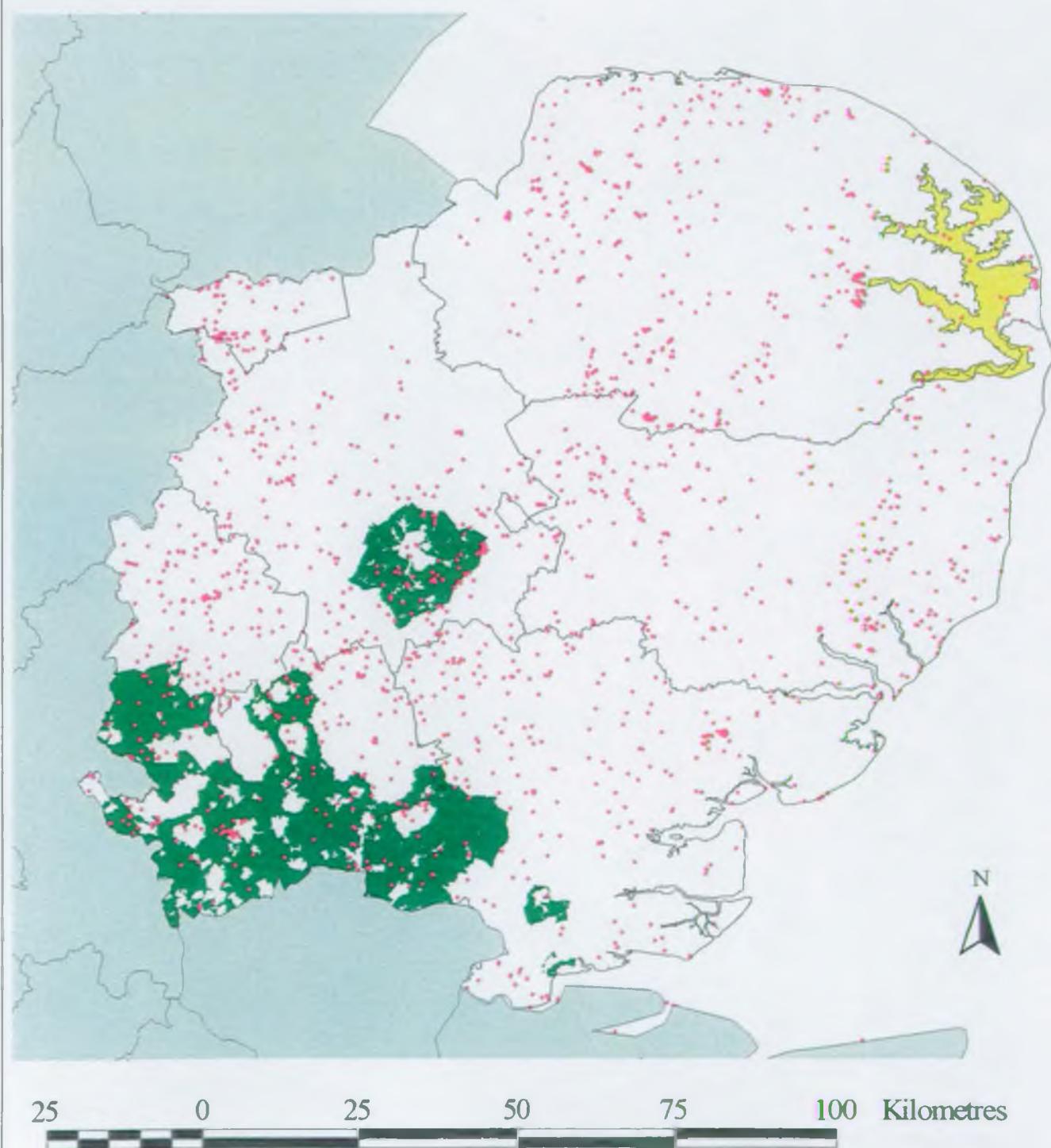


Figure 40

Environmental Snapshot for the East of England

Protected Areas
National Designations



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- Sites of Special Scientific Interest
- National Nature Reserves
- Heritage Coast
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Areas

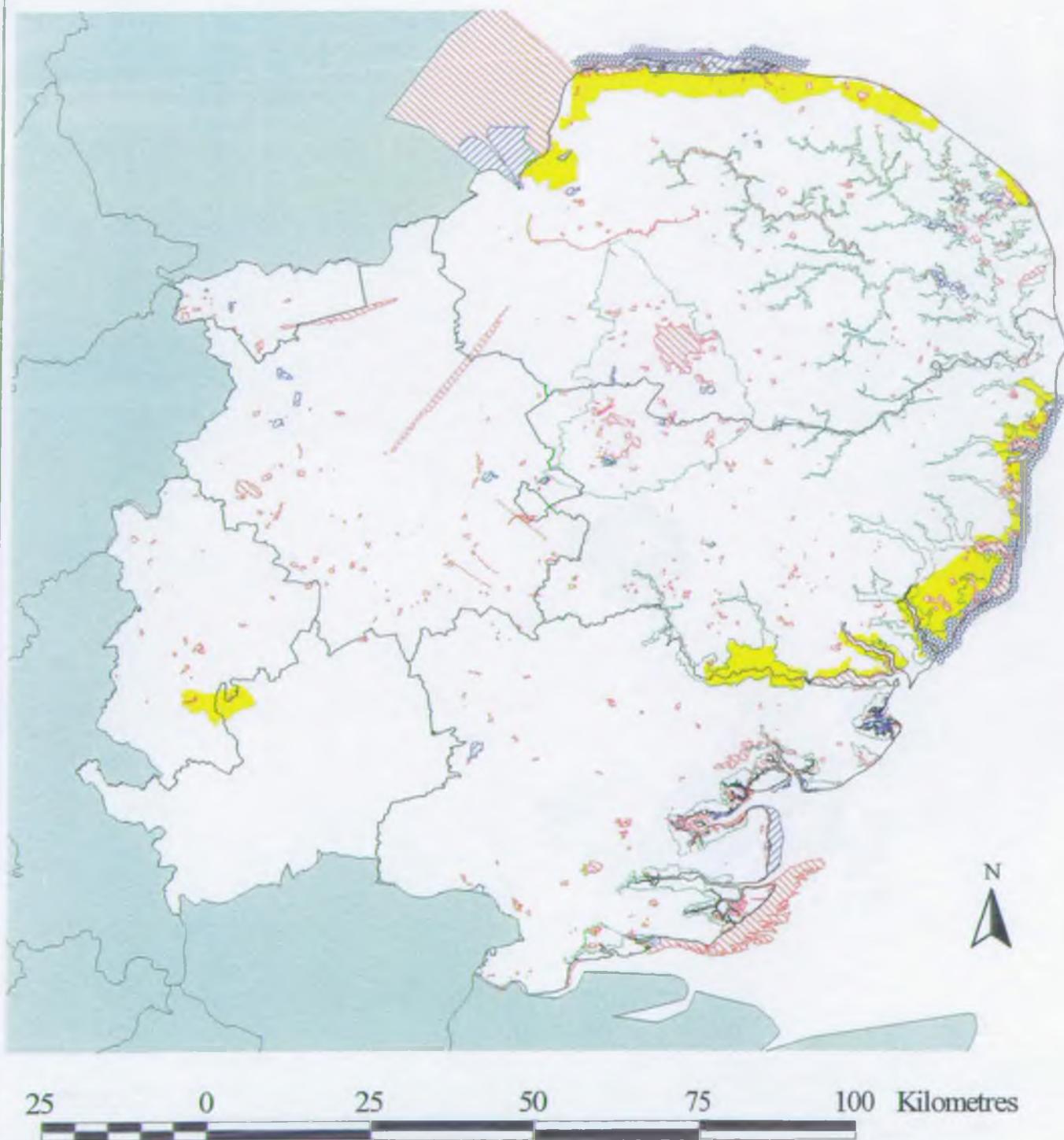


Figure 41

LAND USE

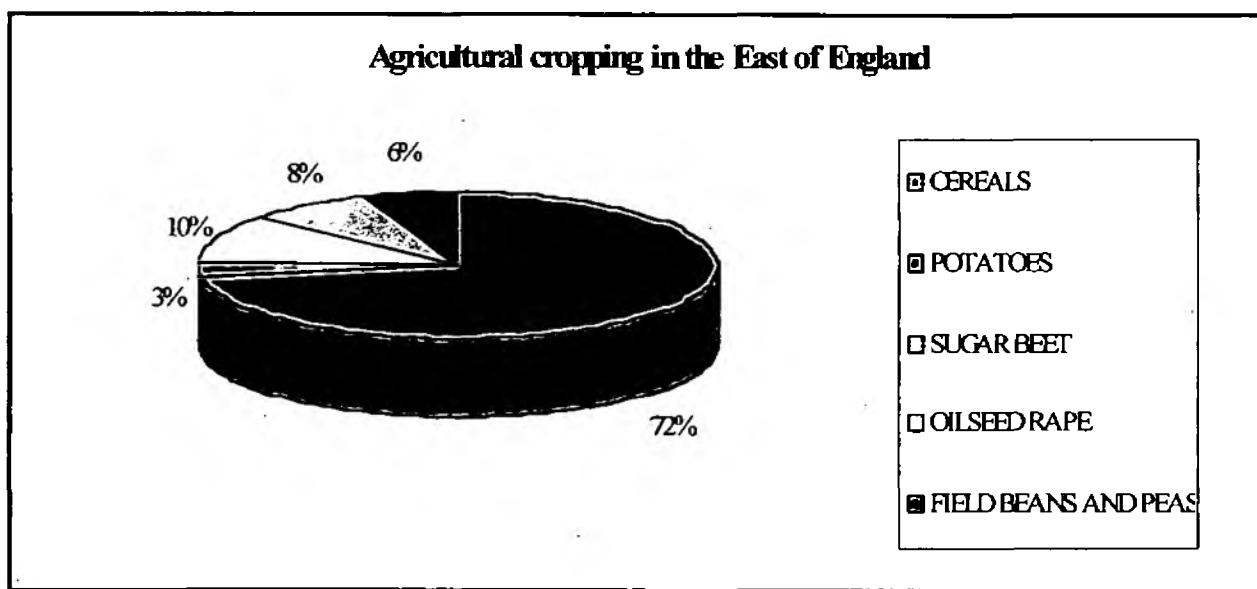
7.5 Rural land use

Figure 42 gives a snapshot of how the land is used in rural settings. The following details of agricultural trends in the East of England has been taken from the Farming and Rural Conservation Agency's (FRCA) draft issues report.

The measure of the long-term value of land as a medium for growing food for future generations is derived from MAFF's Agricultural land Classification System. It is Government policy to protect from irreversible development the best and most versatile agricultural land (Grades 1, 2 and 3a). This land should be protected for the benefit of future generations.

A significant proportion of the East of England is predominately high quality agricultural land, i.e., 58% of the whole country's grades 1 and 2 land is in the East of England. Much of the Grade 1 and 2 land is in and around the Fens, on the fen silts and peats. This is mainly in Cambridgeshire.

Due to the favourable combination of climate and soils, the region is the most intensively cropped in England with 70% of farmland under crop and 10% in rotational set aside from cropping. Cereals still represent nearly 67% of the total cropping area in the region. The East of England is one of the few areas in the country where potatoes can be successfully grown. Subsequently their production has increased over the last 10 years by 6.3%.



Although the East of England is normally associated with arable farming, parts of the region have been traditionally associated with livestock. For example, it is the second largest pig and poultry area in the country.

(Between 1987 and 1997) the region has suffered a decline of 24.4% in labour employed directly on the farm. The reliance on the agricultural industry as a main source of employment is now diminishing, and there is an increasing trend towards more part-time farmers.

Environmental Snapshot for the East of England

Rural Land Use



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- Horticulture
- Arable
- Intensive Pasture
- Extensive Pasture
- Forest & Scrub
- No Data



25 0 25 50 75 100 Kilometres

Figure 42

The Government has stressed the importance of 'a living and working countryside', where traditional rural industries such as agriculture are complemented by a range of businesses to sustain the economy in rural areas. Agriculture will continue to play an important role in the rural economy of the East of England. The forthcoming reforms of the Common Agricultural Policy, will require agricultural businesses to adapt to environmental concerns, and to the changing market requirements brought about by consumer tastes and lifestyles.

It is important, therefore, to value and protect the agricultural land in this region for both its present and future benefits to the country as a whole and for the opportunities it provides to contribute to the economic development of the region.

7.6 Urban land use

Figure 43 illustrates the extent of urban development in the East of England. This highlights the rurality of the region and the increased density as one travels south towards London. Issues surrounding the built environment are inseparable from others such as landscape, archaeology, air quality and the need for infrastructure. Discussion on the region's urban areas can be found in Regional Planning Guidance and county-level reports.

