local environment agency plan

NORTH ESSEX

CONSULTATION REPORT

FEBRUARY 1998

ENVIRONMENT AGENCY

Administrative Details

County Councils	Suffolk Essex
Borough/District Councils	Colchester Babergh Braintree St. Edmundsbury Basildon Chelmsford Brentwood Epping Forest Uttlesford South Cambridgeshire East Cambridgeshire Maldon Tendring
Environment Agency	Anglian Region, Eastern Area
Water Utilities	Anglian Water Services (AWS), Essex and Suffolk Water (ESW) and Tendring Hundred
Sewage Treatment Works	AWS: 94 (>250 people) Private: 6 (>10m^3)
Industrial Discharges	Total: 33, plus nine Water Treatment Work's discharges.
Flood Defence Committees	Essex Local Flood Defence Committee Norfolk and Suffolk Local Flood Defence Committee

Water Resources

Generally, the water resources in the Plan area are committed with no availability for both groundwater or summer surface water. However, there is limited potential for developing winter abstraction for off-stream storage. Of the four major rivers in the Plan area, two are supported by the Ely Ouse to Essex Water Transfer Scheme which provides the essential link to maintain flows in the Stour and Pant/Blackwater for subsequent public water supply abstraction.

The continued drought event from 1995 to 1997 has resulted in low groundwater levels and poor flows in rivers. The low flow rates in the rivers during 1997 resulted in most rivers within the Plan area having formal restrictions of spray irrigation abstraction. However, the drought event has highlighted potential problems of low flows in the Rivers Colne, Brett and Pant.

Environmental Planning

Integrated Pollution Control Authorisations	9
Radioactive Substances Authorisations	9
Number of licensed waste management facilities:	
Landfill Sites	168
Scrap Yards	22
Waste Transfer Stations	14
Waste Treatment	2 (Composting Plants)

Environmental Protection

Length (km) of River in General Quality Assessment (GQA) classifications, 1995.

Chemical		Biological	
Class A	37.5	Class a	111.9
Class B	217.8	Class b	326.4
Class C	191.7	Class c	145.6
Class D	109.9	Class d	26.5
Class E	66.5	Class e	3.5
Unclassified	3.7	Unclassified	13.2

Length (km) of Estuary in Coastal and Estuarine Working Party (CEWP) Grades

Class A	74.6	Class C	5.6
Class B	7.6	Class D	0

Flood Defence

Length of Designated Main River:

Fluvial 573 km Tidal 119 km

Length of Environment Agency Maintained Sea Defences	140 km

Conservation

Numbers of:	
Sites of Special Scientific Interest	76
National Nature Reserves	4
Ramsar Sites	6
Special Protection Areas	6
Candidate Special Areas of Conservation	3
County Wildlife Sites (Total)	189
Scheduled Ancient Monuments	113

Length of River in Each Fisheries Class

	Coarse	Trout	Total
Class A	86.0	48.1	134.1
Class B	171.5	11.3	182.8
Class C	32.0	4.6	36.6
Class D	10.0	10.0	20.0
Total	299.5	74.0	373.5

Navigation

The Environment Agency is the Navigation Authority for the River Stour.

key details

General

Land Area	3,600 km^2 (approx)
Length of Coastline	156 km

Main Towns and Population (mid 1995)

Population	877,500
Haverhill	20,260
Sudbury	11,540
Hadleigh	6,820
Colchester	154,400
Braintree	115,600
Chelmsford	151,700
Maldon	53,300
Brentwood	68,300

your views

This Plan is the basis for consultation between the Environment Agency and all those organisations with an interest in the North Essex Plan area. The Environment Agency are keen to hear your views on the following:

- **Do you agree with the draft Vision for the Plan area?**
- **Have we highlighted all the major Issues and Options?**
- **Are there any alternative Options for resolving identified Issues?**
- **Which Issues and Options do you consider to be of highest priority?**
- **Do you have any general comments to make regarding the Consultation Report?**

Comments on the Consultation Report should be sent to:

Sarah Robson - LEAP Officer
Environment Agency
Eastern Area (Anglian Region)
Cobham Road
IPSWICH
Suffolk
IP3 9JE

All contributions should be made in writing by 1 June 1998.

If you or your organisation need further information or extra copies of this Report, please contact **Sarah Robson** at the above address, or by telephone on:

(01473) 727712 Ext. 4044.

Any comments that are received will be treated as public information unless you specifically state otherwise in your response. Please note that responses will not be answered individually, but will be discussed in the 'Summary of Public Consultation Responses' document. This will be published at a later date.

All comments received on the Consultation Report will be considered in preparing the next phase, the Action Plan. **The Consultation Report will not be rewritten as part of the Action Plan process.** The purpose of the Plan is to stimulate thought and provoke discussion and feedback during the formal three month consultation period.

NORTH ESSEX
LOCAL ENVIRONMENT AGENCY PLAN
CONSULTATION REPORT

Environment Agency
Anglian Region
Eastern Area

February 1998

FOREWORD

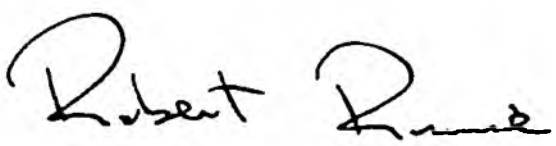
The Environment Agency is a major environmental protection organisation responsible for regulating waste disposal to land, industrial releases to air and for safeguarding and improving the natural water environment. Our overall aim of protecting and enhancing the environment as a whole contributes to the world-wide environmental goal of sustainable development. We are committed to a programme of Local Environment Agency Plans (LEAPs) in order to produce a local agenda of integrated action for environmental improvements. LEAPs also allow us to deploy our resources to the best effect and optimise the benefit for the local environment.

This Consultation Report is the first stage in the Local Environment Agency Plan (LEAP) process for the North Essex Plan area. It provides a framework for Consultation and also a means of seeking commitment from those involved to realise the full environmental potential of the Plan area. Whilst the Plan will be a focus for the Environment Agency's actions factors such as partnership, public participation and the involvement of business communities will be essential to secure success. LEAPs rely to a large extent on building and promoting partnerships. Where improvement works are requires to overcome local issues we aim to work with other organisations and individuals to promote a feeling of joint ownership and to initiate joint funding opportunities.

This Plan includes relevant information about the North Essex area and lists the issues that the Environment Agency have identified and which need to be addressed. It will be essential reading for everyone concerned with the future of the Plan area. We look forward to receiving your comments and contributions. *Your views are important.*

This Plan is being circulated widely and we are keen to draw upon the expertise and interests of individuals, local communities and local and national organisations. These will enable an Action Plan to be produced with an agreed five year programme of activity to enhance and protect the North Essex Plan area. We hope that this Plan will enable a wider public understanding and debate of environmental issues that are of local, national and global importance.

Robert Runcie
Area Manager (Eastern)



OUR DRAFT VISION IS...

to create a better environment in England and Wales for present and future generations. This will be achieved on a local scale by working in partnership with other organisations and individuals to implement schemes that are of tangible benefit to the local environment and promoting sustainable development.

Over the next ten years our prime objectives for the North Essex area are to:

- seek opportunities to improve the conservation value of the area, particularly with respect to protecting, enhancing and, where appropriate, restoring wetland and coastal habitats and associated flora and fauna;
- conserve features of archaeological and historic interest linked to the aquatic environment;
- provide effective flood defences and, where necessary, raise standards of protection, to maintain the integrity of the catchment's freshwater rivers and the coastal fringe. It is currently perceived, for example, that flood risk at, and downstream of, Braintree from the River Brain is unacceptable;
- manage water resources to achieve a proper balance between the needs of the environment and those of abstractors and other users. One important objective is to arrive at a long-term solution which addresses the problem of stagnated river flows, particularly in the Rivers Brett, Colne and Chelmer;
- protect areas of groundwater that are vulnerable to pollution;
- liaise with local authorities by contributing to the production of Local Air Quality Management Plans where required;
- provide effective regulation of industry, having regard to its needs while ensuring appropriate protection of the environment, for instance, from pollution incidents attributable to industrial estates;
- develop and act on the National Waste Strategy and seek partnerships to encourage the reduction, reuse and recovery of waste in preference to disposal;
- maintain, develop and improve fisheries by meeting appropriate fisheries biomass target classes on freshwater rivers, and by the promotion of sound fisheries management policies on all still waters;
- maintain and improve water quality, particularly where water quality targets are not being achieved, for instance, on the Rivers Stour and Blackwater;
- interact with, listen and respond to the community and make a positive contribution towards sustainable development; and,
- ensure that people's appreciation of the environment continues to grow.

The Environment Agency will actively seek to reconcile the conflicting demands on the North Essex Plan area and target resources where they are most needed. Our objectives will be realised through establishing strong links with local communities, working together with conservation organisations, agriculture and industry and increasing public awareness of the need to protect our environment.

CONTENTS

Index of Maps

PART I

The Management Plan

Section 1

Local Environment Agency Planning

An introduction to the Environment Agency and the process of Local Environment Agency Planning.

1.1 Readers Guide to a LEAP Consultation Report

This Local Environment Agency Plan Consultation Report has been divided into two main parts: *Part I - the Management Plan* and *Part II - Supporting Information*.

Part I - the Management Plan

- **Overview:** provides a general description of the Plan area.
- **Issues and Options:** highlights the environmental issues in the Plan area and proposes draft actions to help resolve them. This list is not exhaustive.
- **Protection through Partnership:** considers some of the longer-term, ongoing, strategic management issues which may effectively be addressed in partnership with other organisations.

Part II - Supporting Information

This section provides the supporting information for Part I.

- **Uses, Activities and Pressures:** looks at the main environmental pressures that are put upon the Plan area.
- **State of the Environment:** looks at the current information on the State of the Environment in the Plan area. Where information is available we assess the state of these resources against certain standards or targets.

The draft Vision for the Plan area at the beginning of the Report and the proposed Actions will only be finalised and developed into a Strategy once we have reviewed and considered the responses to the Consultation Report.

There are also a number of technical appendices at the back of the document. Please use the **Contents Table, Index and Glossary** to assist you further. And remember, if the size of the document is daunting, choose only those parts which interest you. You can dip into the rest at a later date.

1.2 The Environment Agency

The Environment Agency is one of the most powerful environmental regulators in the World. It provides a more comprehensive approach to the protection and management of the environment by combining the regulation of land, air and water. The Environment Agency exists to provide high quality environmental protection and improvement. This is achieved by an emphasis on prevention, education and vigorous enforcement wherever necessary. Our principal aim, as set out in the *Environment Act 1995* is to protect and enhance the environment taken as a whole, in order to play our part in attaining the objective of sustainable development.

Environment Agency Objectives:

Our aims:

- To achieve major and continuous improvements in the quality of air, land and water.
- To encourage the conservation of natural resources, animals and plants.
- To make the most of pollution control and river-basin management.
- To provide effective defence and warning systems to protect people and property against flooding from rivers and the sea.
- To reduce the amount of waste by encouraging people to re-use and recycle their waste.
- To improve standards of waste disposal.
- To manage water resources to achieve the proper balance between the Country's needs and the environment.
- To work with other organisations to reclaim contaminated land.
- To improve and develop salmon and freshwater fisheries.
- To conserve and improve river navigation.
- To tell people about environmental issues by educating and informing.
- To set priorities and work out solutions that society can afford.

We will do this by:

- being open and consulting others about our work;
- basing our decisions around sound science and research;
- valuing and developing our employees; and,
- being efficient and businesslike in all we do.

1.3 The Local Environment Agency Plan Process

One of our corporate aims sets out our intention to maximise the benefits of integrated river basin management. Local Environment Agency Plans (LEAPs) are the mechanism to achieve this on a local scale. The LEAP process is a forward-planning process which builds on Catchment Management Plans (CMPs) developed by the former National Rivers Authority (NRA). We have taken the principle of Catchment Management Plans and developed LEAPs on a river catchment basis throughout England and Wales.

LEAPs integrate planning initiatives relevant to the Environment Agency's responsibilities, within the geographical boundaries of a catchment. The Environment Agency takes a lead role in Shoreline Management Plans and Water Level Management Plans and works closely with external organisations to develop plans such as Estuary Management Plans, Biodiversity Action Plans, local plans and structure plans. All these inform and are influenced by the development of a particular LEAP.

The LEAP process includes the production of a Consultation Report, a Summary of Public Consultation and an annually reviewed Action Plan. The Consultation Report describes a Vision for the catchment, identifies Issues and acts as a focus for consultation between us and other partners. Comments on this report can be submitted between February and May 1998. Following consultation, the Statement of Consultation document identifies the main views expressed by all consultees and our response to those views. In October 1998, the Environment Agency will produce an Action Plan with an agreed Vision, strategy and detailed activity plans. Progress will be monitored and reported on annually, by means of an Annual Review. After five years, or sooner if circumstances dictate, the Environment Agency will fully review the Plan. For more details of the LEAP process, please refer to Figure 1 (the LEAP Process).

The Essex Area Environment Group (AEG) are overseeing the production of this Consultation Report. One of their roles is to advise the Environment Agency and its statutory committees on proposals and priorities for LEAPs and advise and comment on LEAP Consultation Reports prior to public release. The independent members of the group each have particular environmental interests, but none are direct employees of the Environment Agency. For instance, AEG members for Essex represent Water Companies, key industry, local authorities, English Nature, the RSPB, fishery interests, Harbour Authorities, the NFU and other various organisations.

The North Essex Plan area is bordered by four other Anglian Region Plan areas, the South Essex and East Suffolk of the Eastern Area (see Map 1) and the Ely Ouse and Cam, produced by the Central Area office (call 01480-414581 to obtain their Reports). It is also bordered by two LEAPs produced by the Thames Region (the Upper Lee and the Roding, Beam and Ingrebourne LEAPs).

Partnerships and Local Environment Agency Plans

Local Environment Agency Plans rely to a large extent on building and promoting partnerships. Where improvement works are required to overcome local issues we aim to work with other organisations and individuals to initiate joint funding opportunities. The Environment Agency often have no powers to control directly all identified actions and the responsible parties may be companies who see little or no financial benefit in carrying out the actions. We therefore strive to build partnerships and encourage public participation, to increase awareness of environmental

STEP 1

The Environment Agency has produced a Consultation Report. This includes:

- a description of the plan area's resources, uses and activities
- a review of the status of the environment
- identification of issues

STEP 2

From February to May 1998 organisations, groups and individuals interested in the future of the plan area can make comments to the Agency.

STEP 3

During the period of consultation and immediately after there will be discussions between the Agency and groups and individuals over key issues.

STEP 4

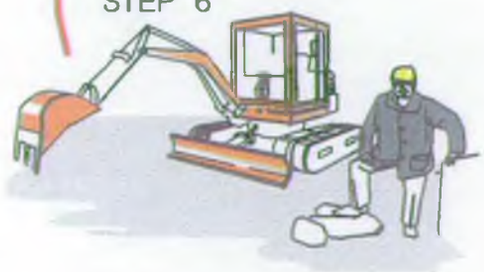
Following the consultation period the Environment Agency will produce a Statement of Public Consultation – a summary of all the consultees' main views and the Environment Agency's response to those views.

