



local environment agency plan

NORTH KENT LEAP

ENVIRONMENTAL OVERVIEW

MARCH 1999



Please return or renew this item by the due date

Due Date



ENVIRONMENT
AGENCY

North Kent Area Key Details

General

Area (sq km) 530.05

Administrative Details

Councils and % of the
Kent Area they Administer

Kent CC	96
Medway C	4

Population

Year	Population
1991	226 000
2001 (Estimate)	234 000

Water Resources

Rainfall (mm/yr)	
Average	665
Drought Conditions	523

Number of licensed abstractions

Surface Water	41
Groundwater	99
Impoundments	0

Flood Defence

	Length (km)
Coastline including main tidal waters	198
Main River including tidal lengths	56
Sea Defences Agency Responsibility	20
Tidal Banks Agency Responsibility	72

Conservation

Sites of Special Scientific Interest	12
Water Dependant SSSIs	11
National Nature Reserves	3
Ramsar or Special Protection Areas	6
Environmentally Sensitive Area: North Kent Marshes	

Fisheries

Length of EC Designated Fisheries (km):

	Freshwater	Tidal
Cyprinid	0	0
Salmonid	0	0

Water Quality

River ecosystem classification as % of the
North Kent catchment between 1995-1997
Class

RE1	0
RE2	1
RE3	0
RE4	57
RE5	42

Chemical GQA as % of sites in each class for
the North Kent catchment rivers in 1995
Class

A	0
B	0
C	1
D	44
E	54

Pollution Prevention & Control

Licensed Waste Sites
18

Process Industry Regulations
15(Plus 1 planned)

Radioactive Substance Regulations
Authorised sites to accumulate and dispose of
radioactive waste 1.



CONTENTS

	Page No
Maps	iii
Tables	iii
1. INTRODUCTION	1
1.1. PURPOSE AND SCOPE OF THE NORTH KENT ENVIRONMENTAL OVERVIEW	1
1.2. STRUCTURE OF THE ENVIRONMENTAL OVERVIEW	1
2. NORTH KENT AREA ENVIRONMENT	3
2.1. INTRODUCTION	3
2.1.1. Location, geology and topography	3
2.1.2. Land use and management	3
2.1.3. Administrative areas and land use planning	6
2.2. ENVIRONMENTAL RESOURCES	10
2.2.1. Introduction	10
2.2.2. Landscape and cultural heritage	10
2.2.3. Air quality	14
2.2.4. Water resources	17
2.2.5. Water Quality	22
2.2.6. Protection against flooding	28
2.2.7. Recreation	33
2.2.8. Waste management	35
2.3. THE STATUS OF KEY BIOLOGICAL POPULATIONS, COMMUNITIES AND BIODIVERSITY	40
2.3.1. Introduction	40
2.3.2. Natural Areas	40
2.3.3. Key Habitats	41
2.3.4. Key Species	45
2.3.5. Designated Nature Conservation Areas	48
2.3.6. Stresses on the Biodiversity of the North Kent LEAP area	49
2.4. COMPLIANCE WITH ENVIRONMENTAL QUALITY STANDARDS, TARGETS AND POLICIES/STRATEGIES	54
2.4.1. Waste management and regulation	54
2.4.2. Flood defence	54
2.4.3. European Water Quality Directives	56
2.4.4. UK water quality objectives and standards	61
2.4.5. Consented discharges to water	61
2.4.6. Fisheries	62
2.4.7. Recreation	62
2.4.8. Biological Populations, Communities and Biodiversity	62

2.5. HEALTH OF THE ENVIRONMENT	64
2.5.1. Introduction	64
2.5.2. Acidification	64
2.5.3. Water	65
2.6. LONG TERM REFERENCE SITES	66
2.6.1. Air quality monitoring	66
2.6.2. Sea level rise	66
2.6.3. Assessment of Estuary Quality	66
2.7. AESTHETIC QUALITY OF THE ENVIRONMENT	67
2.7.1. Introduction	67
2.7.2. Landscape Quality	67
2.7.3. Tranquil areas	67
3. SUMMARY OF ISSUES FOR THE LEAP	68
3.1. INTRODUCTION	68
3.2. SUMMARY OF ISSUES	68
APPENDIX 1: GLOSSARY	70
APPENDIX 2 : ABBREVIATIONS	73
APPENDIX 3 : CONSULTATIONS	74
APPENDIX 4: AIR QUALITY PART B PROCESSES	75
APPENDIX 5: WATER RESOURCES	76
APPENDIX 6: INTEGRATED RIVER BASIN MANAGEMENT: WATER QUALITY	77
APPENDIX 7: EXAMPLES OF RECREATIONAL ACTIVITIES IN THE NORTH KENT LEAP AREA	80

Maps

Map 1: The North Kent Catchment	4
Map 2: Geology	5
Map 3: Topography	7
Map 4: Administrative Boundaries	8
Map 5: Integrated Pollution Control	16
Map 6: Water Resource Areas and Water Supply	21
Map 7: Water Quality	24
Map 8: Flood Defence	31
Map 9: Licensed Waste Sites	38
Map 10: Conservation Designations	44
Map 11: Freshwater Fisheries, Recreation and Amenity	50

Note: Maps have been produced using the best information available at February 1999 and it is recognised that there may be some inaccuracies. More detailed information may be available from the original source.

Tables

Table 1: Water resources summary	18
Table 2: Licensed and actual abstractions of surface and groundwater	19
Table 3: Licensed abstractions for industry and agriculture	20
Table 4: Stresses on water quality	26
Table 5: Fisheries locations and fish farms	47
Table 6: Colour coded flood warnings	55
Table 7: Waste water treatment facilities	58
Table 8: Compliance with standards at bathing waters	59
Table 9: Compliance with water quality standards	61
Table 10: Part B processes	75
Table 11: Authorised and actual water abstractions	76
Table 12: GQA chemical grading	77
Table 13: GQA scheme for biology	78
Table 14: Chemical quality of freshwater courses	79
Table 15: River ecosystem classes	79
Table 16: Biological quality of Frogna and White drains	79
Table 17: Coarse fishing clubs within the North Kent area	81

1. INTRODUCTION

1.1. PURPOSE AND SCOPE OF THE NORTH KENT ENVIRONMENTAL OVERVIEW

This Environmental Overview has been prepared to provide supporting information to the North Kent Area Local Environment Agency Plan (LEAP) Consultation Draft. It is a factual description and analysis of the North Kent environment and the stresses upon it. From the overview a series of issues have emerged which have been carried forward into the LEAP Consultation Draft for consideration by the Agency, its partners and those individuals and organisations generally interested in the local environment.

The scope of the Environmental Overview is confined to those aspects of the environment for which the Environment Agency has responsibilities. In summary these include: the water environment; land and habitats associated with rivers and the coast; and aspects of air quality and waste management. However, the Overview has been prepared in the context of the Agency's overall aim to protect and enhance the whole environment, thus contributing to sustainable development. The term sustainable development is most commonly taken to mean '*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*'.

On 29 September 1998, the Agency published the Consultation Draft of a LEAP for the Kent Area, together with an Environmental Overview. The Kent Area LEAP is a strategic plan and addresses environmental issues that *relate to the Kent Area as a whole or are of particular major local significance*. This North Kent Environmental Overview, and the other 'daughter' Environmental Overviews for individual LEAP areas in Kent, focus on issues that are specific to the area.

1.2. STRUCTURE OF THE ENVIRONMENTAL OVERVIEW

Section 2.1 provides an introduction to the North Kent area – its geology and topography, land use and settlement pattern, and planning and administrative context. The section then describes the state of the environment with reference to the following 'viewpoints':

- Environmental resources (section 2.2)
- Key biological populations, communities and biodiversity (section 2.3)
- Compliance with environmental standards and targets (section 2.4)
- The health of the environment (section 2.5)
- Long term reference sites (section 2.6)
- Aesthetic quality of the environment (section 2.7)

The following pressures or 'stresses' on environmental resources are identified in sections 2.2 and 2.3:

- Natural stresses
- Societal stresses: abstraction of water and minerals
- Societal stresses: consented discharges and wastes
- Societal stresses: non-consented discharges and wastes
- Societal stresses: development, recreation and agriculture

The issues emerging from the Environmental Overview are summarised in Section 3. They are grouped according to the Agency's 'principal concerns' set out in the Agency's overall strategy document entitled '*An Environmental Strategy for the Millennium and Beyond*' (1997).

Principal concerns of the Environment Agency

1. Addressing climate change - helping to ensure that greenhouse gas emissions meet their required targets;
2. Improving air quality - ensure that air is of a quality that is not affected by discharges from major industries;
3. Managing water resources - ensure that water resources are properly managed to provide water for all reasonable needs without harming the environment;
4. Conserving and enhancing biodiversity - ensure that wildlife is protected and their habitat increased;
5. Managing freshwater fisheries - ensure that diverse and invaluable fisheries are protected and their habitats increased;
6. Delivering integrated river basin management - ensure that all waters are of sustainable quality for their different uses; that land is protected from flooding in an economic and environmentally acceptable manner; and that opportunities to enjoy the water environment are conserved and enhanced;
7. Conserving the land - ensure that land is conserved and protected from contamination;
8. Managing waste - ensure that waste is managed safely;
9. Regulating major industries - ensure that adverse effects on air, land and water are minimised.

2. NORTH KENT AREA ENVIRONMENT

2.1. INTRODUCTION

2.1.1. Location, geology and topography

The North Kent LEAP Area (see Map1) covers the surface catchment of the Swale with the lower reaches of the Medway Estuary. It extends from Gillingham in the west to Herne Bay in the east, embracing the whole of the Medway Estuary, the Swale and Isle of Sheppey, and extends southwards to include the dip slope of the North Kent Downs chalk outcrop (see Map 2).

The Area's geology is dominated by the North Kent Chalk block, although other aquifers, such as the Thanet Beds and the Woolwich, Reading and Oldhaven Beds, overlie the Chalk in the north. Topographical divisions largely follow the geology, forming distinctive areas (see Map 3):

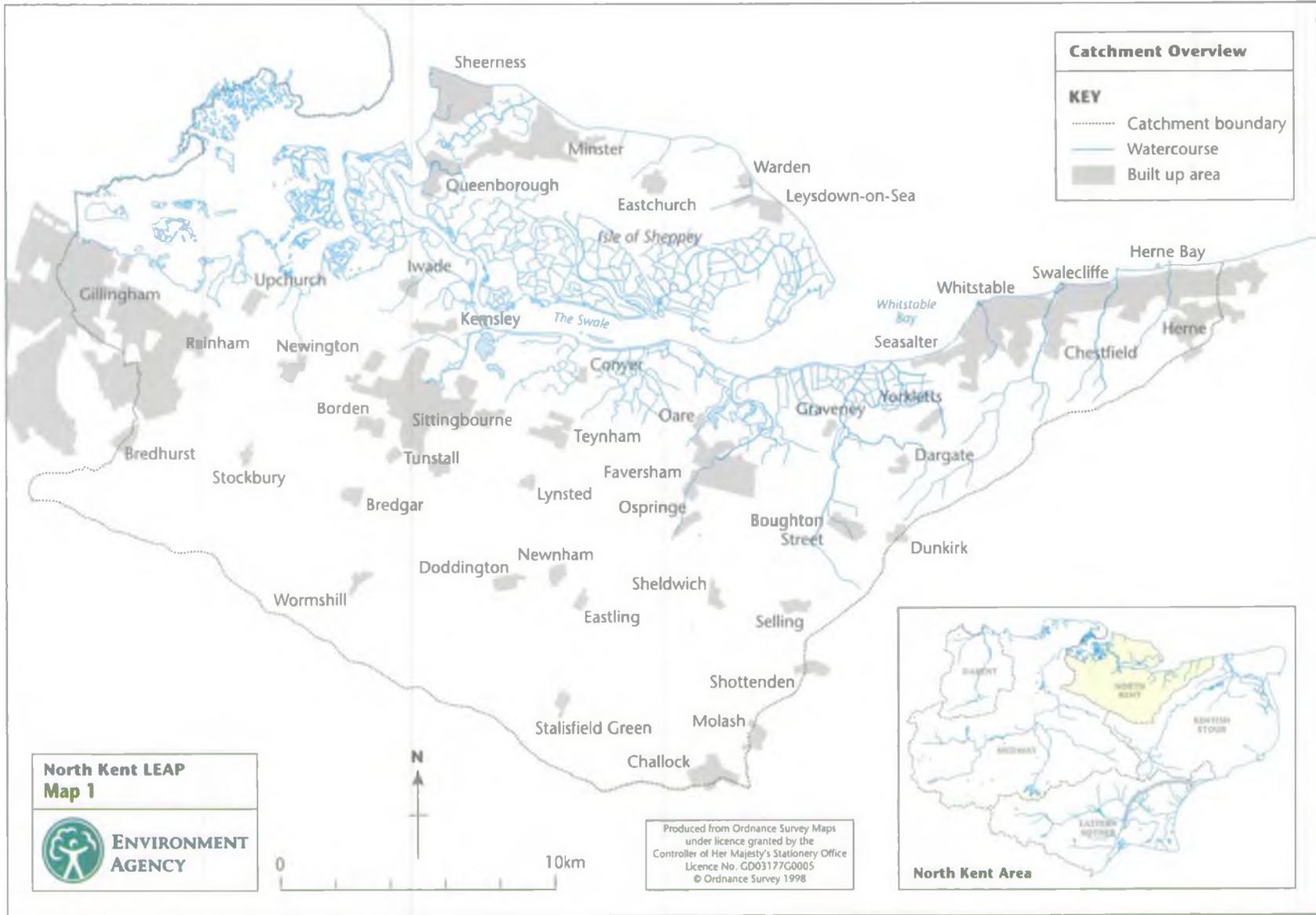
- the Medway and Swale marshes – low lying flat land
- Sheppey - higher northern half of the island and the elevation of open hills and ridges
- North Kent Fruit belt – higher land forming a buffer area to the Marshes and highly influenced by the towns of Gillingham, Sittingbourne and Faversham
- North Downs – highest land along the southern boundary of the LEAP area

The LEAP area is unusual in that there are no significant fresh watercourses. Instead, a series of streams enter into the Medway Estuary and Swale along their southern shores.

2.1.2. Land use and management

The development of the area's main towns - Gillingham, Sheerness, Minster, Sittingbourne and Faversham - has been dependent on the Medway Estuary or the Swale. In recent years the area's more traditional industries have tended to contract, although Sittingbourne still retains a significant manufacturing industry. New commercial developments have expanded and provided new employment opportunities, and this trend is set to continue with the Thames Gateway Planning Framework and the status of the area as an 'Intermediate Assisted Area'.

Urban development covers approximately 15% of the area, with almost all of this in the north of the LEAP area on the banks of the Medway Estuary and the Swale. The resident population of the area is approximately 230,000, of which over 170,000 are located within the five main towns of Faversham, Herne Bay, Sheerness, Sittingbourne and Whitstable, as well as part of Gillingham which falls within the LEAP area.



Agricultural land accounts for over half the LEAP area and comprises a mixture of arable, grassland, hops and orchards. Some of the most productive agricultural land has been derived from former wetlands through drainage and reclamation. The area of farmland has decreased as towns have expanded. Of that which remains, arable and grassland agriculture has increased at the expense of the hop growing and traditional orchards.

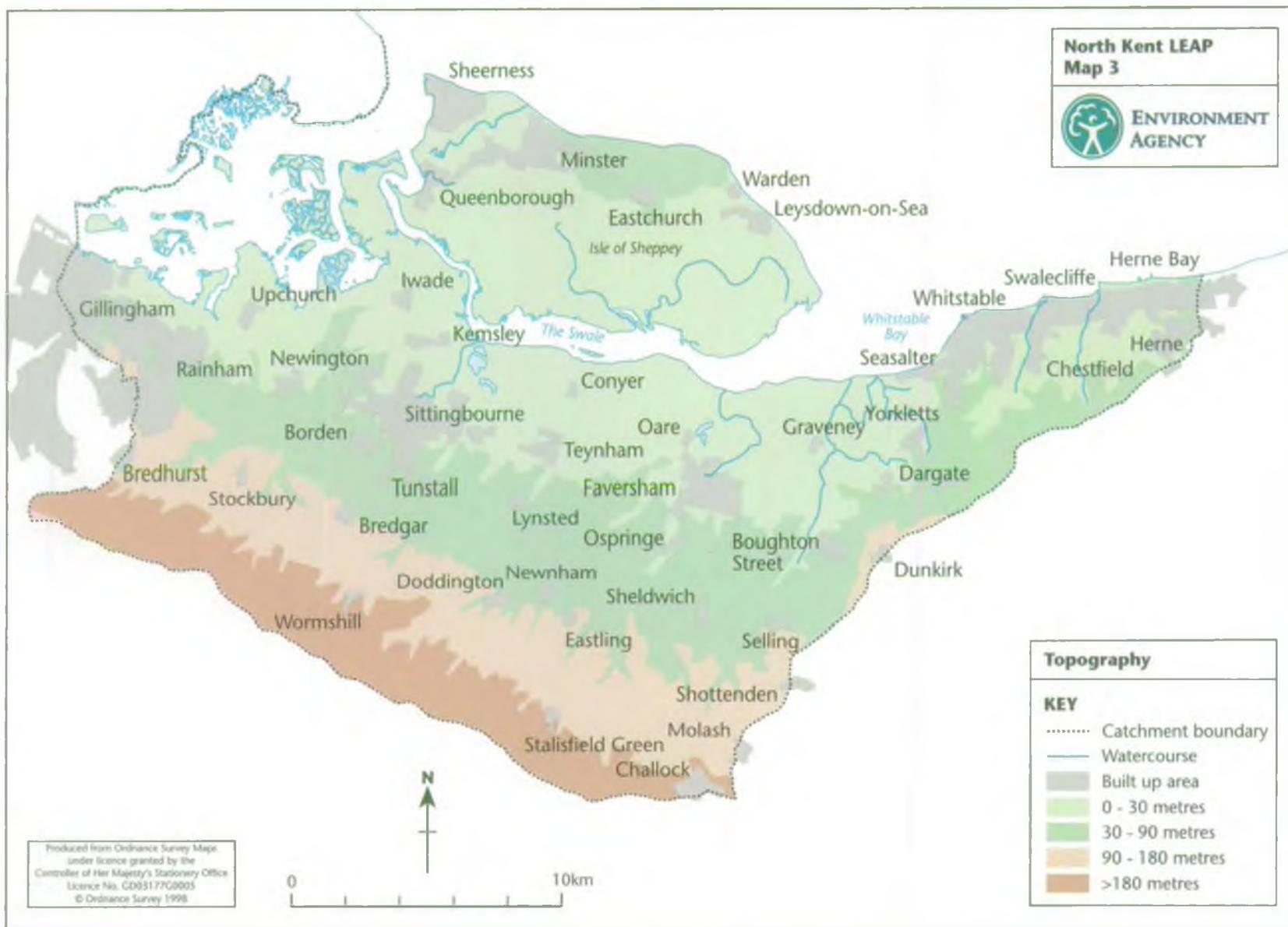
Approximately 15% of the LEAP area is managed for nature conservation, including extensive areas of wetland along the Medway Estuary and the Swale, parts of the Isle of Sheppey and the entire Isle of Harty. Woodland occupies less than 5% of land use in the north of the area, in which the urban development, marshes and agriculture predominate. However, there is a greater proportion of woodland in the south of the LEAP area along the dip slope of the North Kent Downs.