Environmental Snapshot for the East of England

Urban Land Use

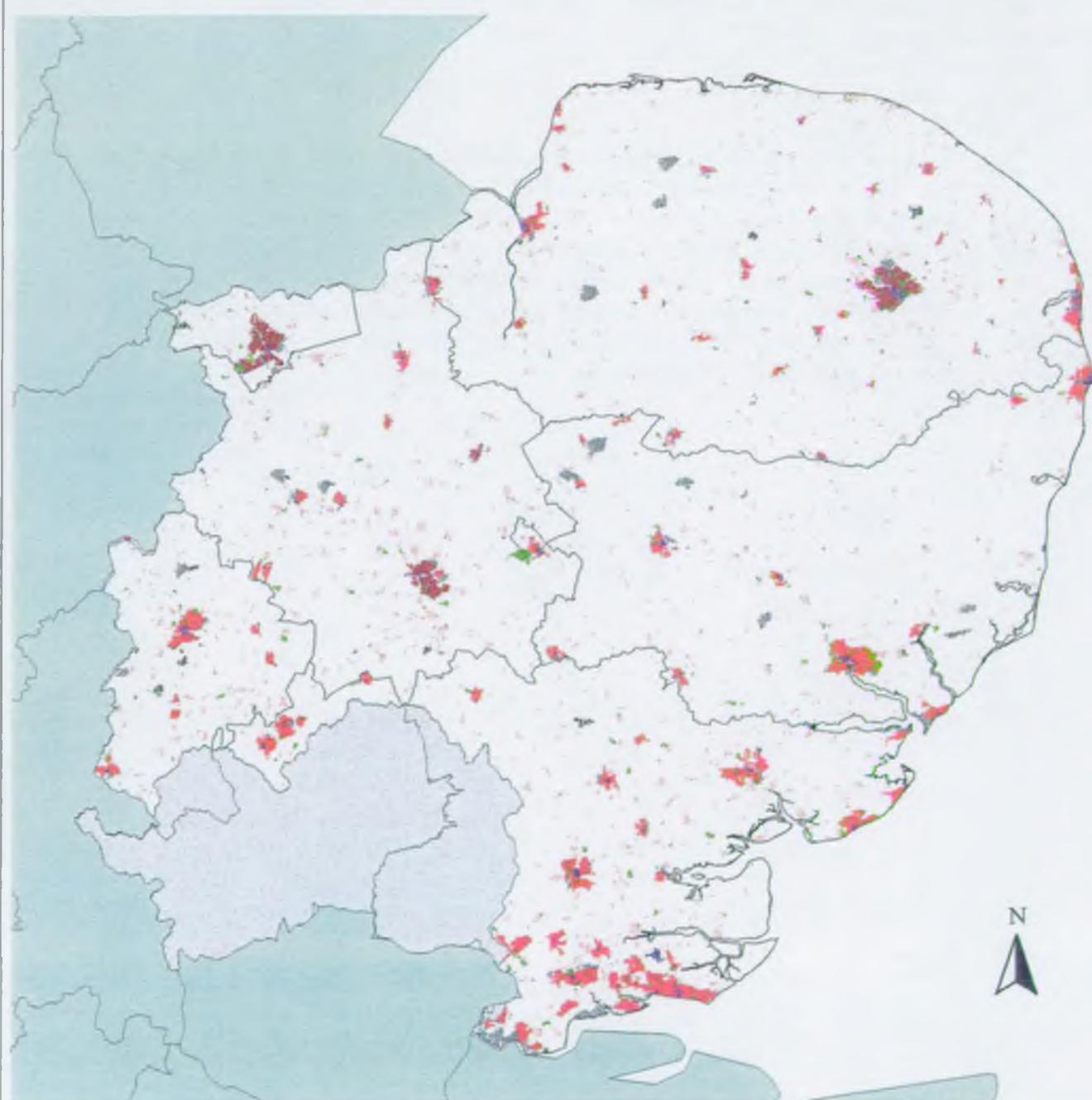


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- City
- Town
- Village
- Industrial
- Commercial
- Recreational
- No Data



25 0 25 50 75 100 Kilometres

Figure 43

SECTION 8 AIR QUALITY

8.1 Summary

Air Quality is generally good across the whole of the East of England. Levels of most pollutants, including Sulphur dioxide SO₂ and Nitrogen dioxide NO₂, are 'low' according to the UK classification system. Ozone may be an occasional problem in summer which is likely to continue for some years, in certain conditions, in the south of the region. Particle levels are probably the cause of most concern in certain meteorological conditions, when polluted continental air is blown across the region.

Local industry may occasionally contribute significantly to local air quality problems but this is unlikely to be major cause of problems on a regional scale. The main air pollution problems are likely to be in urban areas where pollution from traffic will cause occasional exceedences.

8.2 Ambient Air Quality

Figures 44 - 47 have been prepared using data from both monitoring and modelling. There are relatively few monitoring sites in the East of England compared with the rest of the country, most are in London and the major conurbations. Therefore only estimates of the ambient (background) air quality for the pollutants featured can be made. The maps do, however, give an useful snapshot of air quality and some indication of where there may be potential air pollution problems. The data in the maps is examined in reference to the current and proposed air quality standards in the National Air Quality Strategy (NAQS). Information on specific pollutants can be found in Appendix 8.

**Environmental Snapshot for the
East of England**

Air Quality Pollutants:
Nitrogen Dioxide.
Source: AEA Technology 1996

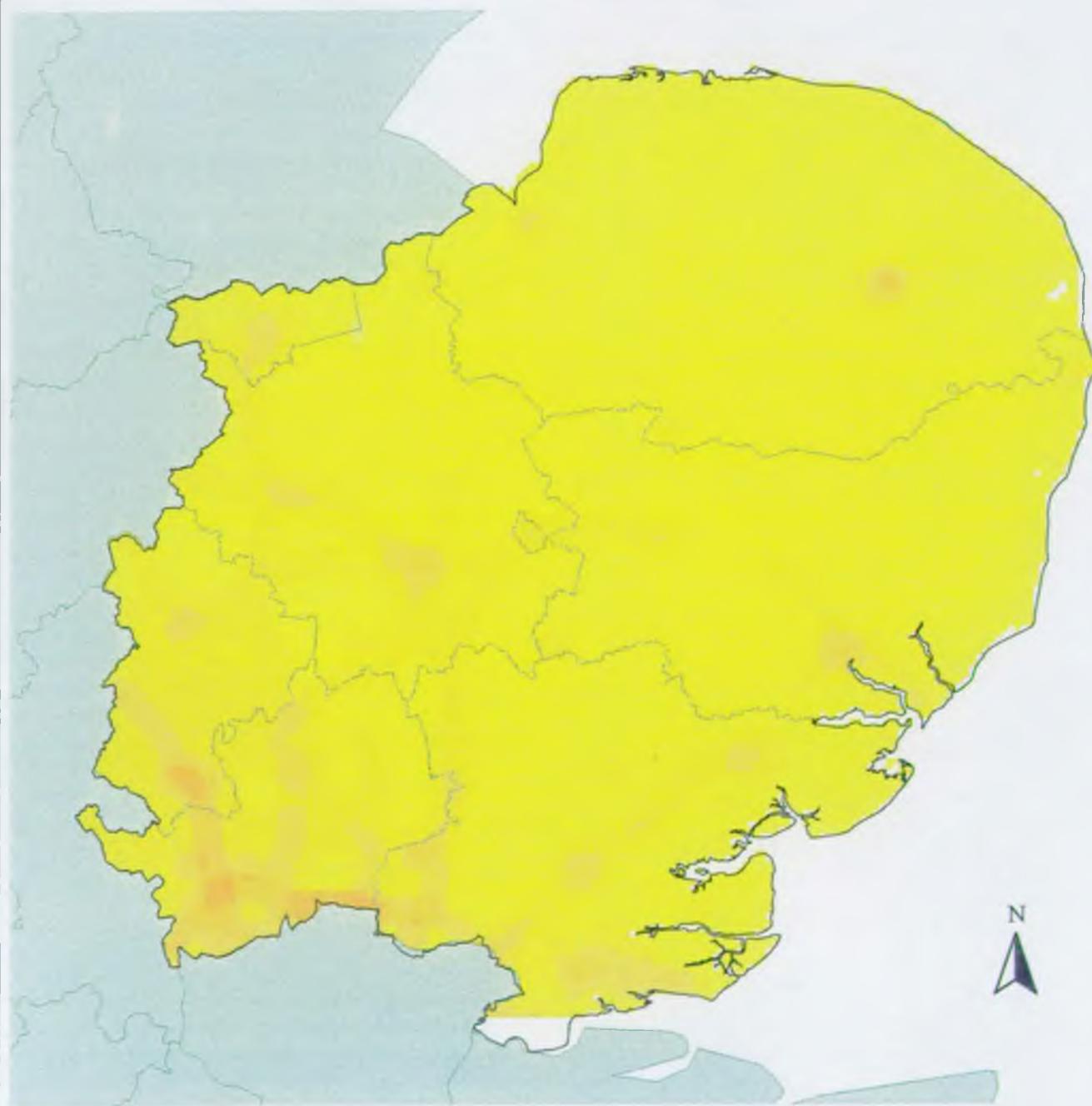


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NO₂ (ppb)



25 0 25 50 75 100 Kilometres

Figure 44

Environmental Snapshot for the East of England

Air Quality Pollutants:

Sulphur Dioxide

Source: AEA Technology 1996

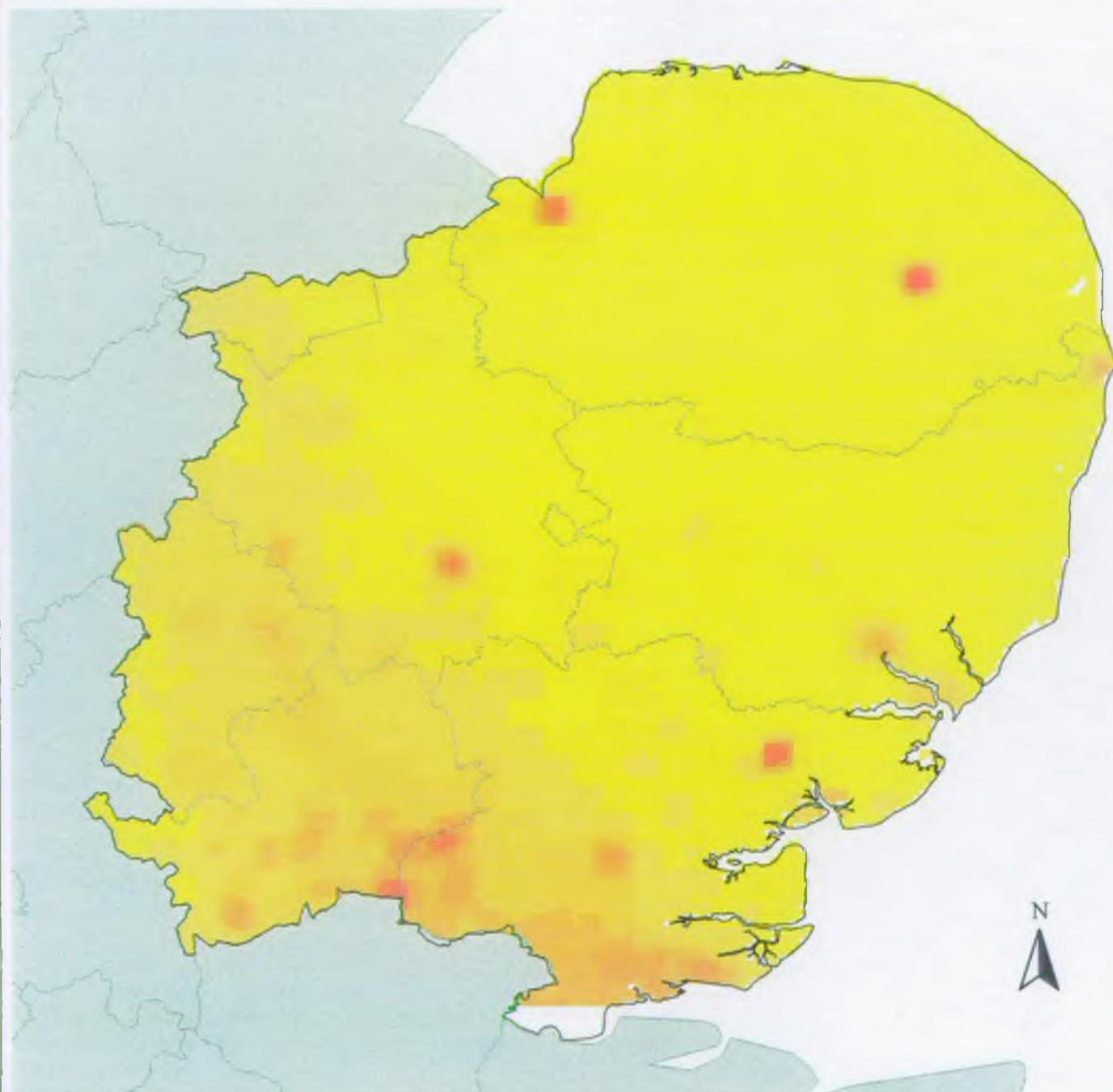
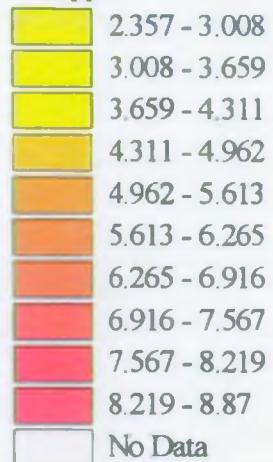


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SO₂ ppb



25

0

25

50

75

100 Kilometres

Figure 45

Environmental Snapshot for the East of England

Air Quality Pollutants: Particulates
Source: AEA Technology (1996)



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PM10s (μgm^{-3})

21.384 - 22.15
22.15 - 22.917
22.917 - 23.683
23.683 - 24.45
24.45 - 25.217
25.217 - 25.983
25.983 - 26.75
26.75 - 27.516
27.516 - 28.283
28.283 - 29.049
No Data