STEP 5

In October 1998 the Environment Agency will produce an Action Plan. This will include:

- a summary of the area's resources, uses and activities
- an agreed vision, strategy and detailed activity plans
- a description of future monitoring activity

STEP 6



The Environment Agency and others will work together to implement the Action Plan

STEP 7

The Environment Agency will produce an Annual Review This will include:

- an update on the status of the environment
- progress achieved on the activity plans
- a review of the appropriateness of the identified actions

STEP 8

After 5 years (or sooner if circumstances dictate) the Environment Agency will fully review the LEAP

Figure 1: The Leap Process

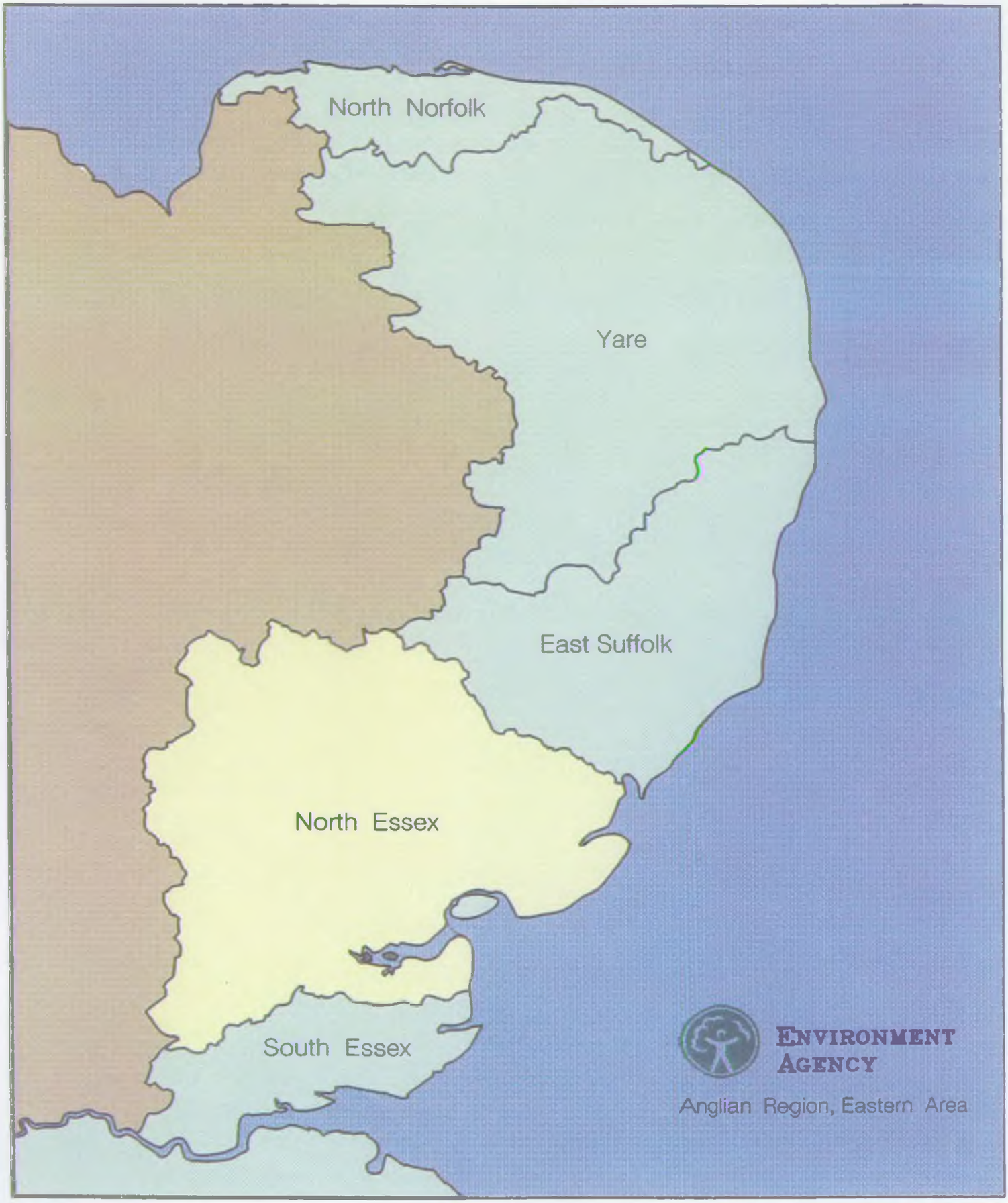
issues and promote a feeling of ownership.

The achievement of some objectives will also depend upon the planning policy of the County, Borough or District Councils. The Environment Agency is a statutory consultee to their policy formation, but we recognise that the Councils are subject to many other constraints under the *Town and Country Planning Act* and, whilst striving to promote sustainability, will not always be able to put environmental needs first. Land use within this Plan area is obviously a major contributor to the state of the environment. In cases where practice will need to change to permit environmental improvements to proceed, it will be necessary to obtain the support of the landowners concerned and for them to make such changes voluntarily, where these are not a statutory requirement.

The achievement of some of the Plan objectives requires the agreement and cooperation of others but it is nevertheless essential that these objectives should still be set and striven for. Alternative means of achieving them might be identified, or the simple identification and publication of objectives might bring about the necessary pressure to encourage those involved, either individually or collectively, to work towards their achievement.

Local Environment Agency Plans – Eastern Area

Map 1



February 1998

1.4 Sustainable Development

The Environment Agency's overall aim of protecting and enhancing the environment contributes to the Governments and the world-wide environmental goal of sustainable development, which has been defined as:

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"
(Brundtland definition, Earth Summit, Rio de Janeiro, June 1992); and,

"Improving the quality of life while living within the carrying capacity of supporting ecosystems"
(Caring for the Earth, World Conservation Union, UN Environmental Programme and World Wide Fund for Nature, 1991).

These definitions of sustainable development recognise that it is the natural environment which provides the fundamental resources through which society meets its needs. Economic, social and environmental issues are intrinsically linked and all form part of a dynamic global system that is in constant metamorphosis. Since the natural environment is the context and source of all human activity, it follows that if this environment is not sustained, then ultimately there can be no society or economy. Economic and social development will be unable to take place if the global environment is destroyed or irreparably damaged.

The Environment Agency's vision statement requires economic and social activities within England and Wales to have due regard to potential environmental implications. Action, regulation, education and enforcement all have a part to play in working towards sustainable development by the Environment Agency and others. Integrated environmental management is a means by which the Environment Agency can promote sustainable development and LEAPs are the mechanism to achieve this at a local scale.

The Government have provided the Environment Agency with guidance on how we should contribute to Sustainable Development. In summary, it reads as follows:

- Because the environment is shared, collective action is necessary.
- Decisions should be based on the best possible scientific information and analysis of risks.
- Ecological impacts must be considered, particularly where resources are non-renewable or effects may be irreversible.
- Cost implications should be brought home directly to the people responsible - the 'polluter pays' principle.
- A holistic approach should be taken to environmental objectives.
- A long-term perspective should be taken.
- Biodiversity should be conserved and enhanced and natural heritage protected.

- A contribution should be made to protecting the global atmosphere.
- The scope for reconciling the needs of the environment and those of development with regard to regulated organisations should be investigated.
- Close and responsive relationships with the public, local authorities and other representatives of local communities should be developed.
- High quality information and advice should be used by the Environment Agency and provided to others.

Section 2

Overview Of The North Essex Area

This section gives a brief overview of the North Essex Plan Area.

2.0 Overview of the North Essex Area

The North Essex Plan area has an undulating topography with the plateau being dissected by small, steep-sided valleys. The area is characterised by small to medium-scale fields and numerous small farm copses and hedgerows with trees that create a natural appearance. However, in places, a large-scale modern arable field pattern overlies earlier field patterns, giving an open feel which is emphasised by the loss of large elm trees through disease. The area has exceptionally attractive medieval towns and large villages with magnificent churches, picturesque timber-framed and colour-washed houses, occasional moated farmhouses, ponds and greens. These settlements have long-established market town functions that serve the surrounding area. Many of these are linked by narrow, winding and sunken lanes, often lined by hedges and grassy banks. In the south east part of the Plan area, parkland is more common, associated with a few large estates and manor houses.

The landscape is predominantly rural with small settlements and several large towns including Braintree, Colchester, Haverhill and Sudbury. The Plan area covers in part the County Councils of Essex, Suffolk and Cambridgeshire and in all or part the Borough and District Councils of Colchester, Babergh, Braintree, St. Edmundsbury, Basildon, Chelmsford, Brentwood, Epping Forest, Uttlesford, South Cambridgeshire and Tendring.

The area has four major river systems (see Map 2), the Stour, Colne, Chelmer and Blackwater. All have floodplains under agricultural use and numerous water mills, a familiar site in this part of the Country, with over 80 such mills present. The coastline is composed of soft materials and is mostly low-lying although some cliffs are present, notably at Walton-on-the-Naze. Some coastal towns are built on high ground, benefitting from coast protection works funded by district councils. Groynes and beach recharge schemes have been employed on open sea reaches in an effort to reduce damaging waves both on high ground frontages and low lying land zones. These are maintained by the Environment Agency.

The area is rich in landscape and wildlife heritage and most of the coast is of international importance for conservation. Within north Essex some rich and varied wildlife has survived, despite the changes that have occurred as a result of agriculture, industry and increased urbanisation since the 1940's. Important semi-natural habitats include ancient woodland, unimproved grassland, mudflats and saltings. The diversity of habitats, the associated plant communities and the breeding and wintering bird populations are of international importance. Many of the river valleys and much of the coast is designated as part of the Suffolk River Valleys or Essex Coast Environmentally Sensitive Areas (ESAs) which encourages landowners to manage their land by traditional methods, which can benefit wildlife and landscape conservation.

Important freshwater fisheries occur in rivers, streams, lakes, reservoirs and ponds throughout the area. These are dominated by coarse fish species, although self-sustaining and introduction-dependent trout stocks can be found in a number of locations. Many of the fisheries are regularly exploited by anglers for recreational purposes. The popularity and diversity of interest of angling as a sport, together with a relatively high resident population and ease of access from London, combine to ensure that there is always a great demand for both angling venues and opportunities. There are extensive and important commercial eel fisheries in tidal waters all around the coastline. Some commercial eel fishing occurs intermittently on inland waters, although catches are small compared with the tidal fishery.

Map 2

The North Essex LEAP Area

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Urban area

February 1998

Water quality in the Plan area has improved since 1990. The General Quality Assessment (GQA) surveys of 1990 and 1996 have shown an overall improvement of 26% within the area. Typically, water quality problems are related to low flows and low dissolved oxygen levels, but the overall improvements are linked to pollution prevention initiatives and increased investment in effluent treatment.

The North Essex Plan area has a long history of supporting a wide variety of agricultural activities and continues to do so over most of the area. Arable cultivation of cereals and root crops are the principal farming activities. Animal husbandry, soft fruit growing, market gardens and intensive glasshouse operations are also supported to varying degrees. Although agriculture is the major industry, other activities include food processing, light industrial and manufacturing activities and chemical and pharmaceutical production. The nuclear power station located on the Blackwater estuary is perhaps the most high-profile installation in the area. The ports at Parkeston and Harwich support both passenger services to Europe and the export/import of freight from around the world. A number of smaller ports are limited to handling freight traffic.

Activities within the area create a mixture of household, commercial, and industrial waste. Landfill is the disposal method for the vast majority of waste that is produced. Active and closed landfill sites are located throughout the Plan area. Their location is influenced by the geology of the land, and many former mineral workings are utilised as landfill facilities. There are a number of closed sites in the Plan area which have the potential to cause problems as a result of them having operated before effective regulation was introduced. They are closely monitored on a regular basis.

Generally water resources are committed with no availability for both groundwater or summer surface water. However, there is limited potential for developing winter abstraction for off-stream storage. Of the four major rivers, two are currently supported by the Ely Ouse to Essex Water Transfer Scheme (hereafter referred to as the Ely Ouse Scheme), which provides the essential link to maintain flows in the Stour and Pant/Blackwater for subsequent public water supply abstraction. The Colne is not supported because the yield of the Ely Ouse Scheme is fully allocated to existing abstractors in the other supported rivers. The Stour Augmentation Groundwater Scheme (SAGS) helps to support the Stour and some of its tributaries (including the Glem and Brett) when all the water needed as part of the Ely Ouse Scheme is not available at the Denver Complex (Norfolk). SAGS has also been used to alleviate low flow problems in the Glem and Brett during the 1996/97 drought.

The Plan area has an average annual rainfall of 570mm of which approximately 430mm is lost to evaporation. The continued drought event from 1995 to 1997 has resulted in low groundwater levels and poor flows in rivers. The low flow rates in the rivers during 1997 resulted in most rivers within the Plan area having formal restrictions of spray irrigation abstraction. However, the drought event has identified that rivers can be susceptible to the effects of low groundwater levels, particularly recently in the Colne, Brett and Pant.

Section 3

Issues And Options

This section details specific Issues that have been identified in the Plan area and provides options for their resolution.

TITLES OF LEAP ISSUES

Managing Our WATER RESOURCES

1a Actual flows are perceived to be inadequate to meet river needs.

1b Concern over the decline in freshwater levels to Cattawade Marshes SSSI.

1c There is a need to develop a better understanding of the extent and interaction of the aquifer system.

1d Problems of stagnated river flows.

1e Existing available water resources are inadequate to meet future demands.

1f Need to review the operation, efficiency and environmental impact of the Stour Augmentation Groundwater Scheme (SAGS).

1g Current groundwater level monitoring is inadequate.

1h (I) Effects of the re-use of treated effluent from Chelmsford Sewage Treatment Works.

1h (II) Effects of the direct discharge of treated effluent from Chelmsford Sewage Treatment Works into Hanningfield Reservoir.

Enhancing BIODIVERSITY

2a The need to better understand the requirements of headwaters in the Plan area.

2b Requirement to improve habitat diversity within rivers and their floodplains.

Managing Our FRESHWATER FISHERIES

3a Investigate and, where possible, ameliorate failures in fisheries biomass targets.

3b Concern over an adverse impact on angling success in the receiving Rivers Stour and Pant/Blackwater due to the operation of the Ely Ouse to Essex Water Transfer Scheme.

3c The current distribution of river reaches designated under the *EC Freshwater Fisheries Directive* does not adequately reflect the distribution of important fish stocks for which protection is required.

Delivering INTEGRATED RIVER-BASIN MANAGEMENT

4a A number of river stretches fail to achieve their existing River Ecosystem (RE) target class for reasons which have yet to be fully established.

4b A number of river stretches fail to achieve their existing River Ecosystem (RE) target class due to factors that cannot be attributed to point-source pollution.

4c Exceedance of *EC Surface Water Directive* nitrogen limit at public water supply intakes on the River Stour at Langham and Stratford St. Mary.