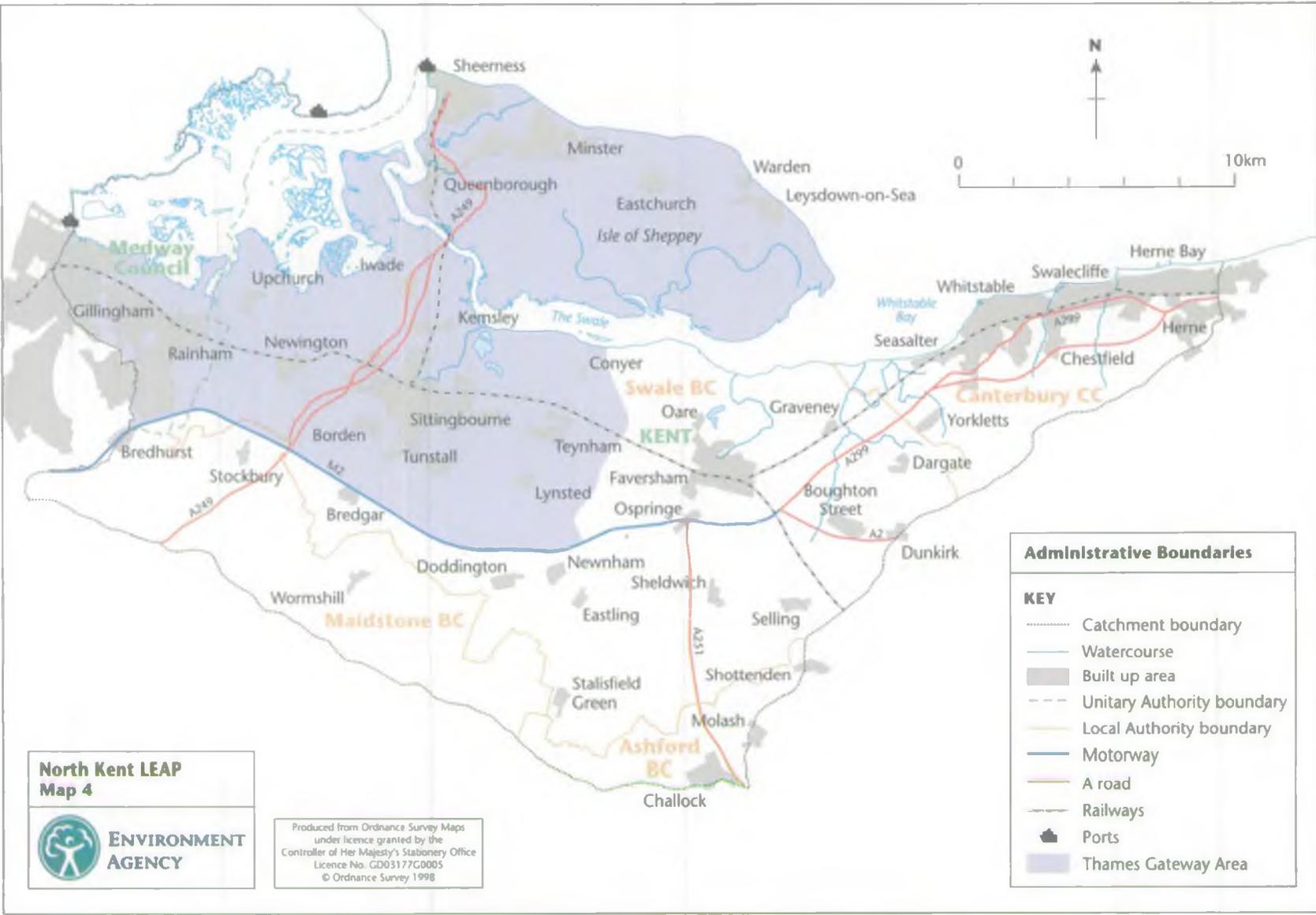
2.1.3. Administrative areas and land use planning

The North Kent LEAP area falls entirely within the County of Kent. The majority of the area lies within the boundaries of Swale Borough Council and Medway Council areas although parts of Maidstone Borough Council, Ashford Borough Council and Canterbury City Council also lie within the LEAP area. Administrative boundaries are shown on Map 4.

The development plans covering the area are:

- Kent Structure Plan (1996)
- Swale Borough Local Plan Deposit Draft (January 1996)
- Maidstone Borough Local Plan – Deposit Draft (May 1997)
- Canterbury District Local Plan – Deposit Draft (March 1994)
- Ashford Local Plan – Deposit Draft (Nov 1996)
- Medway Towns Local Plan – Consultation Draft (1997)





Administrative Boundaries

KEY

- Catchment boundary
- Watercourse
- Built up area
- - - Unitary Authority boundary
- Local Authority boundary
- Motorway
- A road
- Railways
- Ports
- Thames Gateway Area

**North Kent LEAP
Map 4**

**ENVIRONMENT
AGENCY**

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Thames Gateway Planning Framework

“Thames Gateway” embodies the vision for the future of the area previously known as the East Thames Corridor. At its origin the initiative was a collection of substantial and disparate development sites, some seen as difficult to bring into productive use. Thames Gateway aims to change that by setting the framework for a sustained and sustainable programme of economic, social and environmental regeneration. Some of these changes will entail additional residential developments at the fringes of urban areas, although much of it will comprise the re-development of “brownfield” sites in Chatham, Gillingham and on the Isle of Sheppey. It is likely to result in large-scale new housing developments at Iwade, and further commercial development to the North East of Sittingbourne, at Ridham and at the Port of Sheerness Docks.

2.2. ENVIRONMENTAL RESOURCES

2.2.1. Introduction

This section of the Environmental Overview describes the environmental resources of the North Kent LEAP area that fall within the realm of the Environment Agency's interests. Such resources include landscape and cultural heritage associated with the water environment; air quality; the quantity of water resources available; and water quality. Nature conservation resources are considered separately in Section 3.

Also considered in this section are three other additional important concerns of the Environment Agency: the protection of people and property against flooding; recreation; and the management of waste.

2.2.2. Landscape and cultural heritage

The Environment Agency is required when formulating or considering any proposal relating to any of its activities other than pollution control to further the conservation and enhancement of natural beauty, geological or physiographical features of special interest.

In addition, all functions are required to take into account any effect that proposals would have on the beauty or amenity of an area and have regard to the desirability of protecting and conserving buildings, sites and objects of archaeological, architectural, engineering or historic interest.

The Agency also has a duty to promote - to such extent as it considers desirable and resources allow - the conservation and enhancement of the natural beauty of inland and coastal waters and land associated with these waters.

By understanding the character of the landscape of the LEAP area, the Agency can evaluate the alterations to the character that will take place from the decisions it has to make.

Current situation in the North Kent area

Information on the area's landscape has been obtained from the following sources:

- The Countryside Commission's character areas - three types are included in the LEAP area: the Greater Thames Estuary, the North Kent Plain and the North Downs.
- The Kent Thames Gateway Landscape Assessment (July 1995)
- The Eastern Swale Marshes Landscape Assessment (1996)

The Kent Thames Gateway Landscape Assessment divides the Medway Estuary and Swale into four areas: Medway Marshes, Swale Marshes, Sheppey and the North Kent Fruitbelt. The North Kent LEAP catchment also embraces part of the North Downs character area.

Medway Marshes

These are typified by low-lying flat land formed from the marine alluvial deposits, with big open skies and views. The majority of the marshland is reclaimed and protected from inundation by sea walls. To many people, such landscapes do not represent classic scenic beauty, but nonetheless they have a distinct sense of place and are of considerable nature conservation value.

The Medway Marshes are characterised by the predominance of arable cultivation as well as industry, recreation and urban development, particularly on the more immediate coastline. The busy shipping channels and the port facilities create a varied and contrasting skyline.

The area is rich in buried remains, particularly in the intertidal zone and offshore. Exploitation of the marine and estuarine fish and shellfish resource has left archaeological features such as fish traps and weirs. There is evidence of numerous saltworking sites in the Medway Estuary reflecting a major industry for the region. The Saxon Shore Way follows the coastline of the Medway and Swale marshes.

Swale Marshes

The Swale Marshes are more tranquil with less pressure from industry and urban encroachment. These qualities are particularly distinct on the outer parts of the marshes which are most remote from human influences and are closely related to the wilder landscapes of the intertidal zone.

In the Eastern Swale Marshes, there is a sharp contrast between the open grazing land of the marshes and the complex landscapes of orchards, pastures, shelterbelts and copses that characterise the fruit belt. Localised outcrops of London Clay produce distinctive landform features of ridges and hills within the fruit belt which have a strong influence on the character of the marshes.

Construction of the sea wall at the outermost edge of the marshes has reduced the extent of semi-natural saltmarsh vegetation to just a narrow strip. Enclosure from the sea has created extensive areas of traditional grazing marsh characterised by rough grassland and patterned by a complex system of natural and man-made drainage dykes, pools and fleets which supply freshwater for stock and often support reeds and emergent vegetation. The Eastern Swale Marshes remain predominantly under grazing management and have not been extensively ploughed and cultivated although quite extensive areas of grassland have been improved by applications of fertiliser and drainage, such as at Graveney Marshes.

Apart from some notable blocks of woodland on the enclosed marshes near Graveney, tree cover is very limited and the landscape is generally devoid of

features, placing greater emphasis on the presence of grazing animals and wildfowl. To the north of Faversham, mineral extraction has consumed part of the former marshland at Ham Marshes, adjacent to Oare Creek, and has created areas of open water and developing wetland habitat. Further inland alongside Faversham Creek, land-use is mixed and includes areas of industry, housing, allotments and riverside open space.

Amongst the known archaeological remains are Queenborough Castle, on the north side of the Swale. Access onto the grazing marshes and foreshore was gained via trackways, often constructed of wooden platforms and walkways. Prehistoric trackways have survived in waterlogged conditions in the marshes. Causeways across the Swale are known in a number of locations, and the hards and slips for ferries are also found in the intertidal zone. Wrecks, frequently those of barges, and the remains of wharves, survive particularly in intertidal creeks. Sea walls and flood defences survive on the Isle of Sheppey dating from medieval and post-medieval land reclamation. Along with the remains of saltworkings, these walls and dykes are the dominant landscape feature on the marshes.

Sheppey

The landscape of Sheppey has a particularly distinctive character brought about mainly as a result of its coastal, island situation and also by its prominent elevated landform, which contrasts with the coastal marshland lying to the south.

Traditionally the land-use was predominantly pasture with occasional orchards but the area is now mainly arable. Occasional scrub and woodland is found, for example at Furze Hill. The removal of hedgerows and orchards, the loss of trees through Dutch Elm disease and the exposed coastal situation gives a bleak character that cannot easily absorb development. Sheppey is also characterised by its urban and industrial land-uses to the north-west and its amenity developments, in the form of caravan parks and holiday camps, which are prominent in the local landscape.

North Kent Fruit Belt

This stretches from Gillingham down as far as Whitstable and occupies land between the coastal marshes and the Chalk landscapes of the North Downs. This area is predominantly rural and agricultural with an attractive and very distinctive pattern of orchards and shelterbelts, arable pasture and horticultural crop fields, sometimes divided by small blocks of woodland such as Waterham Wood.

Landcover is dominated by a richly varied pattern of agricultural land uses. Orchards are the most distinctive feature of the landscape and are still widespread, although there is evidence of some decline around Elverton. Mixed in amongst them are fields of pasture, arable and horticultural crops, typically defined by strong hedgerows or tall shelterbelts, within which alder and poplar are the distinctive species. Landform is not a key determinant of character but is distinctively undulating or flat as it rolls northwards towards the marshes.

Roman influence on this landscape is evident in the Roman roads and extensive remains at Faversham. The development of Watling Street (now the A2) by the Romans, at the foot of the North Downs, established an important transportation corridor that still exists today.

North Downs

This is a dramatic and distinctive Chalk downland with a continuous and steep scarp giving extensive views out across Kent. Approximately 10% of the LEAP area is Chalk downland, designated an Area of Outstanding Natural Beauty (AONB) and also a Special Landscape Area. In places this higher land projects out into the more undulating landscape of the fruit belt giving rise to the more intricate landforms of the Capstone Downs and Shoring Ridge. Other key landforms are the undulating ridgeline of North Sheppey, the Chattenden Ridge on the Hoo Peninsular, and valley forms to the south of the A2 within the southern part of the fruit belt. Land use includes a few pockets of traditional downland grazing but it is largely dominated by arable fields.

In prehistoric times the Downs were likely to have been covered in dense deciduous woodland. A slow colonisation of the poorer lands on the exposed upper Downs occurred up to the Middle Ages. The open nature of the Downs owes its appearance to the once widespread regime of grazing by stock, and the development of drove roads to move animals to summer pastures or markets. The North Downs Way and the Pilgrim Way follow the ancient track across the ridge.

Stresses

The stresses on the landscape zones are as follows:

- **Medway Marshes:** Industrial and urban pressures are the most significant factors for change on the traditional uses of this land. In the north, the marshes are significantly influenced if not dominated by the development at Grain and Kingsnorth of power stations and port facilities and associated network of roads, rail links, pylons and lighting. The south Medway marshes are under pressure from the encroaching urban areas of the Medway towns and small scale piecemeal industrial developments (**Issue No. 5**).
- **Swale Marshes:** Around Queenborough, and Milton Creek at Sittingbourne, industrial complexes punctuate the landscape. Proposals for a second crossing to Sheppey and pressure for development along the Sittingbourne to Sheerness access corridors, at Iwade, Kemsley and Ridham Dock, could have marked landscape implications, especially in relation to any new lighting (**Issue No. 5**).
- **Sheppey:** Urban, industrial and residential development (including chalet and caravan developments that have grown up in a haphazard manner), are stresses on this area.

-
- **North Kent Fruitbelt:** Faversham, Sittingbourne and Gillingham exert an influence on the adjoining fruit belt. The A299 and A249 trunk roads also have an urbanising effect. This includes linear development and lighting, disturbed land, horticulture with some scruffy pastures and existing large glasshouses at Waterham. Negative influences have also included Dutch Elm disease and arable intensification.
 - **North Downs:** The landscape of the North Downs are experiencing stresses from pressure from changes in the agricultural landscape and pressures from development of urban areas.

2.2.3. Air quality

As well as posing a threat to human health, air pollution can damage flora and fauna, and have significant effects on soils and water. A key aim of the Environment Agency is to achieve a major and continuous improvement in the quality of air.

Industrial processes are regulated under the Environment Protection Act 1990. Part A processes are licensed by the Agency under the Integrated Pollution Control (IPC) regime, while Part B processes are licensed by local authorities under the Local Authority Air Pollution Control (LAAPC) regime. Part A processes are authorised to operate provided they prevent, minimise and render harmless potential emissions made to all environmental media.

Current situation in the North Kent area

The prevailing wind in North Kent is south-westerly, from the industrial areas of south and east London. However, this dominant wind is mitigated to some extent by sea breezes.

A significant amount of air pollution is generated from a few urban areas in North Kent (e.g. Gillingham, Sheerness) due to the increasing use of private cars accompanied with heavy goods vehicles from the commercial and industrial centres of North Kent. Some of these urban areas have levels of nitrogen dioxide and fine particulate matter (PM₁₀) that may exceed air quality objectives at kerbside locations.

Industry is the primary source of sulphur dioxide and total suspended particulates (TSP) in the North Kent LEAP area while road traffic is the main source of oxides of nitrogen. These emissions do not normally result in high average ground level concentrations over the year but specific meteorological conditions may cause elevated maximum hourly concentrations.

*Stresses on air quality**Industrial activity*

There are a total of 14 Part A processes in the North Kent LEAP area (see Map 5). These include paper mills on the Medway, power stations, pharmaceuticals manufacture, and secondary steel smelting.

The Agency is required to review all existing Part A authorisations every four years and assess the potential for damage to sites protected under the Habitats Regulations (e.g. Special Protection Areas, SPAs). This could involve dispersion modelling to estimate the cumulative impacts of the processes (Issue No. 1).

In addition to these Part A processes there are many more, less complex, industrial processes (known as Part B processes that are regulated by local authorities) in and around the area. There are a total of 32 Part B processes within the Swale Borough Council area (Appendix 4, Table 10), which includes most of the industry within the LEAP area. These include, for example, waste oil burners, clay brick manufacturers, concrete batching and coating processes.

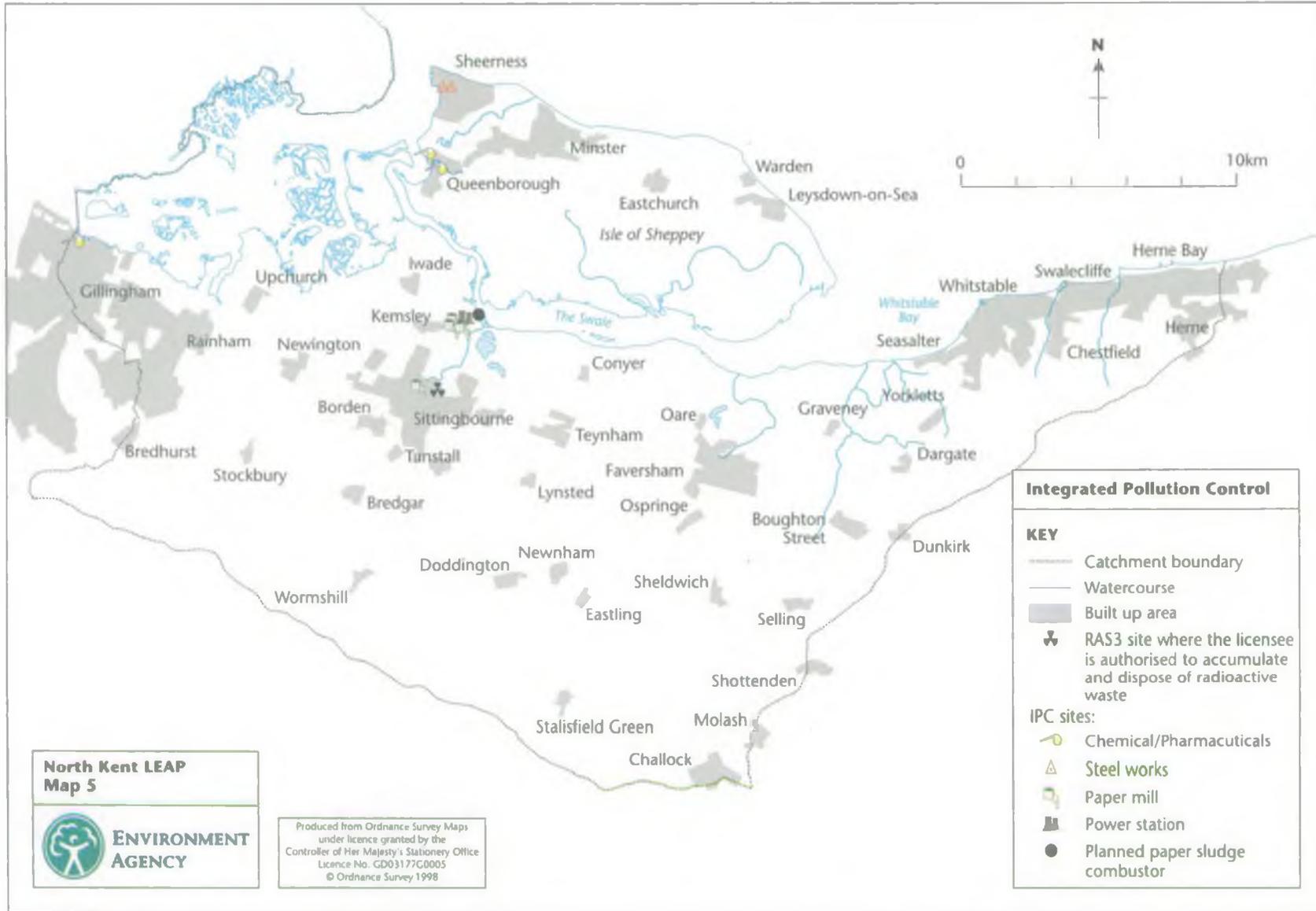
Traffic emissions

Kent County Council has collected 1997 traffic data at 4,638 sampling points on roads in Kent. Traffic projections have also been made for 2005 for these sampling points. In 1997 36% of these sampling points had greater than 20,000 vehicles per day and 9% had greater than 50,000 vehicles. This is projected to increase to 45% having greater than 20,000 vehicles per day in 2005 and 13% having greater than 50,000 vehicles per day. The average percentage of heavy goods vehicles across the sampling points in 1997 was 9% and there was an average speed of 68 km/hour for all vehicles. The 9% of sampling points that had greater than 50,000 vehicles per day in 1997 included stretches of the following roads in the North Kent area:

- A2/M2/A299
- A2
- M20/A249

Emissions from landfill sites

A known cause of climate change is landfill gas, which is the product of the decomposition of organic waste within landfill sites. Whilst it contains many trace elements which give it odour, the most significant component of landfill gas is methane. Methane is a flammable, asphyxiate and powerful greenhouse gas. There are former and current landfill sites in the LEAP area that are producing landfill gas at rates that either detrimentally affect the locality or could contribute to the greenhouse gases in the atmosphere. This issue is addressed in the Kent Area LEAP.



2.2.4. Water resources

A principal concern of the Agency is to ensure that water resources are properly managed to provide water for all reasonable needs and to meet the Agency's commitment to progressive enhancement of the environment. Water is abstracted from the area's rivers and groundwaters for a range of uses including public water supply, agriculture and industry.

Current situation in the North Kent area

Rainfall

The average annual rainfall across the area is approximately 630 mm, which falls to 523 mm for a 1 in 10 year drought. As such, North Kent is one of the driest areas in the UK. The average annual effective rainfall is only 225 mm, declining to 48 mm in a 1 in 10 year drought.

Groundwater

The principal water resource in the LEAP area is the chalk aquifer, indeed groundwater abstraction from chalk currently constitutes over 90% of the total licensed abstraction. The aquifer is heavily committed with respect to abstraction licences. In view of this, and the water shortages in recent years in the Kent Area, the Agency currently has a 'presumption against' issuing any further abstraction licences for consumptive use from the aquifer (Kent Area Groundwater Management Policy, 1993).

The licences are for a range of uses, including potable water supply, industry and agriculture uses. There are a number of large licensed abstractions which are held by the water companies (Southern Water Plc and Mid Kent Water Plc), several paper mills and breweries, and two large agricultural enterprises. The remaining groundwater abstractions are for smaller industrial and agricultural processes and a few domestic water supplies. Appendix 5 shows authorised and actual abstractions (Ml/year) in the LEAP area.

Routine water level measurements based on the Agency's observation borehole network provide evidence indicating a general decline in water table levels in recent years for those areas of the chalk aquifer where resources have been preferentially developed for public supply (Issue No. 2).

Surface water

Surface water sources are available only from the larger creeks discharging into the Swale. No surface water abstractions for public water supply exist within the North Kent LEAP area. There are two industrial abstractions from the River Swale and a number of abstractions from the lower Medway Estuary. A total of 3,870,000 Ml/annum of water is abstracted from the Medway Estuary and 79,555 Ml/annum from the Swale for non-consumptive uses including industrial cooling and amenity.

Water resource balance

Table 1 summarises the results of water balance estimates carried out for the two resource areas which closely approximate to the LEAP area. Of these, East Swale shows a commitment of 88% of effective rainfall under average-year rainfall conditions. The west Swale area is substantially over-committed (126% of effective rainfall).