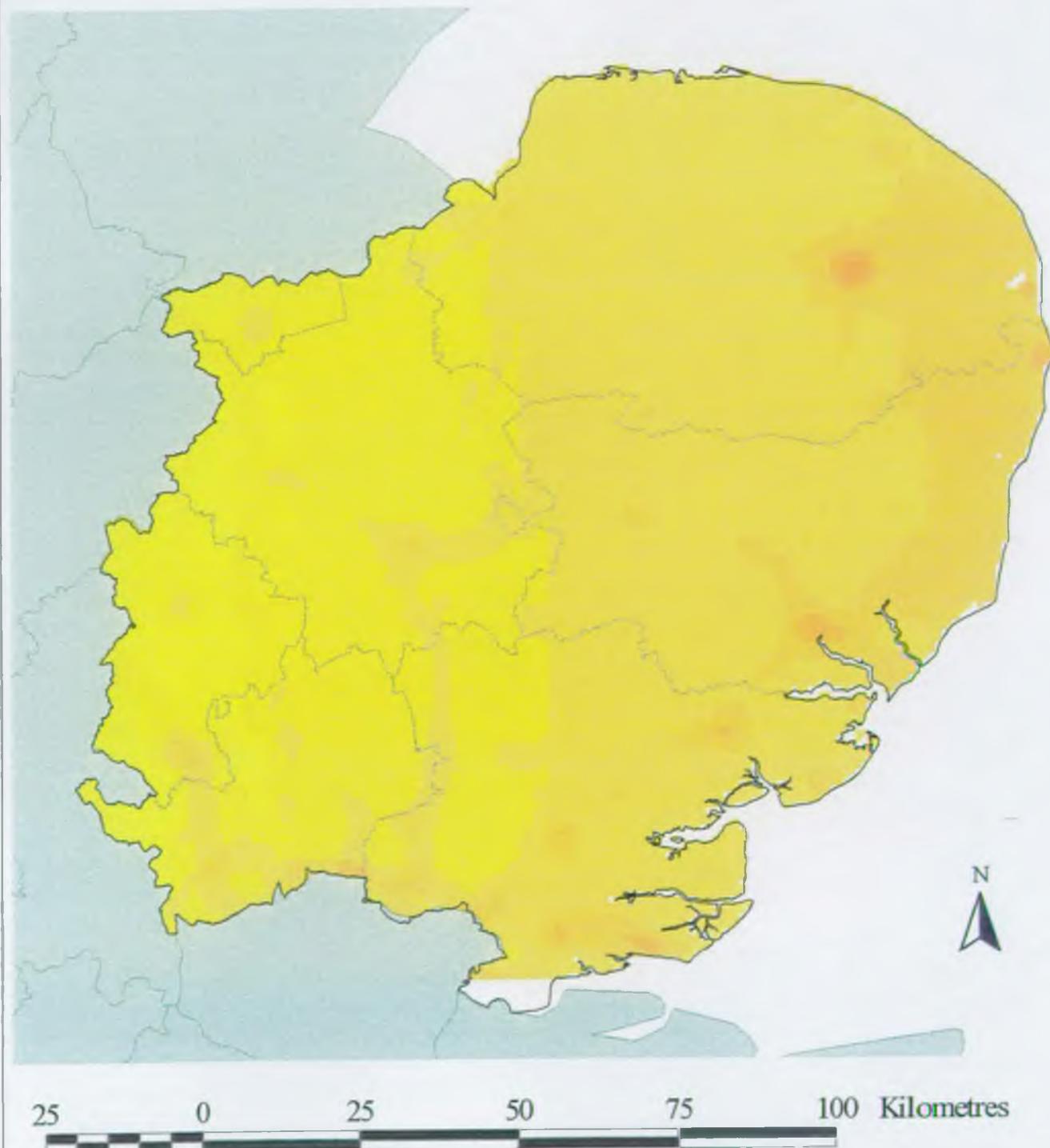


Figure 46

Environmental Snapshot for the East of England

Air Quality Pollutants: Ozone
Source: AEA Technology 1996



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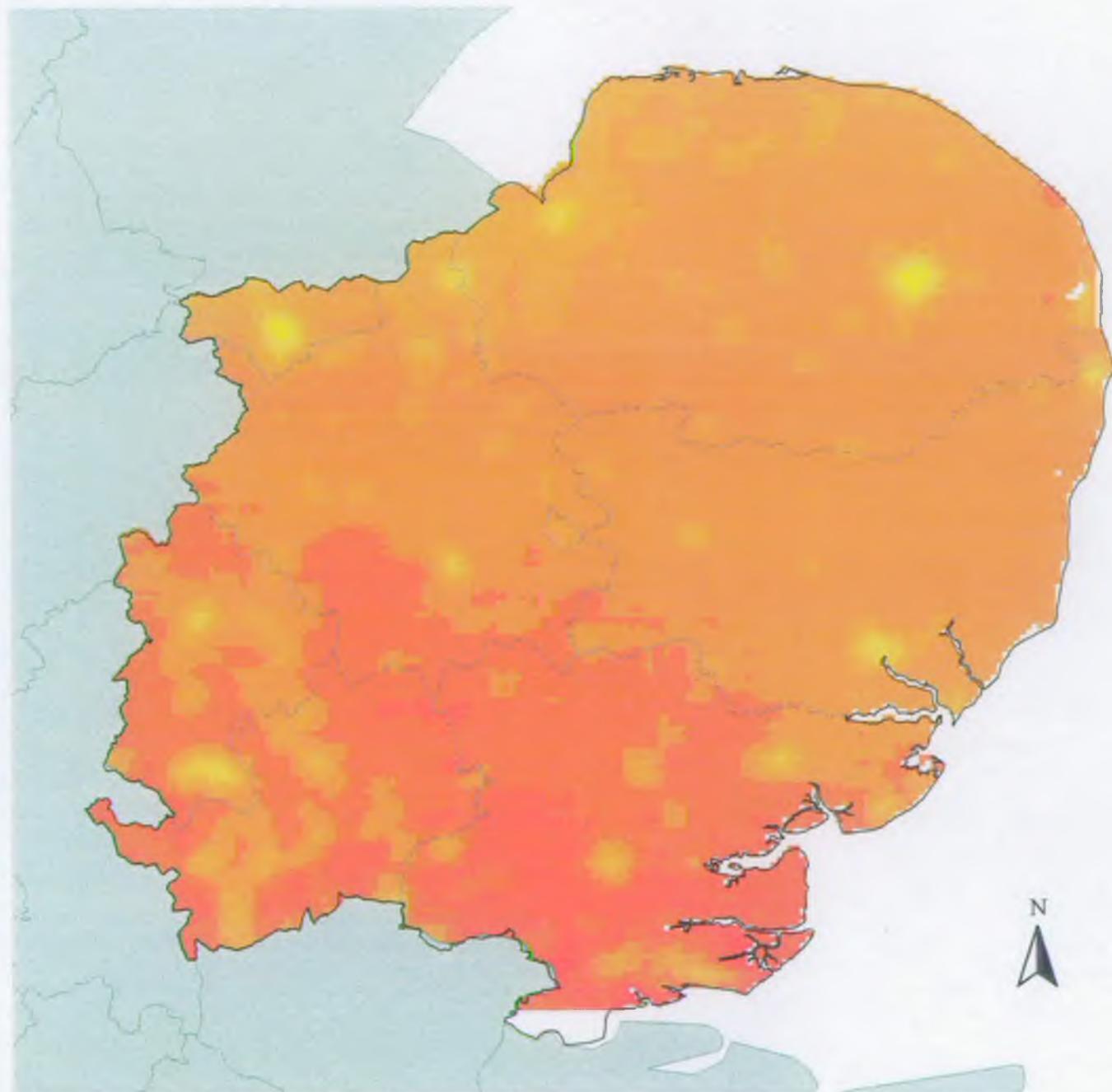
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O₃ no. days ≥ 50 ppb

14.523 - 17.417
17.417 - 20.311
20.311 - 23.206
23.206 - 26.1
26.1 - 28.994
28.994 - 31.889
31.889 - 34.783
34.783 - 37.677
37.677 - 40.572
40.572 - 43.466
No Data



25

0

25

50

75

100

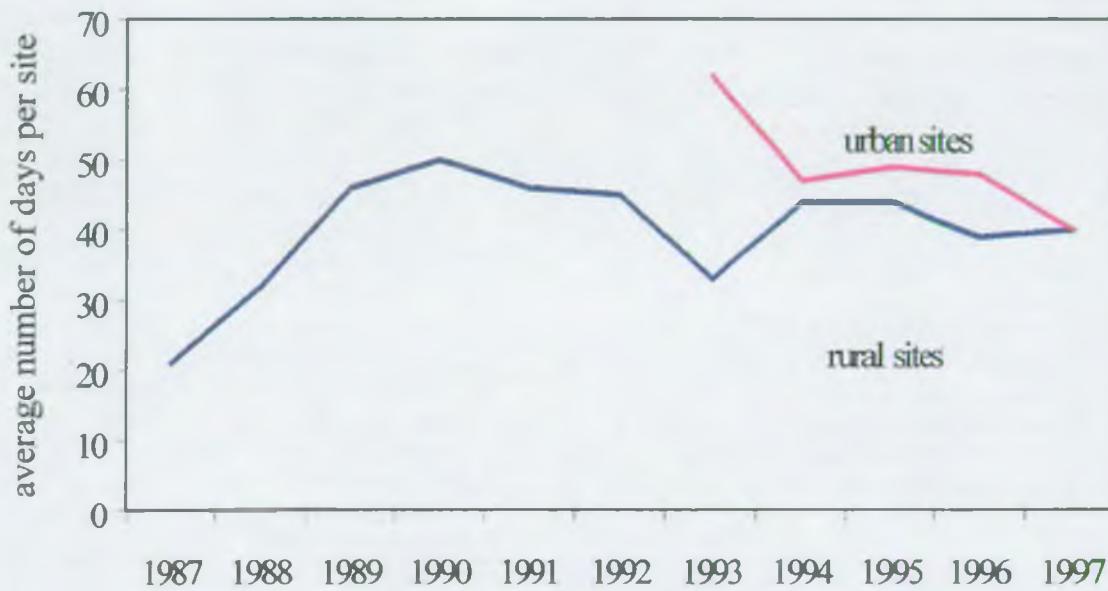
Kilometres



Figure 47

8.3 Days of Air Pollution

National figures indicate that generally urban sites experienced around 40 days in 1997 when pollution levels were above the national air quality standard (at which mild health effects may begin to be experienced by sensitive groups of people). Rural areas experienced an average of between 40-50 days of moderate or poor air quality. It is likely that generally across East Anglia results were slightly better than the national average.



Days of air pollution in the United Kingdom

Figure 48

SECTION 9 CONCLUSIONS AND NEXT STEPS

9.1 State of the Region

The Environment Agency has a key role to play in securing sustainable development in the East of England. As well as fulfilling our statutory and regulatory duties, we are keen to offer information, and advice to support the initiatives of others such as the East of England Development Agency, the East of England Regional Chamber and the Government Office (Go-East). To take this forward we would welcome fully inclusive, collaborative projects and partnerships.

National organisations such as the Agency, as well as having a regional perspective, can also tap into the experience of other regions. The table, below, summarises the range of appraisals and action plans that we may wish to emulate in the East of England. This snapshot can offer useful baseline environmental data for a further appraisal or strategy.

Appraisals and Action Plans in the English Regions

English Region	Environmental Report	Sustainability Report	Sustainability Appraisal	Other
East of England	'Environmental snapshot' March 99 Who? Environment Agency and others Regional Environmental Issues Statement July 99 Who? East of England Environmental Forum.		Regional Planning Guidance (RPG) Currently preparing specification for the sustainability appraisal of the Regional Development Agency's (RDA) Regional Strategy.	'Regional Planning Framework' Who? East of England Local Government Conference.
East Midlands	'Viewpoints on the East Midlands Environment' Who? Environment Agency with Local Government Association (LGA), Government office, and others.	Integrated Regional Strategy being produced by Regional Assembly with input from wide range of partners including the Environment Agency.	Sustainable Development Indicators produced at the same time as "Viewpoints" by similar partnership.	
West Midlands	Environmental Monitor 1998 being produced Who? West Midlands Round Table with a wide range of partners incl. Environment Agency, LGA, Government office, English Nature, etc. Environment Agency and partners also producing Provisional Environmental Statement to be sent to RDA.	Regional Sustainability Action Framework Who? West Midlands Round Table with wide range of partners incl. Environment Agency, Government office and LGA, etc.	Regional Sustainability Action Framework.	Both also relate to preparation of RPG.
North East	State of Region Report March 99. Who? North of England Assembly. Environment included.	No report but Sustainable Development Round Table (includes Environment Agency) have prepared a Sustainability Framework.	Developing techniques for Appraisal of Regional Strategy. Results will be published as supplementary documentation to the Strategy's submission to government in October.	RPG Public Consultation now underway. Environment Agency will include sustainability issues in its formal response.

Environmental Snapshot for the East of England

North West	<p>State of the Environment Report Who? Environment Agency includes environmental information from other regional partners.</p>	<p>Regional Sustainability Action Plan Who? Government office, Environment Agency and others – current draft will transfer into the ownership of the Regional Assembly.</p>	<p>Developed a framework and process for sustainability appraisal of RPG and the RDA's regional strategy. Who? Environment Agency, Regional Assembly, Sustainability North West. Going out to contract for both shortly.</p>	Developed a set of objectives for appraisal of RPG.
Yorkshire and Humberside	<p>State of Region Report January 99. Who? Commissioned by RDA included environment.</p>	<p>Integrated Sustainability Plan Who? Regional Assembly, Environment Agency, English Nature, Government Office and others.</p>	<p>Sustainability Appraisal techniques are being developed for the RPG Who? Environment Agency involved in this development and raising awareness of the need to undertake the Appraisal.</p>	<p>Capacity study undertaken for the RPG Who? Regional Planning Conference and Assembly Already developed a set of sustainability indicators.</p>
South West	<p>'The South West's Environment': consultation document and summary leaflet to be launched at Environment Agency Open Day on 03/07/99. Who? Primarily Environment Agency perspective but hope for collaborative initiative to follow.</p>	<p>'Changing for the Better' booklet (Nov 1997). Who? Government Office, but Environment Agency and others signed up to it Environmental Prospectus. Who? Environment Agency and a number of other key regional partners.</p>	<p>Sustainable Development Round Table commissioned consultants to do sustainability Appraisal of Planning Conference strategy, to inform RPG. Environment Agency part funder and on Round Table and steering group.</p>	<p>Round Table Sustainable Development in discussion with RDA about sustainability proofing of draft Regional Strategy and forthcoming action plans. Round Table also looking at scope for regional Sustainable Development framework.</p>
South East of England	<p>Regional Environmental Statement Who? Conservation Agencies Key Issues Environmental 'Fact Sheet' being produced.</p>	<p>Regional Sustainability Plan (RSP). Progress of RSP under consideration seminar feedback report available.</p>	<p>Sustainability Appraisal of draft RPG undertaken. Assuming that appraisal of RDA's Regional Strategy will take place during consultation. Profile for Regional Sustainability Assessment Who? Conservation Agencies, Local Authorities.</p>	<p>Regional Sustainability Framework being developed in response to white paper. Who? Government Office initiation, using Environment Agency support. Voluntary sector South East Forum for sustainability proposals produced for RDA.</p>
Greater London Authority	"Greenprint" document is about to be published.		<p>Sustainability Methodology will be used on Greater London Economic Strategy as for South East of England Development Agency.</p>	Round Table discussion in progress.

The current upsurge in regionalism has offered an opportunity for a re-think of how we define and achieve sustainable development and a better quality of life. A particular challenge is to integrate, economic, social and environmental factors (see Figure 1). Partners in the South West of England, have prepared an 'Environmental prospectus' which aims to link the economy and the environment. Many of its findings apply resonance to the situation in the East of England, (which is also predominantly rural) and these are given below.

9.2 Linking the Economy and the Environment

Concepts

- The Environmental sector is a growth area as (business) attitudes change, as customers become more aware and as a result of new (European) environmental legislation.
- The need to view the environment as an economic activity in its own right, employing thousands and contributing millions to the economy (i.e., 5 – 10% of GDP) and growing.
- Achieving a good quality of life is important to encourage people to live and work in a locality. Areas of wilderness are important to relieve human stress and reduce pollution.
- Some sectors traditionally reliant on natural resources, e.g., agriculture and sea fisheries are declining – environment and eco-tourism programmes could be a driver for regeneration in these communities.