4d Flood Risk at, and downstream of, Braintree from the River Brain is currently unacceptable.

4e There is a need to fund, coordinate and carry out repairs to private structures.

4f Eutrophication of the lower River Stour and failure to achieve its predicted biological score.

4g Concern over the regulation of river levels and flows associated with the operation and possible increased use of the Ely Ouse to Essex Transfer Scheme.

4h Impact of the effluent discharge from Colchester Sewage Treatment Works on the quality of the Colne estuary.

4i Failure to meet *EC Bathing Water Directive* limit for bacterial criteria.

4j Concern over potential deterioration of river water quality, where present effluent quality is better than the current legal consent.

Conserving the LAND

5a There is a need to provide effective defence and warning systems to protect people and property against flooding from rivers and the sea.

5b Potential impacts on the environment from contamination originating from closed landfill sites.

Managing WASTE

6a There is a lack of information on landspreading of wastes.

6b Increased incidence of fly-tipping.

Regulating MAJOR INDUSTRIES

7a Continued odour problems originating from Haverhill Sewage Treatment Works.

7b Failure to meet *EC Dangerous Substances Directive* limits for heavy metals.

7c A high proportion of pollution incidents (to the aquatic environment) are derived from industrial estates.

In September 1997 the Environment Agency produced a document entitled 'An Environmental Strategy for the Millennium and Beyond'. This strategy is essentially based upon the need to take an integrated approach to the management of the whole environment. In producing this Plan we have therefore used the principal and immediate concerns set out in the *Strategy* to collate the Issues and show how LEAPs utilise integrated action for local environmental improvement.

Our principle and immediate environmental concerns in the North Essex area relate to:

- Managing our WATER RESOURCES.
- Enhancing BIODIVERSITY.
- Managing our FRESHWATER FISHERIES.
- Delivering INTEGRATED RIVER-BASIN MANAGEMENT.
- Conserving the LAND.
- Managing WASTE.
- Regulating MAJOR INDUSTRIES.
- Public awareness and EDUCATION.

The boxes at the beginning of each Section explain what the Environment Agency are doing nationally to deal with each of these challenges, and each Issue helps to highlight local strengths and weaknesses against these targets. Our intended approach for dealing with these challenges is set out in the following text and tables, which show:

- The **Title** of the Issue.
- Supporting **background text** to explain the Issue.
- Proposed **Options** for resolutions of the Issue.
- Responsible **organisations** who will implement the proposed activities, either in a lead role or in partnership with others.
- **Advantages** of the Option.
- **Disadvantages** of the Option.

The following points should also be noted:

- Our everyday work commits substantial resources to monitoring and managing the environment. This work is explained fully in Part II of the document, under the Uses, Activities and Pressures Section and the State of the Environment Section.

- Some actions will require feasibility studies and cost-benefit appraisal of Options prior to work commencing. In some cases, depending on the outcome of these studies, further action may not be justified.

- Should more Issues become apparent during the Consultation Period , further Actions will be added at the Action Plan stage.

- The Issues and Options are not presented in any order of priority and the Options are not mutually exclusive.

We will:

- demand a more efficient use of water by the water companies and by industry in general;
- encourage a more efficient use of water by the public and a change in public attitude to water usage;
- promote the development and sale of low-water usage domestic appliances, supported by legislative changes, if necessary;
- demand reductions in leakage by the water companies before considering any cases for investment in new reservoirs;
- support the imposition of compulsory selective metering where water supplies are under stress and where meters and economically sensible to install;
- support the voluntary acceptance of water meters when accompanied by other water-saving incentives for the Customer;
- vigorously apply our Groundwater Protection Policy to ensure that the quality and use of our groundwaters is improved;
- examine water transfer schemes carefully to ensure that no environmental damage would result from their introduction;
- not approve the exploitation of new environmental resources until water saving measures have been introduced;
- implement the current programme of alleviating low-flow rivers as quickly as possible;
- seek new legislative powers to reform the use of 'licences of right' to extract water from the environment;
- seek new powers to facilitate the inter-basin transfer of water, and for the open and transparent provision of plans and information relating to such schemes in order to broaden the public debate on these important issues;
- ensure that the practical limitations arising from water supply and treatment are fully considered by providing planning authorities with all information relevant to new housing or industrial developments;
- ensure that the UK's experience and needs are reflected in the scientific and technical discussions within the development of the EC's *Water Framework Directive*;
- ensure that all environmental needs are fully taken into account within the next Asset Management Plans (AMPs) negotiations with the water companies; and,
- research into more efficient methods for the management of water, and into the potential risks for the aquatic environment arising from its mis-management.

Issue 1a: Actual flows are perceived to be inadequate to meet river needs.

Background

It is considered that actual flows may at times be inadequate in some river stretches. These effects are perhaps more pronounced in the Anglian Region than in other areas because flows tend to be sluggish due to the relatively flat terrain. Factors of channel geometry may also dominate. A combination of low bed slope and shallow profiles can encourage water within a river to stagnate and to develop weed growth with subsequent implications on the aquatic environment and its aesthetics. To determine the in-river needs and to maintain the ecosystem requires extensive ecological and hydrological studies to establish acceptable water levels, flows and quality. The Anglian Region has set Minimum Residual Flow (MRF) targets at a number of points on rivers within the catchment, to be used in conjunction with river management and for guidance within licence determination to help protect the water environment and other users. Although no objective criteria has been set which defines what is an acceptable minimum flow, the Environment Agency uses a provisional estimate of the 'natural 95% flow'. This is the flow which would naturally be equalled or exceeded for 95% of the time. Whilst this seems to work it is not scientifically based and does vary greatly as a proportion of average flow in different rivers.

The Environment Agency will be progressing studies to identify methodologies for evaluating River Flow Objectives (RFOs). RFOs will define flow regimes (not just the minimum) to meet a variety of environmental objectives. Following this, there is a requirement to review the methodology used for assessing water resource availability in the light of improved knowledge of environmental demands. A river can have a natural cycle of low flows, especially in the upper reaches. Certain habitats can depend on this seasonality while further downstream, different habitats may be established around a progressive flow regime. Therefore it is expected that the RFO methodology should be able to define RFO's at discrete stretches that take into account the characteristic of the river and the habitat baseline established. It must, however, be recognised that rivers do respond naturally to such events as droughts and floods and that these events must also be taken into account in establishing the flow regime.

Progress on determining RFO's has been slow because of data requirements, complexity and the multi-disciplinary technical specialists required to evaluate them. The Environment Agency are now reviewing options to speed up progress.

Options	Responsibility	Advantages	Disadvantages
1. Continue with present approach - policy which attempts to protect the 95 percentile flow.	Environment Agency	No additional cost. Continued consistent approach.	Water resource assessments continue to include a generalised environmental allocation. Actual flows may not be adequate in some stretches. Need to rely on existing MRFs which may not be appropriate. Changes in flow regime may impact on existing licensing/consents.
2. Carry out ecological and in-river needs studies to develop and refine RFOs.	Environment Agency	Nationally consistent. Better understanding of total river needs. Improved resource management. Refined water resource balance. Improved environmental targets.	Timescale. Priorities need to be set across the Region. Additional impact assessments required for licence determination. Cannot proceed until Regional methodology agreed.
3. Implications of doing nothing.		No financial cost.	Flows remain subjectively inadequate.

Issue 1b: Concern over the decline in freshwater levels to Cattawade Marshes SSSI.

Background

Cattawade Marshes are located where the freshwater River Stour enters the estuary, east of the tidal barrage. Cattawade Marshes were designated as a Site of Special Scientific Interest (SSSI) in January 1988 due, amongst its botanical interest, to its rich habitat value for breeding waders and wildfowl. At the time of notification redshank, shelduck, shoveler, teal and water rail all nested in the wetland habitat.

The marshes have suffered from reduced river levels in recent years which have been exacerbated by the drought. Recent surveys carried out by the Royal Society for the Protection of Birds (RSPB) show breeding bird counts are greatly reduced. If present decline continues the conservation value of the site will reduce still further and could result in de-notification of the marshes SSSI status.

This Issue is proposed to be considered under the Asset Management Plan 3 (AMP3) process (see Glossary) which is due for determination towards the end of 1998.

Options	Responsibility	Advantages	Disadvantages
1. Complete Cattawade Marshes WLMP by December 1998.	Environment Agency	Gives coordinated approach to future management.	Timescale and reliance upon other individuals and organisations to implement the objectives.
2. Negotiate with Water Company to implement a more suitable pumping regime.	Environment Agency, Essex and Suffolk Water	Direct benefit.	Delay in formal regulations being processed.
3. Joint approach, reviewing the management of the site.	Environment Agency, English Nature, Landowner, MAFF	Coordinated approach.	Timescale and reliance upon all partners reaching a suitable agreement.
4. Implications of doing nothing.		No financial cost or staff time involved.	Site's conservation value will decline.

Issue 1c: There is a need to develop a better understanding of the extent and interaction of the aquifer system.

Background

The long-term sustainability of water resources has many pressures imposed upon it due to urban, industrial and agricultural growth. To better manage the availability and pressures on the water resources, the Environment Agency needs to develop a better understanding of the extent and interaction of flow between and within aquifers. In particular will be the need to understand the confined/unconfined Chalk and Superficial deposits, as well as the influence the Eocene deposits have in controlling groundwater flow. River flow is critical in summer months and it is the groundwater contributory baseflow which maintains this and determines the health of a river.

Current practice is to base the environmental allowances on river flow assuming that only one type of aquifer is contributing to the overall flow. As such, the water balances which effects two aquifer systems could be inappropriate, especially where there may be a connection between the two aquifers.

From a detailed understanding we would be in a better position to confirm our knowledge of the overall resource availability, undertake strategic management for licensing and realise the effect of development growth on sustainability. For example, potential problems have become apparent within the Brett and the upper Pant with regard to the link between public water supplies and low flows as well as an apparent loss of flow in the lower reaches of the Stour during the summer of 1997.

Option	Responsibility	Advantages	Disadvantages
1. Investigate the flow of the Chalk aquifer.	Environment Agency	Detailed understanding of the Chalk aquifer. Improved water resource balance assessments.	Does not take into account the interaction with other aquifers. Requires additional groundwater monitoring (see Issue 1g).
2. Investigate the flow of the Superficial aquifer system.	Environment Agency	Detailed understanding of the Superficial aquifer system. Improved water balance assessments.	Does not take into account the interaction with other aquifers. Requires additional groundwater monitoring (see Issue 1g).

Option	Responsibility	Advantages	Disadvantages
3. Link all aquifers into a conceptualised understanding.	Environment Agency	Detailed understanding of the Chalk and superficial aquifer systems and the interaction with surface water. Better understanding of the water resource availability.	Cost. Timescales.
4. From 1, 2 and 3, revise water resource budgets and licensing policy.	Environment Agency	More robust and comprehensive licensing policy.	Timescale.
5. Determine the feasibility of further studies (including modelling).	Environment Agency	Strategic management of water resources.	Cost. Timescale.
6. Implications of doing nothing.		No additional financial cost.	No firm understanding of the interaction between aquifers and river flow.

Issue 1d: Problems of stagnated river flows.

Background

The continued drought events from 1995 to 1997 have highlighted problems associated with stagnated flows in several rivers in the Plan area, including reported fish kills and odour problems. The fish kills, odour problems and other related conditions are likely to be linked to the relatively high summer temperatures stripping out the dissolved oxygen within relatively shallow river levels but this is only a symptom of the overall problem.

It is uncertain if the stagnated flows are due to the drought events or as a direct result of human influences, including groundwater and surface water abstraction, land drainage as well as altered stream profiles. There is also the real possibility that the stagnated river flows are a combination of both natural and human influences. Although the visual impact of stagnated flows is obvious, the actual cause of the stagnated river flows and the subsequent conditions may be numerous, complex and difficult to proportion.

The rivers considered to be of concern are the Rivers Brett, Colne, Pant and Chelmer. Although the Environment Agency will be the lead responsibility for any investigation we will be seeking partnership and co-operation from water companies, industry and the farming community as well as conservation bodies to identify causes and seek long-term solutions. Within the Environment Agency we will seek to arrive at a long term solution which addresses multi-functional concerns. This will also form part of the River Flow Objectives (see Issue 1a).

Options	Responsibility	Advantages	Disadvantages
1. Review monitoring	Environment Agency	Better understanding of the causes and symptoms.	Cost. Time.
2. Investigate the problems of stagnated river flows.	Environment Agency	Better understanding of river requirements. Long term solutions.	Cost. Complexity of problem may mean there is no real solution.
3. Implications of doing nothing.		No financial cost.	Poor acceptance of statutory duties. Poor public relations.

Issue 1e: Existing available water resources are inadequate to meet future demands.

Background

Future demands for water in the Anglian Region are progressively rising. Demand for public water supply is assessed by reference to predicted changes in population and consumption habits as well as considering the potential for demand management practices such as leakage control and metering policies. Demand management for industrial and agricultural use must also be considered.

Groundwater resources are already fully committed to existing abstraction and any future increases in demand will have to be met from elsewhere. Indeed current demands are highly dependent on transfers of water into the Plan area via the Ely Ouse Scheme. As demands rise, enhancements to the scheme will need to be considered along with other resource development options. The 'Regional Water Resources Strategy', produced in 1994 expands upon these options. However, there is a need for a full review in the light of recent developments and the implications of climate change. For more details of Development and Water Supply, please refer to Protection Through Partnership, Section 4.1 on Page 57.

Options	Responsibility	Advantages	Disadvantages
1. Educate people to use the water supply better.	Environment Agency, Water Companies	Better use of water. Reduce water consumption.	Cost. Timescale (slow process).
2. Demand management, including improved leakage control.	Environment Agency, Water Companies, OFWAT	Better use of existing water resources. Long term strategy. Delays in Capital expenditure for future resource development. Reduced and efficient use of water supplies.	Constrained by limited resources. Cost. One-off short term measure.
3. Re-use of effluent (see Issue 1h).	Environment Agency, Water Companies, Industry	Additional use of limited water resources.	Public opposition.
4. Increased metering of domestic customers.	Water Company	Better use of water.	Cost and acceptability. Adverse reactions.

Options	Responsibility	Advantages	Disadvantages
5. Additional reservoir storage.	Environment Agency, Water Companies, Industry	Strategic use of water resources. Long term solution. Multiple benefits.	Cost. Transportation and distribution of water. Financing. Public concern.
6. Better utilisation of under-used and unused licences.	Environment Agency, Licence Holders	Better management of existing water resources.	Complex licence issues. Cost. Potential environmental consequences.
7. Grey-water systems.	Water Companies, Industry, Public	Strategic use of water.	Cost to install. No existing infrastructure.
8. Desalination.	Water Companies, Industry	Development of new resource.	Cost. Quality. Limited experience in the UK.
9. Increase transfers into the area.	Environment Agency, Water Companies, Industrial and Agricultural Consortiums	Increase resource availability.	Cost. Timescale. Public concern around area of transfer. Uncertain environmental impact.
10. Aquifer storage and recovery.	Water Companies	Strategic storage of existing/available water resources.	Complex licence issues. Cost. Limited experience in the UK.
11. Implications of doing nothing.		No financial cost.	Inadequate water resources.