Table 1: Water resources summary

Resource Area	West Swale	East Swale
Rainfall (1961-90) Ann. Ave (mm)	600	640
Effective rainfall (mm)	208	234
Run-off from coastal clay cover (MI)	8,464	37,341
Net gain to resource(MI)	25,391	47,524
Total available resource (MI)	25,391	47,524
<i>Authorised Abstraction (MI)</i>	32,074	41,933
% commitment	126	88

Table 2 over page, summarises the licensed and actual abstractions of surface and groundwater for different purposes during the period 1994 to 1997.

Water Level Management Plans

Water Level Management Plans are proposed for all SSSIs that are water related. This includes the North Kent Marshes and the Isle of Sheppey Marshes. Production of the WLMPs in North Kent largely falls to the Lower Medway Internal Drainage Board as the main Operating Authority. These plans will outline water level objectives. As mentioned above surface water is only available from the larger creeks and therefore the marshes are almost totally dependent on rainfall. With pressures on groundwater from public water supplies, industry and agriculture it may be difficult to meet the water level objectives.

Table 2: Licensed and actual abstractions of surface and groundwater

	Licensed Abstraction MI/year	Actual Abstraction MI/year		
		1994/95	1995/96	1996/97
Surface water				
Public Water Supply	0.0	0.0	0.0	0.0
Industry (non-saline)	455.0	23.0	38.0	50.0
Irrigation	537.7	97.6	92.2	49.6
Agriculture (saline)	0.0	0.0	0.0	0.0
Other	151.0	0.1	0.0	74.6
Total	1143.7	120.5	130.2	174.2
Ground water				
Public Water Supply	40633.2	31787.0	28737.8	27049.3
Industry	15972.2	14103.7	14103.7	14334.2
Irrigation	511.4	103.0	77.4	30.3
Agriculture	1202.3	62.7	27.5	56.3
Other	398.9	5.8	0.0	0.0
Total	58718.0	46062.2	42946.4	41470.1
Grand total (MI/year)	59862.0	46182.7	43076.6	41644.3

*Stresses on water resources**Public water supply*

Public water supplies are currently provided by two companies, Southern Water Plc and Mid Kent Water Plc. The sources of potable water are the Tertiaries, Lower Greensand and Chalk aquifer. Pressure for public water supply will worsen with further development in the Medway towns and elsewhere in the Thames Gateway area.

The processes involved in the planning and management of the Kent Area's water resources are based on boundaries corresponding to the hydrological divisions for resource assessment purposes, together with the supply areas of two water companies that serve the area. There are no surface water abstractions for public water supply.

Mid Kent Water Plc abstracts groundwater from eight licensed sites (with numerous boreholes) in the LEAP area, all of which are located just south of the M2. All abstract from the Chalk aquifer, with licensed daily abstractions ranging between 4.5 MI/d and 14 MI/d. Southern Water Plc abstracts groundwater from 20 licensed sites. Licensed daily abstractions from these sources range between 4.5 MI/d and 28 MI/d.

Map 6 shows the Water Resource Areas and public water supply abstraction points in the LEAP area.

Water supply for industry and agriculture

Industry and agriculture in North Kent are supplied from both surface and groundwater sources, with the majority from the latter. The surface water abstractions are primarily for agricultural use and involve limited abstractions from small creeks or drains for spray irrigation. The largest surface water abstraction is taken from the Swale and amounts to 218 Ml/d of saline water used for industrial cooling.

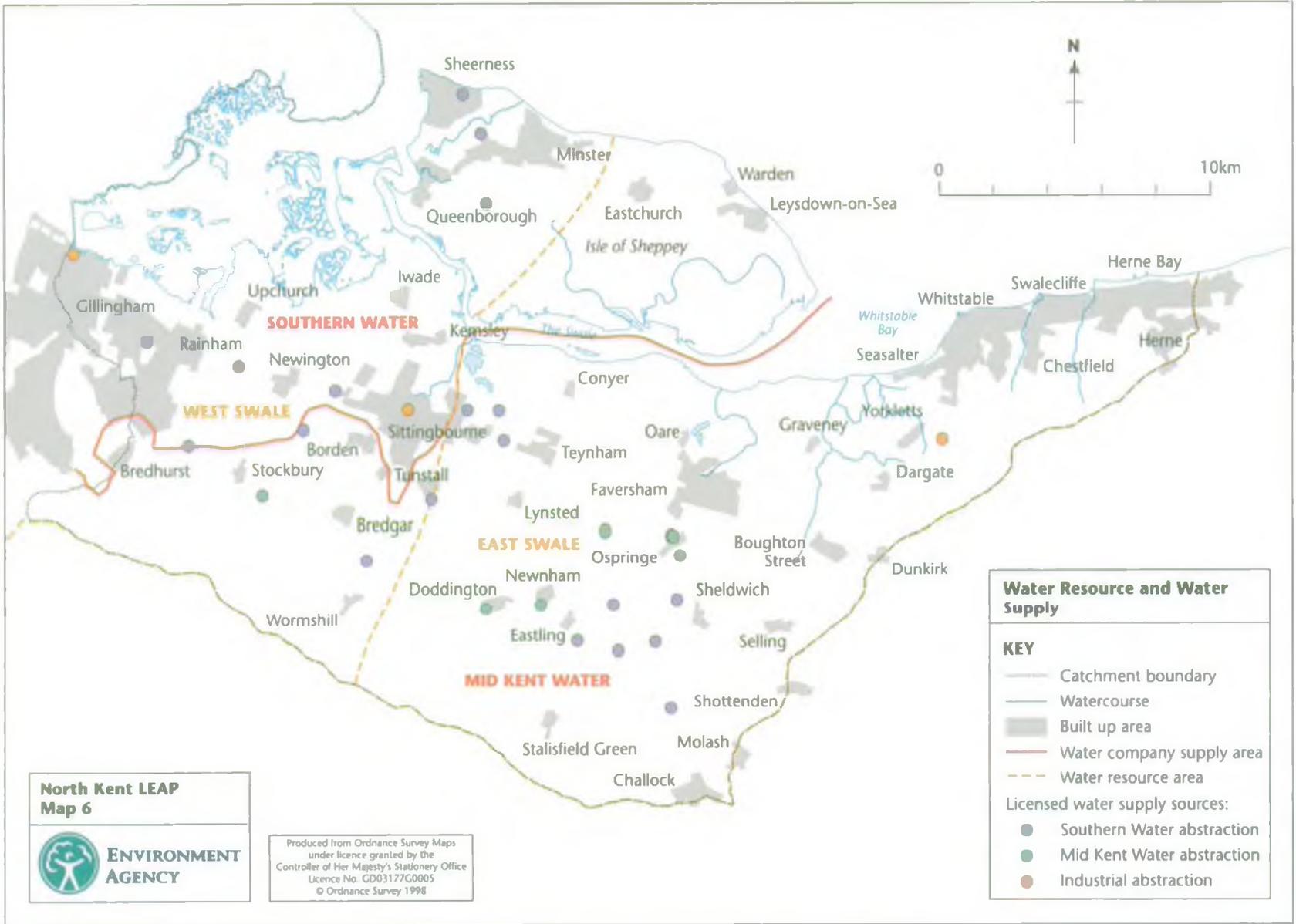
Five licences are currently held by companies, which abstract groundwater for potable use on industrial estates or large agricultural establishments. The most significant in the LEAP area is the licence held by the Port of Sheerness, which is authorised to abstract 349.00 m³ per annum. Table 3 summarises licensed abstractions for industry and agriculture.

Table 3: Licensed abstractions for industry and agriculture

Resource Area	Mean Licensed Abstraction Ml/d		
	Surface	Groundwater	Total
Medway Estuary (Within N. Kent LEAP Area)	0.00	0.67	0.67
West Swale	5.16	2.94	8.10
East Swale	9.14	0.32	9.46
LEAP Area Total	14.30	3.93	18.23

The majority of the licensed agricultural abstractions are for spray irrigation of crops. However, as the percentage of farmland falls, with the adoption of set-aside and other compensatory schemes, the need for irrigation may decrease. On the other hand, the more intensive use of irrigation may mean that total abstraction remains at current levels. Also climate change could result in more demand for water from agriculture as the climate becomes hotter and drier (see section below on climate change).

There is a high demand for water from major industries, such as steel making at Sheerness and paper manufacturing and fruit processing at Sittingbourne. Expansion of these industries depends upon reliable sources of water. Although the water companies currently have adequate supplies, the supply is relatively expensive and the industrialists may prefer a private supply drawing from either the estuary or from Chalk and Tertiary aquifers.



**North Kent LEAP
Map 6**

**ENVIRONMENT
AGENCY**

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Forecast demand growth

Household growth in the North Kent area is predicted to rise by 19% from 1991 (194,000 households) to 2001 (231,100 households). This will place greater stress on public water supply (**Issue No. 2**).

The Habitats Regulations impose a specific duty on the Agency, as a competent authority, to review the effects of new groundwater licences on designated conservation sites.

Climate change

Central to any assessment of future supply/demand balances is the issue of climate change. Recent hydrological data seems to suggest that there is no record of a long term trend but that climate variability is becoming more extreme. The response of aquifers to extreme variations in recharge is hard to predict so the precautionary principle will be applied to any new or varied licence applications. Continued monitoring of all aspects of the hydrological cycle should ensure that any trends are detected (**Issue No. 2**).

2.2.5. Water Quality

A principal concern of the Agency is to achieve a continuing and overall improvement in the quality of controlled waters through the prevention and control of pollution.

Current situation in the North Kent area

The current state of water quality is described below with reference to General Quality Assessment, the River Ecosystem Classification, assessment of estuary quality, Groundwater Protection, consented discharges to water, sewage treatment works and industrial discharges.

General Quality Assessment (GQA) of surface watercourses

The Agency routinely obtains chemical and biological data through its monitoring programmes. Periodic assessment is now made by applying the General Quality Assessment (GQA) Scheme, which provides a general measure of water quality and allows national comparisons. The assessment is based on water chemistry and the biological diversity of the watercourse. The Chemistry GQA comprises six water quality grades which reflect different levels of pollution (A = Very Good to F = Bad). These grades are listed in Appendix 6 (Table 13).

Whereas the Chemistry GQA grades reflect degrees of pollution at the time of sampling, the Biology GQA assesses the health of river stretches through the diversity of tiny animals (macro-invertebrates) that live on the bed of the river. This provides a longer term picture and the best overall guide to the health of

the river ecosystem. The biological water quality is based on the diversity and abundance of particular species of macro-invertebrates. Biological grades are assigned to rivers based on values of Ecological Quality index (EQI). EQI is a ratio which is calculated by expressing biological quality as a fraction of the predicted biological quality that would be found in a clean river. The Biology GQA applies a water quality grading scheme comprising six grades. These are listed in Appendix 6 (Table 14).

The five stretches sampled in North Kent are shown on Map 7, and the GQA Chemical Grades in 1995 to 1997 are given in Table 15 (Appendix 6). The GQA Grades are C or below (fairly good to poor), possibly due to discharges from sewage treatment works upstream.

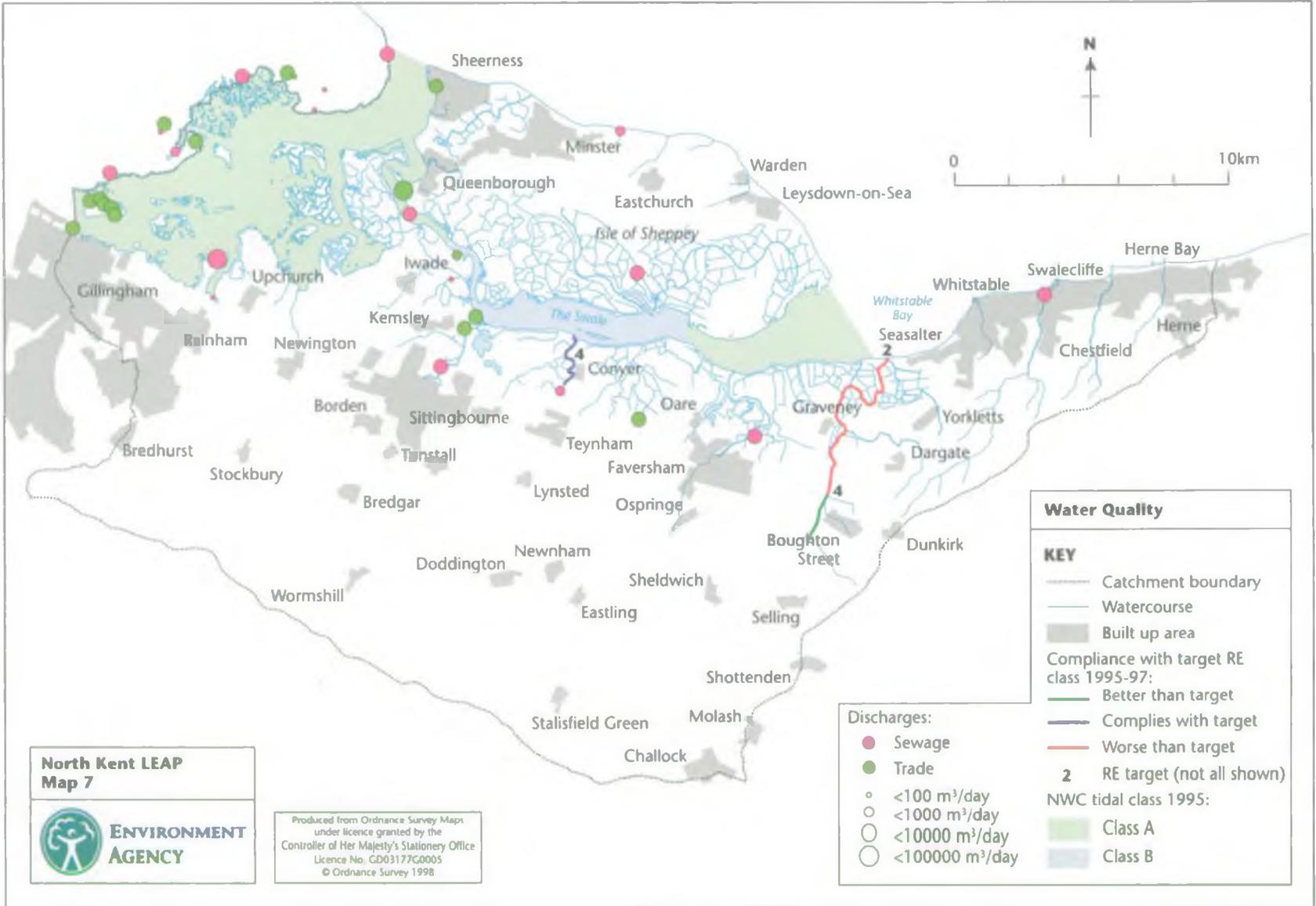
The GQA Biological Grade from 1990 to 1997 for two stretches of watercourses in North Kent are given in Table 17 (Appendix 6). Poor biological quality and some degree of eutrophication have been recorded at several sites. Saline influences and silt deposition affects the biological quality at several sites. However, there are also clear signs of improvement in recent years. Poor biological quality at White Drain, 100m downstream of Boughton sewage pumping station, may be due to a number of leaky cesspits and a poultry unit upstream.

River Ecosystem classification

The Agency uses the river ecosystem classification to establish targets for water quality. This sets standards relating to the chemical quality requirements for different aquatic ecosystems. The scheme is divided into different objective classes each containing standards for these measurements (see Appendix 6, Table 16). The higher the class the tighter the standards. Short-term objectives are proposed, along with a date by which compliance must be achieved. Compliance with River Ecosystem river quality objectives is discussed in section 2.4.4.

Assessment of estuary quality

Six stretches of the Medway and 17 stretches in the Swale were sampled in 1995 for estuarial classifications. Points for tidal classifications are awarded under each of the headings of biological, aesthetic and water quality. These points are then summed and classified into four classes from A (good quality) to D (bad quality). As shown on Map 7, all six stretches in the Medway scored grade A. Six out of the 17 stretches on the Swale scored grade A, the remainder scored grade B. This shows the good quality of the tidal waters.



**North Kent LEAP
Map 7**



**ENVIRONMENT
AGENCY**

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Water Quality

KEY

- Catchment boundary
- Watercourse
- Built up area

Compliance with target RE
class 1995-97:

- Better than target
- Complies with target
- Worse than target

2 RE target (not all shown)

NWC tidal class 1995:

- Class A
- Class B

Discharges:

- Sewage
- Trade
- <100 m³/day
- <1000 m³/day
- <10000 m³/day
- <100000 m³/day

Groundwater protection

The Agency considers the protection of groundwater to be of great importance. Once a groundwater source is contaminated it can take many years before it can be used again. The Agency framework document, *The Policy and Practice for the Protection of Groundwater (1998)*, advises on activities which may affect groundwater quality, including physical disturbance to aquifers, point source and diffuse pollution and contaminated land and identifies constraints. Groundwater Vulnerability Maps that are being produced nationally for England and Wales support these policies. These show the location of aquifers and classify their vulnerability according to the properties of the soil and underlying strata.

Chalk forms a major aquifer in the south of the area with numerous protection zones excluding groundwater abstractions. Minor aquifers are formed by alluvial deposits along the coast and estuaries. These are also exploited but not to the extent of the chalk due to the reduction of water quality towards the coast. The Environment Agency is at present setting up a strategy for monitoring groundwater quality in the North Kent LEAP area

Consented discharges to water

The total consented volume of effluent discharged into the LEAP area is 59 055 m³ per day (excluding discharges from major industries regulated by the Agency under the IPC regime). The Agency issues consents for discharges from sewage treatment works and industrial sites to watercourses. It is the responsibility of the water companies to issue consents to industrial organisations that discharge their trade effluent to sewer.

Sewage Treatment Works (STWs)

Improvements in effluent quality are frequently needed to meet river quality objectives and one of the roles of the Agency is to negotiate future investment by water companies. Asset Management Planning (AMP) assists to specify the improvement work programme. See section 2.4.3 on the Urban Waste Water Treatment Directive.

Industrial discharges

As shown on Map 7, industrial discharges to the Medway Estuary and Swale include:

- effluent discharged from paper mills;
- cooling water discharge from power stations at Kingsnorth, Grain and Kemsley; and
- settlement water from marine aggregate, Ridham dock, Corys Wharf and Frindsbury.

Most of these discharge into the lower Medway Estuary and the Swale which are also popular for swimming, water skiing, jet skiing and wind surfing. Settlement water from marine and riverine dredging is also discharged to the Medway Estuary and Swale.

Stresses on water quality

Stresses on water quality are primarily from non-consented discharges and wastes from pollution incidents, backing up of storm waters from blocked consented storm overflows, leakage from septic tanks, potential contamination from landfill sites and from agricultural run-off. These are summarised in Table 4.

Table 4: Stresses on water quality

		Effect on Water Quality
Natural Stresses	Less Rainfall	Results in reduced river flows and less water available to dilute pollution
	Climate Change	There is evidence in other catchments of Kent that climate change is having an adverse affect on water quality. An increase in temperatures is having an adverse affect on the dissolved oxygen concentration in certain watercourses, which in turn has adverse impacts on the general ecology and fisheries status of these watercourses.
Consented Discharges and Wastes	Flows from STWs	Effluent disposed does not meet all discharge consent criteria.
	Industrial Discharges	Effluent discharged by the paper mills on both the Medway and Swale, cooling water discharge from power stations at Kingsnorth, Grain and Kemsley and settlement water from marine aggregate at Ridham dock, Corys Wharf and Frindsbury.
Non-consented Discharges and Wastes	Pollution Incidents	In the last three years there have been six category 1 pollution incidents (most severe) which resulted in the pollution of watercourses. These included pollution of Kemsley Mill supply after heavy rain from contamination from a site in Sittingbourne. At Minster Marshes, on the Isle of Sheppey there is a problem of high salinity in the ditches. This is from salt water getting into the ditches via the boating lake. There is some concern that storm flow management at Teynham is inadequate to protect the Frogal Drain.

		Effect on water quality
Non-consented Discharges and Wastes	Combined Sewer Storm Overflows	The present sewerage system in most areas is not large enough to take the volumes of water associated with storm events. Overflows are connected to the sewerage system so that in storm events they overflow into the surface water system. On several occasions the overflows have been blocked by debris and backing up of storm waters has caused flooding and pollution incidents (Issue No. 11). Some CSOs in the Gillingham/Rainham area have been fitted with screens and telemetry and there are plans to extend this to other CSOs. Telemetry will enable spill frequencies to be determined so that the need for further improvements can be assessed.
	Septic Tanks/Cess Pits	Poorly maintained septic tanks or private treatment plants may lead to cumulatively significant water quality problems. For example the houses on an unadopted road in Whitstable are served by cesspools and have caused two complaints in the last few years due to illegal pumping out onto adjacent grazing land.
	Landfill Sites	Former landfill sites may constitute a source of pollution to groundwater
	Agricultural Run-off	Accidental discharges from silage or slurry stores or from poor management of low rate irrigation of farm wastes results in water quality problems. There is also diffuse pollution from agricultural run-off in the form of fertiliser, suspended solids from ploughing of fallow land, or pesticides.
	Agricultural Wastes	Agricultural wastes have on occasion caused pollution of watercourses. Where problems are discovered, the Agency requests farmers to prepare a farm (waste) management plan. It does not currently assist with this, but may recommend consultants.
	Thermal Loading	Medway and Kingsnorth power stations have been identified as probable contributors to thermal loading of the Medway Estuary from the discharge of warm water.
Development Pressures	Agriculture/Forestry	Water quality in the marshlands is very susceptible to pollution from farming practices
	Housing Development	Potential problem of accommodating increases in effluent discharges within existing or new licences

2.2.6. Protection against flooding

A key aim of the Agency is to provide appropriate protection for people and property against flooding from rivers and the sea and to provide adequate arrangements for flood forecasting and warning.