The following will list the types of environmentally orientated business activities under three themes:

- (i) maximising the Environment sector;
- (ii) regenerating the Primary sector; and,
- (iii) capitalising on a high quality environment.

(i) Maximising the Environment Sector

- *The Environment Industry* – firms that provide goods and services which are needed for environmental protection, e.g., water industry.
- *Environmental Management* – use of systems and (clean) technologies by business to assess and reduce their impact on the environment, whilst increasing efficiency.
- *Renewable Energy* – development of wind energy and bio fuels etc (to cut greenhouse gas emissions see section 2)
- *Waste management* – recycling and alternatives to landfill.
- *Natural Environment Sector* – economic activity associated with the protection and enhancement of the natural environment, e.g., Environment Agency, Wildlife Trusts, National Trust, etc.

(ii) Regenerating the Primary Sector

- *Agriculture* – environmental land management schemes, organic farming, sea fisheries.
- *Regional produce* – using the high quality of the environment to brand regional produce; local purchasing; 'countryside products'.
- *Forestry* – working woodlands and community forests; local charcoal production.

(iii) Capitalising on a high quality environment

- *Tourism* – world's fastest growth sector, walks, countryside attractions, sustainable tourism, clean beaches and bathing water.
- *Attract inward investment* – linked to perceived quality of life and location (in a recent survey 57% of company executives stated that quality of life was the most important factor for relocation to another city).
- *Films and Media* – attractive natural and built environment locations.

It would seem valuable as a short-term next step to determine the significance of these sectors as they are, clearly, areas of potential employment and commercial opportunity.

9.3 Achieving Environmental Gain

We feel that there is a need for regional bodies to:

- (In the short/medium term) undertake a clear analysis of the significance of the environmental sector on the regional economy;
- Play to our strengths provided by the nature and character of the East of England;
- Ensure that opportunities presented by the environment for supporting and enhancing a diverse and strong economy are fully recognised, and supported, towards achieving an improved quality of life in the East of England, e.g., through Regional Planning Guidance (RPG) or East of England Development Agency's Regional Economic Development Strategy (EEDA REDS);
- Develop skills to meet these opportunities, e.g., management courses including modules on Environmental Management Systems;
- Develop incentives through East of England Development Agency's Regional Economic Development Strategy and Go-East funding activities;
- Identify flagship projects to demonstrate the 'win win opportunities', e.g., through EEDA or the Sustainable Development Round Table; and
- Develop and use sustainability appraisal so that social, environmental and economic benefits can be achieved through new projects, programmes and policies, identified through RPG and EEDA's REDS.

The Final Word

If you would like to know more, the Environment Agency holds a great deal of data, which can be obtained by contacting our public register staff or customer services staff in our Area offices.

The central point of contact on regional development or local government matters is Michelle Doyle, Regional Technical Planning Manager.

APPENDIX 1. OVERVIEW AND ASSETS**Table of Local Environment Agency Plans (LEAPs) covering East of England Region**

CATCHMENT	START DATE	DRAFT LEAP	LEAP PUBLISHED
North Norfolk	Oct 1995	June 1996	Mar 1997
Wash	Dec 1995	Aug 1997	Apr 1998
Old Bedford	Sept 1996	June 1997	Apr 1998
East Suffolk	Oct 1996	June 1997	Mar 1998
North Essex	May 1997	Feb 1998	Nov 1998
Cam	June 1997	Jan 1998	Nov 1998
Upper Ouse	Aug 1997	Feb 1998	Sept 1998
Nene	Mar 1998	Nov 1998	June 1999
Ely Ouse	Mar 1998	Dec 1998	Sept 1999
Bedford Ouse	Jun 1998	Feb 1999	Nov 1999
Broadland Rivers	Jul 1998	Mar 1999	Oct 1999
South Essex	Mar 1999	Dec 1999	Aug 2000
N W Norfolk	Apr 1999	Dec 1999	Sept 2000
Welland	Nov 1996	June 1997	Mar 1998
Colne	Oct 1996	Nov 1997	Sept 1998
Upper Lee	Nov 1997	Jun 1999	Feb 2000
North London	Feb 1998	Nov 1999	Jun 2000
Thame Valley	Feb 1997	Oct 1997	Aug 1998
Roding, Beam & Ingrebourne	Dec 1995	Dec 1996	Sept 1997

Environmental Snapshot for the East of England

Local Environment Agency Plans



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Main River	Local Environment Agency Plans
Bedford Ouse	
Cam	
Colne	
East Suffolk	
Ely Ouse	
Nene	
North Essex	
North London	
North Norfolk	
North West Norfolk	
Old Bedford	
Roding, Beam & Ingrebourne	
South Essex	
Thames Valley	
The Wash	
Upper Lee	
Upper Ouse	
Welland	
Broadland Rivers	

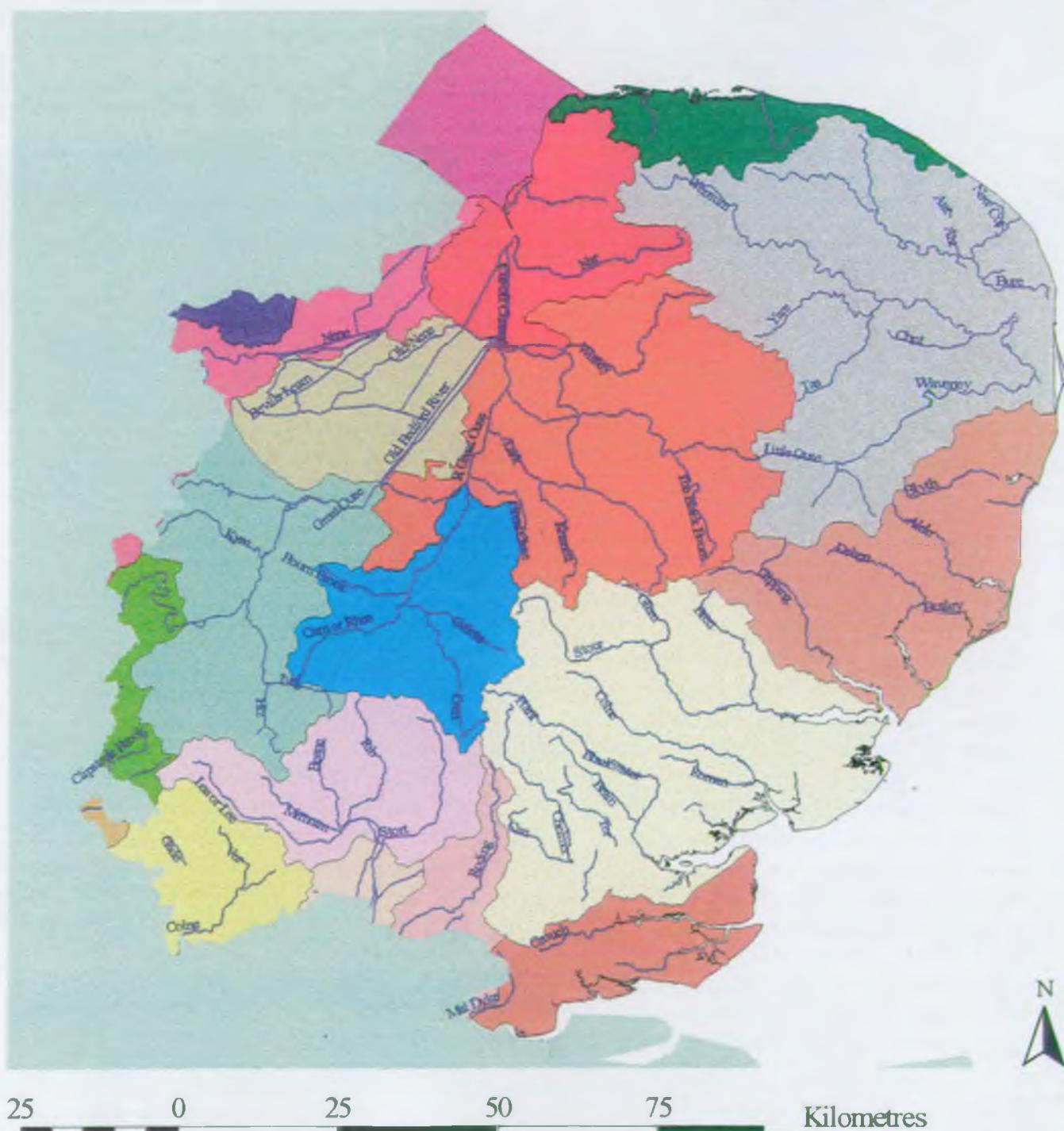


Figure A1

APPENDIX 2. CLIMATE CHANGE

A2.1 Global Warming

Although, a complex and incompletely understood phenomenon, global warming (see Figure A2) is thought to be due to the excessive production of greenhouse gases such as carbon dioxide (CO_2 , a by-product of energy use), methane (from many sources including waste landfills and agriculture), oxides of nitrogen and chlorofluorocarbons (CFCs, from aerosols etc). Global warming, and associated climatic change, could have significant global and local effects upon wildlife and agriculture, as well as human activity.

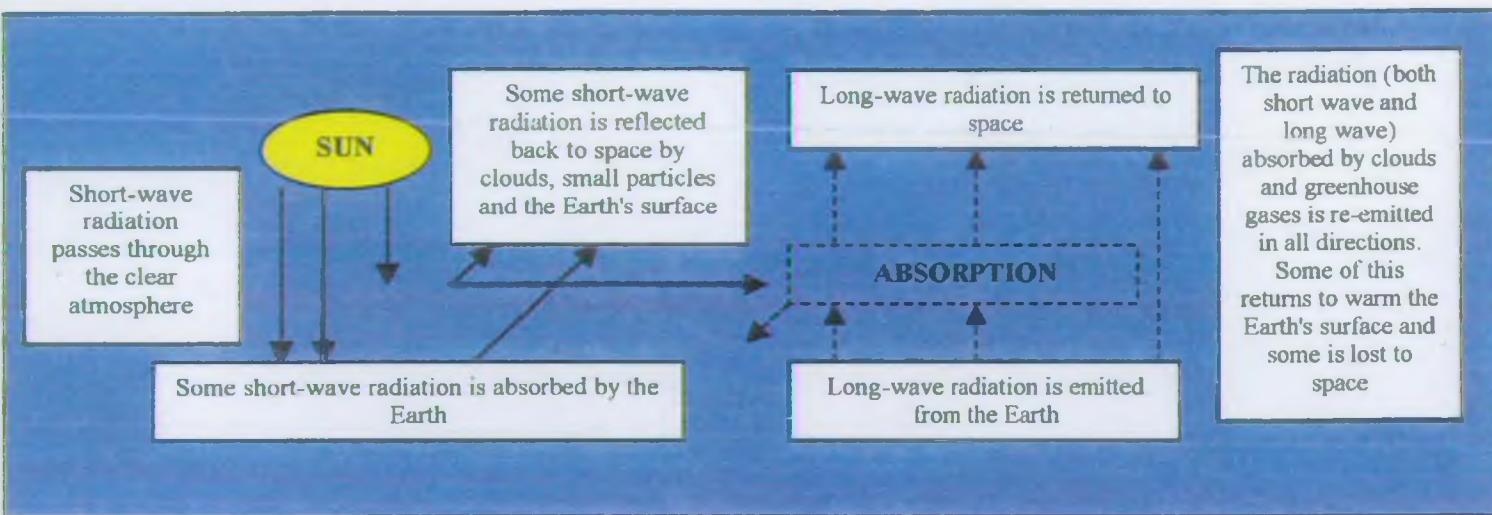


Figure A2 The greenhouse effect (Viner and Hulme 1997)

A2.2 Impacts of sea level rise

The predicted future rate of sea level rise is the subject of debate nationally and internationally. As a result, predictions are usually in the form of a range of likely scenarios. The sea level rise experienced in the UK results from both the impacts of global warming, and the continual change in relative elevation of the land and sea. Unfortunately, the UK experiences sea level rise at a rate 10% higher than the global average, and in the East of England the overall rise rate is even higher - as the south east of England is slowly sinking into the sea, just as Scotland is rising from it.

The most direct and immediate effect of sea level rise is that the level of protection offered by an existing structure or natural system is decreased, for the simple reason that water levels are higher. This means that, in future, overtopping events will be more frequent and flooding will occur more often. In addition, as more significant changes in mean sea level are experienced (over decades), changes in current and erosion patterns locally, and eventually regionally, will occur. Effects will be most pronounced where natural shoreline evolution is prevented by the presence of existing structures. Aside from associated sea level rise, global warming will also have other effects on coastal flooding. Of major significance is increased 'storminess', the magnitude and exact nature of which can only be crudely estimated at present. With this phenomenon, storms may occur more often. An example given in recent research shows that by 2050 in Harwich, Essex, a 410mm sea level rise could occur, and an event presently occurring once in 100 years may become the 1:10 year event (Hulme and Jenkins, 1998). The increased frequency of storm events may be coupled with an increased number of storm surges affecting this vulnerable low-lying coastline.

Associated with this, the effects of 'coastal squeeze' should also be considered when evaluating impacts on the flood plain. This occurs as habitats can not move landward as sea levels rise, due to a hard line of flood defence structures, and they become squeezed between defences and the rising seas. These intertidal areas can act to dissipate wave energy and ensure less reaches the shoreline – nationally an estimated 10,000 ha of mudflats and saltmarshes are acting as natural sea defences, a large proportion in this region. If such areas are eroded, flooding may increase as higher waves with more energy and erosive power reach the upper shore.

In the short term, as highlighted in regional and national press, the effects of coastal erosion and flooding are usually localised and experienced by few properties. As the effects of sea level rise become more widespread, larger areas will experience these (predicted) impacts and this will be of major significance to many dwellers in the coastal and estuarine regions, with respect to insurance, planning and infrastructure issues.

A2.3 Impacts upon the Norfolk, Suffolk and Essex coasts

For the last 10 years flood defences in Essex, Norfolk and Suffolk provided and maintained by the Agency have been designed assuming a future sea level rise of 6mm per year. This figure represents the 4.5mm/yr standard UK figure accounting for global warming, and an additional 1.5mm/yr to account for the land movement of the south east of England. In addition, engineering works are designed to allow for future modification where possible.