Issue 1f: Need to review the operation, efficiency and environmental impact of the Stour Augmentation Groundwater Scheme (SAGS).

Background

Despite pre-licensing investigations and post-operational experience the Environment Agency would prefer to have a better understanding of the flow mechanisms before and after pumping, the impact of abstraction on the environment and other users, as well as the effectiveness on operational net gain at meeting downstream flow targets. The operation of the SAGS has also been constrained by alleged impacts of abstraction and the licence conditions which enforces a fifteen year aggregate total that could be exceeded within a five year drought period.

Options	Responsibility	Advantages	Disadvantages
1. Review existing data and collate a common database.	Environment Agency	Collates all information.	Does not improve understanding of flow mechanisms or impact of abstraction.
2. Establish hydrogeological framework and estimate the impact, effectiveness and efficiency of operation.	Environment Agency	Improved understanding of flow mechanisms or impact of abstraction.	Relies on completion of Option 1.
3. Undertake strategic management scenarios and review implications of results.	Environment Agency	Strategic management of water resources. Better position to assess impacts. More robust approach.	Relies on completion of Option 2.
4. Establish control rules for operation.	Environment Agency	Better use of water resources. Improved efficiency. Value for money.	Difficult to establish effective control rules.
5. Implications of doing nothing.		No financial cost.	Continued ad hoc approach to dealing with problem. Limited understanding of the system.

Issue 1g: Current groundwater level monitoring is inadequate.

Background

The Environment Agency collects groundwater level data routinely to support many of its core activities. Principally, data is required to establish the state and condition of groundwater resources, to determine the current availability and to predict future availability. In addition, greater emphasis is being placed on groundwater level data to be used in strategic water management, especially during continued drought events.

Unlike surface water, groundwater is hard to visualise and difficult to assess without proper infrastructure. The location, extent, slope and direction of flow cannot be understood from the surface without proper monitoring boreholes or wells. Groundwater may not flow in the same direction as the surface topography and can be influenced by features such as rivers, abstraction and the changes within the groundwater aquifer, as well as being controlled by the topography of the base of the aquifer.

As part of its routine monitoring programme, the Environment Agency has many groundwater level monitoring boreholes developed over many years of unplanned development. The boreholes are measured monthly and the data are placed onto an archive database. It is from this database that various trends and resource availability can be assessed.

However, the effectiveness of the groundwater level monitoring depends on the monitoring network. At present it is considered that the monitoring network is inadequate and that the effectiveness of interpretation is impaired. This situation is accepted to be the case for all the aquifer systems in the Plan area.

Anglian Region has initiated a programme of formally reviewing the monitoring networks for all aquifers, including this Plan area. Initially the review will determine if there is sufficient monitoring based on an agreed minimum network density. At the same time, a Research and Development (R&D) project is to be advanced, which will determine the ideal monitoring network based on many contingent variables.

Options	Responsibility	Advantages	Disadvantages
1. Review monitoring network based on minimum criteria.	Environment Agency	Network to an agreed standard. Better understanding of groundwater resources and availability.	Cost of 'filling in the gaps'. New network may not take into consideration localised features.
2. Review network based on R&D findings.	Environment Agency	Monitoring network properly takes into account Environment Agency's duties and responsibilities. Better understanding of groundwater resources and availability.	Cost of 'filling in the gaps'. New network may not take into account localised features. Timescale. Uncertainty if new methodology will work.
3. Implications of doing nothing.		No financial cost.	Monitoring remains inadequate.

Issue 1h (Part 1): Effects of the re-use of treated effluent from Chelmsford Sewage Treatment Works.

Background

The Chelmer Augmentation Scheme (CHAS) is primarily a water resource scheme to redistribute and re-use treated effluent to increase water resource availability for meeting future demands, rather than be discharged to the estuary via a dedicated pipeline and constituting a net loss of the resource. Essex and Suffolk Water are investigating several options to redistribute effluent from the Chelmer Sewage Treatment Works, including direct discharge into Hanningfield Reservoir as well as augmenting the River Chelmer to allow for increased abstraction downstream at Langford. Both these options mean that the current discharge into the Blackwater Estuary would substantially reduce, and in turn may have an overall environmental effect.

Whichever option is considered, the Environment Agency shall require a holistic approach to environmental protection and impact assessment. For example, if redistribution via the river network is considered then we would be seeking to ensure that the stretch will continue to comply with its current RE target class and show no deterioration in any other parameters (*e.g.* bacteriological). Similarly, any direct discharge into the reservoir will require the effluent to be treated to an acceptable standard. Currently Essex and Suffolk Water have a drought contingency measure which redirects effluent to Hanningfield Reservoir, as part of an eighteen month investigation. The Consent to discharge expires towards the end of 1998. It is likely that development of either scheme in the long-term will involve a public enquiry.

Options	Responsibility	Advantages	Disadvantages
1. Discharge majority of effluent to Hanningfield Reservoir.	SEE ISSUE 1h (Part 2)		
2. River Gravel recharges.	Essex and Suffolk Water, Environment Agency, Anglian Water Services	Additional source of water to meet future demands. Good use of water resources.	Net gains uncertain, making regulation difficult. Cost.
3. River augmentation.	Essex and Suffolk Water, Environment Agency, Anglian Water Services	Additional source of water to meet future demands. Good use of water resources.	Net gains uncertain, some regulation difficult. Cost.
4. Implications of doing nothing (discharge effluent directly into the estuary).	Anglian Water Services, Essex and Suffolk Water	No additional cost. Potential waste of water resources.	Additional demand for water to be met from other scarce resources. Loss of precious resources.

Issue 1h (Part 2): Effects of the direct discharge of treated effluent from Chelmsford Sewage Treatment Works into Hanningfield Reservoir.

Background

The drought period of 1995 - 97 has resulted in Essex and Suffolk Water becoming increasingly concerned about their ability to supply water to the population of south Essex. The reserves in Hanningfield Reservoir were exceptionally low during 1997, demonstrating the vulnerability to long, dry periods and Essex and Suffolk Water's fragile balance between available water resources and demands. Essex and Suffolk Water are currently having a hosepipe ban in their area to conserve resources. They have also approached the Environment Agency and requested that they be permitted to discharge a proportion of the fully treated effluent from Chelmsford STW directly into the reservoir, after mixing it with river water. Consent was granted in July 1997 subject to conditions which include;

- the effluent to be subjected to UV disinfection;
- tight sanitary standards;
- limits on any identified dangerous substance;
- a rigorous data collection, analysis and reporting programme; and,
- consent was time limited until December 1998.

Essex and Suffolk Water have approached the Environment Agency again with the proposal to extend the time limit until the CHAS Scheme (see Issue 1h [Part 1]) is fully operational, probably in two or three years time. This proposal is currently being considered by the Environment Agency. Essex and Suffolk Water have employed Consultants to do a full Environmental Assessment and undertake modelling to determine what standards would be required to fully protect the reservoir should the discharge continue for several years.

Options	Responsibility	Advantages	Disadvantages
1. Revoke the consent at the earliest opportunity.	Environment Agency	Stops sewage effluent from entering reservoir.	May result in shortage of water.
2. Continue with current consent conditions.	Essex and Suffolk Water	No financial cost.	Public opposition.
3. Impose more rigorous consent conditions from Jan 1999.	Environment Agency, Anglian Water Services, Essex and Suffolk Water	Ensures long term uses and objectives of reservoir.	Cost.
4. Refuse an extension time limit.	Environment Agency	Stops sewage effluent from entering reservoir after December 1998.	May result in shortage of water if drought conditions continue.
5. Implications of doing nothing.		No financial cost.	Threat of inadequate water supply to south Essex.

We will:

- play a full part in implementing the EC *Habitats Directive*;
- play a full and active part in delivering the UK's Biodiversity Action Plan by acting as the 'contact point' for twelve species of aquatic animals and plants, and by acting as the 'lead partner', either singly or in collaboration with others, for ten of them;
- ensure that all aspects of the Biodiversity Action Plan are incorporated into the Agency's guidance and become part of its Local Environment Agency Plans;
- implement a series or regional projects, in partnership with local conservation groups, to deliver biodiversity targets at specific sites;
- allocate specific resources to conservation projects aimed at increasing biodiversity;
- control eutrophication, where feasible, in order to enhance biodiversity;
- improve the management of wetlands for conservation purposes;
- use and promote best environmental practice for the protection and restoration of river habitats;
- develop and set conservation criteria for all of the Agency's environmental licensing activities;
- implement specific projects to restore habitats in rivers and lakes, increase the area of reedbeds and other water plants, and improve river banks;
- 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; and,
- carry out research into the management of species in the aquatic environment in order to meet fully all biodiversity action plan targets.

Issue 2a: The need to better understand the requirements of headwaters in the Plan area.

Background

Headwaters of rivers contribute significantly to their biodiversity. There are, for instance, many macro-invertebrates that are exclusive to, or predominantly found in headwaters (a number of these species are rare). Similarly headwaters can provide valuable habitat. Our knowledge of the status of headwaters in the Plan area is very limited, as is our understanding of the impact of agricultural practices, water quality and resource issues.

Options	Responsibility	Advantages	Disadvantages
1. Assess the level of data on headwaters and identify priorities for completing species level surveys of selected headwaters.	Environment Agency	Fulfilment of conservation and fisheries duties. Protection of riverine biodiversity.	Increased timescale.
2. Identify a strategy for the protection of headwaters.	Environment Agency	Fulfilment of conservation and fisheries duties. Protection of riverine biodiversity.	Long timescale.
3. Implications of doing nothing.		No staff time.	Headwaters will not be protected.

Issue 2b: Requirement to improve habitat diversity within rivers and their floodplains.

Background

Until recently, river management across the Region was driven by agricultural policies to improve drainage within the floodplain and hence maximise the production of cereals. These activities have resulted in the loss of many in-channel and floodplain habitats. It is typically the case for the North Essex Plan area that most rivers are suffering from a lack of habitat diversity. Recent changes in land-use policies, as a result of reforms to the Common Agricultural Policy and the introduction of the Essex Coast Environmentally Sensitive Area (ESA) Scheme, provide the potential to restore the ecology of some sections of the rivers through a variety of enhancement techniques, where this does not undermine agricultural land-use in the floodplain.

A study will soon be carried out on the River Blackwater to identify restoration proposals that will result in significant ecological improvements to the river channel. Many of the proposals will be aimed at physical enhancements that will have a neutral or even beneficial impact on the standards of flood defence in the catchments.

To achieve Biodiversity Action Plan targets for riverine species (e.g. otters, water voles and crayfish) improvements will be required to a number of riverine habitats. These have been identified as Options below. At the time of this Plan going to print, the Biodiversity Action Plans are at their consultation stage and, once finalised, we will endeavour to reach the targets set.

Options	Responsibility	Advantages	Disadvantages
1. Identify and implement river/ floodplain restoration projects and habitat enhancements.	Environment Agency, Conservation bodies	Fulfils duties under legislation to further conservation.	Cost.
2. Identify specific enhancements to improve fish habitat and spawning sites.	Environment Agency, conservation bodies	Fulfils duties under legislation to maintain, improve and develop fisheries.	Cost.
3. Implications of doing nothing.		No financial cost.	Habitat diversity not improved.

We will:

- secure a more robust funding base for fisheries management by improved marketing and the setting of fair charges to anglers;
- review the economic basis of fisheries management;
- introduce a standard fisheries classification scheme;
- monitor every river fisheries over a five year rolling cycle;
- restore spawning grounds for freshwater fish;
- implement a programme of minimum acceptable flows for rivers;
- develop specific longer-term strategies for salmon, trout and coarse fisheries;
- reduce poaching to a minimum and bring rod licence evasion to under 10%;
- consider the likely costs and benefits of fixed penalty fine schemes for rod licence offences;
- consider the desirability of introducing mandatory rod licence display systems; and,
- research into the factors which affect the viability of our unique freshwater fisheries populations.

Issue 3a: Investigate and, where possible, ameliorate failures in fisheries biomass targets.

Background

A number of river stretches in the North Essex Plan area fail to achieve their fisheries biomass target class. Current failures occur on parts of the Rivers Stour, Glem, Colne and Blackwater, together with the whole of the Ramsey River, Asheldham Brook and Holbrook (see Map 3). These failures require investigation to determine the contribution to failure made by natural processes, to ensure that the target classes are appropriate and to identify any remedial measures which may be necessary.

Options	Responsibility	Advantages	Disadvantages
1. Investigate failures in fisheries targets, confirm that the targets are appropriate and identify remedial measures.	Environment Agency	Complies with Environment Agency duties and legislation.	Cost.
2. Where appropriate, implement remedial measures.	Environment Agency	Complies with Environment Agency duties and legislation.	Cost.
3. Implications of doing nothing.		No financial cost.	Continued failure of targets.

Fisheries Biomass – Target Failures

Map 3

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Failed to meet target class (1995–97 survey cycle)

February 1998

Issue 3b: Concern over an adverse impact on angling success in the receiving Rivers Stour and Pant/Blackwater due to the operation of the Ely Ouse to Essex Water Transfer Scheme.

Background

It is frequently claimed by the angling community that operation of the Ely Ouse Scheme, particularly at high and/or very variable rates, has an adverse impact on angling catches in the receiving rivers. This possibility has been brought into sharp focus by the drought conditions of recent years, which have seen the scheme operating on an unprecedented scale. The effect on angling success may be present irrespective of whether or not there is any impact on the scale and composition of the fish stocks themselves.

Options	Responsibility	Advantages	Disadvantages
1. Evaluate angling catch data to determine if any adverse impact can be identified.	Environment Agency, Angling Clubs	Complies with Environment Agency duties and legislation. Determines if perceived problems are real or imaginary and evaluates their scale.	Good quality angling catch data in a form suitable for analysis is very hard to obtain and can only be supplied by Angling Clubs with detailed and long term angling match records. Cost.
2. Do not operate transfers at high and/or variable rates.	Environment Agency, Essex and Suffolk Water	Removal / reduction of known sources of concern and complaint.	Possibly unacceptable constraint on the use of the scheme to secure public water supply. May not be necessary if no actual link exists between scheme operation and angling success.
3. Implications of doing nothing.			Continued possibility of unacceptable adverse impacts.

Issue 3c: The current distribution of river reaches designated under the *EC Freshwater Fisheries Directive* does not adequately reflect the distribution of important fish stocks for which protection is required.

Background

The designations of river reaches requiring protection in accordance with the *EC Freshwater Fish Directive 78/659/EEC* have not been subject to critical review since 1986. It is known that the current designations do not include all river reaches regarded as important for their fish stocks (see Map 22 and Appendix 2 for relevant key statistics). Consequently, these stocks are not protected to the best available standards under EC law. This Issue affects all of the catchments in the Plan area, but is also a national issue.