Current situation in the North Kent area

Due to the low-lying nature of much of the LEAP area, it is prone to flooding. In the post-war period there has been a significant amount of land drainage to convert saltmarsh to arable land. The extent of saltmarsh in the Medway Estuary has been reduced from 2157 hectares to just 645 hectares since the last century. Although this management practice is no longer used, it has resulted in the dramatic reduction of a large natural defence to flooding, a problem compounded by the removal of sediment by dredging (see section 2.3, for further information on the saltmarsh and stresses on it).

The dredging of the estuarine areas, carried out by the Medway Ports Authority, requires the disposal of this dredged material at three land-based locations in the LEAP area. The removal of sediment leaves less for accretion and deposition within the Medway Estuary and Swale. With little natural defence and reduced sediment to build up further natural defences, sea defences have been needed.

There have been changes to the land-use within the area for several thousand years, with particularly significant change over the last 200 years. The major human influences on natural processes fall into four main categories:

- built defences, such as sea walls and groynes, to protect areas of coastline from flooding and erosion;
- dredging of the estuary and disposal of the material;
- enclosure of saltmarsh behind sea wall and drainage of the saltmarsh areas for agricultural purposes; and
- drainage of estuarine areas for purposes of land reclamation.

Due to the scale of human influence in the area it is not possible to predict exactly how natural processes work. For instance there is insufficient knowledge about coastal processes to inform decisions about sediment budgets (Issue No 10).

Map 8 shows the extent of sea defences along the coast and watercourses within the North Kent LEAP area and the locations of Environment Agency control structures and pumping stations. A variety of defences protect the banks of the Medway Estuary and Swale from flooding and erosion. These include concrete sea walls, clay embankments, rock revetments and groynes.

There are a number of pumping stations for land drainage but only two for flood defence. These are:

- Seasalter pumping station - the only permanent mainland pump; and
- Mocketts Outfall mobile pump.

Both are used to pump water over sea defences when water levels in Seasalter Main Drain and Capel Fleet respectively are too high.

The majority of tidal sea defences are present along the north-eastern and western tip of the Isle of Sheppey and along both banks of the Swale from Chetney to Whitstable.

Flood risk areas

The risk of flooding is a problem in the North Kent LEAP area due to the potential combination of both fluvial and coastal flooding events. In February 1996, tidal flooding occurred up to 4 m above ordnance datum (AOD); prior to this in 1978 defences were overtopped by extreme tidal flood events; in 1953 the worst tidal flooding in recorded history resulted in extensive property damage with high water recorded at 4.8m AOD. The main areas currently at risk of fluvial flooding are described below:

- **Swalecliffe valley** is narrow and steep sided and as a result shows a flashy response to rainfall events. During periods of intense rainfall several properties at the lower end of the valley, near the coast, are at risk from occasional fluvial flooding.
- **West Brook** regularly used to flood onto Herne Bay road. A new culvert has been installed along the Brook as part of a new development scheme, the road has not flooded since, although there have been few large rainfall events, and no extreme events, to test the culvert's effectiveness.
- **Scrapsgate Drain on Sheppey** also suffers from occasional fluvial flooding at its outfall end.
- **Seasalter and Graveney Marshes** are covered by a dense network of drains and ditches. These do occasionally flood onto the local agricultural land resulting in either crop damage or unsuitable/inaccessible pasture.

Much of the North Kent coast, which is unprotected by cliffs or higher ground, is at risk from coastal flooding. In some areas there is the risk of both coastal and fluvial flooding. In the 1970s approximately 100 plots of land on the Graveney Marshes were sold. The development of these plots resulted in the retention of water from fluvial flood events. The prevention of effective drainage led to increased flood damage and resulted in enforcement action to remove retaining structures such as brick walls.

Development has occurred outside defended areas. Several dwellings outside the Seasalter, Shellness and Leysdown defences are at high risk from coastal flooding because they are unprotected. In 1978, North Kent suffered particularly bad coastal flooding resulting in damage to many properties at these locations.

Capital works: river

The current capital programme in Kent indicates an annual expenditure of approximately £5m by the Environment Agency. In North Kent the 5 year programme includes the construction of a permanent pumping station at the site of the Mocketts Sluice on Capel Fleet, as recommended in the Water Level management Plan.

Capital works: coastal

There are a number of schemes on the sea defences and tidal banks within the present capital programme, including:

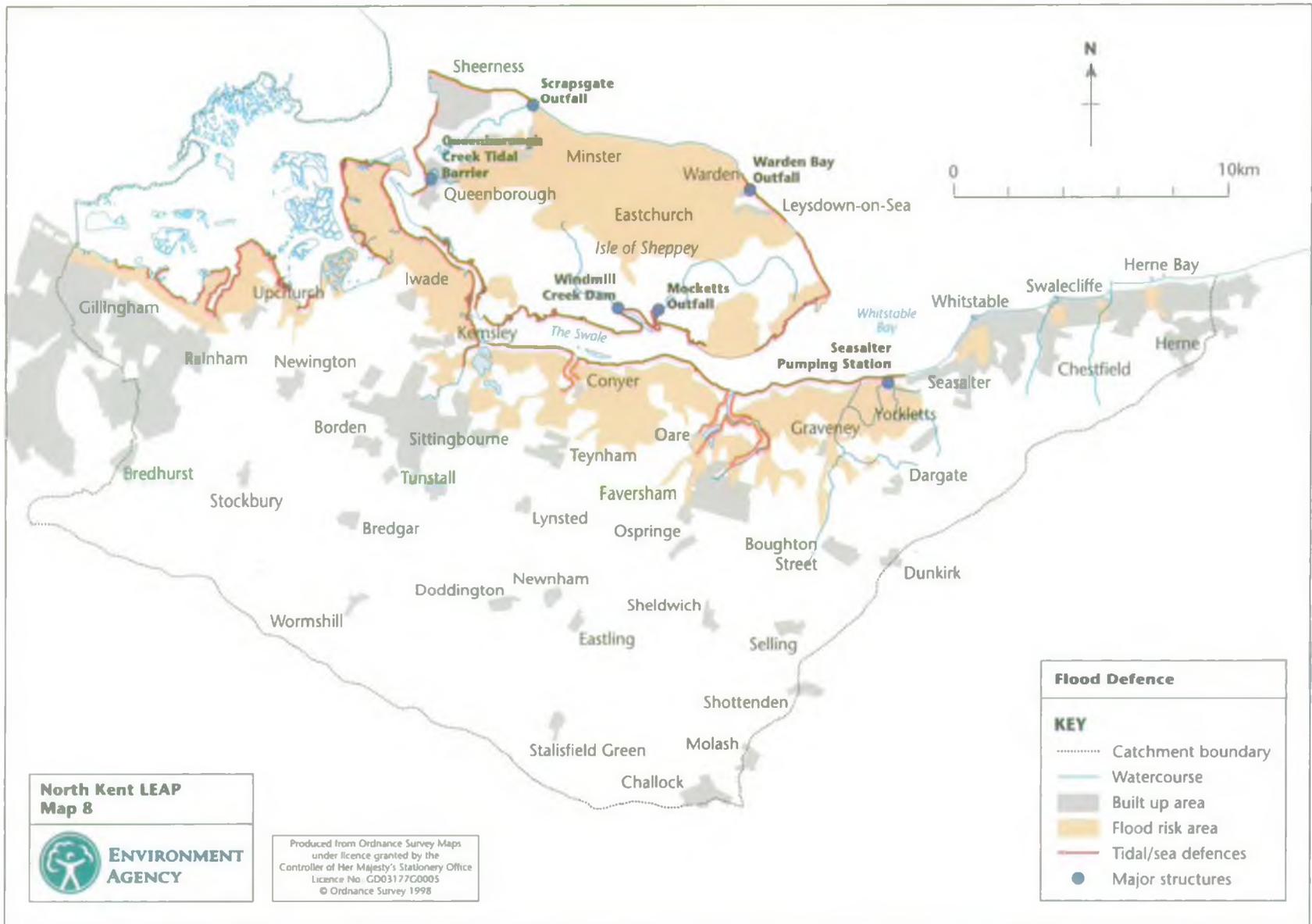
- A scheme for the replacement and repair of Sheerness frontage due to existing works showing signs of ageing and shingle replenishment at Bartons Point. Damage was sustained during the floods of February 1996.
- A flood defence wall west of Conyer Creek slipped after its construction in 1987 so the top was removed to reduce ground pressure, the proposed work will involve re-topping the wall.
- A number of non-grant aided schemes to do heavy maintenance work. This will involve the wall-topping, or saddling, of a number of defences; this process involves replacing revetments on the front of the walls and replacing vegetation both on top and at the rear.
- A proposal to construct a new counterwall to protect Rushenden from flooding from the Swale.

Maintenance works: coastal

The coastal defences present around the Medway Estuary and Swale are generally in a good state of repair and are maintained primarily by the Environment Agency, through a programme of annual maintenance work. The flood defences protecting the built up areas, for example around Sheerness, comprise of concrete walls that must be inspected regularly. These include the Queenborough Creek Barrier.

The Agency is not obliged to maintain sea defences as public amenities but does require access for maintenance, so there are generally a number of points of access. However, stretches of the Saxon Shore Way and parts of the defences in the centre of Sheerness are historic public rights of way and as such it is the Agency's responsibility to provide public access to these defences whilst carrying out its defence maintenance programme.

The grass on many of the embankments is flail mown at least twice a year. This is necessary to maintain the structural integrity of the flood defences including in times of over topping. The defences are in some locations botanically interesting due in part to the mowing regime and the programme is designed to promote this where practical. In view of the length of defence and resources available it is not possible to always undertake the most ideal mowing regime from a conservation viewpoint.



Dredging

Maintenance dredging by the Medway Ports Authority is carried out in the Medway Estuary and to a lesser extent in the Swale as and when necessary. Dredgings from the Medway are disposed of on land based sites. As a result, all the sediments removed from the estuarine area are not returned into the system and are therefore unavailable for redistribution. This may result in a lowering of deposition which may be necessary to maintain the level of the intertidal areas under the present trend of sea level rise.

Although the dredging itself is not a flood defence issue, the dredging and any disposal of material within the estuary may affect the hydraulic behaviour of the estuary and thus may have an indirect impact on flood defence. The Ministry of Agriculture, Forestry and Fisheries' policy is to encourage wherever possible, the beneficial uses of dredged material for purposes such as beach nourishment, the feeding of saltmarshes and as wave breaks. The "mudflat recharging project" being carried out at Bedlams Bottom in the Medway Estuary, aims to evaluate the use of maintenance dredged sediment for the continuous recharge of intertidal profiles of mudflats and marshes, retaining the sediment within the estuarine system.

Managed retreat

Managed retreat, involving setting back the line of actively maintained defence to a new line inland of the original and promoting the development of intertidal habitat on the land between the old and new defences, has not been considered to be an option for the Medway Estuary and the Swale. This is due to the extent of low-lying land behind the sea walls, which could be flooded. There are two main factors which suggest that it is timely for the Agency to review its position with respect to managed retreat:

- (i) the high monetary cost of maintaining the sea defences (which may outweigh the benefits in terms of protecting people and property from flooding);
- (ii) the potential conservation benefits of retreating the line of sea defences, in terms of the creation of salt marsh and other diminishing habitats.

A number of areas in North Kent where managed retreat would bring operational and environmental benefits are therefore being investigated in consultation with the landowners, users and conservation bodies.

Stresses on flood defence

There are four stresses on flood defence:

- the natural force of rising sea levels relative to land level may increase the area of land liable to flood;
- pressures for development have resulted in building in river floodplains and below maximum tide levels in areas protected by sea defences, for example

at Graveney Marshes. There are pressures from holiday chalet owners to relax planning conditions which restrict the use of holiday accommodation in tidal areas from April to October;

- blocked combined storm overflows (CSOs) results in the backing up of storm waters and flooding (see earlier section on water quality);
- the recreational use of flood defences may compromise their effectiveness. The sea defence walls provide useful access routes and many form part of the public rights of way system. There may be opportunities to enhance recreation provision on the sea walls, although there are potential conflicts between different uses on the narrow tops of the walls and significant health and safety concerns (e.g. due to people falling off the walls) (Issue No. 4).

Climate change could have serious long-term consequences for North Kent as a result of, amongst other factors, rising sea levels. The UK Climate Change Impacts Review Group completed a review of the potential effects of climate change in July 1996 for the Department of the Environment. This document stated that "the balance of evidence suggests that there is a discernible human influence on the global climate". It is predicted that sea level will rise at the rate of about 500 mm per decade for the UK as a whole and this is likely to be exacerbated in the southern and eastern England by sinking land.

The future planning of sea defences needs to take account of possible sea level rise due to climate change. Raising the level of defences above that necessary today can only be justified where evidence of actual sea level rise supports the need. Where reconstruction or improvement of flood defences is carried out, the designed defence level usually takes account of the predicted sea level rise over a 50 year period. Changes to mean sea level are much smaller than the short term changes due to tides, surges and waves. However, only a slight rise in mean sea level will amplify the frequency of extreme water levels caused by storm surges. MAFF allows for an increase of 6 mm/year when appraising its coastal defences in the Agency's Southern Region.

2.2.7. Recreation

The Environment Agency seeks to protect, improve and promote recreation on or near to water where appropriate or desirable. It is also concerned about the appearance (aesthetic quality) of the water environment.

Recreation covers all aspects of water-related leisure activities, from the informal type such as walking, picnicking and visiting the waterside, to formal water sports such as canoeing, rowing, sailing, fishing and water-skiing. Water forms an important part of our landscape, and people enjoy being on water, near it, appreciating it aesthetically, or just watching other people or wildlife using it.

The key objectives of the Agency are to:

- increase the quality, quantity and diversity of access;
- improve access to, and facilities available, at Agency sites;
- promote water and associated land for appropriate recreational use;

-
- increase the number of recreational opportunities through all Agency operations;
 - influence environmental improvements which provide recreational benefits; and
 - resolve any perceived or actual conflicts.

Current situation in the North Kent area

Water related recreation in the area is principally based around the Medway Estuary, the Swale and tributary creeks. Other important areas are the lakes located at Little Murston and Oare and the coastline between Herne Bay and Whitstable. The Strand area in Gillingham provides watersports facilities, together with a picnic area and children's playground. The Riverside Country Park, located on the shore of the Estuary in Gillingham is a valuable recreational resource for the people of the Medway Towns.

Water based recreational activities

A number of water based activities take place on the estuary and tributary creeks (e.g. sailing, canoeing, water-skiing etc). The Agency has no direct involvement or control over these activities, however, they are listed in Appendix 7 for information. Organisations with direct involvement in or control over recreational activities in the area include the Medway Ports Ltd, which is the Harbour and Navigation Authority for the Medway Estuary and also for the Swale, Milton and Faversham Creeks, Local Authorities and the Medway Yachting Association, which represents dinghy sailing, motor/sail cruising, windsurfing and powerboating in the Medway Estuary and the Swale.

Angling

The most popular locations for sea angling are Medway Towns riverside, Hoo marshes, mouth of the Estuary near Garrison Point and alongside the north shore of Sheppey. There are five principal coarse fishing clubs in the area, representing approximately 3,000 anglers (see Appendix 7). There are also numerous anglers who are not club members.

Land based recreational activities

Public access to the water environment in the LEAP area is generally good, with extensive public rights of way alongside the estuary and coast including long distance trails (see Appendix 7). The Riverside Country Park is located on the estuary shore at Gillingham and there are popular beaches along the north shore of the Isle of Sheppey and Whitstable. However, there are few bridleways in the area which are not well linked.

It is believed recreational cycling is increasing within the LEAP area, although there are, as yet, few designated cycle routes. The proposed route for Sustrans National Cycle Route No 15 will pass through the LEAP area and where it affects Agency interests it is still under negotiation.

The LEAP area is enormously rich in nature conservation interest, particularly the Medway Estuary, the Swale, their tributary creeks and marshes much of which is designated as SSSI, SPA and Ramsar sites. This area provides opportunities for people to enjoy wildlife (in particular bird watching) and to appreciate the openness and tranquillity of the landscape.

Other activities undertaken include horseriding, target shooting, clay pigeon shooting, field archery, and air sports. Large areas of marsh are leased to Kent Wildfowling and Conservation Association.

Stresses on recreation

The Medway Estuary, the Swale, their tributary creeks and associated marshes provide opportunities for a wide variety of recreational activities and attract large numbers of people. However, intensive recreational activity in the Medway Estuary and the Swale such as use of powerboats and jet-skis reduces opportunities for quiet enjoyment of the environment (**Issue No. 4**).

2.2.8. Waste management

The Agency's role

The Agency has a key role in implementing the Government's proposed national statutory waste strategy, which is required under the Environment Act 1995.

Currently the strategy is based on three key objectives:

- to reduce the amount of waste society produces;
- to make the best use of the waste produced; and
- to minimise risks of harm to human health and environmental pollution.

Current situation

The Waste Local Plan (1998) prepared by Kent County Council indicates that North Kent has a growing shortage of facilities with planning permission to deal with the waste that the community will generate. It is not clear to the Agency that this is the case, since a site capable of accepting all wastes, except special waste, has recently been licensed at Eastchurch, North Sheppey. However, the licence holder failed to win the local waste disposal contract. This was awarded to an operator in Essex, where the waste will now be landfilled for 3 or 5 years. It is not clear therefore what waste the Eastchurch site will accept. The Agency, in line with the proximity principle and the principle of regional self-sufficiency, would prefer local facilities in Kent to be used (**Issue No. 13**).

Licensed facilities

The licensed sites located within the LEAP area are identified on Map 9.

Exempt sites

There are currently around 75 waste management related sites and operations that have registered exemptions from waste management licensing. These include a number of small recycling operations.

Void space

At the end of March 1996, total remaining void space across the whole of Kent was estimated to be 18.4 million m³. On the basis of void space requirements, committed disposal capacity, as at 1993, gives a life of almost 14 years for Type A wastes (material for which, in bulk, the environmental impact of decomposition is less than, or comparable with, that of topsoil). Disposal capacity gives a life of just over 5 years for Type B (material which, in bulk, may decompose slowly, but in its deposited form is only slightly soluble in water) and Type C wastes (material which may decompose (rapidly) and may contain soluble matter which could cause pollution if allowed to enter ground or surface water systems). In the Swale Borough Council area, which covers most of the North Kent LEAP area, a total of 2,215,000 m³ of permitted landfill capacity was estimated as being available at the beginning of 1993.

Proposed facilities

There are proposals for two integrated waste management facilities (waste to energy plants) in the North Kent catchment.

Stresses on waste management

Waste arisings

The Agency has recently commenced work on the national survey of waste arisings as part of a process aimed at reducing the amount produced. This is based on questionnaires, a telephone survey and some follow-up visits to waste generating activities. The amount of waste arising in the North Kent LEAP area will be assessed as part of the survey.

Storage and spreading of sewage sludge

The UK has agreed under international conventions to cease the disposal of untreated sewage sludge at sea by the end of 1998. This has necessitated the treatment of sewage sludge at licensed sites and increased spreading on land. The storage and spreading of sewage sludge on agricultural land is controlled by MAFF.

Under the Sludge Use in Agriculture Regulations 1989, the Sludge Producer (generally the water company) is required to keep registers of all spreading sites, waste streams, quantities and the acreage spread. The Environment Agency can inspect these registers at any time and is in the process of doing so under a National Sludge Pilot Survey.

Under the Waste Management Licensing Regulations 1994 (Paragraph 8, Schedule 3), the Sludge Producer is only required to register sites with the Environment Agency where the waste is to be stockpiled prior to spreading on agricultural land. They also have to register sites with the Agency where they are spreading sludge on non-agricultural land.

In the North Kent area there are no entries in the public register of sewage sludge spreading for wastes not used for agriculture. Sewage sludge is not generally stockpiled prior to spreading, however there are approximately nine sites registered to stockpile sewage sludge. There are a far greater number of areas where sewage sludge is spread and registered only with MAFF. Hence, the Agency does not have representative data on the amount of sewage sludge that is being spread and potentially impacting on the quality of land.

Storing and spreading of paper sludge

The spreading of paper sludge on land (under registered exemptions from waste regulations licensing) is an issue in North Kent (**Issue No. 14**). Kemsley Mill at Sittingbourne is the main producer in Kent of paper sludge that is spread on agricultural land. Data from 1997 indicate that some 18,500 tonnes of paper sludge was stockpiled and spread on land in the North Kent area.

Paper sludge may be stockpiled prior to spreading or it may be spread immediately. While the management of land spreading has undoubtedly improved over recent years, the activity still gives rise to odours and complaints. The Agency liaises with the mills and spreading contractors to ensure that there is no stockpiling, no spreading on groundwater Zone 1 areas and to protect surface water. The amount of spreading will be very significantly reduced when the waste to energy plant is built at Kemsley.