The coastal areas of these counties are generally low-lying, often below sea level, and are typically formed of geologically soft material. This is easily eroded under conditions of increased sea levels and increased storminess, as in such events large quantities of sediment can be removed from the shoreline. Where the coastline is not actively defended, natural coastal processes form a defence, such as a dune system to dissipate wave energy. (Such systems are very important in these areas, as economic justification of new flood defence structures is difficult to obtain for areas of arable land with little urban development or significant infrastructure). As a result engineers are increasingly looking for sustainable and cost effective forms of flood defences, and are now more likely to propose "managed realignment". Although the resulting shoreline may be physically closer to developed inland areas, ultimately such schemes aim to offer a better level of protection against flooding by providing, for example, areas of saltmarsh which act as a natural flood defence and increase biodiversity. A study examining the sustainability of the flood defence provided by sea walls in Essex has preliminarily concluded that on basis of cost:benefit assessment 36% are to be considered for alternatives to maintenance (including realignment) (Environment Agency, 1998). Essex is already the location of two managed realignment sites (Orplands and Tollesbury, both in the Blackwater estuary).

The Suffolk estuaries are currently the subjects of management strategies that will examine the impact of sea level rise on these systems. When sea level has risen by 500mm, it is estimated that massive increases in volumes of water entering and leaving the estuaries over each tidal cycle will cause increased flow velocities, flow redirection, formation of wider and deeper estuary mouths, and a significant loss of intertidal habitats. All these outcomes act to reduce or threaten the flood defence capabilities of the structures in place. Estuaries may also experience higher water level rises than the open coast as a result of the funnelling of flows by their shape. They then act as a route by which hinterlands may be flooded even where coastal defences are adequate.

From recent work on the coastal zone, including the preparation of Shoreline Management Plans, and now strategic studies covering large coastal and estuarine areas, it has become

apparent that the coast and estuarine systems should not be considered disparate units, especially when considering the flood defence of the coastal plains.

The Agency is continually contributing to research projects concerning global warming and sea level rise, most recently to the 'REGIS' three year research programme which aims to produce a generic model for assessing the impacts of predicted changes on agriculture, water resources and flood defences in any area. It is using part of the Agency's Anglian Region as a case study, and is concentrating efforts on the impacts of sea level rise in the coastal zone.⁷

A2.4 References

Viner and Hulme: 1997 **The Climate Impacts LINK Project: Applying Results from the Hadley Centre's Climate Change Experiments for Climate Change Impacts Assessments** - Climatic Research Unit, UEA Norwich.

Hulme and Jenkins: 1998 **Climate Change Scenarios for the United Kingdom - Scientific Report. UK Climate Impacts Programme Technical Report No 1.** - Climate Research Unit, UEA Norwich.

Environment Agency: 1998 **Essex Sea Walls Strategy (Draft).**

⁷ Please Note: 'REGIS' includes only Norfolk, Suffolk and Cambridgeshire
Environment Agency - Anglian Region

APPENDIX 3. WATER

Water Quality

A3.1 Bathing Water Quality - 1998

Low level concentrations of coliforms are now regularly being achieved at many of the designated bathing waters, with over 90% attaining median values for faecal coliforms below 100 per 100ml and 20% of samples taken having faecal coliform concentrations less than the limit of detection (<10 per 100ml). This improvement and stabilisation of bathing water quality has coincided with the completion of all the large schemes at STWs, which were targeted in the investment programme (AMP2, 1995-2000), under the Bathing Waters Directive.

A3.2 Pollution incidents - 1997

Category 1 and 2 incidents (see section 3.7) were caused by a number of different types of pollution reflecting the intensity of land use and development and the wide range of pressures, which the rivers in the East of England Region are under.

Examples are listed below:

- 17 spillages of oil (from a power station, shipping, industry and transport)
- 28 sewage-related incidents
- 12 incidents involving organic matter from livestock farming and the food industry
- 8 incidents involving chemicals such as fertiliser and wood preservative
- 18 were of other pollutant types and from a variety of sources (including industrial, sewage industry, transport and natural).

A3.3 Groundwater Protection Maps

The 'Policy and Practice for the Protection of Groundwater' (1998) is a risk-based framework for evaluating the potential impact of proposed land developments on groundwater resources, and is underpinned by a set of groundwater protection maps. These are particularly useful when advising the Town and Country Planning process.

Information shown on the groundwater protection maps has been simplified from the more detailed 'Groundwater Vulnerability Maps' and 'Source Protection Zone Maps'.

Water Resources

A3.4 Surface water availability

The Agency manages surface water resources by dividing the region into surface water catchments; the shape and size of these catchments is largely determined by topography. A further distinction is made between the resource available in the summer (April to October inclusive) and that available in winter (November to March inclusive).

The Agency generally no longer issues licences for summer surface abstractions if they have the potential to affect downstream freshwater flows.

In the winter period when run-off and river flows are higher, there is surplus surface water resource in most rivers. Any application for a winter surface water abstraction is scrutinized by the Agency for its potential impact on the environment and downstream users (e.g., other abstractors, navigation and amenity value); the applicant will be asked to provide supporting information in the form of an environmental appraisal.

Those areas where there is the least resource available are:

- the headwaters of rivers where the flow is least;
- in rivers with little flow variation and therefore an aquatic environment reliant on the maintenance of a higher proportion of the total flow. (There are a number of rivers in the region which have a high dependence on groundwater resulting in a more constant flow than a river responding purely to rainfall events; many of these now have formal conservation status);
- where the Agency is aware of existing stress on the environment which any proposed abstraction would worsen (e.g., freshwater streams on estuarine mudflats which are important for over-wintering birds);
- where there is greatest development of the resource.

Natural surface water resources can be added to by returning effluents (which increase in proportion to demand) and transfers from other catchments.

As surface water resources approach the stage of becoming fully committed, there is likely to be a greater emphasis on the development of winter surface water resources.

The Agency is currently looking at ways to better define the environment's river flow needs. To allow for future modification of river flow objectives, all new significant abstraction licences are time limited and can be reviewed when they expire.

A3.5 Groundwater availability

The Agency manages groundwater resources by dividing the region into groundwater catchments; the shape and size of these catchments, where appropriate, being defined by hydrogeological units or surface water catchments. Groundwater resources have a delayed response to rainfall which has the effect of dampening seasonal changes; there is, therefore, no distinction made between the summer and winter resource.

In order to determine the resource availability, a water balance method is used. This allows the classification of resource availability in each groundwater catchment (see Figure A3). The method has been widely consulted on and is published in the Agency's Regional Water Resources Strategy (1994). Since the licensing of abstractions was first introduced, the aim has been to ensure no catchment-wide 'mining' of water (i.e., a year on year lowering of the water table). Although this has not happened, some catchments are perceived as suffering from environmental stress exacerbated by low water tables; in these areas the Agency is concentrating its efforts to review the quantities allocated to the environment and to manage abstractions.

Even if a catchment is seen as having nominally available groundwater resources each application is scrutinized for its local impact on the environment and existing users. The potential local impact of a proposed abstraction can be significant in view of the high concentration of groundwater dependent environmental sites in the region, together with the extensive use that is made of groundwater resources. The applicant will be asked to prepare an environmental assessment of these potential impacts to support their application and aid the Agency in its own assessment.

In view of the importance and number of water-dependent environmental sites in the region a precautionary approach is taken when licensing resources. All new significant groundwater abstraction licences are time-limited to enable a review of their impact or reassessment of the resource availability when they expire.

Environmental Snapshot for the East of England

Groundwater availability
March 1998



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Non aquifer

No water available

No water available pending review of quantities allocated to the environment

Nominal surplus

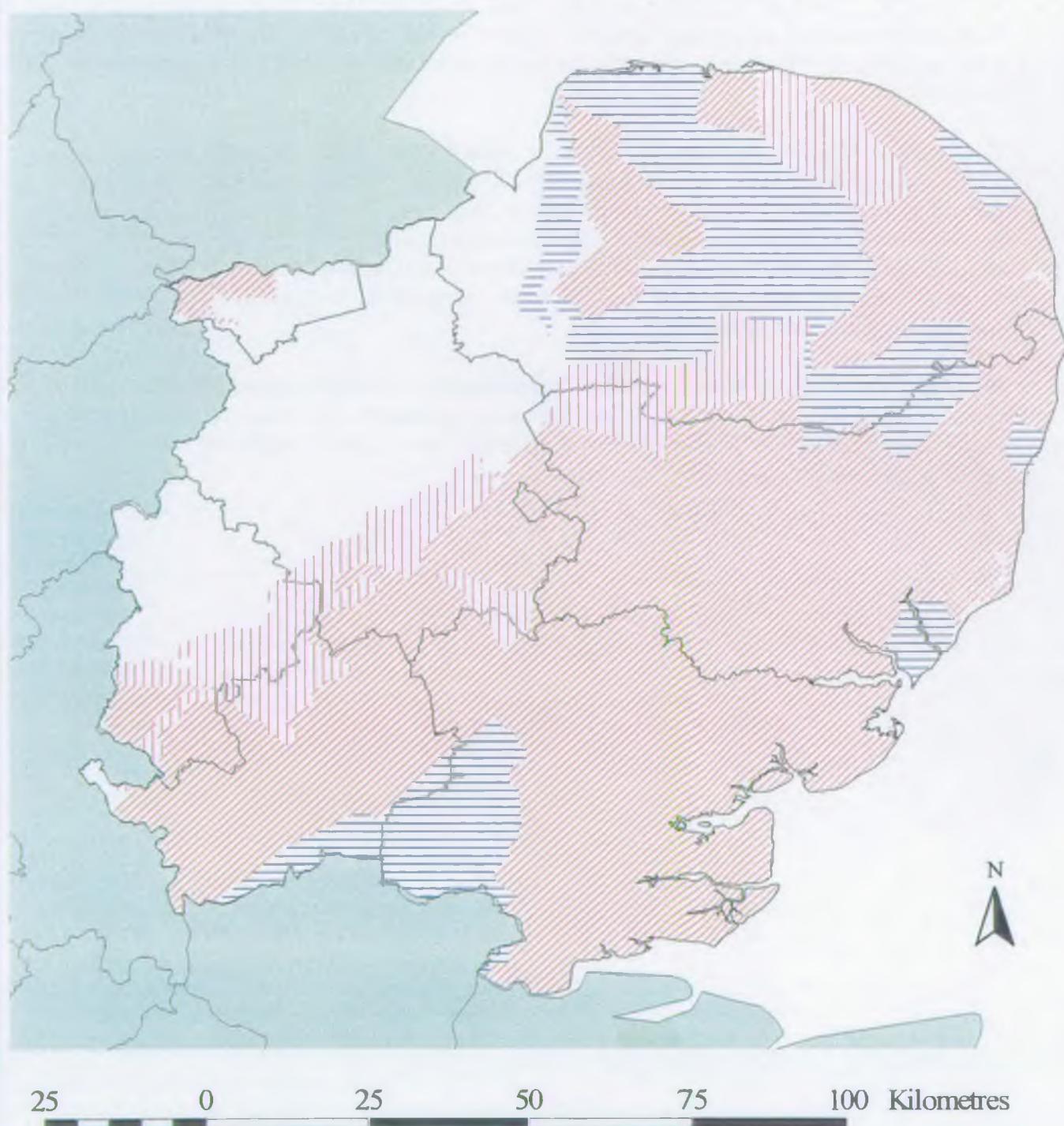


Figure A3

A3.6 Agenda for Action and Periodic Review (AMP3)

The water companies have re-assessed the yields of their sources. The results were audited by the Agency and published in March 1998. Overall yields were largely unchanged for the companies providing supplies in the counties of Norfolk, Suffolk, Cambridgeshire, Essex, Bedfordshire and Hertfordshire (Anglian Water Services, Essex & Suffolk Water Company, Cambridge Water Company, Tendring Hundred Water and Three Valleys Water). The reliability of existing sources providing public supplies in the East of England Region was confirmed.

The potential effects of climate change have been investigated following research commissioned by the Agency and the water companies. However, this remains an area of uncertainty. The average availability of both surface and groundwater resource may go up or down in the East of England, according to different future scenarios (see Section 2, Climate Change).

At the same time demands for water may well increase both for public supply and agriculture. Predicting the occurrence or impacts of extremes such as greater drought severity (which may be more important than averages) is more difficult. However, the most recent report from the UK Climate Impacts Programme suggests relatively little change in the future frequency of long droughts.

Companies submitted costs to OFWAT in December 1998, for actions to put right the impacts of abstraction at key sites, including a number of wetland sites in Norfolk, Cambridgeshire and Hertfordshire. In March 1999, the Secretary of State directed that all these schemes should be funded, some of which may include the modification of abstraction licences or relocation of abstractions. All sites identified by the Agency and English Nature (detailed in Environment Agency report 'A Price Worth Paying' May 1998) in the East of England have been included.

The companies have also submitted estimated costs to OFWAT to undertake an investigation of river low flow problems where water company abstractions may have had an impact. These include rivers in the counties of Norfolk, Suffolk, Cambridgeshire, Essex, and Hertfordshire, and are also covered by the Secretary of State's direction.

Companies have also submitted to OFWAT, proposals for managing their supply/demand balance and to the Agency setting out their water resources plans to predict and meet or manage future demands for water.