Options	Responsibility	Advantages	Disadvantages
1. Review existing designations and recommend revision as required.	Environment Agency	Complies with Environment Agency duties and legislation. Increases the proportion of fish populations protected by the *EC Freshwater Fish Directive.*	Cost. Could lead to increased monitoring and reporting commitments. May impact on other river uses - particularly effluent discharges. Could lead to a requirement for substantial investment by (some) dischargers to ensure that standards are met.
2. Implications of doing nothing.		Maintains the *status quo.*	Does not provide the best level of water quality protection available for freshwater fisheries

We will:

- manage river-basins in an integrated way, via Local Environment Agency Plans;
- ensure that all waters are of sustainable quality for their different uses;
- deliver a continual improvement in overall water quality;
- provide effective flood defence;
- provide an effective flood warning system;
- increase the numbers of rivers and still waters capable of supporting viable fisheries;
- enhance and conserve inland navigations, as national assets of environmental, economic, social and recreational value;
- secure the most appropriate legislation, management systems and financial arrangements to ensure the sustainability of our navigational waters;
- work with others to improve and develop inland waterways as an integrated network;
- improve river habitat quality, as measured by river habitat surveys;
- improve wetland management;
- improve riverside landscapes;
- improve bathing water quality;
- improve estuarine waters for shellfisheries;
- increase the number of Agency-owned sites available for public recreation; and,
- work with local authorities to maximise the conservation and recreational use and value of our river-basins.

Issue 4a: A number of river stretches fail to achieve their existing River Ecosystem (RE) target class for reasons which have yet to be fully established.

Background

A number of river stretches have a history of poor water quality, either for dissolved oxygen or for dissolved oxygen combined with other parameters (see Table 1). The failure to achieve the assigned RE target cannot be directly attributed to natural factors and, hence, further investigation is required.

Options	Responsibility	Advantages	Disadvantages
1. Carry out further investigations to ascertain reasons for failures.	Environment Agency	Quantifies problem.	Cost.
2. Instigate a pollution prevention campaign.	Environment Agency	Potential for elimination of input sources.	Cost. Time involved to educate.
3. Implications of doing nothing.		No financial cost.	Continued failure of RE target.

TABLE 1: SUMMARY OF THOSE STRETCHES WITH LONG TERM NON COMPLIANCE AGAINST THE RIVER ECOSYSTEM TARGET WHERE FURTHER INVESTIGATIONS ARE REQUIRED

Issue	River	Stretch	Parameter failure (& target)	Longevity of RE non compliance (based on 84-96 data)	1996 GQA Biological Classification	Comments regarding non compliance
4a	Stour	Newmarket Foods Ltd to Stour Brook	Un-ionised ammonia (RE3)	Long-term	a	Discharge from Newmarket Foods in combination with Ely Ouse water. Trade effluent discharge compliant with RNC ammonia limit. Investigation required to determine impact of un-ionised ammonia.
	Salary Brook North Tributary	Blue Barns Farm to Ardleigh Reservoir	Dissolved Oxygen (RE3)	Long-term	e	Low flows. Septic tank discharges to be identified and eliminated
	Roman River	Essex and Suffolk Water Co Dam to Manwood Bridge (Abberton)	BOD, Ammonia and Dissolved Oxygen (RE1)	Long-term	b	Requires investigation. Prepare model of river to determine interaction of several discharges
	Layer Brook	Rockingham Farm to Abberton Reservoir	Dissolved Oxygen (RE3)	Long-term	e	Requires investigation. May require a pollution prevention campaign.
	West Dyke	Brightlingsea to West Dyke Sluice	Dissolved Oxygen (RE4)	Long-term	not sampled	Low flows Storm overflows now resolved. Await results of monitoring impact.
	River Brain	Braintree STW to Bulford Mill	BOD (RE3)	Long-term	d	Urban runoff. Braintree STW not on RNC, but is an AMP3 candidate.

Issue	River	Stretch	Parameter failure (& target)	Longevity of RE non compliance (based on 84-96 data)	1996 GQA Biological Classification	Comments regarding non compliance
4a	River Blackwater	Wickham Bishops to Langford	Dissolved Oxygen (RE2)	Long-term	b	Eutrophication caused by sewage effluents, agriculture and the Ely Ouse scheme. Also industrial estate and highway drainage from Braintree and Witham may contribute.
	Roxwell Brook	Newlands Brook to River Can	Dissolved Oxygen (RE2)	Long-term	b	Low dilution of sewage effluent and agricultural run-off. Pollution prevention campaign advised.
	River Can	Roxwell Brook to River Wid	Dissolved Oxygen (RE2)	Long-term	a	Low dilution of sewage effluent and agricultural run-off. Pollution prevention campaign advised.

Issue 4b: A number of river stretches fail to achieve their existing River Ecosystem (RE) target class due to factors that cannot be attributed to point-source pollution.

Background

This issue relates to river stretches where the principle reason for failure against RE target is for dissolved oxygen and a review of the data has shown that dissolved oxygen levels have not deteriorated over the last fifteen years. Only sites which have no significant consented effluents upstream of the sample point have been included in this category.

The lower levels of dissolved oxygen measured are not associated with pollution but are a result of the lowland nature of the rivers. River flows are often naturally low, resulting in slow flowing watercourses with little re-aeration occurring. This may be further exacerbated by increased nutrient levels resulting in increased vegetation and algal growth - eutrophication. The presence of high concentrations of algae cause large fluctuations in dissolved oxygen levels and elevated biochemical oxygen demand (BOD) results.

Hence, at a number of sites dissolved oxygen levels achieve values substantially lower than the assigned target (see Table 2). The other measures of water quality readily achieve the RE target. In these rivers it is improbable that the targets will ever be achieved for the reasons given above. Table 2 shows the levels of dissolved oxygen currently measured against the RE target.

As these oxygen levels are historically those that were sustained in these low flow rivers, the ecology and fish community have adapted and we have no reason to believe from our biological monitoring that adverse impacts have taken place.

Options	Responsibility	Advantages	Disadvantages
1. Introduce a derogation for dissolved oxygen but ensure that 'no deterioration' policy applied.	Environment Agency	RE compliance achieved. BOD and ammonia will not deteriorate.	None.
2. Reconsider length of classified rivers in light of flow criteria.	Environment Agency	Focus monitoring and management on significant stretches.	Change in length of classified river.
3. Downgrade River Ecosystem target.	Environment Agency	RE compliance achieved for all parameters.	Downgrading of other compliant parameters, may permit deterioration of existing quality for BOD and Ammonia.
4. Initiate investigations into oxygen loss routes in river systems.	Environment Agency	Understanding of natural processes with the river systems.	Topic area currently not defined. Cost.

Options	Responsibility	Advantages	Disadvantages
5. Introduce physical structures with re-aeration characteristics, e.g the reinstatement of natural riffles.	Environment Agency	Improve chemical and biological quality.	Lack of gradient. Cost.
6. Implications of doing nothing.		None.	Continuing non-compliance.

TABLE 2: SUMMARY OF THOSE STRETCHES WITH LONG TERM NON COMPLIANCE AGAINST THE RIVER ECOSYSTEM TARGET THAT CANNOT BE ATTRIBUTED TO POINT-SOURCE POLLUTION.

Issue	River	Stretch	Parameter failure (& target)	Longevity of RE non compliance (based on 84-96 data)	1996 GQA Biological Classification	Comments regarding non compliance
4b	Stour Brook	Withersfield to Haverhill STW	Dissolved Oxygen (RE3)	Long-term	d	No river flow at time
	Stour	Flatford Mill to Cattawade	Dissolved Oxygen (RE3)	Long-term	not sampled	Eutrophication
	River Glem	Glemsford STW to Glemsford Flume	Dissolved Oxygen (RE2)		b	Cause unknown. STW compliant with RNC.
	Chad Brook	Chadacre to Shimpling STW Shimpling STW to Acton	Dissolved Oxygen (RE3) DO and BOD (RE1)	Long-term	d c	At times little or no flow is available upstream to dilute STW effluent. Consideration needs to be given to appropriateness of river quality targets.
	Chad Brook	Acton to River Stour	Dissolved Oxygen (RE1)	Long-term	a	Low flows. Inappropriate target
	Old River Brett	Brettenham to Chelsworth	Dissolved Oxygen (RE2)	Long-term	b	Low flows
	Lavenham Brook	Cockfield to Lavenham STW	Dissolved Oxygen (RE3)	Recent	d	Low flows
	Lavenham Brook	Lavenham STW to Old River Brett	Dissolved Oxygen (RE2)	Long-term	b & a	Low flows. Intermittent farm pollution eliminated
	River Brett	Kersey Brook to Shelley	Dissolved Oxygen (RE2)	Long-term	a	unknown

Issue	River	Stretch	Parameter failure (& target)	Longevity of RE non compliance (based on 84-96 data)	1996 GQA Biological Classification	Comments regarding non compliance
4b	Ramsey River	Ramsey to Dock Sluice	BOD and Dissolved Oxygen (RE3)	Long-term	b	Eutrophication
	Holland Brook	Thorpe STW to Fan Bridge	Dissolved Oxygen (RE4)	Long-term	c	Eutrophication. Low flows
	Holland Brook	Fan Bridge to Holland Sluice	Dissolved Oxygen (RE3)	Long-term	c	Eutrophication. Low flows
	Colne	Ridgewell to Hedingham STW	Dissolved Oxygen (RE2)	Long-term	c & b	Eutrophication. Low flows. Duckweed
	Toppesfield Brook	Toppesfield to River Colne	Dissolved Oxygen (RE3)	Long-term	c	Dries out
	Bourne Brook	Gosfield Lake to Sparrow Pond Outlet	BOD and Dissolved Oxygen (RE2)	Long-term	d	Low flows. Eutrophic flow from lake. Review whether sampling point is appropriate.
	River Pant	Radwinter Bridge to Finchingfield Brook	BOD and Dissolved Oxygen (RE2)	Long-term	c	Dries out without Ely Ouse Eutrophic with Stour transfer.
	River Chelmer	Armitage Bridge to Great Easton Tributary	Dissolved Oxygen (RE1)	Long-term	a	tight target
	River Ter	Headwaters to Great Leighs STW	Dissolved Oxygen (RE1)	Long-term	b	Unknown Possibly low flows
	River Chelmer/Long Pond	Langford to Heybridge Basin	BOD (RE3)	Long-term	b	Eutrophication. Tide-locked for part of tide cycle.

Issue 4c: Exceedance of *EC Surface Water Directive* nitrogen limit at public water supply intakes on the River Stour at Langham and Stratford St. Mary.

Background

All the four public water supply intakes, used for direct supply, have a long history of failing to meet the *EC Surface Water Abstraction Directive* for nitrogen (see Table 6 on Page 101). The source of the nitrogen is predominantly agricultural, but sewage effluent also contributes a small but consistent load. To control the agricultural source the Rivers Blackwater, Brain and Chelmer have been designated as Nitrate Vulnerable Zones (NVZs) and it is proposed that the River Stour will follow. The decision to designate the southern rivers was challenged in the British courts and a decision is currently awaited from the European Court. Should designation be confirmed, farmers will be required to regulate the application of nitrogen to their fields.

Under the *EC Urban Waste Water Treatment Directive* the same rivers have been designated as Sensitive Areas (Nitrate) [SA(N)]. This will require nitrogen removal at all qualifying discharges (sewage treatment works serving populations greater than 10,000 people). This is not a simple or cheap procedure and the DETR has asked that Anglian Water undertake operational investigations to assess the feasibility. This work is currently underway.

Options	Responsibility	Advantages	Disadvantages
1. Police Nitrate Vulnerable Zones and monitor fertiliser input by farmers.	MAFF, Environment Agency	Regulates nitrogen fertiliser use.	Cost. No control over point sources.
2. Await outcome of the judicial review (with European Court of Justice).	DETR, Environment Agency	National policy confirmed.	Time. No control over point sources.
3. determine nitrogen loads discharged from all sources.	Anglian Water Services, Private Dischargers	Determines nitrogen sources.	Time. Cost.
4. Consent nitrogen loads from STWs.	Environment Agency, Anglian Water Services	Limits nitrogen arising from STWs.	Processes cannot achieve targets. Appeals likely to be upheld. Cost.

Options	Responsibility	Advantages	Disadvantages
5. Do not use intakes for direct water supply.	Environment Agency, Water Companies	Nitrogen need not be limited. Cost to dischargers.	Significant cost to water supply companies for re-configuring their infrastructure. Reservoir sources will be unable to cope with extra demand. Potable loss in water resource.
6. Implications of doing nothing.		No financial cost or time.	Failures for nitrogen continue.

Issue 4d: Flood Risk at and downstream of Braintree from the River Brain is currently unacceptable.

Background

Options for flood protection need to be assessed to reduce the risk of flooding in Braintree. Increased run-off from recent industrial/residential developments and highways has increased the pressure on the river to carry flood flow.

As with many urban areas, drainage systems in Braintree suffer from the high volumes of storm water run-off which place increasing pressure on the finite infrastructure and river channels. The growth of impermeable areas associated with new development and the tendency for increased intensity of rain storms add to this pressure. Furthermore, the quality of this run-off is often poor and detrimental to the well-being of the streams and watercourses. Diversion of such flows to the foul sewerage is both costly and prejudicial to the effective performance of the treatment works to which it would be conveyed. Alternative control and disposal needs to be developed to reduce the demands on the drainage system. To this end, a management framework based on integrated river catchment and drainage planning would allow development and coordination of local strategies.

Options	Responsibility	Advantages	Disadvantages
1. Partnership with developers and local authority.	Environment Agency, Developers, Braintree District Council	Coordinated approach. Reduction of flood risk and pollution downstream. Recharge of aquifers.	Cost.
2. Flood park upstream of Bulford, or balancing ponds with primary conservation aim.	Environment Agency, Braintree District Council, Landowners	Enhancement of the environment. Balances flow. Constructed to enhance conserv-ation and recreation.	Cost.
3. Implications of doing nothing.		No financial cost.	Continued flooding and pollution.

Issue 4e: There is a need to fund, coordinate and carry out repairs to private structures.

Background

Within the catchment there are a large number of water mills which are of varying but considerable age, and within the next 50 years it is thought that they will all fail as water retaining structures unless maintained and renovated, or bypassed with new structures. There are over 80 such mills and the effects of their demise and loss of retained water level would be considerable in terms of amenity, landscape value and also from the point of view of environmental and recreational interests. The mills themselves usually involve a minimum of four separate structures - floodgates, control gates, weirs and mill head banks. Of the 85 mills within the Plan area, the Environment Agency hold the Mill Rights to nineteen and can be considered to have some responsibility for the maintenance of the structures.

Responsibility for refurbishment of these structures lies with the owner of the Mill Rights or the Navigation Authority (this is especially important on the River Stour where the Environment Agency is the Navigation Authority).

Options	Responsibility	Advantages	Disadvantages
1. Buy out the Mill Rights.	Environment Agency	Coordinated management of rivers.	Cost.
2. Keep repairing and funding.	Environment Agency, Landowners	Maintain millheads and environmental consequences.	Cost.
3. Secure funding and build a programme of automating all the gates.	Environment Agency	Coordinated management of rivers.	Increased maintenance.
4. Implications of doing nothing.		No repairs. No cost.	Eventual loss of floodgates (lifespan of 30 years). Loss of habitat. Possible local flooding if a Mill Gate jams shut.