Dredging waste

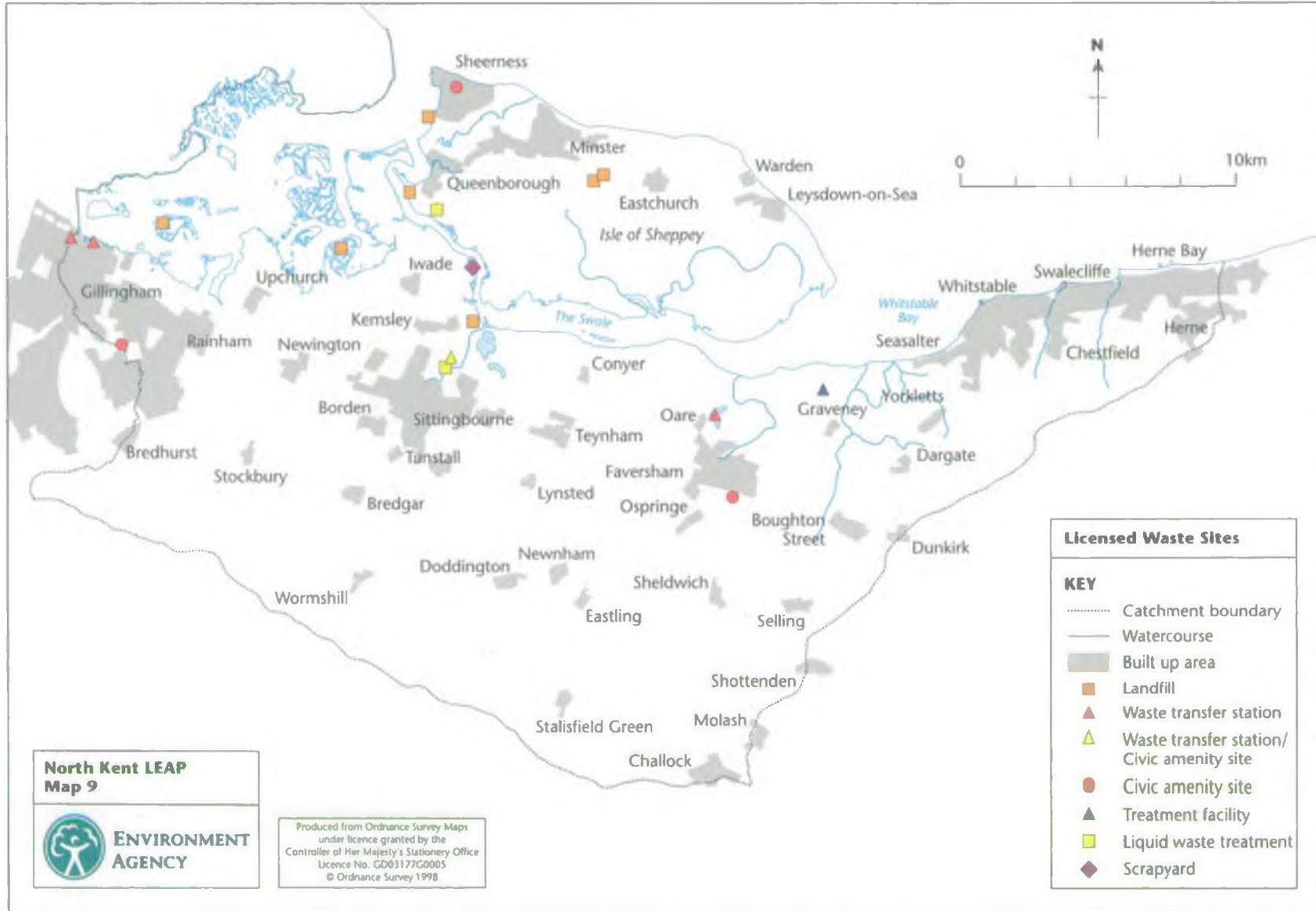
River dredgings arise from the ongoing need to keep clear the main navigation channels of the Thames and Medway, together with their docks.

Medway Ports Limited (MPL) currently disposes of about 53,000 m³ of maintenance dredgings each year. Some goes to Rushenden Marshes at Queenborough. Other material is also deposited here and the site as a whole has an estimated life of some 10 years. The remainder of the MPL's arisings goes to Hoo Island, which has further capacity for a few years only.

There is capacity for disposal of over 1.5 million m³ at Barksore Marshes. However, this is in direct conflict with statutory nature conservation designations and it is understood that the permission for deposition has now been revoked.

Transfrontier Shipments (TFS) of waste

With commercial ports at Ridham and Sheerness Docks, the area is an important point of entry and exit for numerous shipments under the Transfrontier Shipments of Waste Regulations 1994. As a general rule,



shipments of waste for genuine recovery operations are permitted while shipments for disposal are banned. Potentially hazardous wastes (Amber and Red Listed wastes) require prior consent from the Environment Agency before any shipments can take place. Green Listed wastes (less hazardous) are not subject to prior consent and no pre-notification of shipments is required.

The Agency has no records of any amber listed wastes (pre-notified to the Agency) being imported through Sheerness Docks. Ridham Dock is known to import Amber Listed wastes (pre-notified to the Agency) for recovery operations within Kent and other counties.

Shipments of metal shredding residues (Amber Listed) are also imported to Mayer Parry Recycling Facility at Ridham Dock for fragmentation. There are also a large number of imports of green listed metals to this site through Ridham Dock. Co-Steel at Sheerness imported a trial load of alkaline batteries (through Dover). There is no other large commercial recovery facility for Amber Listed wastes within the LEAP area. It is likely that there will be other "recovery facilities" in this area handling green listed wastes.

There is concern that Green List shipments may contain waste that should be prenotified i.e. Amber List or possibly Red List wastes. The Agency has set internal targets for inspection of Amber and Green list shipments. The Port Inspection Programme that is shortly due to be undertaken in Kent may yield further information and statistics for this and other LEAP areas.

Contaminated land

There is concern about abandoned industrial premises and whether wastes within them present a hazard. The Agency has considered a survey of abandoned industrial and military sites (Issue No. 12). There is known groundwater pollution associated with the former Brugges pesticide works near Sittingbourne, and the Agency has won Supplementary Credit Approval from the DETR for a ground investigation. The site is currently being assessed for funding for a clean-up phase after contamination with DDT and Polyaromatic hydrocarbons (PAHs). There are known to be around 100 closed landfill sites in the North Kent LEAP area.

2.3. THE STATUS OF KEY BIOLOGICAL POPULATIONS, COMMUNITIES AND BIODIVERSITY

2.3.1. Introduction

Biodiversity encompasses the whole variety of life on earth. This includes all species of plants and animals and their genetic variation, together with the complex ecosystem of which they are part.

A principal concern of the Environment Agency is to help conserve and enhance biodiversity for the benefit of present and future generations.

In order to meet overall objectives for biodiversity, whilst recognising its obligation to consider costs and benefits, the Agency seeks to:

- play a full and active part in delivering the UK's Biodiversity Action Plan;
- play a full part in implementing the EC Habitats Directive;
- implement a series of projects, in partnership with local conservation groups, to deliver biodiversity targets at specific sites;
- allocate specific resources to conservation projects aimed at increasing biodiversity;
- improve the management of wetlands for conservation purposes;
- use and promote best environmental practice for the protection and restoration of river habitats;
- implement specific projects to restore habitats in rivers and lakes, increase the area of reed beds and abundance of other water plants, and improve the ecological potential of river banks; and
- ensure that there is no deterioration in the quality of the aquatic environment in particular, and deliver significant improvements in river and still water quality by tackling diffuse pollution of them.

2.3.2. Natural Areas

English Nature has examined the local distinctiveness of the North Kent LEAP area to identify its characteristic wildlife and natural features, which are used to define Natural Areas. There are four Natural Areas within the North Kent LEAP area:

- Greater Thames Estuary, which covers the estuarine habitats of the LEAP area including the Isle of Sheppey;
- North Kent Coast, which covers the coastal habitat to the east of Whitstable;
- North Downs, which covers the Chalk downland to the south of the LEAP area;
- North Kent Plain, which covers the low lying land between the downs and the maritime natural areas.

2.3.3. Key Habitats

A county wide survey of habitats was undertaken by the Kent Wildlife Habitat Survey Partnership during 1990 to 1993. The habitats of particular relevance to the Environment Agency are described below.

The Environment Agency has particular responsibilities in relation to water dependent habitats (**Issue No. 6**). The LEAP area is unusual in that there are no significant fresh watercourses. Instead, a series of streams enter into the Medway Estuary and the Swale, the majority of which arise from spring lines in the Chalk as it dips beneath the London Clay. The output from the springs soon becomes diffused within the general drainage system of marshes. The majority of water dependent habitats in the LEAP area are associated with the Medway Estuary and the Swale, their tributary creeks and associated marshes. These are:

- intertidal mud and sand flats;
- saltmarsh;
- grazing marsh;
- reedbeds;
- estuarine open water;
- saline lagoons;
- shellbanks.

A short description of the current status of each of these habitats is provided below.

Intertidal mud and sand flats

Kent has approximately 10,300 ha of intertidal mud and sand flats of which approximately half (6,200 ha) are located in the North Kent area. The North Kent mudflats represent approximately 2.5% of the British resource. The area of intertidal mudflats has suffered extensive historical losses due to sea level rise (Kent Biodiversity Action Plan, 1997) (**Issue No. 3**).

Mudflats are important for:

- feeding waders and wildfowl, particularly in winter and on migration (e.g. dunlin, plover, knot, godwits and curlew);
- specialised invertebrates;
- beds of eel grass.

Saltmarsh

Saltmarshes are vegetated marshes within the intertidal area, which occur where low lying land is periodically inundated by the tide. The North Kent area contains approximately 1,170 hectares of saltmarsh in the Medway Estuary and Swale which represent 3% of the total British resource.

As part of natural coastal processes, saltmarsh is constantly building and eroding. Historically, the rate of erosion in Kent has exceeded that of formation, mainly due to sea level rise. A survey of losses due to erosion between 1973 and 1988 revealed a 15% loss in the Swale (Kent Biodiversity Action Plan, 1997) (**Issue No. 3**).

Saltmarshes are important for:

- rich plant communities including species such as golden samphire;
- invertebrates including species such as the ground lackey moth;
- high tide roost sites for wintering and migrating waterfowl;
- breeding sites for waders such as redshanks, little tern and Mediterranean gull;
- providing a natural sea defence by breaking up the energy of the waves as they reach the shore.

Grazing marsh

Grazing marsh is a complex habitat of pasture, sea walls and numerous dykes and fleets. There is a salinity gradient across the marsh - some areas are brackish and other parts fresh water.

The exact extent of grazing marsh in the UK is not known but it is estimated that there may be a total of 300,000 ha (with 200,000 ha in England). Only a small proportion of this area is semi-natural (10,000 ha in the UK and 5,000 ha in England) (Biodiversity : The UK Steering Group Report, 1995).

The County of Kent contains 5,255 ha of grazing marsh (approximately 2% of the UK total), of which the majority is unimproved or semi-improved. The Medway Estuary and the Swale contain approximately 3,000 ha of grazing marsh (approximately 50% of the Kent total) (Kent Biodiversity Action Plan, 1997 and Kent Wildlife Habitat Survey, 1995).

Significant losses of this habitat have occurred in the UK over the last 60 years (**Issue No. 5**). The extent of loss in the North Kent area is currently unknown.

Grazing marsh is important for:

- plants such as divided sedge, sea barley and saltmarsh goosefoot;
- invertebrates, in particular associated with the ditches;
- breeding and wintering waders and wildfowl;
- birds of prey such as hen harriers;
- water voles.

Reedbeds

Reedbeds are fens or swamps dominated by stands of the common reed *Phragmites australis*. There are about 5000 ha of reedbeds in the UK, most of which are less than 20 ha (Biodiversity: The UK Steering Group Report, 1995).

The area of reedbed has been declining steadily since the end of the Second World War due to drainage and lack of management (estimated as a net loss of 5-10% of reedbed in England between 1979 and 1993).

A limited amount of reedbed habitat is present in the North Kent area, for example reedbeds at Motney Hill and Capel Fleet and numerous small areas of reedbed in ditches associated with grazing marsh. The total area of reedbed in the LEAP area is currently unknown.

Estuarine open water

The Medway Estuary and the Swale provide an area of open water, which is important for:

- feeding area for breeding little and common terns;
- predator free roosting sites for wildfowl;
- small numbers of wandering common seals;
- fish spawning grounds e.g. bass.

Saline lagoons

There are at present approximately 1,300 ha of saline lagoon habitat in the UK (Biodiversity : The UK Steering Group Report, 1995). It is thought probable that formation of new lagoons will not keep pace with the process of lagoon loss.

The area of saline lagoons within the North Kent area is relatively small. Several shallow flooded man made pools (e.g. Murston pits on the south side of the Swale) provide areas of saline open water in the LEAP area. These provide safe roosting and feeding areas for birds during the winter and breeding habitat during the spring and summer.

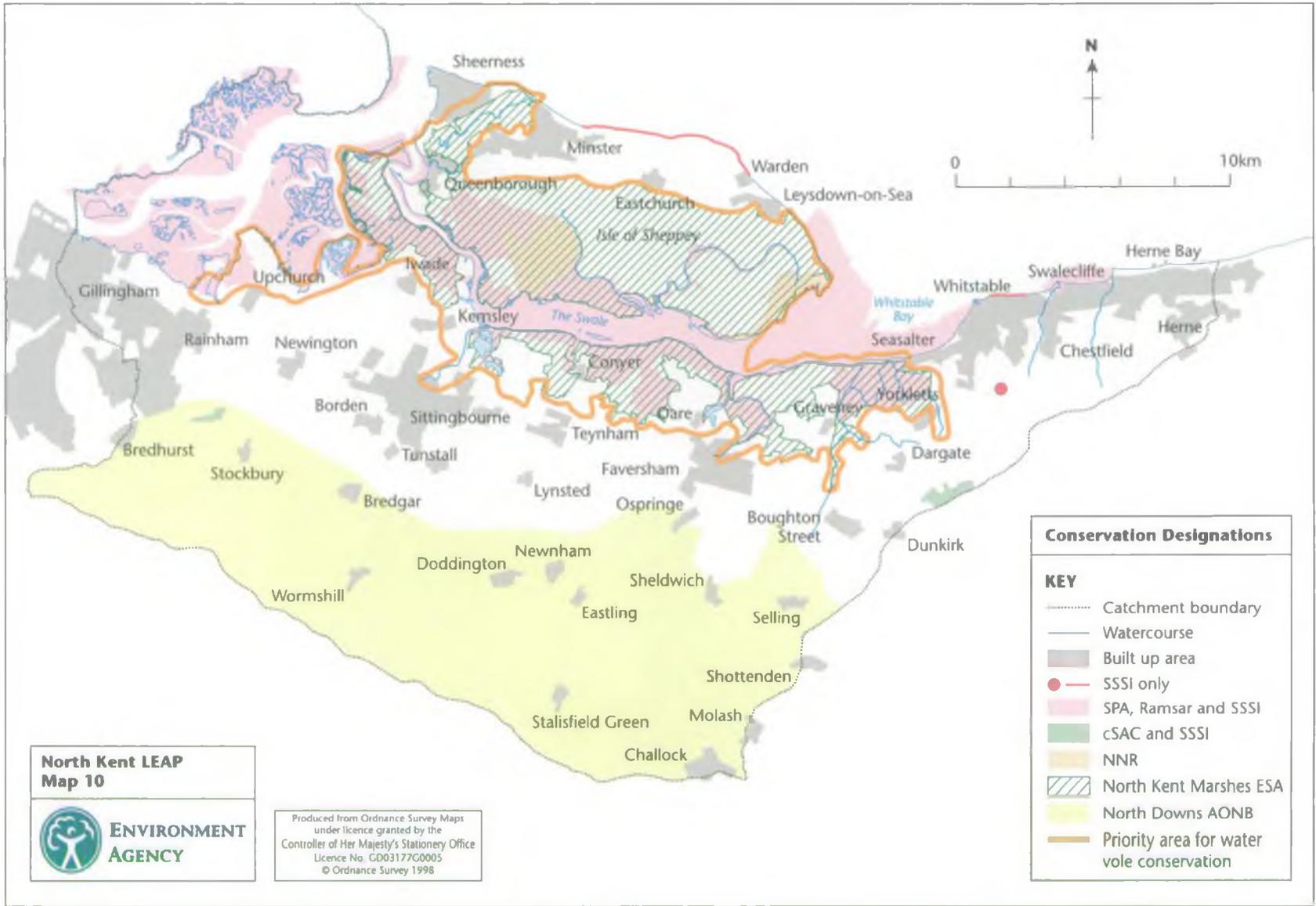
Shellbanks

Shellbanks, which are formed from the accumulation of the remains of estuarine shellfish, are present at Shellness at the eastern end of the Isle of Sheppey. The habitat is important for:

- providing roosting sites for waders at high tide;
- providing nesting sites for little terns and ringed plovers;
- a distinctive flora including sand couch, sea holly, sea sandwort, sea rocket and prickly sandwort.

Other habitats of particular relevance to the Environment Agency are:

- drainage ditches associated with agricultural land;



- freshwater lakes;
- land owned by the Agency.

These habitats are described below.

Drainage ditches

Drainage ditches associated with agricultural land occur throughout the LEAP area, and form important habitats for a number of species such as water vole.

Freshwater lakes

Approximately 10 ha of freshwater lakes are located to the west of Faversham which were former mineral abstractions sites. The lakes support an interesting diversity of wildlife.

Areas of land owned by the Environment Agency

The Environment Agency has a responsibility for managing its land to sustain, enhance or create conservation interest where opportunity arises. The sea defence walls, which are managed by the Agency, form an important habitat which in contrast to the rest of the marshland provide the only areas of dry grassland. The habitat is important for species such as hog's fennel, sea clover, slender hare's ear, Fisher's estuarine moth and Roesel's bush cricket.

The Agency also owns small areas of land at Seasalter pumping station, Faversham and Elmley.

2.3.4. Key Species

Wildfowl and wading birds

The Medway Estuary, the Swale and surrounding habitats support numerous species of breeding, migrating and over-wintering birds. These species are important in a local, national and international context and large areas have been designated as nature conservation areas (see Section 2.3.5).

Biodiversity Action Plan (BAP) Species

Under the UK BAP and Kent BAP, the Environment Agency is the lead agency for a number of species. Of these, water vole and shad have been recorded in the North Kent area (**Issue No. 7**).

Water vole : The water vole was formerly common in Britain but has undergone a considerable decline in numbers, distribution and density throughout this century. A national survey in 1989-90 recorded losses from 67% of former sites and it is estimated that this may rise to 94% by 2000 (Kent Biodiversity Action Plan, 1997).

Within the County of Kent, water vole is present throughout the Great Stour and tributaries and in the Medway LEAP area. It is also present in the North Kent marshes despite the brackish conditions. Water vole is thought to have a stronghold in Sheppey due to the nature of the habitat and low number of

mink. Further survey work is needed, including the marshes of the South Medway and South Swale. A comprehensive survey of Sheppey in 1997 funded by the Agency revealed presence over much of the marshes with a healthy population in the South East.

The Agency considers the North Kent area, particularly the Isle of Sheppey, to be regionally important for water voles. The target for water vole in the Kent BAP is to arrest the decline in the water vole population in Kent by 2000.

Shad : Shad occur in large shoals in shallow coastal waters and estuaries. Mature fish move up rivers into freshwater to spawn in late spring. Spawning takes place in flowing water over stone and gravel. After spawning, spent adults drop back downstream to the sea again. Fry return to the sea after 1-2 years spent feeding and growing in the quiet waters of the upper estuary.

Two species of shad are found in the British Isles, the allis shad (*Alosa alosa*) and twaite shad (*Alosa fallax fallax*). Both species are listed on Annexes II and V of the Habitats Directive. Allis shad are also listed on Appendix II of the Bern convention and twaite shad are listed on Appendix III. Both species are included on the UK BAP Steering Group list of priority species, and the Kent BAP Steering Group has produced a species action plan. Allis shad are also protected under Schedule 5 of the Wildlife and Countryside Act 1981, and the twaite shad has been recommended for addition.

The populations of both allis and twaite shad have declined significantly throughout Europe. In the UK shad are now virtually absent in rivers where they were once prolific.

Shad have been recorded in the Medway Estuary adjacent to the Kingsnorth Power Station and in the Swale. Data on the population is currently unavailable.

The targets for shad in the Kent BAP are to investigate best practice methodology to survey shad and to protect shad in Kent and prevent further loss.

Smelt : Smelt are listed in the Bern Convention and Annexes II and V of the Habitats Directive. Smelt are a pollution sensitive species that live in clean river estuaries. In spring, smelt migrate upstream into the lower reaches of rivers to spawn. Spawning takes place in fast flowing water where the sticky eggs attach to a variety of substrates on the river bed. Once hatched fry are washed into the upper estuary where they feed and grow.

Fisheries

The responsibility of the Agency in the North Kent LEAP area in relation to fisheries is restricted to salmon, trout, freshwater fish and eels. The following description focuses on these species. It is noted, however, that the Medway Estuary and the Swale support important commercial fisheries (including plaice, bass, cod, herring, mullet and sprats) and shell fisheries.

Salmon and sea trout : Salmon and sea trout are occasionally caught in the Medway river and estuary.