Environmental Snapshot for the East of England

Work to be carried out under AMP3
April 1999



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- Wetlands affected by abstraction
- Wetlands affected by discharges
- ▲ Rivers affected by abstraction

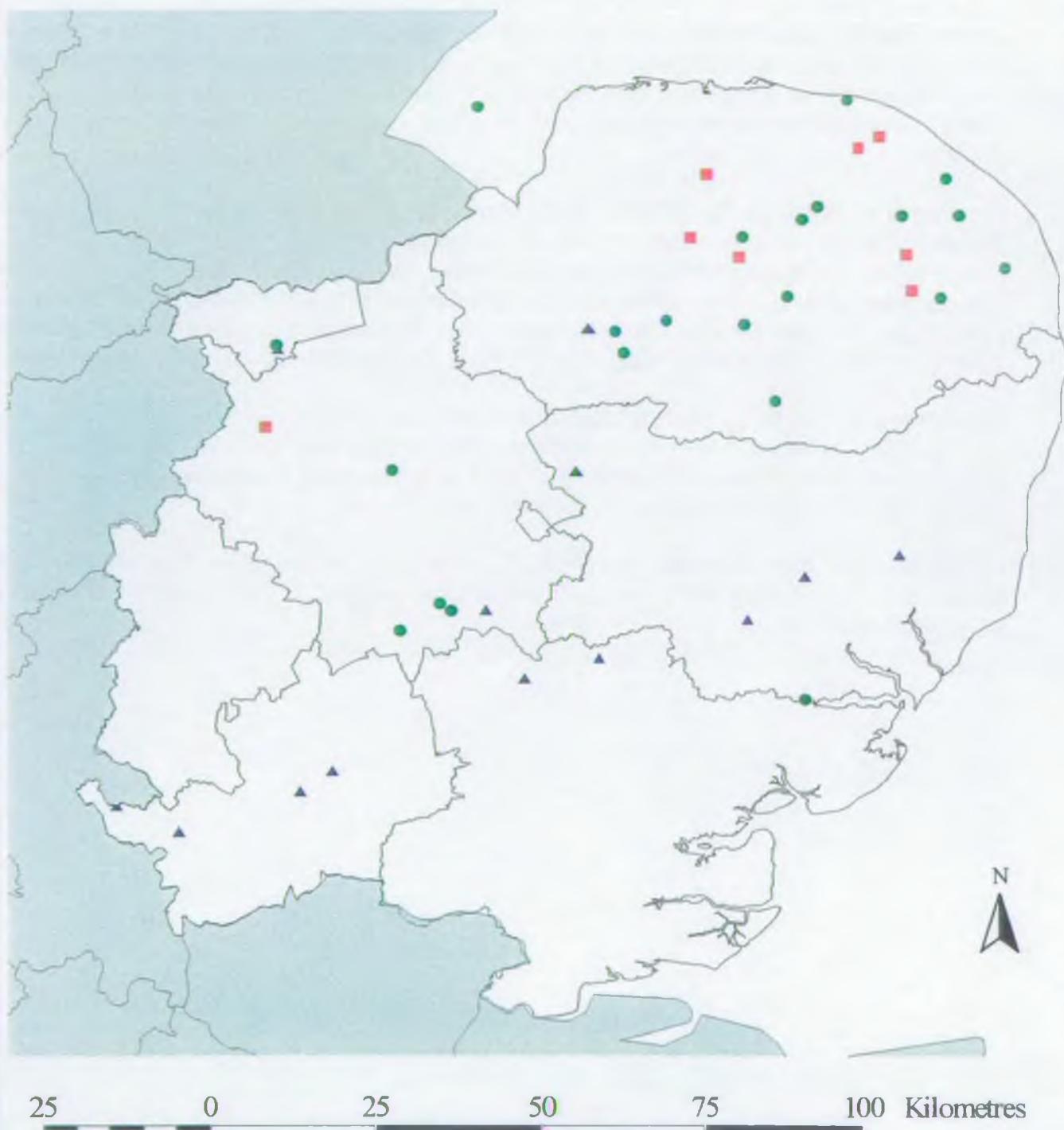


Figure A4

A3.7 Other Water Resources Initiatives

The Government has launched a number of initiatives which will lead to changes that affect the management of water resources:

- The 'Water Summit' held in May 1997 and subsequent 10 point action plan has resulted in water companies being set mandatory leakage targets, greater responsibilities in dealing with customer supply pipe leaks and a stronger emphasis on water efficiency measures.
- The government has just published its decisions following consultation on a review of the water abstraction licensing system in the report 'Taking Water Responsibly'. The time limiting of licences and regular catchment-based reviews, the possible use of economic instruments to influence water allocation and duties on all abstractors to use water efficiently, are all proposed.
- Consultation on 'charging for water' was carried out in April 1998, which led to the Government publishing its decisions in November 1998 in the report 'Water Charging in England and Wales: Government Decisions following Consultation'. The report identifies customer choice on how water is paid for, eg, some customers remaining unmeasured for essential water use. Customers opting for a meter will be able to have it installed free and can revert back to an unmeasured charge within a year. The Government recognises that metering can play a useful role in the sustainable management of water resources, particularly in managing demands from discretionary uses such as garden sprinklers.
- The consultation on 'The Future of Regional Planning Guidance' and draft 'Planning Policy Guidance on Regional Planning' (PPG 11, Feb 99) asks for views on the role which water supply (and other environmental considerations) should play in guiding the location and level of new development.

It is too early to predict what will happen as a result of these reviews, but overall they should help to reduce or stabilise public water supply demands, alongside giving more protection to the water environment.

In addition, the Agency has carried out a scoping study to identify abstraction licences and other consents needing review to fulfil the requirements of the Habitats Directive. We are working with English Nature to agree procedures for detailed work on the full review. In advance of this, many water company sites are being assessed via AMP3.

A3.8 Water Level Management

The beneficiaries of water level management lie beyond those individuals who use boats. These waterways are important to the rural economy, and in this region in particular, the economic benefits are considerable. Beneficiaries include fisheries, conservation, local businesses, property values and those who use the river and water environment for recreation. Current 'ball park' estimates of expenditure activity into the rural economy from this sector are:

Navigable waterways (including Agency rivers and the Broads):

Informal Recreation	£52 million
Boating	£12 million.

Enclosed Waters, the coast and non-navigable rivers:

Informal Recreation	£20 million
Angling	£432 million.

This economic base should be taken into account when drawing up plans. It should also be noted that there is room for sustainable development, and very often this type of activity is attractive to external sources of funding. The key to unlocking this 'pot' is to ensure all the strategies by key organisations refer to similar goals and objectives to re-enforce the external bidding process.

A3.9 Water Resources Glossary of Terms (see also Appendix 10)

The key information (see Figure 22) on deployable output, water available for use, demand forecasts and target headroom have been calculated largely using standard methodologies and definitions that have been researched and agreed between the Agency and the UK water industry.

- ***Deployable output:*** the output that can be reliably obtained from a water company source, constrained by the lowest of a range of factors:
 - environment, including any known future reductions planned;
 - abstraction licence;
 - pumping plant or borehole/aquifer properties (capability during drought conditions);
 - treatment plant capability and losses;
 - water quality.
- ***Water available for use:*** water that is reliably available to put into supply; calculated by subtracting an *outage* allowance from the deployable output.
- ***Outage:*** a temporary loss of deployable output, due to planned or unplanned events. This allows for routine planned maintenance activity as well as unpredicted events. Companies are, however, expected to take prudent measures to secure reliability of their sources and minimise outage.
- ***Demand Forecast:*** the predicted future water needs of an area. Companies take into account both commercial and domestic demands, and the economic, environmental and social factors likely to affect future trends.
- ***Target headroom:*** an allowance calculated to take account of legitimate uncertainties in the forecasts of demands and resources available. Key elements included are:
 - potential changes in abstraction licences to protect the environment;
 - extent of dependence on time-limited licences;
 - gradual pollution causing a reduction in abstraction;
 - uncertainty of climate change on resources and demands;
 - uncertainties in demand forecasts arising from population and housing growth, per capita consumption, economic activity and market trends.

A3.10 References

Source: OFWAT 1997-98 Report on Leakage and Water Efficiency

APPENDIX 4. WASTE

A4.0 What is Special Waste?

The keeping, treating and disposal of controlled waste is regulated by waste management legislation. Some waste, known as 'special waste' are considered to present a greater risk to man and the environment. The keeping, treating and disposal of special waste is regulated more closely through a specially designed consignment note procedure. This procedure is defined in 1996 Special Waste Regulations drawn up under the Environmental Protection Act 1990.

Wastes become special due to their hazardous characteristics. Many hazardous chemicals become special wastes but, as a result of the 1996 Regulations, the definition was widened to include hard form asbestos and many oils. As a result, the quantity of special waste increased dramatically.

A4.1 Special Waste Arisings

The special waste consignment note procedure ensures that the Agency can track the arisings, movements and disposal of all special waste using SWaT (Special Waste Tracking System). The table below shows the quantities of special waste arising by district (see note below) in the East of England, for the year 1997/98.

East of England Special Waste Arisings by County and District Authority 1997/98⁸

County	District	Special Waste Tonnage	County	District	Special Waste Tonnage
Cambs	Cambridge City	5987	Herts	Broxbourne	3103
	E Cambs	3818		Dacorum	5073
	Fenland	1601		East Herts	4348
	Huntingdonshire	7765		Hertsmere	4715
	Peterborough	11484		North Herts	4735
	S Cambs	22218		St Albans	10404
Beds	Bedford	34384		Stevenage	2798
	Luton	5512		Three Rivers	2002
	Mid Beds	3927	Norfolk	Breckland	3717
	South Beds	6149		Broadland	2349
				Gt Yarmouth	10887
Essex	Basildon	10227		Kings Lynn & W Norfolk	5146
	Braintree	20913		North Norfolk	7616
	Brentwood	5170		Norwich City	9357
	Castle Point	697		South Norfolk	4223
	Chelmsford	8038	Suffolk	Babergh	3735
	Colchester	4487		Forest Heath	4074
	Epping Forest	3159		Ipswich	6906
	Harlow	3657		Mid Suffolk	5457
	Maldon	8224		St Edmundsbury	4073
	Rochford	1778		Suffolk Coastal	4916
	Southend-on-Sea	3002		Waveney	3190
	Tendring	4425			
	Thurrock	37001			
	Uttlesford	2332			

A4.2 Reference

Environment Agency: 1998 South East England Strategic Waste Management: Report on the 1996 Survey

⁸ Note: Where districts appear to produce very large quantities of special waste, this can be the result of consignment from special waste transfer stations in the district.