Issue 4f: Eutrophication of the lower River Stour and failure to achieve its predicted biological score.

Background

The River Stour is considerably eutrophic in its lower reaches. This is caused by the input of nutrients from discharges and farmland but is exacerbated by the Ely Ouse Scheme which elevates nutrients and introduces diatoms and algae. When these diatoms and algae bloom they cause large fluctuations in dissolved oxygen concentration and significantly alter the biological balance of the river.

This has resulted in the river being proposed for designation as a Sensitive Area (eutrophic) [SA(E)] and Sensitive Area (Nitrate) [SA(N)] under the *EC Urban Waste Water Treatment Directive*. If designated, this will result in phosphorus and nitrogen loads being reduced at sewage treatment works serving populations of greater than 10,000 people.

Options	Responsibility	Advantages	Disadvantages
1. Research programme to investigate the chemical and biological aspects of the Ely Ouse Scheme transfer through trials and monitoring.	Environment Agency	Provides adequate data to study problem.	Does not solve problem.
2. Provide phosphorus removal at STWs discharging to the River Stour.	Environment Agency, Anglian Water Services	Reduces phosphorus loading. Contributes to solution.	Cost. Unlikely to solve problem in short term.
3. Model algal dynamics and nutrient sources caused by transferring water from a lowland river into headwaters of another.	Environment Agency	Understanding of system and development of a control strategy.	Cost. Time. Does not solve problem.
4. Implications of doing nothing.		No financial cost or time.	River Stour is eutrophic.

Issue 4g: Concern over the regulation of river levels and flows associated with the operation and possible increased use of the Ely Ouse to Essex Transfer Scheme.

Background

When the Ely Ouse Scheme is operating at full capacity (which it tends to do in drought years during the winter months) the flow in the river is markedly greater than the natural flow. This flow results in an increased physical pressure on the river channel which shows evidence of erosion and flooding at certain locations.

Options	Responsibility	Advantages	Disadvantages
1. Regulate flow to enable a better regime.	Environment Agency, Essex and Suffolk Water	Regulates flow. Removal/reduction of known sources of concern or complaint.	Cost. Possibly unacceptable constraint on the use of the Scheme to secure public water supply.
2. Automate the gates.	Environment Agency, Essex and Suffolk Water	Simplifies procedures.	Destroys historic value of site - some are listed structures. Does not eliminate the problem.
3. Bank strengthening.	Environment Agency, Riparian Owner	Reduction of erosion.	Cost and maintenance.
4. Transfer load (spread out load to other rivers to ease the burden).	Environment Agency, Essex and Suffolk Water	Eases the burden.	Potentially spreads the problem. Cost.
5. Parallel channels around the pinch points.	Environment Agency, Essex and Suffolk Water	Eases the burden on the channel.	Cost. Physically impossible in some areas.
6. Implications of doing nothing.		No financial cost.	Increased physical pressure on the river channel and continued possibility of unacceptable adverse impacts.

Issue 4h: Impact of the effluent discharge from Colchester Sewage Treatment Works on the quality of the Colne estuary.

Background

The estuary fails its target class for ammonia along the stretch from Colchester to Colne Point and has the poorest water quality of all the estuaries in the Eastern Area. Anglian Water are currently modifying Colchester Sewage Treatment Works to improve the quality of the discharge. We are optimistic that before long the estuary quality will significantly improve.

Options	Responsibility	Advantages	Disadvantages
1. Monitor for improvement.	Environment Agency	Determines improvements.	Cost.
2. Stepped improvements to STW.	Anglian Water Services	No wasted cost.	Time.
3. Consider alterations to discharge location.	Anglian Water Services, Environment Agency	Eliminates problem.	Cost.
4. Effluent reuse.	Anglian Water Services, Environment Agency	Eliminates problem. Provides extra resource.	Cost.
5. Major modification to STW.	Anglian Water Services	Provide much improved treatment.	Cost. Long run-in time.
6. Implications of doing nothing.		No financial cost or staff time.	Continued failure of target class for ammonia.

Issue 4i: Failure to meet *EC Bathing Water Directive* limit for bacterial criteria.

Background

The North Essex Plan area has nine bathing waters designated under the *EC Bathing Water Directive*. Historically, many of these have failed the Guideline Levels (GL) set by the *Directive* and in some instances, failure of the Mandatory Levels (ML) also occurred. Major capital expenditure by Anglian Water Services has provided treatment for those discharges of sewage into coastal waters such that all now comply with the GL values. There remains, however, a few occasions when bacterial levels are higher than normal, although below the GL values, indicating possible contamination from intermittent discharges. Such events threaten the award of a Blue Flag for bathing water quality which has significance for the local economy.

Options	Responsibility	Advantages	Disadvantages
1. Carry out investigative surveys.	Environment Agency	Helps with solving problem.	May not identify the source because of the intermittent nature of the problem.
2. Control point sources.	Environment Agency, Anglian Water Services, Traders	Eliminates some inputs.	Cost to responsible organisations.
3. Implications of doing nothing.		No financial cost.	Failures may arise.

Issue 4j: Concern over potential deterioration of river water quality, where present effluent quality is better than the current legal consent.

Background

Effluent quality is controlled by the current Legal Consent. Dischargers are required to ensure effluent quality is compliant. In some situations a sewage treatment works may be producing an effluent quality that is considerably better than the Legal Consent, termed 'over-performing'. In this situation there is a risk that the effluent quality from these 'over-performing' works may deteriorate to the legal consent standard and potentially cause a failure of water quality targets downstream.

A number of selected STWs were checked for over-performance by looking at the impact on downstream water quality if the discharge were at its legal consented load. Where this showed there would be an adverse effect on downstream river quality, these works are listed in Table 3. The 'Index of Over-Performance' is also presented to give a numerical measure of how far current effluent quality is from its Legal Consent limit. For each STW the Index of Over-Performance for a particular determinand is given. A high value indicates that current effluent quality is significantly better that the Legal Consent limit, compared to a low value which indicates current effluent quality is close to its Legal Consent limit.

Table 3:Over-Performing STWs

STW	Receiving Watercourse	Index of over-performance		RE Target Class	Potential Class*
		BOD	Ammonia		
Great Leighs	River Ter	56	33	RE1	RE3
Rayne	River Brain	58	-	RE2	RE5
Bocking	River Blackwater	82	-	RE2	RE4
Boxford	River Box	65	77	RE2	RE4
Long Melford	River Stour	38	75	RE2	RE3
Halstead	River Colne	73	44	RE2	RE3
Langham	Black Brook	59	94	RE3	RE5
Nayland	River Stour	85	-	RE3	RE5
Braintree	River Brain	58	55	RE3	RE5
Haverhill	Stour Brook	37	41	RE3	RE5
Bildeston	Bildeston Brook	81	-	RE3	RE5
Birch	Birchwood Brook	69	50	RE4	RE5

* indicates the likely RE class should the STW quality deteriorate to a point where it just complies with its legal consent

\- indicates that STW is not over-performing for this parameter

Additionally a number of STWs which discharge into rivers that are designated under the *EC*

Freshwater Fish Directive do not currently have a consent limit for ammonia and hence, the river is at risk of failing the *Directive* ammonia standard. It is our intention to introduce ammonia limits at the earliest opportunity.

STW	Receiving Watercourse
Clare	River Stour
Stisted	River Blackwater
Rivenhall End	River Blackwater
Shimpling	Chad Brook
Nayland	River Stour
East Bergholt	River Stour

Options	Responsibility	Advantages	Disadvantages
1. Develop priority listing based on impacts, with subsequent need to impose River Needs Consent (RNC) in the next AMP3 review.	Environment Agency, Anglian Water Services	Target river class is maintained through cost effective investment.	RNC may not be supported by statutory objective.
2. Implications of doing nothing.		No financial cost.	Risk of a failure of river target class will continue.

We will:

- influence the Town and Country Planning Systems to prevent developments in the wrong places;
- implement the Flood and Coastal Defence policy as advised by MAFF and the Welsh Office;
- secure an adequate level of investment in flood defence;
- provide flood plain surveys to local planning authorities;
- discourage development in flood plains;
- work with nature to reduce coastal flooding;
- develop new methods to survey and manage flood defences;
- report regularly on the state of flood defences;
- identify the state and extent of the problem of soil erosion;
- develop a soil erosion alleviation strategy, including guidance on bet practice;
- work with local authorities to identify, and report on the extent of, contaminated land;
- regulate identified 'special' contaminated land sites effectively;
- research into the specific risks and remediation needs of contaminated land;
- measure the effectiveness of steps taken to reduce nitrates in designated nitrate vulnerable zones; and,
- develop methods for monitoring the 'state' and quality of soil with respect to its potential pollution.

Issue 5a: There is a need to provide effective defence and warning systems to protect people and property against flooding from rivers and the sea.

Background

The sea defences along the Essex and south Suffolk coastline were constructed to protect the low-lying land behind and have been improved and maintained through continued investment by the Environment Agency and its predecessors over many years. As a consequence the standard and condition of these defences is generally high. The management of flood defences is carried out by the Environment Agency routinely through the maintenance programme. Capital flood defence schemes are set out by our Long Term Plan. The development and implementation of the Long Term Plan is overseen by the Essex Local Flood Defence Committee.

A five year programme of flood risk mapping is being carried out in the Region according to priorities agreed with local planning authorities. These maps will show floodplain envelopes together with those areas which are already given increased flood protection by existing defences. Surveys will ultimately be supplied to planning authorities for inclusion in their development plans. The Environment Agency is responsible for dissemination of flood warning information to those at risk in fluvial as well as coastal locations.

Table 4: Long Term Plan Schemes
Brightlingsea Tidal Defences
Jaywick to Colne Point
Clacton Sea Defences
Tendring & Holland Tidal Defences
Stour & Orwell Estuary Strategy
Stour & Orwell Estuary Process

Table 5: Priority Surveys
Braintree
Chelmsford
Colchester
Tendring Peninsula
Stour
Tollesbury Frontage

Options	Responsibility	Advantages	Disadvantages
1. Continue to maintain and improve flood defence and warning schemesvia the following actions:			
a) Delivery of flood defence improvement and replacement as identified in the Long Term Plan and Flood Defence Strategies (see Table 4 for details of specific schemes).	Environment Agency	Improvement in standard of defence.	Cost. Risk of damaging habitats if improperly designed.
b) Implement the Essex Shoreline Management Plan	Environment Agency, Landowners, MAFF, Maritime District Councils	Integrated and sustainable management of defences.	Cost. May result in loss of some defended areas. Risk of damaging habitats if improperly designed.
c) Maintain existing defences.	Environment Agency	Maintain *status quo*.	Fragmented approach to flood defence needs. Cost.
d) Improve the successful receipt of flood warnings and, over a five year period, achieve an 80% success rate for property flood warnings where a flood forecasting system exists.	Environment Agency	People and property better protected from flooding.	None.
2. Continue to progress the production of floodplain surveys in the Plan area (for specific areas please refer to Table 5).	Environment Agency	Prevents inappropriate development in the floodplain.	Time. Cost.
3. Implications of doing nothing (except emergency response).	Environment Agency	No financial cost	Deterioration in defence standards Risk of sudden/uncontrolled inundation Non-compliance with the *Habitats Directive*

Issue 5b: Potential impacts on the environment from contamination originating from closed landfill sites.

Background

Leachates generated from the decomposition of wastes in landfill sites can contaminate groundwaters and surface waters. Contamination of groundwaters is more common from closed landfill sites which were operational during times when standards of containment were significantly lower than the present day. Examples of such sites in this Plan area are Great Baddow, Shalford, Woodham Walter, Bears Pit (Acton) and Martins Farm (St. Osyth). The anaerobic decomposition of landfilled putrescible wastes disposed also generate landfill gas, a mixture of methane and carbon dioxide. This gas can migrate under the ground from an uncontained site and is potentially explosive.

Options	Responsibility	Advantages	Disadvantages
1. Continued monitoring at known sites.	Environment Agency, Landowner	Improved information with regard to remediation, if necessary.	Does not solve the problem.
2. Database on closed landfill sites.	Environment Agency	Improve information for the future.	Will not tackle unknown or illegal dumps.
3. Site investigation of old landfill to locate most highly contaminated wastes for removal.	Environment Agency, Landowner	Likely to halt further contamination.	Cost. Does not resolve issue of existing contamination.
4. Trench interception system - capture of leachate and controlled venting of landfill gas.	Environment Agency, Landowner	Likely to be effective in preventing migration of leachate in landfill gas.	Cost. Does not remove source of contamination.
5. Implications of doing nothing.		No financial cost.	Potential groundwater contamination.

We will:

- provide a high quality waste regulation service;
- develop an overall database of waste arisings and disposals;
- measure the effectiveness of taxation to reduce waste and to encourage its re-use and recycling;
- obtain information on fly-tipping and devise means of combatting it;
- implement the 'producer responsibility' regulations;
- develop life-cycle assessment methodologies for dealing with waste;
- encourage and inspire industry to develop new and improved techniques for the management of special and other industrial wastes;
- ensure achievement of national waste strategy targets for the reduction of waste disposed of to landfill;
- ensure achievement of national targets for the recovery, recycling and composting of municipal waste;
- combat organised crime, at national and international level, involving the illegal trading in waste;
- research into the technical needs of successful waste management, including best practice and best practicable environmental options;
- secure high quality management of radioactive waste in industry;
- ensure that any proposals for solid radioactive waste disposal will provide the necessary high level of protection for man and the environment; and,
- commission research into the potential effects of wastes entering the environment, including the potential effects of radioactive wastes.

Issue 6a: There is a lack of information on landspreading of wastes.

Background

Although the landspreading of wastes to land for agricultural benefit is exempt under the *Waste Management Licensing Regulations 1994*, when it is practised certain information must be provided to the Environment Agency. Present levels of notification are significantly lower than we would expect and we are concerned about possible illegal waste disposal.

Option	Responsibility	Advantage	Disadvantage
1. Improve levels of notification.	Environment Agency	Improved data on volumes of waste.	Two-pronged problem - not going to be resolved on its own.
2. Enforcement work (over and above routine business).	Environment Agency	May identify unauthorised disposal.	Cost. Increase of staff resources to assist with this. Unlikely to halt all unauthorised activity.
3. Increased publicity/ education and pollution prevention visits.	Environment Agency	Educates people with proper procedures.	Still not effective on its own.

Option	Responsibility	Advantage	Disadvantage
4. Demand more accurate laboratory analysis from waste disposer. A vast majority of the information is inadequate at present.	Environment Agency	Improved information on pollution potential of waste being spread.	Will not reduce illegal disposal. May discourage people from informing us in the first place.
5. Produce an advisory code of practice.	Environment Agency and MAFF	Education. May reduce illegal disposal.	Cost.
6. Implications of doing nothing.		No financial cost or staff time.	Notification levels remain low.