Freshwater fish : Common carp and rudd are commonly found in maritime, brackish drains. They are also present with other coarse fish (perch, roach etc) in freshwater lakes in the north west Kent area.

Elvers and eels : Elvers (glass eels) migrate through the Medway Estuary and the Swale and into the feeder rivers and dykes in March and April each year. Adult eels pass through the Medway Estuary and the Swale during June to October for their return oceanic migration back to the spawning grounds of the Sargasso Sea. Recent data suggest a spread of the parasite *Anguillicola crassus* through the eel population.

Fisheries and fish farms : Principal fisheries and fish farms in the LEAP area are listed in Table 5.

Table 5: Fisheries locations and fish farms

Type	Name of Water	Owner/club
Coarse Fisheries	The Fleet	Shepway DC
	Sheerness Canal	Shepway DC
	Holmplace Farm Dykes	Holm Place Farm
	New Rides Farm Dykes	New Rides AC
	Murston Lakes (3 No)	Sittingbourne AC
	School Pool	Faversham AC
	Wood Pool	Faversham AC
	Mill Pool	Faversham AC
	Bysingwood Lake	Faversham AC
	Culnells Reservoir	Farmer
	Tonge Mill Pond	Unknown
	Horsham Pond	Farmer
	Capstone Country Park Lake	Local Authority
Seasalter Dykes	Unknown	
Trout Fisheries	Uplees Trout Fishery	Unknown
Trout Farms	Luddenham Trout Farm	Mr S Weatherley

2.3.5. Designated Nature Conservation Areas

European Directive on Wild Birds: Special Protection Areas (SPAs)

A SPA is a site designated by member states under the EC Birds Directive 1979 as the most suitable territories in number and size for the conservation of bird species protected by the Directive.

As shown on Map 10, there are three SPA sites within the LEAP area - Medway Estuary and Marshes, part of the Swale Extensions, and Thanet Coast and Sandwich Bay.

- **The Medway Estuary and Marshes** qualifies as a SPA by supporting (in summer) nationally important breeding populations of avocet and little tern (both EC Birds Directive Annex I species) and a diverse assemblage of breeding migratory waterfowl. It also qualifies by supporting (in winter) nationally important wintering populations of avocet and a diverse assemblage of wintering species and by supporting internationally important species such as blacktailed godwit, turnstone, shellduck, wigeon and brent goose. The site also qualifies as a wetland of international importance by regularly supporting over 20,000 waterfowl.
- **The Swale** qualifies as an SPA by regularly supporting over 20,000 waterfowl and by virtue of regularly supporting diverse assemblages of the wintering and breeding migratory waterfowl of lowland wet grassland and other estuarine habitats. It also qualifies as an SPA as it has over 1% of the national populations of some Annex I species (avocet and marsh harrier) and over 1% of international populations of other species such as wigeon, redshank, brent goose and others.
- **Thanet Coast and Sandwich Bay** qualifies as an SPA by supporting a nationally important breeding population of little tern and by supporting a nationally important wintering population of golden plover. The site also qualifies by regularly supporting an internationally important wintering population of turnstone and nationally important wintering populations of a further four species - ringed plover, grey plover, sanderling and Lapland bunting. Large number of migratory passerine birds pass through the site during spring and autumn migration periods.

Ramsar sites

Ramsar sites are wetlands of international importance. There are three Ramsar sites within the LEAP area - Medway Estuary and Marshes, The Swale and Thanet Coast, and Sandwich Bay. These sites qualify as Ramsar sites by supporting a number of species of rare plants, invertebrates and birds and by virtue of regularly supporting over 20,000 waterfowl.

Sites of Special Scientific Interest (SSSI)

There are 12 SSSIs in the LEAP area, of which six have strong water related aspects. These are listed below and shown on Map 10.

- Medway Estuary and Marshes;
- Thanet Coast;
- Ellenden Wood;
- The Swale;
- Tankerton Slopes;
- Warden Point.

Nature reserves

There are 3 National Nature Reserves (NNRs) within the North Kent LEAP area: Blean Woods NNR, The Swale NNR and Elmley NNR. There are also a number of other nature reserves in the LEAP area, including RSPB reserves, Kent Wildlife Trust reserves, Local Authority reserves and private reserves.

Sites of Nature Conservation Interest (SNCI)

There are 60 SNCIs in the North Kent area, of which 19 currently have strong water related aspects.

Environmentally Sensitive Area (ESA)

The North Kent Marshes ESA scheme aims to maintain, and where possible, enhance the distinctive landscape and associated wildlife and historic resources of the area by encouraging beneficial farming and other land management practices. The scheme offers farmers payment for meeting certain objectives, such as water management, arable reversion and use of buffer strips next to watercourses. The extent of the ESA is illustrated on Map 10.

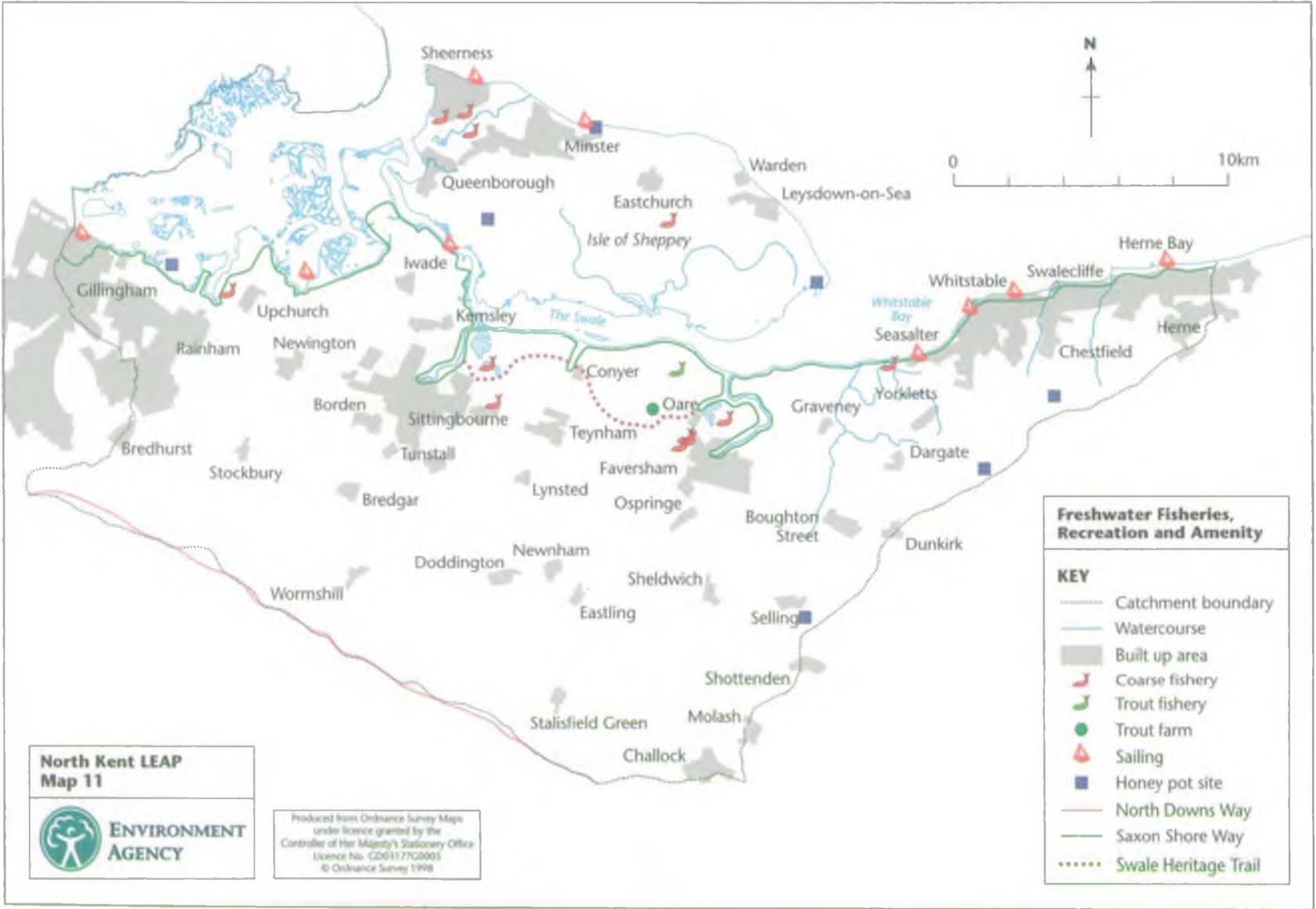
2.3.6. Stresses on the Biodiversity of the North Kent LEAP area

As indicated above, many factors influence the abundance and diversity of flora and fauna in the North Kent area. These include:

Natural stresses

With rising sea level, saltmarshes would naturally migrate inland. Where the "hard" sea defences prevent this process, saltmarsh is squeezed and disappears. The same process will also result in the loss of intertidal mudflats (**Issue No. 3**).

There are numerous small islands within the Medway Estuary and the Swale, which provide valuable nesting sites for birds. As a consequence of sinking land, rise in sea level and/or erosion of material from the islands, the smaller



**North Kent LEAP
Map 11**

**ENVIRONMENT
AGENCY**

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islands are becoming inundated by the estuary (**Issue No 3**).

Natural stresses on the fisheries of the area include the perceived impact of cormorant activity on fish populations in inland still waters and dykes and the impact of the parasite *Anguillicola crassus* on the eel population. Reduced rainfall in the area is resulting in increasing brackishness in coastal fisheries resulting in lowered water levels and leading to impacts on fish resources including fish mortalities.

There is a concern that there is insufficient baseline information on fisheries against which stresses on the fish population can be assessed.

Societal stresses – abstractions

Much of the area is rainfall dependent, therefore it is difficult to raise water levels in some areas. Authorised abstraction levels are 75-100% in the East of the area and over 100% in the West of the area during times of below average rainfall (see section 2.2.4, above). This has implications for the management of water levels in the ESA (**Issue No. 2**). In addition, research has indicated that there is a correlation between fresh water flows across mud flats and the distribution of waders and wildfowl in the estuary.

Water vole (a legally protected and BAP target species) is present in the LEAP area and has a stronghold on the Isle of Sheppey. The main threat to the water vole population may well come from low water levels in the ditches, although habitat degradation and predation of the water vole, especially by mink have also been identified as threats to the species (**Issue No. 7**). The low number of mink on Sheppey is likely to be a factor contributing to the success of the water vole on the island.

Pursuant to Section 14 of the Salmon and Freshwater Fisheries Act 1975, intakes from and discharges to waters frequented by Salmon and Sea Trout will require gratings to prevent destruction of the fish. Assessments of the sites are presently underway.

Societal stresses - discharges

Due to the national and international nature conservation importance of Medway Estuary, the Swale and tributary creeks, the impact of consented discharges from treatment works, discharges from industry and pollution from shipping (including oil spills) on the estuary is of concern.

Conversely, the trend for improvements in the quality of sewage discharges may result in lower nutrient loading and therefore lower productivity in the estuary. This may have an impact on the nature conservation status of the estuarine habitats.

Pollution from farming practices may adversely affect the nature conservation value of the grazing marshes.

Discharges from power stations into the north of the Medway Estuary are

resulting in elevated temperatures in localised areas of the estuary. The impacts of the elevated temperatures on the estuarine flora and fauna are not fully known (**Issue No. 9**).

Discharges of sewage, agricultural run-off, tri-butyl tin (TBT) anti-fouling paints and litter are of particular concern in relation to shell fisheries.

Impacts of agricultural run-off are resulting in increased eutrophication of still waters and dykes, and impacts on freshwater species (favouring rudd and common carp) at the expense of less resilient species.

Impacts of water quality are of concern particularly in relation to salmonid species (**Issue No. 9**).

Societal stresses - agriculture

Drainage ditches in grazing land, agricultural land and orchards provide habitats for important flora and fauna. Insensitive management of the ditches is resulting in adverse impacts on the flora and fauna. In particular, it is important that routine maintenance work undertaken by the Environment Agency, IDBs and landowners is sympathetic to wildlife (**Issue No. 6**).

Maintenance of grazing marsh habitat requires the maintenance of water levels within the marsh. Drainage of land for agricultural development has led to a lowering of water levels, in conflict with the requirements for grazing marsh. This is a particular problem in areas of mixed arable and grazing land. Other agricultural practices that are resulting in adverse impacts are the use of fertiliser and pesticides.

It is necessary to manage the grassy habitats of flood defence walls to maintain the integrity of the wall and to prevent invasion by shrubs. Due to the importance of the flora and fauna of the dry grassland, it is important that management is undertaken in a sympathetic manner (**Issue No. 6**).

Societal stresses - infrastructure

The Medway Estuary and the Swale are dredged to maintain a navigable channel. At present, material dredged from the estuary is disposed of on Hoo Island in the Medway and Rushenden in the Swale. Disposal of dredged material on land has two adverse impacts on nature conservation - removal of sediment from estuary sediment budget has an effect on the maintenance of saltmarsh and intertidal mud habitats and the disposal of the dredgings has a direct impact on the disposal area (**Issue No. 10**).

Dredging in the estuary may also impact on fisheries in the estuary.

Societal stresses - recreation

Water based recreation within the Medway Estuary, the Swale and tributary creeks has the potential to result in disturbance of wildlife (particularly birds). This is of particular concern for noisy activities such as jet-skis, which are frequently used outside the restricted areas (**Issue No. 4**).

Land based recreation (including activities such as bait digging, wildfowling, motorsports and use of model aircraft) also has the potential to impact on nature conservation (**Issue No. 4**).

Fishing activities undertaken in the LEAP area have the potential to impact on key fish species including protected species (allis and twaite shad). Use of gill netting within the estuary has been taking salmon and sea trout as an illegal by catch, and the exploitation of eels is perceived to be resulting in a decline in eel populations. Disruption of the passage of eels through the estuary and into the creeks and Medway is also of concern.

There are conflicts between water based recreation and commercial fishery activities, in particular operation of jet-skis within shellfish nursery grounds and pleasure craft failing to give way to operating trawlers.

Societal stresses - development

Development of artificial sea defences has the potential to result in alteration of the natural coastal processes, and reduced deposition of material on saltmarshes, thus contributing to the loss of saltmarsh habitat (**Issue No. 3**).

Pressure for development in the LEAP area, in particular recreational development such as marinas, poses a threat to the natural habitats of the catchment.

Theft of specimen fish especially carp from still water and their unregulated transfer can cause overstocking and disease problems.

2.4. COMPLIANCE WITH ENVIRONMENTAL QUALITY STANDARDS, TARGETS AND POLICIES/STRATEGIES

2.4.1. Waste management and regulation

The White Paper 'Making Waste Work' identifies specific primary targets:

- to reduce the proportion of controlled waste going to landfill to 60% by the year 2005;
- to recover 40% of municipal waste (including household waste and some commercial waste collected by local authorities) by the year 2005 - this includes recycling, composting and energy from waste.

Secondary targets include:

- to recycle or compost 25 % of household waste by the year 2000;
- to increase the use of secondary and recycled materials as aggregates in England from 30 million tonnes p.a. to 40 million tonnes p.a. by 2001 and 55 million tonnes p.a. by 2006;
- to increase home composting activity to 40% of households with a garden by the year 2000, and to ensure that all local authorities consider the potential for composting schemes by the end of 1997;
- one million tonnes of organic household waste to be composted by the year 2000;
- easily accessible recycling facilities for 80% of households by the year 2000.

The Government is currently consulting on a new National Waste Strategy for England and Wales and it is likely that these targets will become more stringent.

No accurate data are available about compliance with these targets in the North Kent area. However, in January 1993 recycling centres were in operation at 22 sites across Kent as a whole, of which 17 were purpose built householders' waste sites. Most are small scale operations, sorting and bulking up inert waste. In 1992/93 8.3% of domestic waste in Kent (53,600 tonnes) were recycled through local authority facilities.

2.4.2. Flood defence

Flood warning responsibilities

The number of flood warnings given last year indicates the vulnerability of land uses to flooding and the capital works or management that is needed. Colour coded warnings are given when water levels are likely to exceed existing flood defences and when combinations of climatic conditions are exceptionally adverse. Colour coded warnings are given according to the

amount of flooding likely, as described in Table 6.

Table 6: Colour coded flood warnings

Yellow Warning	A warning of flooding to some low lying farmland and roads near rivers or the sea
Amber Warning	A warning of flooding to isolated properties, roads and large areas of farmland near rivers or the sea
Red Warning	A warning of serious flooding affecting many properties, roads and large areas of farmland

From September 1997 to April 1998 ten coastal yellow flood warnings were given in coastal zones in the North Kent LEAP area. Three fluvial yellow flood warnings were given for West Brook, three yellow and one amber warning was given for Swalecliffe Brook and two yellow warnings were given for Warden Bay Drain and Scrapsgate Drain.

Flood warnings are distributed to the general public/households via the media, such as AA Roadwatch, local radio and teletext and by the use of the Automatic Voice Message (AVM) system over the telephone system (further information is available from the Environment Agency).

Many of the flood gates are operated by Swale Borough Council and landowners. Effective lines of communication are essential for ensuring that sluices and gates are closed at the threat of a flooding event.

Flood defence standards of service (SOS)

Specific reaches of sea defences along tidally influenced water courses, are classified as providing "below", "above" or "acceptable" standards of service. Other reaches of sea defence are classified according to their condition i.e. good, fair or poor.

The provision and maintenance of defences, to improve the standards of services, requires a large amount of capital and revenue expenditure. The survey which provides the basis for the current SOS figures for North Kent was conducted in November 1992, and since then work has been undertaken to improve the defences. However, there still remains a need to optimise standards of service through the ongoing programme of defence maintenance and improvement.

Current large works planned for the area include:

- enhancement of the Swale tidal river walls (1999)
- Capel Fleet - Mocketts pump 1999-2000
- Sheerness sea defences 1999-2000
- Rushenden sea defences 2000-2001

2.4.3. European Water Quality Directives

The following EC Directives contain standards that are relevant to water quality in the area:

- Dangerous Substances Directive
- Surface Water Abstraction Directive
- Shellfish Waters Directive
- Shellfish Hygiene Directive
- Freshwater Fisheries Directive
- Urban Waste Water Treatment Directive
- Bathing Waters Directive
- Nitrates Directive
- Groundwater Directive

The Agency is required to ensure compliance with certain elements of the Directives cited above.

Dangerous Substances Directive

The Dangerous Substances Directive (EC Directive 76/464/EC) covers the control of substances based on their toxicity, persistence, and potential to accumulate in biological organisms. They include specific organic compounds such as pesticides and solvents, and specific metals that are discharged into the sewerage system and sewage treatment works.

This Directive describes two lists of compounds. List I contains substances regarded as particularly dangerous because they are toxic, they persist in the environment and they bioaccumulate. Discharges containing List I substances must be controlled by Environmental Quality Standards (EQSs) issued through Daughter Directives. List II contains substances that are considered to be less dangerous but which still can have a harmful effect on the water environment

There was one List I failure in the North Kent area in 1997. This was a coastal site, at North Kent Buoy. This incident may be linked to a pollution incident at Watlingbury on the non-tidal stretch of the river. There was one List 2 failure 100m east of Swalecliffe in the North Sea, due to dissolved chromium.

Surface Water Abstraction Directive

The Surface Water for Abstraction as Drinking Water Directive (75/40/EEC) ensures that water abstracted for public supply meets certain quality standards and is given adequate treatment before entering public water supplies. There are no surface water abstraction sites in the North Kent area.

Shellfish Waters Directive

The Shellfish Waters (79/923/EEC) Directive requires the analysis of water samples to be undertaken to determine the levels of a number of parameters including pH, temperature, metals and organohalogenes. There are currently no sites designated in the North Kent Area under this Directive. However, the

Swale is proposed as a new shellfish water which will require protection under the above Directive. If the Swale is designated, the Agency will be required to monitor these waters.

Shellfish Hygiene Directive

The EU Shellfish Hygiene Directive (91/492/EEC) which lays down the health conditions for the production and placing on the market of live bivalve molluscs, protects the health of consumers of live bivalve molluscs such as mussels and oysters. This Directive defines standards for shellfish quality required in the end product. It also classifies bivalve mollusc shellfish harvesting areas into four categories according to concentration of bacteria found in the shellfish flesh.

MAFF and the Department of Health share responsibility for implementing this Directive in England and Wales. The Environment Agency provides information on the location of discharges that may affect harvesting areas.

There are no designated Bivalve Mollusc Production Areas (effective from 1 September 1998) in the LEAP area. Shellfish Bivalve Mollusc Production Areas are classified according to the quality of the shellfish flesh. This is measured in terms of the number of faecal coliforms per 100g of flesh. Different shellfish purification treatments are required for each shellfish water category. There are four categories (A – D) and harvesting from category D is prohibited. The Isle of Sheppey is designated class B for Cockles and Mussels. The Swale river bed 4 is designated class B for *O.edulis*, beds 6,7, and 8 are designated class B for Cockles and Mussels and beds 1 and 2 are designated class C for Mussels. South Oare, Whitstable, Swalecliffe, Herne, Hampton, Beltinge Bay and Herne Reculver Pollard along the North Kent Coast are designated class B for Mussels.

Freshwater Fisheries Directive

This Directive on the quality of fresh waters needing protection or improvement in order to support fish life (78/659/EEC) lists appropriate water quality standards for salmonid and cyprinid freshwater fish communities. There were no failures in North Kent in 1997.