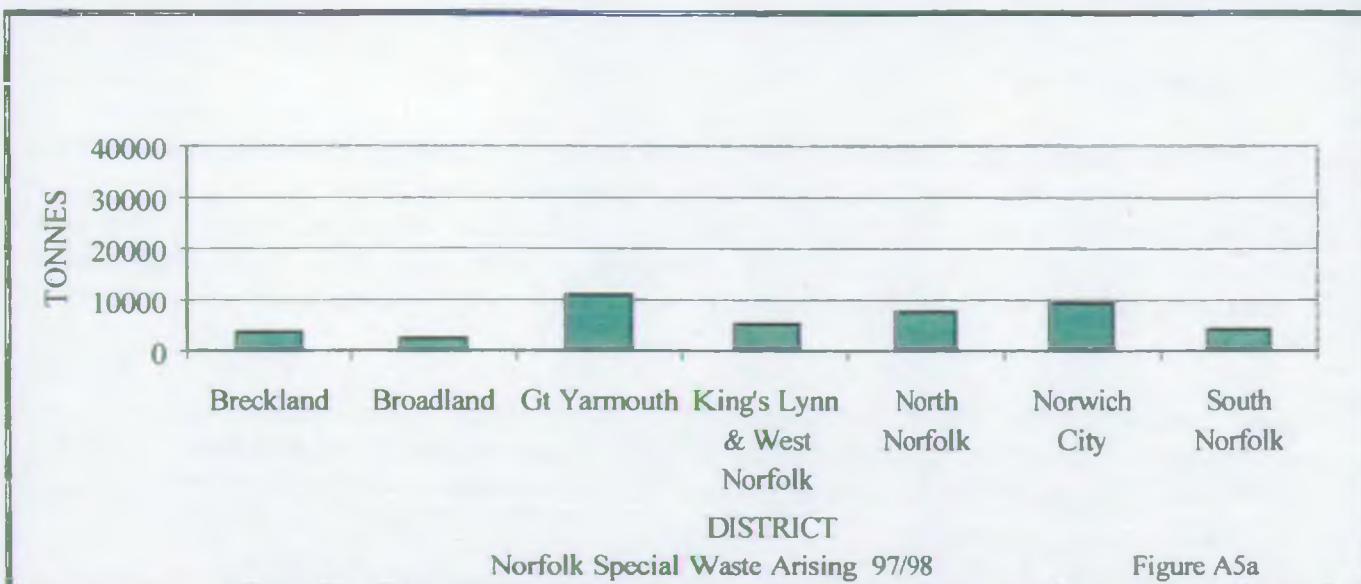


Figure A5a

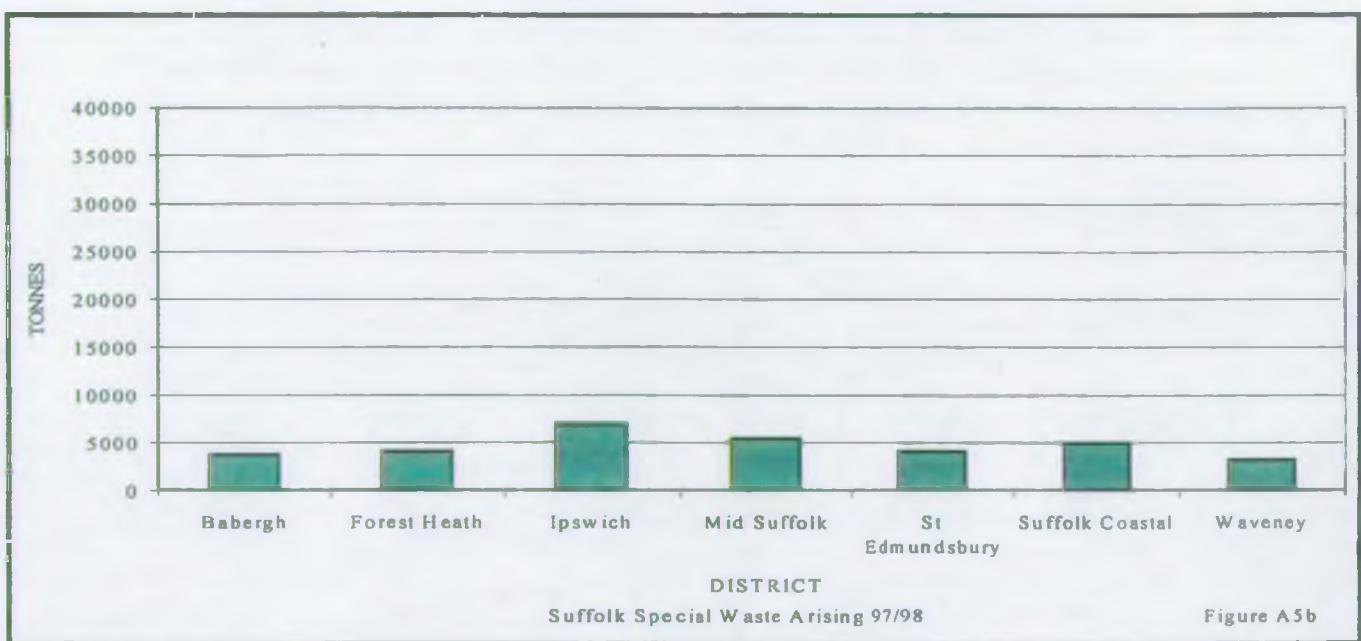


Figure A5b

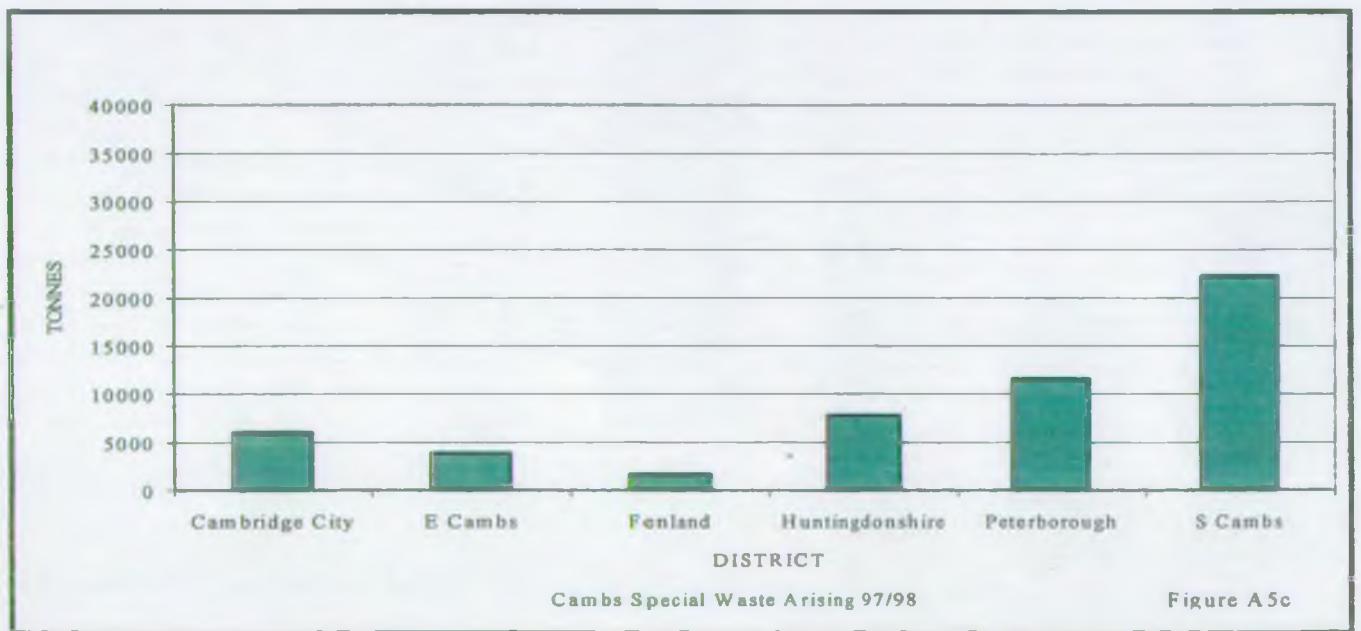


Figure A5c

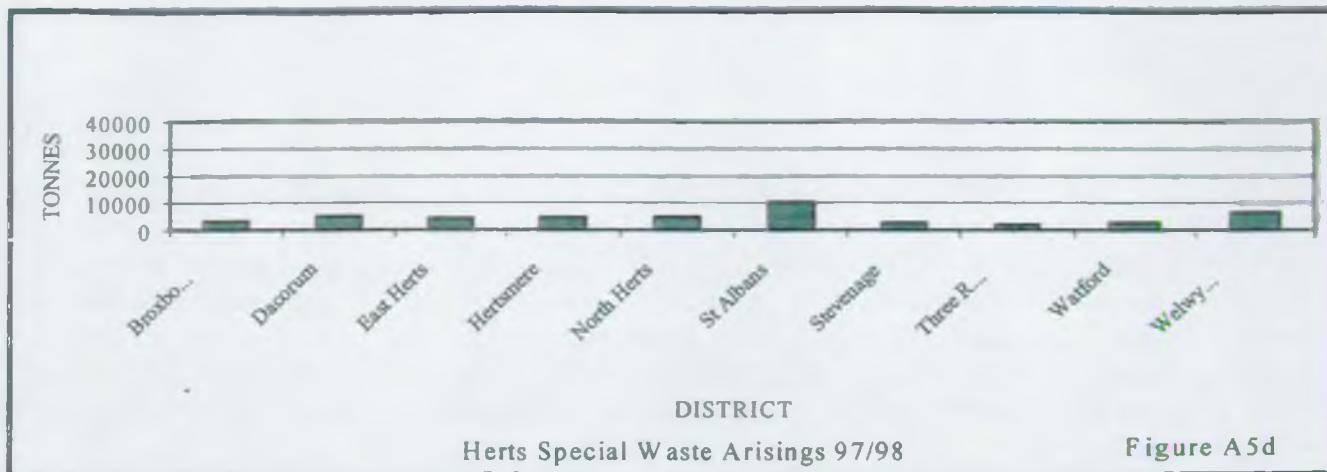


Figure A 5d



Figure A 5e



Figure A 5f

APPENDIX 5 BIODIVERSITY AND WILDLIFE

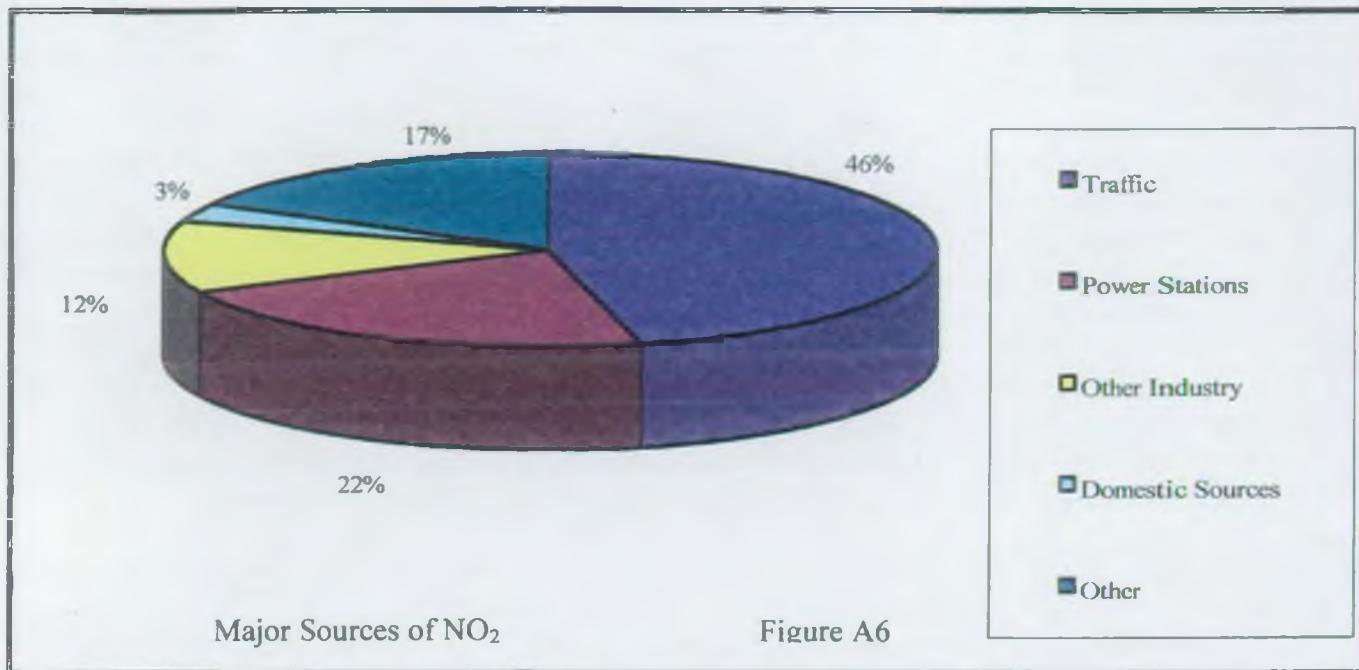
A5.1 Crayfish

Native crayfish are protected under the Wildlife and Countryside Act 1981, which makes it illegal either to take them from the wild or sell them without a licence from the appropriate conservation agency. The species is also included in the International Union for Conservation of Nature and Natural Resources (IUCN) Red Data List, the Bern Convention and the European Habitats Directive. In order to keep non-native crayfish for human consumption a general licence is required from MAFF for certain parts of the country. In the East of England region, a licence is required in Norfolk only. MAFF also have a Code of Practice advising on how to keep live crayfish securely and detailing responsibilities under the Wildlife and Countryside Act 1981.

The Environment Agency is the contact point for advice on the conservation of native crayfish and has a key role in promoting the implementation of practicable actions needed to conserve the species.

Appendix 8 Air Quality

A8.1 Nitrogen Dioxide (NO_2)



The DETR's consultation document (Jan 1999) on the review of the NAQS proposes an annual limit for NO_2 of 21 ppb as a provisional objective for 2005. It can be seen from Figure 44 that certain urban areas and major roads have the potential to exceed this, but it is unlikely to be a major problem for the East of England compared with other regions. Most problems with NO_2 will be tackled by current initiatives such as; Auto-Oil Programme (1998), IPPC Directive (1996), and the EC Large Combustion Plant Directive (1997), although some local air quality management measures may be necessary in some urban areas.

A8.2 Sulphur Dioxide (SO_2)

As a result of the Clean Air Act (1993), the replacement of coal as a fuel and the use of cleaner technologies in the industrial sector, emissions of SO_2 have fallen by 63% in the UK since 1970. Nationally emissions of SO_2 are now generally dominated by a few large emitters, none of which are sited in the East of England, although there are a number of smaller lower volume emitters present within the region.

Figure 45 indicates the levels across the region are well below the current NAQS standard (100 ppb/15 minute mean). However, given that the map shows an annual average it is more relevant to judge the levels against the proposed new national annual objective of 7 ppb. Consequently, this would be exceeded in some areas in the extreme south of the region, but it should be remembered that this is not a statutory requirement and it is thought that with the continued application of present policies most areas will comply with the main objectives by 2005. This should certainly be true of the East of England.

A8.3 Particles (PM_{10})

Particles are currently measured as PM_{10} s, ie, particles of $10\text{ }\mu\text{m}$ or less in diameter. It is now generally acknowledged that PM_{10} s are made up of several different types of particles from different sources, and consequently, the measurement of them is not as accurate or reliable as we would wish. Particles appear to consist of three types – primary, (from traffic and industry), secondary, (from atmospheric chemical reactions) and coarse, (from natural sources such as dust and sand).

Evidence is growing that a significant proportion of secondary and possibly primary particles are transboundary in nature making it impossible for local air pollution measures to control them. Transboundary effects are especially important in certain meteorological conditions, ie, when air is blown across the region from the continent. This transboundary effect can be seen to an extent in the east to west banding on the map (Figure 46).

Levels of particles higher than NAQS objectives are sometimes experienced throughout the United Kingdom. Modelling suggests that the elimination of all urban traffic would not bring levels down sufficiently to achieve the current objective. The proposed standard will be adjusted to encompass recent developments in particle research and monitoring.

A8.4 Ozone (O_3)

Ozone (O_3) does not feature in the Air Quality Regulations (1997), despite featuring in the NAQS, as it is a secondary pollutant and it is recognised that local air quality management measures cannot control it. This is because it is formed by the photochemical reaction of sunlight on its precursors; nitrogen oxides and hydrocarbons, which are frequently emitted from the continent. These precursors contribute to several additional and distinct environmental problems. This could mean, when considered as part of overall emissions control policy, ozone benefit may be reduced in order to optimise the overall effect on the environment.

Figure 47 shows days of O_3 levels above 50ppb in 1996, the current provisional standard, which allows 10 exceedences a year. It can be deduced that this is being exceeded, especially in the south of the region. This is probably due to the airborne transport of precursors generated in London and Europe. O_3 tends to be a rural, summertime problem as it requires sunlight and in urban areas traffic generated nitric oxide (NO) reacts with it to form NO_2 , hence the lower number of exceedences in towns.

Discussions are continuing at a european level on the creation of a national ceiling level for O_3 precursor generation. The review of the NAQS concluded that such measures would not be in place in time to meet the objective by 2005 and there may still be exceedences across southern Britain up until 2010.

A8.5 Process Industries

Figure A7 shows the location of 110 sites which equates to 170 number of processes (these numbers are constantly changing). The Agency can provide information on these sites on request.

Environmental Snapshot for the East of England

Process Industry
Regulation Processes (1997)



ENVIRONMENT
AGENCY

Environment Agency Copyright

Crown Copyright
Automobile Association Copyright

• PIR Process



Figure A7

APPENDIX 9. STATE OF THE ENVIRONMENT REPORTS

LOCAL AUTHORITY	TITLE	DATE	CONTENTS
Cambridgeshire County Council (in partnership with Peterborough City Council and the district councils)	Cambridgeshire and Peterborough - State of the Environment Report 1998	1998	Sustainability, Energy, Transport, Air Quality, Water, Waste, Land Uses, Natural Environment, Built Environment, Archaeology and Cultural Background and Physical Background.
Norfolk	State of the Environment Report 1997	1997	Air, Climate, Energy, Minerals, Waste, Water, Wildlife, Landscape, Cultural Heritage and People.
Hertfordshire	A 50 Year Vision for the Wildlife and Natural Habitats of Hertfordshire - A Local Biodiversity Action Plan	1998	Woodland, Wetland, Heathland and Acid Grassland, Neutral Grassland, Farmland, Urban Habitat, Endangered Species e.g. Otter, Crayfish, Water Vole, Song Thrush, Tree Sparrow.
Hertfordshire	A report on the State of Hertfordshire's Environment Annual Update 1998	1998	Transport, Energy, Wildlife, Air Pollution, Waste, Water, Land Use.
Luton	Safeguarding Tomorrow Caring for the Environment in Luton 1997/98	1997/98	Air Pollution, Noise Pollution, Water, Landfill Gas Monitoring, Radiation Monitoring, Light Pollution.
Bedfordshire & Luton	Bedfordshire and Luton Biodiversity Action Plan - The Way Forward	1996/97	Waterways and Wetlands, Woodland, Farmland, Urban Habitats, Biological Recording, Community Involvement.
Suffolk	Suffolk Local Biodiversity Action Plan 1998	1998	Cereal Field Margins, Ancient/Species Rich Hedgerows, Coastal and Floodplain Grazing Marsh, Lowland Heathland, Fens, Reedbeds, Saline Lagoons, Sea Grass Beds, Endangered Species
Suffolk	Suffolk's Environment...towards sustainable development	1997	The Rural Environment, The Built Environment, Transport, Recreation and Open Space, Other Resources
Thurrock	ERICA - State of the Environment Report on Interactive CD-Rom	1996	
Essex	The Essex Environment A report on the State of the County's Environment	1992	Air Quality, Water Quality, Waste, Noise, Energy, Landscape and Townscape, Wildlife, Outdoor Recreation, Transport and Traffic, Business in the Environment
Essex	The Essex Environment A summary report	1992	Air Quality, Water Quality, Waste, Noise, Energy, Landscape and Townscape, Wildlife, Outdoor Recreation, Transport and Traffic, Business in the Environment
OTHER	TITLE	DATE	CONTENTS
Environment Agency Thames Region	The Environment Agency's State of the Environment Report for Thames Region	1998	Climate Change, Conserving the Land, Water Resources, River Basin Management, Waste, Biodiversity, Fisheries, Air Quality
Environment Agency Thames Region	Thames Environment 21 - The Environment Agency Strategy for Land Use Planning in Thames Region	1998	Water Resources, Flooding, Pollution, Waste, Conservation, Recreation, Climate Change, Sustainability