Issue 6b: Increased incidence of fly-tipping.

Background

The introduction of the landfill tax in September 1996 has increased the pressure on the environment through the illegal disposal of wastes. Local authorities and the Environment Agency have seen an increased prevalence of illegal dumping in recent months and a continued problem of fly-tipping within the North Essex Plan area.

Option	Responsibility	Advantages	Disadvantages
1. Joint enforcement work with local authorities and the police.	Environment Agency, Landowner, Police	Detection of illegal activities. Reduced fly-tipping.	Cost. Piecemeal because of amount of coordination needed.
2. Education and customer care.	Environment Agency	Educating public.	Still cannot stop everyone.
3. Implications of doing nothing.		No financial cost.	Fly-tipping continues.

We will:

- continue the efficient and effective delivery of Integrated Pollution Control;
- implement the requirements of the *EC Directive* on *Integrated Pollution Prevention and Control*;
- implement the relevant requirements of the *Control of Major Accident Hazards Directive*;
- Develop practical working relationships with fellow regulators, particularly the Health and Safety Executive;
- Develop pollution prevention control tools including projects relating regulation to emission, efficiency and economic benefits;
- encourage the use by industry of BS 7750/ ISO 14001 accreditation;
- encourage registration under the EU Eco-management and Audit regulations;
- pay special attention to the needs of small and medium-sized enterprises;
- maintain and expand the Chemical Release Inventory;
- introduce Operator and Pollution Risk Appraisal;
- play a full and active part in the EU Network for the Implementation and Enforcement of Environmental Law;
- ensure that radioactive releases from nuclear sites which result in exposures to individual members of the public are well within accepted limits;
- ensure that the total potential impact of releases from nuclear sites are environmentally acceptable;
- develop and implement toxicity based consenting methods for releases from complex industrial sites;
- ensure improvements are made to the quality of discharges to estuarine and coastal waters;
- implement the requirements of the *EC Urban Waste Water Treatment Directive*;
- research into effective means of ensuring that disinfectant and sterilisation techniques are safe for the environment; and,
- develop and implement tools to assess risks, costs, benefits and options in relation to the major industrial pressures on the environment.

Issue 7a: Continued odour problems originating from Haverhill Sewage Treatment Works.

Background

The odour problems from Haverhill STW have been ongoing for around thirty years. Although the odour problems are identified at the treatment works it is thought that the chemicals/substances that combine to produce the odours enter the sewerage system from the town's industrial estates. These sources and the mechanisms which intermittently results in persistent odours reaching the water supply intake need to be determined and controlled.

Options	Responsibility	Advantages	Disadvantages
1. Install additional treatment at STW.	Anglian Water Services	Contributes to solution.	Substantial cost.
2. Install additional treatment at certain trade effluent outfalls.	Traders, Anglian Water Services	Contributes to solution.	Substantial cost and unlikely to solve problem in the short term.
3. Divert effluent to below Wixoe intake.	Environment Agency, Anglian Water Services	Protects River Blackwater only.	Cost and does not solve problem in River Stour.

Options	Responsibility	Advantages	Disadvantages
4. Identify source through study, either internally or externally.	Environment Agency, Anglian Water Services, Traders, Essex and Suffolk Water	Shared costs. Contributes to solution.	Time. Multiple sources may exist.
5. Strengthening emergency response procedures.	Environment Agency, Anglian Water Services, Traders, Essex and Suffolk Water	Better protection of intakes.	Unlikely to solve problem in the short term. Ongoing cost.
6. Implications of doing nothing.		No financial cost or staff time.	Continued odour problems.

Issue 7b: Failure to meet *EC Dangerous Substances Directive* limits for heavy metals.

Background

Several routine sample points on the estuaries and coastal waters have exceeded the limits for List II metals as laid down in the *EC Dangerous Substances Directive* and the *EC Shellfish Waters Directive* (see Table 6 on Page 101). The Environment Agency commissioned the Centre for Environment Fisheries and Aquaculture Science (CEFAS), an executive Agency of MAFF, to review the available data and to determine the likely sources for these substances. They believed that the three principle sources were: freshwater rivers, known dicharges (STWs and industry) and diffuse inputs. The most significant source of zinc was found to be sacrificial anodes on boats. The most significant source for copper was antifouling. It is not considered possible to control this source in the foreseeable future. The Environment Agency operates a policy of reducing loads of dangerous substances wherever possible in line with the North Sea Conference.

Options	Responsibility	Advantages	Disadvantages
1. Enhanced monitoring.	Environment Agency	Determines scale of problem.	Does not solve problem.
2. Seek a derogation if shown not to be harmful.	Environment Agency, DETR	Eliminates failure.	Does not solve problem.
3. Further research into methods for eliminating it.	Environment Agency, MAFF	Finds cause.	Cost. Time.
4. Control point-sources.	Environment Agency, Anglian Water Services, Traders	Eliminates some loads.	Cost to Anglian Water Services and Traders.
5. Implications of doing nothing.		No financial cost or staff time.	Continued failures.

Issue 7c: A high proportion of pollution incidents (to the aquatic environment) are derived from industrial estates.

Background

There are a large number of industrial estates within the Plan area which account for a large proportion of the pollution incidents in the aquatic environment. Industrial estates in Witham and Haverhill are two such examples but high numbers of incidents are recorded throughout the Plan area. The Agency endeavours to achieve improvements in the quality of surface water discharged from industrial premises by offering advice to estate owners and occupiers and by raising awareness of practices which threaten the quality of the environment. Pollution prevention inspections of premises in targeted areas are carried out by the Environment Agency, often in partnership with Anglian Water Services.

In addition to these proactive initiatives, the Environment Agency is also discussing with developers and local authorities alternative drainage systems designed to contain pollutants and control discharge flows. Such Best Management Practices are ways of minimising diffuse pollution using procedural and structural techniques. These can reduce the quantity of runoff, slow the speed of runoff to allow settlement, filtration and infiltration, and allow natural ways of treating the surface water before discharge to watercourses. Examples of the techniques employed include porous surfaces, retention ponds, reed beds, grass swales and wetlands. The application of such techniques must take account of the suitability of the local substrata, the economics and, in respect of established development, the practicalities of retrofitting the facilities.

Options	Responsibility	Advantages	Disadvantages
1. Pollution prevention visits and consultation with companies.	Environment Agency, Anglian Water Services	Education raises awareness.	Time.
2. National Pollution prevention campaigns.	Environment Agency, WSAs	Assists with solving problem.	Cost and time. Non-site specific.
3. Liaise with AWS to improve methods and trace polluters.	Environment Agency	Assists with solving problem through site specific targeting.	Cost and time.
4. Intensify enforcement action.	Environment Agency Anglian Water	Continue existing practice to punish law breakers.	Staff time and cost. Addresses problem after the event.
5. Resort to Works Notices.	Environment Agency	Proactive action. Polluter pays.	Staff time and cost. Notices not yet available.
6. Divert low flows to foul sewers.	Anglian Water	Removes polluted load from surface water sewers.	Cost. Sewers may become hydraulically overloaded

Options	Responsibility	Advantages	Disadvantages
7. Modify drainage to best management practice.	Local Authorities, Environment Agency, Developers	May be the most beneficial and economic in the long term.	Difficult and costly to retrofit to existing systems. Requires acceptance. Requires space.
8. Implications of doing nothing.		No financial cost or staff time.	Continued pollution.

Section 4

Protection Through Partnership

This section will allow environmental issues to be identified, which the Environment Agency addresses, or seeks to address in partnership, but which do not meet the criteria for inclusion as issues within the Issues and Options section.

4.0 Introduction

The 'Protection Through Partnership' section provides the opportunity to address longer-term management issues in partnership with others. It looks at how the Environment Agency can work with others for the benefit of the local environment. The timescales for action will depend upon our ability to work effectively with other groups, and requires a commitment from all to improve the environment.

The partnership approach is an underlying theme of the LEAP process because, although the Environment Agency operates within an extensive regulatory framework, it is recognised that it has very little control over the mechanisms which determine land use change and, hence, pressures on the environment on a catchment-wide basis. Also, it must be remembered that LEAPs are non-statutory documents. In order for their policies and actions to be effective, they therefore need to be incorporated into statutory documents, such as Structure Plans and Local Plans.

We are currently involved in many projects and activities that rely on partnerships. Close links are already established with local authorities, water companies, industry, angling clubs, conservation bodies, port authorities, recreation and landscape bodies. New partnerships will be sought, both with these organisations and with others. It is hoped that joint funding initiatives and joint ownership of projects will provide a more secure basis for environmental protection.

Many other partnerships occur or are planned within the Environment Agency, all of which are designed to deliver the mutual objectives of the partners involved. The Environment Agency has a diverse network of relationships with many national, regional and local organisations as well as landowners and the general public. One significant area for future development will be the building of partnerships to aid environmental education. It is through these partnerships that we are able to fully contribute towards the goal of sustainable development.

This Section outlines some of the partnerships that are occurring, or are planned, within the North Essex Plan area.

4.1 Managing Our WATER RESOURCES

Development and Water Supply Partners: Water Companies

The Environment Agency liaises with Anglian Water Services, Essex and Suffolk Water and Tendring Hundred Water, in order to manage water resources in the Plan area and to ensure that both demand management and demand forecast plans are appropriate. Within this framework and in conjunction with our abstraction licensing system the Environment Agency regulates the water companies and other abstractors to achieve the proper balance between the needs of the environment and other water users. Where water resources are fully committed then water could be supplied from elsewhere. However, the full impacts and costs of this will need to be assessed to ensure sustainability. If additional finance, capital, investment or infrastructure are necessary, then these costs will ultimately be borne by the developer and water company customers. It is also vital that development does not proceed ahead of due consideration to social and environmental costs. The Environment Agency will work with the water supply companies and local authority planners to ensure that all costs and implications of development are balanced against the need for sustainable water supplies. We will want sustainable water supplies to be

agreed and demonstrated before development takes place.

The Environment Agency does place great emphasis on demand management especially where this will reduce pressures on the environment or prevent the need for the development of new resources. We encourage measures such as the water company's leakage control and metering programmes and initiatives to build water conservation into new developments, for example through installation of low water-use appliances. We will also work actively to discuss and consider alternative sources of supply, including aquifer storage and recovery, augmentation of treated sewage as well as desalination.

4.2 Enhancing BIODIVERSITY

Biodiversity Action Plans Partners: Local Authorities, English Nature, Wildlife Trusts

As part of the Environment Agency's input into Local Agenda 21 we are part of the Anglian Regional Biodiversity group aimed at translating the national initiative of biodiversity into a Regional context. At a local level Local Authorities and environmental organisations, including the Environment Agency, are compiling the Essex Biodiversity Action Plan with specific targets for habitats and species, many of which are relevant to this area. We are in a key position to influence many of these targets since Action Plans will be concerned with coastal habitats, wetlands and aquatic species (*i.e.* reedbeds, brackish lagoons, otter and crayfish). As such we are playing an active role in the production of the Biodiversity Action Plan and taking on specific responsibility to progress Action Plans for key species and habitats. The conservation of biodiversity will be a key indicator of the successful implementation of sustainable development in the Plan area.

Conservation Enhancement Projects Partners: Suffolk Wildlife Trust, Anglian Water Services, River Colne Countryside Project, Colchester Borough Council, Others

The Environment Agency has developed many partnerships to implement environmental enhancement. At Cornard Mere SSSI a scrape has been dug and a small pipeline installed by the Environment Agency in partnership with Suffolk Wildlife Trust and Anglian Water Services. Previously water levels had dropped significantly at the site due to an adjacent public water supply borehole. The scrape provides a valuable fenland habitat enhancement and the pipeline ensures a supply of water.

The Environment Agency own two areas of land at Flatford on the River Stour, which lie within Cattawade Marshes SSSI. This area is an important reedbed which over the years has become overgrown with invasive vegetation. In an attempt to improve the value of the reedbed, a project was drawn up with the approval of English Nature. The smaller plot of land the Environment Agency own was cleared and the top soil removed to leave only the rhizomes of the reeds remaining. A penstock was then installed to allow freshwater to inundate the site. This Spring the rhizomes have begun to grow which should lead to the re-creation of a healthy reedbed. English Nature are monitoring the success of the site to assess its suitability elsewhere, and it is hoped to continue the work on the larger plot of land next year.

Pond excavation works were carried out at Fordham Parish Pond to improve the habitat diversity of this village pond. The work was carried out in partnership with the Colne Countryside Project.

Salary Brook flows alongside the Greenstead Estate in Colchester. Whilst carrying out flow improvement works to the river the Environment Agency in conjunction with Colchester Borough Council and a working party from the estate restored two ponds that are in the centre of the common land adjacent to the river. Habitat improvement works were also carried out on the river itself by increasing channel diversity.

Estuary Management Plans Partners: Suffolk Coast and Heaths Project

The Stour and Orwell Estuaries Management Plan was coordinated by a sub-group of the Suffolk Coast and Heaths Project whereby each partner aims to coordinate their work to conserve and enhance the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB). This sub-group is collectively known as the Estuaries Group and includes the Environment Agency. The shared objectives formulated in the document are to maintain and enhance wildlife conservation and landscape, improve and extend facilities for recreation, resolve existing conflicts between interests and support and encourage sustainable agriculture. As a member of the Estuaries Group, we are aware of, and aim to achieve, the objectives set out by the Estuaries Management Plan and will work in partnership with the other members of the Group to protect this area of Suffolk.

4.3 Managing Our FRESHWATER FISHERIES

Fisheries Enhancement Projects Partners: Angling Clubs and Fisheries Owners

Opportunities for the Environment Agency to join with or assist Angling Clubs and Fisheries Owners in the design and implementation of management actions or schemes arise very frequently, particularly with respect to stillwater fisheries. The extent of the Environment Agency's involvement is very variable, and can range from straightforward verbal advice to the deployment of staff and/or equipment to provide direct practical assistance with fish stock assessment or fish removals/transfers.

Every effort is made to ensure that good quality fisheries management advice is always available, and that any fish stocks under threat from water loss or pollution are rescued as appropriate. However, it is not always possible to take up potential opportunities for other practical involvement, because of the large number of cases which arise. Priority is given to public and angling club waters, rather than to those in private ownership. The Environment Agency will also seek to investigate (and provide appropriate advice) in all reported cases of fish mortality and fish disease. Every year, a considerable number of fisheries benefit from these arrangements, which form a key element of the overall fisheries service.

The launch of the 'Essex Angling Watch' in October 1997 represents a significant new measure for the protection of fisheries through organisations and individuals working in partnership. The scheme is similar to a Neighbourhood Watch, but is targeted specifically at angling-related crime throughout the County. Essex Angling Watch is being run by the Essex Angling Consultative Association, in cooperation with the Essex Police and the Environment Agency and is believed to be the first scheme of its kind in the country.