Urban Waste Water Treatment Directive (UWWTD)

Under the terms of the Urban Waste Water Treatment Directive (91/271/EEC), current arrangements for the treatment and disposal of sewage have become subject to requirements for treatment to standards specified within the Directive. The objective of the Directive is to protect the environment from being adversely affected by the disposal of insufficiently treated urban waste water.

Southern Water Services provides all municipal waste water treatment facilities in the area. Table 7 shows waste water treatment facilities in the North Kent LEAP area, the level of treatment required and completion date.

Table 7: Waste water treatment facilities

Works	Level of Treatment Required	Completion Date
Queenbrough	Secondary	2000
Motney Hill	Secondary	Completed
Hoo (discharges into Medway Estuary)	Secondary	2005
Whitewall Creek	Secondary	Completed
Herne Bay	Secondary	Completed
Swalecliffe	Secondary	2000
Teynham	Secondary	2000

The most significant discharges into the Medway Estuary and Swale are sited at Motney Hill and Queenborough, respectively (see Map 7). Construction work for secondary treatment has been carried out at Motney Hill and the new plant has been operational since July 1998.

Hoo STW is outside the North Kent LEAP area but discharges to the Medway Estuary. Southern Water Services is planning to transfer the flow from Hoo Waste Water Treatment Works to Whitewall Creek Waste Water Treatment Works which currently has secondary treatment. This will ensure that the UWWTD is complied with. Southern Water Services is currently applying for a new storm discharge at Hoo Waste Water Treatment Works.

Locally negotiated improvements to the effluent discharged by the paper mills on the Medway Estuary and Swale have contributed to major improvements in water quality. Upstream of the M2 road bridge new and improved treatment facilities at two large paper mills, the Aylesford Paper Mill complex and Smurfit have contributed to the overall improvement in water quality in the whole of the Medway Estuary.

The Agency carries out monitoring of a three mile wide strip of coastal water four times a year. Samples are analysed for a range of chemical parameters and chlorophyll-a, which is present in plants and is an indicator of the presence of algae. In 1995/96, for eight coastal sites from Medway Buoy to Rye Bay, chlorophyll-a levels were typically less than 5 µg/l (0.005 mg/l). This indicates that, at present, the marine environment in the area is relatively healthy. However, other records show that algal blooms are relatively common along the North Kent coast.

Bathing Waters Directive

The Bathing Waters Directive (76/160/EEC) protects the environment and the health of bathers by reducing pollution entering identified bathing areas. The Directive contains standards for 19 microbiological, physical and chemical parameters to assess bathing water quality. Compliance is assessed by DETR.

The Agency is required to sample and analyse bathing waters in accordance with the requirements of the Directive and report the results annually to the DETR. Four sites within the LEAP area are designated as bathing waters.

These are located at Sheerness and Leysdown on the northern coast of the Isle of Sheppey and at Herne Bay and Whitstable West Beach. Table 8 shows compliance with mandatory Coliform standards and guideline Coliform and Faecal Streptococci Standards from 1990 to 1997 at these four bathing waters.

Table 8: Compliance with standards at bathing waters

Compliance in year:	Sheerness	Leysdown	West Beach	Herne Bay
1990	Not designated	Meeting mandatory	Meeting mandatory	Non-compliant
1991	Meeting mandatory	Meeting mandatory	Meeting mandatory	Non-compliant
1992	Meeting guideline	Meeting guideline	Meeting guideline	Non-compliant
1993	Meeting guideline	Meeting guideline	Meeting guideline	Meeting mandatory
1994	Meeting guideline	Meeting mandatory	Meeting mandatory	Non-compliant
1995	Meeting guideline	Meeting guideline	Meeting guideline	Meeting mandatory
1996	Meeting guideline	Meeting guideline	Meeting mandatory	Meeting mandatory
1997	Meeting guideline	Meeting mandatory	Meeting mandatory	Meeting guideline

All four bathing beaches met the mandatory standards in 1997 and, except for Herne Bay in 1994, have met these standards since 1993. Sheerness Bathing Beach shows the best record as it has met the tighter guideline standards over the last six years. All four of the designated bathing beaches should meet the guideline standards with the completion of improvements to the waste water treatment works.

Nitrates Directive

The EC Directive (91/676/EEC) concerning the protection of waters against pollution caused by nitrates from agricultural sources protects water from pollution by nitrates used in agriculture. This Directive requires Member States to monitor the nitrate concentration in freshwaters (surface and ground) and review the eutrophic state of fresh surface, estuarine and coastal waters to identify those that are or could be affected by nitrate from diffuse agricultural sources. The land draining to these polluted waters could be designated as a nitrate vulnerable zone (NVZ).

There are no NVZs designated in the North Kent area.

Groundwater Directive

The Groundwater Directive seeks to prevent pollution of groundwater from certain dangerous substances. The substances are split into two lists. List I contains the most dangerous substances and these must be prevented from entering groundwater. List II are less dangerous but their entry into groundwater must be limited such that it does not cause pollution of the groundwater.

The Government has developed the Groundwater Regulations, which transpose the Directive into British Law. This will be enacted on the 1 April 1999 and requires the Agency to authorise any disposal of materials containing List I or II substances that could impact or reach groundwater. People wishing to carry out an activity which includes the discharge of List I or II substances to the ground or groundwater after 1 April must apply for an Authorisation prior to undertaking the activity. Failure to do so is a criminal offence.

The Agency can also serve notices on individuals or companies that use or store List I or II substances where it believes that due to a lack of proper facilities or procedures there could be an accidental release of such substances to groundwater. The notice would detail works required by the person or company to prevent such a release and a date by which the work must be done.

The Agency expects to authorise a number of previously exempt activities especially in the farming industry such as the disposal of used sheep dip. A number of properties and industries within the area have oil storage tanks. The Agency will seek to identify those that are below standard and serve notices to prevent pollution occurring.

Summary

Compliance with water quality standards is summarised in Table 9.

Table 9: Compliance with water quality standards

Standard/Target	Number of Monitoring Points	Compliance
Dangerous Substances Directive	Seven designated points	One List 1 failure and one List 2 failure in 1997
Shellfish Hygiene Directive	Four designated areas	Three areas designated class B and one area class C
Urban Waste Water Treatment Directive	Seven STW	All require secondary treatment by 2000 or 2005
Bathing Waters Directive	Four designated sites	All sites met mandatory standards in 1997
Nitrates Directive	No NVZs designated in the North Kent area	
Groundwater Directive	No result – Directive is only partially implemented	

2.4.4. UK water quality objectives and standards

River Quality Objectives

Two of the five river stretches (Thanet Way and Red Sluice on the White Drain) failed their river objectives from 1/7/95 to 30/6/98 (Table 15, Appendix 6). There are no consented discharges in the vicinity of the sampling points. The failure is therefore attributed to diffuse pollution sources such as road run off which may be worsened during low flow periods exacerbated by increased abstractions for agricultural use.

2.4.5. Consented discharges to water

The consented discharges to water are reviewed in Section 2.2.5. These include consents that the Agency issues for sewage treatment works and industrial sites. Improvements in effluent quality from sewage treatment works are frequently needed to meet river quality objectives through the Asset Management Plans (AMPs).

2.4.6. Fisheries

Although the Agency has a statutory duty to maintain, improve and develop fisheries, there are few targets or criteria against which fishery performance is assessed. There are no targets for the assessment of stocks of freshwater fisheries, eels, smelt, salmon and trout. In addition, the level of current information on fish stocks is insufficient to provide an adequate baseline for assessment. However, five estuary sites have been biannually sampled since June 1997 and liaison with netsmen has commenced.

The Agency has been given the powers of a Sea Fisheries Committee within the Medway Estuary. Improved water quality has laid the foundation for an expanding fishery. The need to produce and enforce of byelaws to regulate this fishing area will soon be required. The differing interpretation of the powers of the Agency resulting from the presence of historic fishing rights in part of the Medway Estuary and the requirement to enforce fisheries legislation will also need to be resolved (Issue No. 8).

2.4.7. Recreation

The Environment Act 1995 requires the Agency to promote, where desirable, the recreational use of all inland waters and associated land. The Agency also has a duty to preserve public access to places of natural beauty through its own functional work and to also make best recreation use of land and water under its control.

In 1997 the Environment Agency and English Sports Council published a consultation draft of their *Water Related Recreational Strategy for the Southern Region*. The main purpose of the document is to promote good practice in the planning and management of water related recreation and to promote provision for recreation as an integral part of the Agency functions. The strategy does not contain any targets for recreational provision but sets out a series of principles, for example visitor facilities should be promoted as they are an integral part of many recreational activities. Recreational provision within the North Kent area is described in Appendix 7. There are many opportunities for the implementation of the objectives of the regional strategy within the North Kent area.

2.4.8. Biological Populations, Communities and Biodiversity

The Agency has a number of duties with regard to conservation of biodiversity under the Environment Act 1995. These are summarised in Appendix 2. In addition, the Agency has responsibility under the following:

1992 Habitats Directive and 1994 Habitats Regulations

The 1994 Habitats Regulations require the Agency to carry out its activities in a manner which assists in maintaining the 'favourable conservation status' of sites afforded statutory protection under the Habitat Directive. This includes

the review of current authorisations and assessment of new works to evaluate impacts on European sites (Special Protection Areas and Special Areas for Conservation) afforded protection under the Directive. There are a number of designated European sites in the LEAP area (see Section 2.3). The first phase of identifying authorisations that may affect sites is complete. National guidance on how to proceed was published in January 1999 (Issue No. 7).

Biodiversity Action Plans (BAPs)

The Agency has responsibilities under the National BAP and is a stakeholder in the Kent BAP (see Appendix 2). The Environment Agency is identified as the lead agency for a number of habitats and species, of which the following were identified in the North Kent area: water vole, otter and allis and twaite shad. The Agency also has responsibilities for the following habitats in the North Kent area (although it is not identified as the lead agency): grazing marsh, reedbeds, intertidal mud and sand flats and saltmarsh. For each habitat or species identified, the BAP sets a series of objectives and targets and proposed specific actions (Issue No. 6).

2.5. HEALTH OF THE ENVIRONMENT

2.5.1. Introduction

Traditional methods of assessing environmental quality have relied heavily on the taking of measurements with respect to established physico-chemical standards and criteria. As a consequence, data have accumulated over the years on the levels of certain substances in the environment. Assessments of the state of the environment have frequently been made on the basis of whether the levels of substances are considered to be acceptable or not, rather than by direct measurement of the state of the environment itself. There are good reasons why this has been so. Methods for sampling and analysis for many substances are well developed and convenient, quantitative standards exist, and there is a direct link to the control of emissions to the environment.

Developments in the science of ecotoxicology are opening new avenues for more direct assessment of environmental health. New ecotoxicological techniques show considerable potential not only in providing direct measures of ecological condition but also in making the important link between the observed effects and their causes. Ecotoxicological databases are continually expanding, covering an increasing number of different species and different chemicals, providing a valuable source of interpretative information. A challenge for the future is the development of techniques that allow direct measurement of ecological health "symptoms" that are sufficiently robust and reliable for incorporation into national monitoring programmes. However, there is still much to be done to improve overall understanding of the health of the environment and how it is changing in response to the pressures placed upon it.

2.5.2. Acidification

Acidification of the land and surface water is caused by acid deposition - the wet and dry deposition of acidic substances from the air that can affect areas hundreds of miles away from their original sources. Acid deposition consists largely of sulphur dioxide (SO_2) and oxides of nitrogen (NO_x) from the burning of fossil fuels in power stations, other industrial processes, and in road transport, with ammonia emissions from agriculture accounting for a lesser proportion through oxidation to NO_x . Emissions of SO_2 are thought to be responsible for nearly two-thirds of all deposition, with about a third coming from NO_x . Natural sources of acidity including organic decay and lightning, account for only 5% of acid deposition in the UK.

The major sources of emissions of SO_2 and NO_x in the North Kent Area are power stations, other industry and road transport. There are no specific stresses arising from these emissions.

2.5.3. Water

The Medway Estuary and Swale have notably improved in water quality over the past ten years following improved treatment of waste from the paper mills. This improvement has been confirmed by recorded improvements in the fisheries of the Swale. Further improvements in water quality will be achieved as a result of improvements in the treatment of municipal waste water required by the UWWTD.

The health of the water environment may be described by parameters other than standard chemical determinands such as BOD (see section 2.4.3 of Kent Area Environmental Overview, p. 98).

In coastal waters the Agency carries out monitoring of a three mile wide strip of coastal water four times a year with samples analysed for a range of chemical parameters and chlorophyll-a which is present in plants and is therefore an indicator of the presence of algae. In 1995/6 for eight coastal sites from Medway Buoy to Rye Bay, chlorophyll-a levels were typically less than 5 µg/l. The UWWTD guideline level of eutrophication is 10 mg/l. Although the spot sampling indicates that, at present, the marine environment in the Area is relatively healthy, other records show that algal blooms are relatively common along the North Kent coast.

2.6. LONG TERM REFERENCE SITES

2.6.1. Air quality monitoring

Kent County Council was the first local authority to develop an Air Quality Management System (AQMS). It brings together air quality monitoring and modelling, industrial air pollution control and transport management. The Kent Air Quality Management Partnership includes the County Council, 14 district councils and co-opted members including the Environment Agency and National Power.

The Kent Air Quality Model was used in the AQMS to predict annual average concentrations of nitrogen dioxide (NO₂), SO₂ and total suspended particles (TSP) with 1995 data. Air Quality in the North Kent LEAP area is generally good. Nowhere do levels of nitrogen dioxide, sulphur dioxide or total suspended particulates exceed DETR statutory levels. However, the Medway Towns (including parts of Gillingham which are within the LEAP area) exceed DETR guidance levels. Guidance levels are not statutory, but if exceeded could threaten the healthy air quality within the LEAP area.

The AQMS suggested that a more detailed study and development of action area programmes might be needed in the Medway Towns. At present the AQMS considers the three pollutants described above, NO₂, SO₂ and TSP. It is likely that Kent will also need to monitor carbon monoxide and ozone, whilst monitoring of the remaining four pollutants in the UK Strategy, benzene, 1,3-butadiene, lead, polyaromatic hydrocarbons (PAHs) may be considered later.

2.6.2. Sea level rise

The Agency uses the Meteorological Office's Storm Tide Forecasting Service for the purpose of monitoring sea level rise. The local gauge used by the Meteorological Office is at Sheerness.

2.6.3. Assessment of Estuary Quality

Two sites on the Medway Estuary but outside the North Kent area, Sun Pier and Burham, are being included in the National Marine Monitoring Plan as long term monitoring sites for estuary quality as a whole.

2.7. AESTHETIC QUALITY OF THE ENVIRONMENT

2.7.1. Introduction

The preceding sections of this Environmental Overview have assessed the state of the environment of North Kent from the perspective of series of 'technical' viewpoints. The same viewpoints are used nationally by the Agency to ensure consistency between Regions and Areas. They also help to identify issues for the Agency to address through the LEAP. Qualitative or aesthetic aspects of the environment are also important, however, and it is in these terms that most people view the environment – what it looks like, how it feels.

The links between the Agency's responsibilities and the aesthetic quality of the environment are often indirect. However, an understanding of people's perceptions of an area is an important aspect of the LEAP process. The following paragraphs consider two aspects: landscape quality and tranquillity.

2.7.2. Landscape Quality

Landscape assessment is principally a tool for identifying the character of the landscape rather than assessing landscape quality. Section 2.1.3 describes the landscape character of the LEAP area and refers to the Countryside Commission's Character Areas, Kent Thames Gateway and Eastern Swale Marshes Landscape Assessments. The Medway and Swale marshes are the dominant landscape character area within the LEAP area, and the one with which most people are familiar.

Whilst the distinctiveness of the marshes is widely recognised, they are not generally regarded as a high *quality* landscape. In contrast, the North Kent Downs are part of an Area of Outstanding Natural Beauty, designated at the national level for their landscape quality.

This perception of the marshes is reflected in the recent history of development in close proximity – such as the power stations, major manufacturing industry, and lines of pylons. Such development detracts from views across the marshes, and their remote character.

2.7.3. Tranquil areas

Whilst the visual qualities of the marshes have diminished, they maintain a strong sense of remoteness and tranquillity – qualities that are increasingly rare in the south east of England. This is confirmed on the 'tranquillity map', produced by the Council for the Protection of Rural England and the Countryside Commission.

3. SUMMARY OF ISSUES FOR THE LEAP

3.1. INTRODUCTION

This section provides a summary of the issues emerging from the Environmental Overview of the North Kent LEAP area. The issues are grouped around the nine Principal Concerns of the Environment Agency (see Section 1, above).

3.2. SUMMARY OF ISSUES

Environment Agency Concern*	Issue
Addressing Climate Change	<i>No local issues defined; the Kent Area LEAP identifies the need for the sustainable management of landfill gas, and the need to review the standard of flood defences to address the predicted effects of climate change</i>
Improving Air Quality	1 Additional data is required to assess the cumulative effects of certain emissions from industrial processes and other sources both within and outside the Area
Managing Water Resources	2 Historic development of groundwater has resulted in a general deterioration in the balance of water resources, as evidenced by depletion of spring-fed chalk streams and increased stress on wetland habitats
Enhancing Biodiversity	3 The area of intertidal habitat (saltmarsh and mudflats) in the Medway Estuary and the Swale is being reduced as a consequence of a number of stresses
	4 How to promote water related recreation that is compatible with other interests
	5 Conserving and enhancing water related habitats and landscapes
	6 How to achieve the Agency's biodiversity objectives in the North Kent area
	7 Implementation of the Agency's responsibilities under the Habitats Directive and Habitats Regulations
Managing Freshwater Fisheries	8 How the Agency implements its role in managing the fishery in the Medway estuary

Environment Agency Concern*	Issue
	9 Impacts of water quality improvements and elevated water temperatures from industrial discharges on the productivity and nature conservation value of the Medway Estuary and the Swale are unknown.
Delivering Integrated River-Basin Management	10 The physical processes operating in and around the Medway Estuary and the Swale are not fully understood, or agreed. This reduces the Agency's ability to carry out its flood defence and conservation duties effectively.
	11 The requirement for additional sewerage capacity in the future is likely to highlight current problems with combined sewer storm overflows
Conserving the Land	12 There is currently a lack of data on the location and extent of contaminated land in the area
Managing Waste	13 Sustainable waste management cannot be achieved in the area in the long term with the current levels of waste generation combined with the existing waste management infrastructure
	14 The environmental impact of land application of paper sludge
Regulating Major Industries	<i>No issues identified which are not already being addressed as part of normal regulatory duties.</i>

*From: An Environmental Strategy for the Millennium and Beyond (Environment Agency 1997)

APPENDIX 1: GLOSSARY

Abstraction	Removal of water from surface water or groundwater, usually by pumping.
Abstraction Licence	Licence issued by the Environment Agency under Section 38 of the Water Resources Act 1991 to permit water to be abstracted.
Asset Management Plan	Asset Management Plans are the means by which the water undertakers plan the work required and the capital expenditure necessary, for improvements and maintenance of the water supply, sewage treatment works and sewerage systems. These are drawn up through consultations with the Agency and other bodies to cover a five-year period. The Department of the Environment Transport and Regions, and OFWAT must agree Asset Management Plans.
Aquifer	A layer of underground porous rock which contains water and allows water to flow through it.
Biochemical Oxygen Demand	A measure of the amount of oxygen in water during the breakdown of organic matter.
Catchment	The total area of land which contributes surface water to a specified watercourse or water body.
Combined Sewer Overflow	An overflow structure that allows discharge from the sewerage system to a watercourse during wet weather conditions.
Controlled Water	Defined by the Water Resources Act 1991 Section 104. They included groundwaters, inland waters and estuaries.
Cyprinid	Coarse fish of the carp family ie roach, dace, bream etc.
Discharge Consent	A statutory consent issued by the Environment Agency under Schedule 10 of the Water Resources Act 1991 to indicate any limits and conditions on the discharge of an effluent to a controlled water.
Dissolved Oxygen	The amount of oxygen dissolved in water. Oxygen is vital for life so this measurement is an important, but highly variable, indicator of the "health" of a water. It is used to classify waters.

Effective rainfall	The rain remaining as runoff after all losses by evaporation, interception and infiltration have been allowed for.
Environmentally Sensitive Area	An area defined by MAFF for which grant aid is available for appropriate agricultural and water/land management.
Eutrophication	Presence of nutrients e.g. fertilisers in aquatic systems leading to excessive growth of algae and other aquatic plants.
Floodplain	This includes all land adjacent to a watercourse over which water flows or would flow, but for flood defences, in times of flood..
Greenhouse gas	Natural and man-made gases which influence the greenhouse effect. Including carbon dioxide, methane, ozone and chlorofluorocarbons.
Groundwater	Water that is contained in underground rocks (aquifers).
Internal Drainage Boards	Autonomous public bodies under the control of board members (including those elected by agricultural ratepayers and those nominated by local authorities), with responsibilities and powers for flood defence on ordinary watercourses (non-Main Rivers) under the Land Drainage Acts.
Main River	All watercourses are designated as either 'Main River' (defined in maps held by the Environment Agency and MAFF) or 'ordinary watercourses' ('non-Main River'). Main Rivers include all watercourses that contribute significantly to a catchment's drainage, although ordinary watercourses may be significant locally. The Agency has powers to carry out works to protect land and property from flooding by improving drainage of Main Rivers only, under the Water Resources Act 1991. Local authorities (and in some areas Internal Drainage Boards) have powers for flood defences on ordinary watercourses, and the Agency has a supervisory role.