APPENDIX 10. GLOSSARY

Abstraction	The removal of water from any source, either permanently or temporarily, usually by pumping.
Asset Management Plans (AMP)	Means by which the water undertakers plan the work required and capital expenditure necessary for improvements and maintenance of the water supply, sewage treatment works and sewerage systems. AMPs are drawn up through consultation with the Environment Agency and other bodies to cover a five year period. AMPs have to be agreed by DoE and OFWAT.
AMP2 and AMP3	An acronym for the second and third Asset management Plan produced by the Water Companies for the Office of Water Services (OFWAT). It sets out the water industry investment programme for the period 2000 to 2005.
Aquifer	A permeable geological stratum or formation that is capable of both storing and transmitting water in significant amounts.
Area of Outstanding Natural Beauty (AONB)	Designated by the Countryside Commission under the National Parks and Access to the Countryside Act 1949 to conserve and enhance the natural beauty of the landscape, mainly through planning controls.
Biodiversity	Diversity of biological life, the number of species present.
Biomass	The total mass of all living organisms (producers, consumers and decomposers) or of a particular set (e.g., species), present in an ecosystem or at a particular trophic level in a food-chain, and usually expressed as dry weight or, more accurately, as the carbon, nitrogen or calorific content per unit area.
Brown field site	Change of use to allow redevelopment of a site, such redevelopment prevents over development on green field sites – which is generally considered more sustainable.
Controlled Landfill	Where wastes are deposited in an orderly planned manner at a site licensed under the Control of Pollution Act 1974.
Controlled Waste	Industrial, household and commercial waste, as defined in UK legislation. Controlled waste specifically excludes mine and quarry waste, wastes from premises used for agriculture, some sewage sludge and radioactive waste.
EEDA	East of England Development Agency
Effective Rainfall	The proportion of rainfall that can infiltrate to an aquifer after evapotranspiration and run-off.
Eutrophication	The enrichment of water by nutrients, especially nitrogen and phosphorous, which cause: accelerated growth of algae and high plant life; changes in the ecological balance and deterioration in water quality.
Evapotranspiration	A combined term for water lost as vapour from a soil or open water surface (evaporation) and water lost from the surface of a plant, mainly via the stomata (transpiration). The combined term is used since in practice it is very difficult to distinguish water vapour from these two sources in water-balance and atmospheric studies.
Fish Biomass	A measure of the quality of a fishery as found in terms of surveys, weight by area, i.e., g/m ² .
Flood Defence	Anything natural or artificial that protects against flooding, to a designed return period.
Flood Plain	This includes all land adjacent to a river where water is naturally stored during flood conditions.
Global Warming	The increase in the average temperature of the earth, thought to be caused by the build up of greenhouse gases.
Go-East	Abbreviation for the Government Office for the East of England
Green Belt	Any zone of countryside immediately adjacent to a town or city, defined for the purpose of restricting outward expansion of the urban area.
Groundwater	May refer to all subsurface water as distinct from surface water. Generally groundwater is considered to be that water which is below the zone of saturation and contained within porous soil or rock stratum (aquifer).
Groundwater Protection Policy	Environment Agency policy which controls activities having the potential to pollute ground water resources.
Groundwater Protection Zones	Identify the proximity of land to a groundwater source.

Incineration	The burning of waste at high temperatures to reduce its weight and volume. Incineration can also reduce the toxicity of waste materials. Many incineration plants are also known as Waste-to-Energy (WTE) facilities due to the beneficial recovery of energy in the form of heat and power.
Inert Waste	Category of waste which includes material which will either not decompose, or will decompose very slowly. Materials in this category would include waste from the construction industry; such as hardcore, soil, stone and glass
Integrated Pollution Control (IPC)	An approach to pollution control in the UK which recognises the need to look at the environment as a whole, so that solutions to particular pollution problems take account of potential effects upon all environmental media.
Local Agenda 21	The majority of Agenda 21 cannot be delivered without the commitment and cooperation of local government. Each local authority is encouraged to adopt its individual Local Agenda 21 - its own sustainable development strategy at the local level, involving partnerships with other sectors, such as the Environment Agency, businesses, community and voluntary groups.
Nitrate Vulnerable Zone (NVZ)	An area where nitrate concentration in sources of public drinking water exceed, or are at risk of exceeding the limit of 50mg/l laid down in the 1991 EC Nitrate Directive, and where compulsory, un-compensated agricultural measures will be introduced from 1996 as a means of reducing those levels.
Per Capita Consumption	The quantity of water used for household domestic purposes expressed as a volume per person.
Public Water Supply	The supply of water by companies appointed as Water Undertakers by the Secretary of State for the Environment under the Water Industry Act 1991.
RAMSAR	Wetland site of International Importance that is designated under the Ramsar* convention (* a town in Iran where the international convention originally agreed in 1975 to stem the progressive encroachment on, and loss of, wetland).
RDA	Regional Development Agency
River Habitat Survey (RHS)	An inventory survey of physical features of the river and adjacent habitat.
SERPLAN	South East Regional Planning
Site of Special Scientific Interest (SSSI)	A site given a statutory designation by English Nature or the Countryside Council for Wales because it is particularly important, on account of its nature conservation value.
Soil Moisture Deficit	When growing plants cannot meet their immediate moisture needs from incoming precipitation, they use the moisture reserves that are available in the soil. This creates a soil moisture deficit when measured against the field capacity of the soil.
Special Area of Conservation (SAC)	Area designated under the EC Habitats Directive.
Special Landscape Area (SLAs)	Area of special landscape quality, designated by the County.
Special Protection Area (SPA)	Statutory protected habitats for wild birds under EC Regulations.
Special Waste	Category of waste which includes material with any of the following properties:- dangerous to life as defined in the regulations, or with a flash point of 21°C (or less), or a prescription-only medicine.
Standing Conference of East Anglian Local Authorities (SCEALA)	SCEALA is made up of planning representatives from councils in Suffolk, Norfolk and Cambridgeshire. They have produced a strategy for regional development for the period up to the year 2016 which is used by the Secretary of State to inform the Government Regional Planning Guidance Note (RPG6).
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

ACRONYMS AND ABBREVIATIONS

AMP	Asset Management Plan
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BAPs	Biodiversity Action Plans
CFCs	Chlorofluorocarbons
CIP	Climate Impacts Programme
cSACs	candidate Special Areas of Conservation
DETR	Department of the Environment and Transport
EEDA	East of England Development Agency
EN	English Nature
FRCA	Farming and Rural Conservation Association
FRCN	Fisheries Recreation Conservation and Navigation
GDP	Gross Domestic Product
Go-East	Government Office for the East of England
GOSW	Government Office for the South West of England
GQA	General Quality Assessment
IPC	Integrated Pollution Control
IUCN	International Union for the Conservation of Nature and Natural Resources
LA21	Local Agenda 21
LEAPs	Local Environment Agency Plans
MAFF	Ministry of Agriculture Fisheries and Food
NAQS	National Air Quality Strategy
NHS	National Health Service
NNRs	National Nature Reserves
NVZs	Nitrate Vulnerable Zones
OFWAT	Office of Water Services
PIR	Process Industry Regulations
PPG	Planning Policy Guidelines
RAS	Radioactive Substance
REDS	Regional Economic Development Strategy
RES	Regional Economic Strategy
RPB	Regional Planning Body
RPG	Regional Planning Guidance
RQO	River Quality Objectives
RSPB	Royal Society for the Protection of Birds
RSR	Radioactive Substance Regulations
SCEALA	Standing Conference of East Anglian Local Authorities
SEEDA	South East of England Development Agency
SERPLAN	South East Regional Planning
SINCs	Sites of Importance for Nature Conservation
SMPs	Shoreline Management Plans
SPAs	Special Protection Areas
SSSIs	Sites of Special Scientific Interest
STW	Sewage Treatment Works
SWaT	Special Waste Tracking System

Environmental Snapshot for the East of England
APPENDIX 11 OTHER USEFUL PUBLICATIONS

European Commission, December 1994. East Anglia Single Programming Document for EC Objective 5b Areas.

National Rivers Authority - Anglian Region, September 1994. Water Resources in Anglia - A sustainable strategy for secure water supplies and a better water environment.

DETR, 1998. UK Climate Change Programme - Consultation Paper.

DETR, September 1998. Digest of Environmental Statistics No.20 1998, The Stationery Office, London.

SCEALA and SERPLAN, February 1999. Towards an East of England – Regional Planning Framework Version 8.

Our ref:
Your ref:

Date: 19 July 1999



ENVIRONMENT
AGENCY

To: (see distribution list)

EAST OF ENGLAND ENVIRONMENTAL SNAPSHOT

Please find attached a copy of the above report and a summary which was prepared by a multi-functional project team during March (see notes).

The data has been since used as part of our liaison work with the East of England Regional Development Agency, Government Office, Environmental Forum and Assembly.

The East of England covers the six counties of Cambridgeshire, Suffolk, Norfolk, Essex, Hertfordshire and Bedfordshire. Consequently we will need to liaise with Thames Region (North East Area) to ensure the gaps are filled for Version 2.

I would welcome your views on how to take this further and what our dissemination strategy should be. We have a number of options:

- (i) Complete dataset and use internally only;
- (ii) As (i) but use with key external consultees and partner organisations only;
- (iii) As (ii) above but fine tune and publish summary widely; or,
- (iv) Prepare a State of the Environment Report for East of England plus summary.

We need to continue to refine our data on environmental indicators as well as map based information for liaison on regional governance and european funding issues. Once I have analysed your initial response, I will present a costed appraisal of our 'next steps' to a future RMT.

Any comments on the contents and approach are welcome by 16th August 1998. Please return any 'excess' reports.

Regards

A handwritten signature in black ink, appearing to read "M. Doyle".

MICHELLE DOYLE
Regional Planning Manager

Direct dial 01733 464335
Direct fax 01733 464153

Cont/d..

Environment Agency
Kingfisher House, Goldhay Way, Orton Goldhay, Peterborough, PE2 5ZR
Tel: 01733 371811 Fax 01733 231840

h:\my documents\environmental snapshot\snapshot letter.doc



Note:

1. The Team

The project team were:

Project Manager: Michelle Doyle – Regional Planning Manager
Josephine Osborn – Regional Technical Planning Assistant
John Adams – Regional FRCN Manager
Nigel Tomlinson – Regional Fisheries Development Officer
Wendy Brooks – Regional Conservation Officer (Flood Defence)
Alan Maclean – Geaographic Data Officer
Gail Donald – Water Resources Planner
John Waddingham – Water Resources Planner
Colin Trendall – Regional IPC/RAS Support Officer
Adrian Young – Regional PIR/RSR Environment Planning Specialist
Chris Saville – Regional Waste Planning Officer
Sarah Chadd – Regional Environmental Scientist
Penny Coad – Quality Planning Assistant
Mark Norbury – Senior Analyst Developer

2. Line Managers

All parties worked extremely positively and creatively. If you require feedback on individuals for performance management/ratings purposes, please let me know.

3. Resources and Prioritisation

The cost of this report was:

Name	Department	Hours	Cost (£)	Work postponed to undertake snapshot
A. Maclean	FD & FRCN	95	1730.9	
J. Rawson	FD	3	67.56	Effectively done as overtime
N. Tomlinson	FRCN	7.5	237.45	
W. Brooks	FRCN	3.75	91.425	
R. Valentine	FRCN	3.75	55.9875	
J. Dixon	FRCN	7.5	136.65	
J. Adams	FRCN	6	226.32	
G. Donald	WR	7.5	131.25	
J. Waddingham	WR	42.5	850.85	
P. Smith	WR	7.5	216.15	
S. Chadd	EP	17	423.3	Two main items put on hold - a PID for a £100k national R & D project and recruitment
P. Coad	EP	90.5	1448	8 of these done outside office hours
C. Trendall		35.2	466.048	Delay to requests for PR info and filing
A. Young		29.7	842.292	Stopped work on the Regional Air Quality Action Plan which resulted in a delay, was unable to comment on draft IPPC Process Handbook and Ely Ouse LEAP

Cont/d..

C. Saville	WASTE	52	1294.8	Now behind on - National Guidance on Strategic Waste Management Assessments, Standard Site Returns, work for SCEALA
S. Rasmussen	WASTE	12.5	195.25	
M. Norbury	CIS	35.1	1957.77	
J. Osborn	TECH PLAN	250	2200	
M. Doyle	TECH PLAN	70	2206.4	Management and coordination duties
Total		776	£14778.33	

Staff Time: £14778.33

Photocopying: £820.00

Total: £15598.33

4. Feedback from the team

Despite the disruption this task caused, the response to the initiative was on the whole very positive. Their comments are as follows:

- Allowed us to work with other colleagues and disciplines for the first time;
- Interesting to learn about devolution and the 'outside world';
- Allowed us to get our data in order (transfer to new GIS software);
- Allowed the development of skills on Arcview GIS;
- Would be keen to continue under different timescales.

Distribution List

Robert Runcie
Ian Ripley
Innes Jones
Mick Pearson
Peter Kite
Keith Stonell
Hilary Aldridge
Brigid Newland
Chris Mills
Andy Stewart
Sarah Chadd/Penny Coad
John Adams/Nigel Tomlinson/Wendy Brooks
Alan Maclean
Gail Donald/John Waddingham
Colin Trendall/Adrian Young
Chris Saville
Mark Norbury
Nigel Fawthrop/Rona Chellew
Jonathan Wortley/John Macrae