National Nature Reserve	An area of land designated by English Nature under Section 35 of the Wildlife and Countryside Act 1981. They are managed by, or on behalf of, English Nature specifically for nature conservation purposes.
Passerine	Perching birds of the group Passeriformes eg Larks, Swallows and Wrens.
Potable Water	Water of suitable quality for drinking.
Ramsar Sites	Internationally important wetland sites adopted from the Ramsar Convention on Wetlands of International Importance especially as waterfowl habitats (1971) and ratified by the UK government in 1976.
River Quality Objective	The level of water quality that a river should achieve in order to be suitable for its agreed uses.
Salmonid	Game fish of the salmon family, e.g. Salmon, trout and sea trout.
Sea defences	Natural or man-made features that protect land and property from flooding by the sea.
Sites of Special Scientific Interest	An SSSI is an area of land notified under the Wildlife and countryside act 1981 as being of special nature conservation interest. SACs, SPAs and Ramsar sites are also classified as SSSI.
Special Protection Areas	Internationally important nature conservation sites designated under the EEC Wild Birds Directive. All SPAs are also SSSIs.
Strata	Layers of rock, including unconsolidated materials such as sands and gravel.
Sustainable development	'Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs' (definition from World Commission on Environment and Development, 1987. Our Common Future - The Brundtland Report).
Tertiary	A geological era lasting from approximately 65 to 2 million years ago.

APPENDIX 2 : ABBREVIATIONS

AMP	Asset Management Plan
AOD	Above Ordnance Datum
AQMS	Air quality management system
BAP	Biodiversity Action Plan
BOD	Biochemical oxygen demand
CSO	Combined sewer overflow
DETR	Department of the Environment, Transport and Regions
FRCA	Farming and Rural Conservation Agency
EQI	Ecological Quality Index
EQS	Environmental Quality Standard
ESA	Environmentally Sensitive Area
GQA	General Quality Assessment
IPC	Integrated Pollution Control
LEAP	Local Environment Agency Plan
$\mu\text{g/l}$	Microgrammes per litre
mg/l	Milligrams per litre.
MAFF	Ministry of Agriculture, Fisheries and Food
MPL	Medway Ports Limited
MRF	Minimum Residual Flows
NO _x	Oxides of nitrogen
NNR	National Nature Reserve
NRA	National Rivers Authority - a predecessor body to the Environment Agency
NVZ	Nitrate vulnerable zone
OFWAT	Office of Water Services
PAH	Polyaromatic hydrocarbons
PM ₁₀	Particulate matter smaller than 10 microns in diameter
RE	River ecosystem
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEORP	South-East Otters and Rivers Project
SNCI	Site of Nature Conservation Interest
SO ₂	Sulphur Dioxide
SOS	Standard of Service
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STW	Sewage treatment works
TBT	Tri-butyl tin
TFS	Transfrontier shipment
UWWTD	Urban Waste Water Treatment Directive
WLMP	Water Level Management Plan

APPENDIX 3 : CONSULTATIONS

The following organisations were consulted during the preparation of this Consultation Draft.

- Ashford Borough Council
- Canterbury City Council
- Council for the Protection of Rural England
- Country Landowners Association
- Countryside Commission
- Countryside Project Centre
- English Heritage
- Farming and Rural Conservation Agency
- Government Office for the South East
- Kent and Essex Sea Fisheries Committee
- Kent Anglers Fisheries Consultative Committee
- Kent County Council
- Kent Wildlife Trust
- MAFF
- Medway Ports
- Mid Kent Water
- National Farmers Union
- National Trust
- Royal Society for the Protection of Birds
- Royal Yacht Association
- Salmon and Trout Association
- Sheerness Docks
- Southern Water
- Upper and Lower Medway Internal Drainage Boards

Supported by data and information supplied by Area and Regional staff and the National Centre for Environmental Data and Surveillance.

Meetings were held with the following:

- Swale Borough Council
- Medway Council
- English Nature

APPENDIX 4: AIR QUALITY PART B PROCESSES**Table 10: Part B processes**

Process	Number of Licensed Processes
Waste Oil Burner	4
Clay Brick Manufacture	3
Timber Process	1
Concrete Manufacture	1
Hot Dip Galvanising	1
Concrete Batching	3
Concrete Products	3
Ferrous Foundry	2
Plaster Process	1
Coating Process	4
Tablet Coating	1
Incineration	1
Non Ferrous Foundry	2
Roadstone Coating	1
Mineral Process	2
Powder Coating	1
Mobile Crushing Plant	1

APPENDIX 5: WATER RESOURCES
Table 11: Authorised and actual water abstractions

Aquifer	Year	Purpose (Ml/year)					Total
		PWS/ Private	Ind- ustrial	Irrigation	Agri- culture	Other	
Drift	Auth Abs.	0	557	40	1	0	598
	94/95	0	47	0	0	0	47
	95/96	0	119	0	0	0	119
	96/97	0	323	0	0	0	323
Drift and Tertiaries	Auth Abs.	0	1	0	0	0	1
	94/95	0	1	0	0	0	1
	95/96	0	0	0	0	0	0
	96/97	0	0	0	0	0	0
Tertiaries	Auth Abs.	0	74	77	98	131	380
	94/95	0	11	7	60	0	79
	95/96	0	12	6	25	0	44
	96/97	0	12	9	49	0	70
Tertiaries and Chalk	Auth Abs.	2000	141	0	1038	0	3179
	94/95	58	109.81	0	0	0	168
	95/96	128	51	0	0	0	179
	96/97	127	66	0	0	0	194
Chalk	Auth Abs.	47940	15120	366	63	268	63755
	94/95	31708	13881	90	2	6	45687
	95/96	28480	13865	65	2	0	42412
	96/97	26896	13877	21	7	0	40800
Chalk and Lower Greensand	Auth Abs.	2830	0	0	0	0	2830
	94/95	22	0	0	0	0	22
	95/96	130	0	0	0	0	130
	96/97	26	0	0	0	0	26
Folkestone Beds Only	Auth Abs.	0	80	0	0	0	80
	94/95	0	53	0	0	0	53
	95/96	0	56	0	0	0	56
	96/97	0	57	0	0	0	57

APPENDIX 6: INTEGRATED RIVER BASIN MANAGEMENT: WATER QUALITY

Table 12: GQA chemical grading

The basic chemical grade of the GQA Scheme is defined by standards for the concentration of BOD, ammonia and dissolved oxygen. The overall grade assigned to a river is determined by the worst of the three grades for the individual determinands. The grades are defined in terms of the 90-percentile for BOD and ammonia and the 10-percentile for dissolved oxygen; in other words, the river reach should contain less than the specified levels of BOD and ammonia for at least 90 percent of the time, whilst the level of dissolved oxygen must not fall below the prescribed level for more than 10 percent of the time.

Water Quality	Grade	Dissolved Oxygen	Biochemical Oxygen Demand (ATU)	Ammonia
		(% Saturation) 10-percentile	(mg/l) 90-percentile	(mgN/l) 90-percentile
Very Good	A	80	2.5	0.25
Good	B	70	4.0	0.60
Fairly Good	C	60	6.0	1.30
Fair	D	50	8.0	2.50
Poor	E	20	15.0	9.00
Bad	F*	< 20	-	-

Note * : Quality does not meet the requirements of Grade E in respect of one or more determinands.

Table 13: GQA scheme for biology

The biological scheme is based on groups of macroinvertebrates (small animals including mayfly, nymphs, snails, shrimps and worms) that are found on the riverbed. By comparing Families found in the sample with those expected if the river were unpolluted, rivers can be classified into one of six grades:

Grade	Outline Description
a – Very Good	Biology similar to (or better than) that expected for an average and unpolluted river of this size, type and location. High diversity of Families, usually with several species in each. Rare to find dominance of any one Family.
b – Good	Biology falls a little short of that expected for an unpolluted river. Small reduction in the number of Families that are sensitive to pollution. Moderate increase in the number of individuals in the families that tolerate pollution.
c – Fairly Good	Biology worse than that expected for an unpolluted river. Many sensitive families absent, or number of individuals reduced. Marked rise in number of individuals in families that tolerate pollution.
d – Fair	Biology shows big differences from that expected for an unpolluted river. Sensitive families scarce and contain only small numbers of individuals. A range of pollution tolerant families present, some with high numbers of individuals.
e – Poor	Biology restricted to pollution tolerant species with some Families dominant in terms of the number of individuals. Sensitive Families rare or absent.
f – Bad	Biology limited to a small number of very tolerant Families such as worms, midge larvae, leeches and water hog louse, present in very high numbers. In the worst case, there may be no life present in the river.

Table 14: Chemical quality of freshwater courses

Watercourse	O S Grid Reference	GQA 1995	GQA 1996	GQA 1997	RE Objective	Class Achieved 95-97
Frogna! Drain 100m D/S of Teynham STW	TQ 957640	D	D	D	4	4
Frogna! Drain U/S of tidal sluice at Conyer	TQ 959645	E	E	D	4	4
White Drain D/S of Boughton pumping station	TR 052600	C	C	B	4	2
White Drain: Thanet Way	TR 055613	E	E	E	4	5
White drain: Red Sluice	TR 075650	D	D	D	2	4

Table 15: River ecosystem classes

Class RE 1	Water of very good quality and suitable for all fish species.
Class RE 2	Water of good quality and suitable for all fish species.
Class RE 3	Water of fair quality and suitable for high class coarse fish populations.
Class RE 4	Water of fair quality and suitable for coarse fish populations.
Class RE 5	Water of poor quality, which is likely to limit coarse fish populations.
Unclassified	Water of bad quality in which fish are unlikely to be present or insufficient data is available by which to classify water quality.

Table 16: Biological quality of Frogna! and White drains

Watercourse	Location	90	91	92	93	94	95	96	97
Frogna! Drain	Upstream of tidal sluice at Conyer	c	b	d	c	N/A	b	-	c
	100m down- stream of Teynham STW	N/A	N/A	N/A	N/A	N/A	c	b	
White Drain	U/S of Red Sluice	c	c	b	c	N/A	b	-	c
	Brook Bridge Graveney	c	c	c	b	N/A	b	b	-
	Downstream of Boughton pumping station	N/A	N/A	N/A	N/A	N/A	d	d	-

APPENDIX 7: EXAMPLES OF RECREATIONAL ACTIVITIES IN THE NORTH KENT LEAP AREA

Coastal Cruising

A great variety of craft cruise the area, from Thames barges to small powered day boats. There are 17 clubs and marina who cater for motor cruisers in the study area and 19 locations with accommodation for sailing cruisers.

Sailing

Both competitive and non-competitive sailing is undertaken in the estuary.

Canoeing and kayaking

Clubs are based at Whitstable and Lower Upnor. Access to the water for canoes is possible from Upper and Lower Upnor, Gillingham Pier, Gillingham Strand, Queenborough, Sheerness, Harty Ferry (both sides), Sheerness and Whitstable. Subject to the tide access is also available at Kingsferry Bridge, Conyer Creek, Oare Creek and Seasalter. Canoes can cope with shallow water and can reach areas inaccessible to other craft.

Waterbikes and jetskiing

Use of personal watercraft is restricted to two speed exemption areas within the estuary, between Folly Point and the Medway Buoy and Long point on the Swale to 150 m north of Kingsferry Bridge. Illegal use outside these areas is common, but is difficult to manage and police. A site for jetskiing has been approved by Swale Borough Council from Loves private beach between Leysdown and Warden Bay.

Powerboats

Use of power boats is subject to speed restrictions in certain areas of the estuary.

Hovercraft

Use of hovercraft is a minor activity, principally undertaken in Chatham Reach, Gillingham Reach, Stoke Marshes and North Sheppey.

Rowing

Queenborough Town Rowing Club uses the sheltered waters of the West Swale.

Diving

Activity is limited due to the poor water visibility, however, some dives take place in Stangate and Sharfleet Creeks and off Queenborough.

Water-skiing

Three clubs are located within the LEAP area : Kent Boat and Ski Club, Long Reach Ski club and a club based at Whitstable. Water-skiing is restricted by the Ports Authority to certain areas in the estuary.

Windsurfing

Windsurfing is undertaken off the north shore of Sheppey and in the estuaries. Minster is considered to be an important regional site.

Angling

The most popular locations for sea fish angling are Medway Towns riverside, Hoo marshes, the mouth of the Estuary between Garrison Point and the Pier and on the north shore of Sheppey.

Lugworm (*Arenicola marina*) and ragworm (*Nereis diversicolor*) are dug from within the intertidal belt mainly on the south shore of the Swale, and sold through a number of local outlets. The industry accounts for approximately 5 men working full time or part time. Numerous pleasure anglers also dig their own worm throughout the area. All digging is manual. Peeler crabs (common shore crabs *Carcinus maenas*) are also a popular bait for shore anglers and, in season, are often harvested by local professional bait collectors.

There are three principal coarse fishing clubs in the area, representing approximately 1200 anglers (see Table 18). There are also numerous anglers who are not represented by any club.

Table 17: Coarse fishing clubs within the North Kent area

Club	Approximate membership	Areas fished
Faversham Angling Club	400	Fishing rights to four lakes north of Faversham.
Sittingbourne Angling Club	700	Fishing rights to a series of lakes north of Sittingbourne
New Rides Angling Club	85-100	Two ponds at Sittingbourne

Source : North Kent Marshes Initiative, Medway Estuary and Swale Management Plan Topic Papers 12 - Water Environment

Country Parks

The Riverside Country Park, located on the shore of the Estuary in Gillingham, is run by Medway Borough Council. The council has also obtained the adjacent area and may extend the park.

Informal beach recreation

The beaches along the north shore of the Isle of Sheppey and Whitstable are popular for informal beach recreation. Water quality meets EU standards and the Beach Street section of the Sheerness coast is awarded the Blue Flag Award. The north shore of Sheppey is zoned for different users.

Use of public rights of way

There is a public right of way along the majority of the south of the Medway Estuary and Swale which extends beyond Heme Bay, forming part of the Saxon Shore Way (which traces the old shoreline of the coast). There is no public access from some of the peninsulas which extend into the estuary eg Motney Hill, Horsham Marsh, Barksore. There is a coastal route around two thirds of the Isle of Sheppey between Rushenden and along the north coast to Harty Ferry (including the East Sheppey Trail and West Sheppey Trail). Other popular long distance footpaths are the North Downs Way and Swale Heritage Trail. There are few bridleways in the area, which are not well linked.

Cycling

It is believed recreational cycling is increasing within the LEAP area, although there are, as yet, few designated cycle routes. The proposed route for Sustrans National Cycle Route No 15 will pass through the LEAP area and where it affects Agency interests it is still under negotiation.

Wildfowling

Large areas of marsh are leased to Kent Wildfowling and conservation Association. Shooting is normally undertaken at dawn and dusk.

Birdwatching and enjoyment of wildlife

The LEAP area is enormously rich in nature conservation interest, particularly the Medway Estuary, the Swale, their tributary creeks and marshes much of which is designated as SSSI, SPA and Ramsar sites. This area provides opportunities for people to enjoy wildlife (in particular bird watching) and to appreciate the openness and tranquillity of the landscape. Birdwatching requires access and car parking and visibility over undisturbed marsh.

Other activities

Other activities undertaken include horseriding, target shooting, clay pigeon shooting, field archery, and air sports.

A

Acidification.....	64
Agricultural waste.....	27
Agriculture.....	2, 6, 17, 18, 19, 20, 27, 32, 36, 37, 52, 59, 64, 76
Air quality.....	1, 2, 10, 14, 66
Allis shad.....	46

B

Biodiversity Action Plans (BAP).....	45, 46, 51, 63
Biological quality.....	23, 62, 79

C

Character Areas.....	67
Climate change.....	2, 15, 20, 22, 26, 33
Consented Storm Overflows.....	27
Contaminated land.....	25
Conyer Creek.....	30, 80
Countryside Commission.....	10, 67, 74

D

Department of Health.....	57
DETR.....	39, 58, 66
Dredging.....	26, 28, 32, 37, 52

E

Ecotoxicology.....	64
English Heritage (EH).....	74
English Nature (EN).....	40, 72, 74
Environmentally Sensitive Area.....	49, 71
Estuary quality.....	22, 23, 66
Estuary Quality.....	22, 23, 66
Eutrophication.....	23, 52, 65, 71
<i>Exempt Sites</i>	36

F

Farming and Rural Conservation Agency (FRCA).....	74
Faversham Creek.....	12, 34
Fisheries.....	2, 32, 46, 47, 51, 53, 56, 57, 62, 74, 81
Fishing.....	53, 81

G

General Quality Assessment (GQA).....	22, 23, 77, 78, 79
Geology.....	1, 3, 5
Grazing marsh.....	11, 12, 41, 42, 43, 51, 52, 63
Groundwater.....	17, 18, 19, 20, 22, 25, 27, 37, 39, 56, 60, 61, 70, 71

H

Habitats.....	1, 2, 15, 22, 32, 40, 41, 43, 45, 46, 48, 51, 52, 53, 62, 63, 72
Household waste.....	54

I

Incineration.....	75
Industrial discharges.....	25
Industry.....	3, 11, 12, 14, 15, 17, 18, 19, 20, 51, 60, 64, 67, 81
Integrated Pollution Control (IPC).....	14, 16, 25
Intertidal mud and sand flats.....	41, 63
Irrigation.....	19, 20, 27, 76

L

Land drainage	28, 29
Land use.....	3, 13
Landfill	15, 26, 27, 36, 39, 54
Landscape	10, 11, 12, 13, 14, 33, 35, 49, 67, 82
Leakage.....	26
Litter	52

M

Main Drain.....	29
Main Rivers	71
Maintenance Works	30
Medway 3, 6, 11, 13, 15, 17, 18, 19, 20, 23, 25, 26, 27, 28, 30, 32, 34, 35, 37, 41, 42, 43, 45, 46, 47, 48, 49, 51, 52, 53, 58, 65, 66, 67, 74, 80, 81, 82	
Milton Creek.....	13
Minerals.....	2
Ministry of Agriculture, Fisheries and Food (MAFF).....	32, 33, 36, 37, 57, 71, 74

N

National Trust (NT).....	74
Natural areas.....	40
Natural Areas.....	40
Nature reserve.....	49
Navigation	34, 37
Nitrates	56, 59, 61
North Kent Downs.....	3, 6, 67

O

Oare Creek.....	12, 80
Otter.....	63

P

Paper Sludge.....	37
Part A processes	14, 15
Part B processes.....	14, 15, 75
Pollution	10, 14, 16, 22, 25, 26, 27, 36, 39, 40, 46, 51, 56, 58, 59, 60, 61, 66, 78
Ports.....	28, 32, 34, 37, 80

R

Rail	13
Rainfall	17, 18, 26, 29, 51, 71
Ramsar sites.....	35, 48, 72, 82
Recreation.....	2, 10, 11, 33, 34, 35, 52, 53, 62, 81
Reedbeds	43
River Quality Objectives (RQOs).....	61
Rivers.....	17, 22, 23, 30, 37, 61, 66, 71, 72, 79
Rivers	
Conyer Creek.....	30, 80
Faversham Creek	12, 34
Main Drain.....	29
Medway 3, 6, 11, 13, 15, 17, 18, 19, 20, 23, 25, 26, 27, 28, 30, 32, 34, 35, 37, 41, 42, 43, 45, 46, 47, 48, 49, 51, 52, 53, 58, 65, 66, 67, 74, 80, 81, 82	
Milton Creek.....	13
Oare Creek.....	12, 80
Swalecliffe Brook	55
West Brook	29, 55
White Drain	23, 61, 79
Royal Society for the Protection of Birds (RSPB)	49

S

Salmon.....	46, 51, 53, 62, 72, 74
Saltmarsh.....	11, 28, 32, 41, 42, 49, 52, 53, 63
Sea defences.....	28, 29, 30, 32, 33, 49, 53, 55
Sea level rise.....	32, 33, 41, 42, 66
Sea Trout.....	46, 51
Septic Tanks.....	27
Sewage Sludge.....	36, 37
Sewage treatment works.....	22, 23, 25, 56, 61, 70
Shad.....	46, 53, 63
Sites of Nature Conservation Interest.....	49
Sites of Special Scientific Interest (SSSIs).....	18, 49, 72
Smelt.....	46
Southern Water Services.....	57, 58
Special Areas of Conservation (SACs).....	72
Special Protection Areas (SPAs).....	15, 48, 63, 72
Species (BAPs).....	45, 47
Storage and spreading of sewage sludge.....	36
Surface water.....	17, 18, 19, 20, 27, 36, 37, 56, 64, 70
Swalecliffe Brook.....	55

T

Thames.....	80
Thames Gateway Planning Framework.....	3, 9
Thermal Loading.....	27
Topography.....	5
Transfrontier Shipments (TFS) of Waste.....	37
Twaite shad.....	46, 53

U

Urban Waste Water Treatment Directive.....	25, 56, 57, 61, 65
--	--------------------

V

Void Space.....	36
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W

Waste management and regulation.....	54
Water Level Management Plans (WLMPs).....	18
Water vole.....	42, 45, 46, 51
West Brook	29, 55
White Drain.....	23, 79

MANAGEMENT AND CONTACTS:

The Environment Agency delivers a service to its customers, with the emphasis on authority and accountability at the most local level possible. It aims to be cost-effective and efficient and to offer the best service and value for money.

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