4.4 Delivering INTEGRATED RIVER-BASIN MANAGEMENT

Water Level Management Plans Partners: English Nature, Wildlife Trusts, RSPB, FRCA, Landowners

The implementation of Water Level Management Plans (WLMPs) requires partnerships between all individuals and organisations who have an interest within a Plan area such as English Nature, Wildlife Trusts, the Royal Society for the Protection of Birds (RSPB), the Farming and Rural Conservation Agency (FRCA) and owners and occupiers. As the operating authority, the Environment Agency has in place 15 WLMPs for parts of the North Essex area. These WLMPs can be seen in Appendix 5. The Environment Agency aim to integrate the views of all the relevant interests at the site to ensure that a balanced and sustainable water level regime is adopted. Other operating authorities are also producing WLMPs and the Environment Agency work closely with these bodies, to ensure full consultation and appropriate objectives are reached. The implementation of the WLMPs objectives depends upon the approval and cooperation of all the relevant interests and initiatives for joint funding between the interested parties to ensure that these wetland conservation sites are protected and enhanced.

Investment by the Water Companies Partners: Water Companies

The Environment Agency continually influences the water companies to ensure that capital investments for environmental improvements to infrastructure are prioritised. Our influence on these matters is exerted through discussions with the water companies, the DETR and the Office of Water Services (OFWAT) as part of the Asset Management Plan (AMP) process which identifies the water companies capital expenditure within 5 yearly periods, over statutory and non-statutory requirements.

Redevelopment of Land at Springfield Basin and Extension of Navigation Partners: Chelmsford Borough Council

Major redevelopment of Brownfield sites, including the extension of a navigation is set out in Chelmsford Borough Council's local plan. The Environment Agency has agreed to work with the Borough tp promote a joint development vision whilst ensuring that best environmental practices are enforced. Benefits will include improved recreational use of water, better riverside access and an improved river corridor environment.

Concern over Bacterial Concentrations in the West Mersea and Tollesbury Oysterages Partners: Anglian Water Services

West Mersea Sewage Treatment Works is trialing ultra-violet treatment of its effluent to improve bacteriological water quality. Monitoring is ongoing, in conjunction with the Environment Agency and the prospects look very good.

Shellfish Harvesting Partners: Environmental Health Officers, Conservation Organisations

Responsibility for compliance with the *EC Shellfish Hygiene Directive 91/492/EEC* lies with the District Council Environmental Health Department. However, the Environment Agency and Environmental Health Officers liaise regularly to discuss problems and promote investigations.

Within the Plan area commercial shellfishery operations are located in numerous creeks of the Blackwater and Colne estuaries and Hamford Water (see Map 6).

Oil Spill Contingency Plans Partners: Port Authorities

Control of marine oil spillages that occur within the Plan area will be subject to actions and procedures with our partners, in a similar manner to those currently developed for the Harwich Haven complex, where a Memorandum of Understanding exists between the Port Authorities and the Environment Agency. In the event of a significant oil spill the County and District/Borough Councils and the Marine Pollution Control Unit will all be involved with the Environment Agency in protecting and cleaning operations.

Recreational Opportunities Partners: Countryside Management Projects, Local Authorities

The Environment Agency works closely with many countryside management projects, for instance the Dedham Vale and Stour Valley Project and the Colne Countryside Project, to improve recreational opportunities in the Plan area. A walks leaflet has been produced for the area between Dedham and Flatford in partnership with the Dedham Vale and Stour Valley Project that is extremely popular in an attractive tourist stretch of the River Stour.

Brain Valley Project Partners: Braintree District Council

Discussions during the summer of 1997 concerned the opportunity for partnership between Braintree District Council and the Environment Agency to remediate and enhance the River Brain corridor through Braintree Town Centre. The Council has now received the project report from Hyder Environmental Consultancy regarding an outline of a linear park between Riverside and Skitts Hill within a longer length between Rayne Road (former A120) to the Braintree Bypass (new A120).

The Council have obtained EU Single Regeneration Budget Funding for the project. The development will be known as the John Ray Linear Park. It will incorporate public cycle and footpath access and new river bridges, public open space, wildlife areas, a reedbed zone to remediate residual leachate seepage from a 1960's refuse tipped area adjacent to the river, widening of a stretch for model boats and possible canoeing or other boating, together with the creation of several lakes adjacent to or connected with the river.

The scheme offers the opportunity for increasing flood storage and sediment management, improved self-purification, together with elimination of modification of redundant or dilapidated weir structures. Several surface water sewers outfalling in the stretch are thought to be contaminated by misconnections and the scheme is an opportunity to remedy these. Water level enhancement is thought to be needed to enhance a fen area at Hoppit Bridge. This scheme compliments the Environment Agency's objectives for conservation and water quality enhancements and offers contributions to the need for flow storage and reduced velocity to compensate for increasing runoff rates from substantial urban development and redevelopment. There appears to be promising prospects for partnership on this scheme.

4.5 Conserving the LAND

Development Partners: Local Authorities, District Councils, etc.

As a statutory consultee under Town and Country Planning legislation, the Environment Agency seeks to ensure that local planning authorities are aware of the environmental implications of an individual development when deciding on whether to grant planning permission. In some cases we will ask the local planning authority to impose conditions on a development, to ensure that impacts on the environment are acceptable. We will endeavour to work with the relevant District/Borough Councils to ensure that any development is sensitive to the needs of the local environment.

Local Agenda 21 Partners: Local Authorities

Local Agenda 21 (LA21) has been adopted to ensure that sustainable development is achieved on a local scale. Within the North Essex Plan area, LA21 is at varying stages of production. The future involvement of the Environment Agency on these issues will very much depend on the status of LA21 within each of the local authority areas.

Because so many of the problems and solutions being addressed by LA21 have their roots in local activities, the participation and cooperation between local authorities and the Environment Agency will be of vital importance. The Environment Agency will, where practicable and relevant to our work, provide environmental information and work with others to achieve the objectives of sustainable development. We intend to support and contribute towards Local Agenda 21 initiatives within the Plan area. The Consultation Report and the consultation period within the Plan process, positively reinforces the message of building partnerships, emphasising the importance of local action and assisting with achieving a greater sense of continuity.

Loss of Saltmarsh Replenishment Project Partners: Harwich Haven Authority, English Nature

The estuaries and intertidal areas within the Plan area have suffered from loss of this important coastal habitat. Saltmarsh loss is evident at Hamford Water and the estuaries of the Stour and Blackwater. The Environment Agency have been closely involved in work with Harwich Haven Authority to redress this problem, using dredged material as a means of replacing the lost land. Close and effective liaison has been necessary at all times to ensure that work is sympathetic to the needs of the local environment.

Coastal Protection Partners: District Councils, Harbour Authorities

Within the framework of the Shoreline Management Plan, we are continuing to encourage liaison opportunities with the relevant District Councils who have responsibilities for coastal defences under the *Coast Protection Act 1949*. This will ensure that our respective coastal and sea defence activities are complementary and do not have any adverse effect on adjacent frontages.

4.6 Managing WASTE

Strategic Waste Planning Partners: Local Authorities, SERPLAN

In 1997, the Environment Agency undertook a Waste Monitoring Survey for SERPLAN (South East Regional Planning Conference). This involved the collection and collation of information on the types and quantities of waste going to waste facilities in the south east Region and depletion of landfill resources. Ultimately, the results of the Waste monitoring survey will inform the development of Regional Planning Advice for waste prepared by SERPLAN. The information collected should also help local authorities prepare their statutory Waste Local Plans. Essex is a SERPLAN county and the monitoring survey involved the Environment Agency in an extensive data collection exercise. A temporary member of staff was employed to undertake the bulk of the data collection. Crucially, the success of the survey depended on information held by the Environment Agency and the County Council. Close liaison was therefore necessary to make sure that no information was missed.

Litter Partners: Local Authorities, Tidy Britain Group

Although each local authority has specific responsibilities for litter control and clearance, the Environment Agency will endeavour to work with them, on tidal sections of beaches, to implement strategies to minimise this particularly acute problem. We have worked with local authorities at various stretches as part of our overall environmental strategy.

Waste Minimisation Schemes Partners: Industry, local authorities, Business Link, etc.

As part of the Government's waste strategy, we are taking a key role in promoting waste minimisation within industry, and in the Environment Agency's Eastern Area a number of initiatives are either underway or at the planning stage.

We already offer advice to companies on how to reduce the use of raw materials, water and energy, as well as recycling of waste materials such as packaging waste, and intend to develop this work. We are currently trialing the 'Waste Minimisation and Waste Management Best Practice Guide' produced by the Environment Agency, and hope that some companies in the Plan area will be involved in this. The Guide demonstrates how companies can go about establishing waste minimisation initiatives, and is supported by visits and telephone advice from Environment Agency staff as needed.

We were involved in setting up a major seminar about waste minimisation for Essex businesses in partnership with Essex County Council and Colchester Borough Council. As part of the seminar, the Environment Agency is helping a local family business (through the Best Practice Guide) to undertake a full waste minimisation exercise so that these experiences can be presented as a case study relevant to the local business community. It is hoped that the seminar will lead to the establishment of a waste minimisation club, where member businesses will be able to share experiences and discuss difficulties, as well as organising further help and information from various source

4.7 Improving AIR QUALITY

Air Quality Partners: Local Authorities

The *Environment Act 1995* extends responsibilities of Local Authorities to establish action target standards for certain air pollutants so as to improve air quality. This may involve more extensive measures involving parties other than those regulated by local authorities as operators of processes prescribed for their control, Part B processes, by the *Environmental Protection Act 1990*. The Environment Agency in its regulation of processes prescribed for its control, Part A processes, will be required to participate in the setting and achievement of such local standards. Local authorities will introduce assessments for local air quality in due course and, where it is shown to be necessary according to nationally agreed criteria, prepare Local Air Quality Management Plans for operation in defined areas where targets are unlikely to be met. The 'alert' threshold for any pollutant or combination of pollutants would define the level at which there is a potential risk of exceedance of any air quality standard. If the level were reached or approached in a particular area, it should therefore trigger a mandatory obligation on the relevant pollution control authorities, including the Environment Agency, to investigate and where appropriate take remedial action.

4.8 Public Awareness and EDUCATION

Education Partners: Business, Industry, Local Authorities, Others

Environmental education is a central means of furthering our commitment to sustainable development. Education offers people the capacity to address environmental issues which is vital to achieving a sustainable society. Education in its broadest sense means personal awareness, experience and interest developed over a period of time, whether at home, school, college or university, at work, or in the wider community.

The Environment Agency considers environmental education to be vital and we are actively developing an education service to help schools and colleges at all levels of the curriculum. We encourage local liaison and project-related work in the environment and provide several resource packs and data sets for students to use within their studies. For instance, we have recently distributed a CD-Rom package to a wide selection of Junior Schools in the Anglian Region, called 'Greener Futures'. This package forms a Lifestyles and Environmental Audit project with questionnaires and an extended interactive environment in which various games and tasks are embedded related to environmental issues. This package was created in partnership by the Environment Agency, Cambridgeshire County Council, the DETR and Peterborough Environmental City Trust.

A project was also completed in collaboration with the River Colne Countryside Project and Stanway Fiveways County Primary School. An educational pond was constructed in the grounds of the school for use by the pupils and local community.

In conjunction with Colchester Borough Council and Gosbeck Primary School enhancement work was carried out on their school pond. This work will improve the conservation and educational value of this school resource.

It is also part of the Environment Agency's routine business to promote environmental education in other sectors of society, including business and industry, local authorities and other key players. The Local Environment Agency Plan process positively contributes towards education in a fundamental way. The Environment Agency also undertake pollution prevention visits, attend road shows and science fairs, provide speakers, distribute educational documents and generally work in a pro-active way to protect the environment.

PART II

Supporting Information

Section 5

Uses, Activities And Pressures

This section identifies the major activities within the Plan area. It also outlines the environmental pressures that these activities place on the North Essex Plan area, together with a description of the Environment Agency's responsibilities

5.1 INTRODUCTION

The purpose of this Section is to identify and summarise the uses, activities and pressures in the Plan area which exert an influence upon the wider environment. This information consolidates the understanding of the Plan area against which future actions will be considered.

The information presented in this Section is limited to those activities and pressures upon which the Environment Agency has direct or indirect influence.

5.2 URBAN AND RURAL LAND USE

5.2.1 Development

Development within our cities, towns and countryside, and in particular the urbanisation of greenfield sites (land which has not been developed) has the single most significant impact on our environment. Development may include new building works, changes in land use, and the development of communication systems and other infrastructure.

Development can result in an increased risk/occurrence of flooding as a consequence of changes to surface water drainage and unsuitable development in the floodplain. The overall aim of the Environment Agency's flood defence policies (as set out in 'Policy and Practice for the Protection of Floodplains') is to secure and, where necessary, restore the effectiveness of floodplains for flood defence and environmental purposes.

In wet weather, urban areas generate high volumes of storm water run-off which place increasing pressure on the finite drainage infrastructure and river channels. The growth of impermeable areas associated with new development and the increasing tendency for intense rain storms add to this pressure. Furthermore, the quality of this run-off is often poor and detrimental to the well-being of the streams and watercourses. Diversion of such flows to the foul sewerage system is both costly and could be prejudicial to the effective performance of the treatment works to which it would be conveyed. The control and appropriate alternative disposal of these flows would reduce flooding and prevent poor quality water being discharged to the rivers. The creation of a management framework based on integrated river catchment and drainage planning would allow the development and coordination of local strategies which would ensure the right disposal route for such water.

The predicted change in land use is identified through Structure Plans and Local Plans. These development plans are increasingly recognising the importance of sustainable development and acknowledging that land is a finite resource of fundamental importance, both to the economy and the local environment. Many policies exist to protect the environment as a result. This may include bringing areas of vacant, derelict and under-used land within existing built-up areas (brownfield sites) into productive use, since this helps to reduce the requirement to find greenfield sites for new development, which inevitably involves some loss of natural resources within the countryside.

It is the intention of the Environment Agency to ensure that these development plans reflect the needs of the environment and contain policies that ensure environmental protection. Local authorities are key players in environmental management. They have the key planning role,

which is fundamental to many of our internal functions and also play a central role in promoting local sustainable development initiatives. Successful environmental management at the local level will be critically dependent upon the ability of local authorities and the Environment Agency to work together. We therefore attach great importance to building such relationships with local authorities. For an idea of local authorities in the area, please refer to Map 4.

All authorised development should seek to be sustainable, including all services which supply the development needs, and all products and waste produced. This adopts a holistic approach in the management of the environment. The Town and Country Planning system provides for developments plans at two levels, Structure Plans and Local Plans. The status of these development plans within north Essex is shown in Appendix 6.

First, the Essex and Suffolk Structure Plans set out key strategic policies as a framework to feed into local planning by District Councils, as well as providing guidance to statutory and other organisations for their own plans and programmes. These are prepared by Essex and Suffolk County Council's and after the consultation period, a deposit plan, an examination in public and a statement of proposed modifications, the Plans are formally adopted.

Second, the Local Plans prepared by the relevant District/Borough Councils set out more detailed policies and specific proposals to guide development in their areas. These are prepared by the respective Local Planning Authorities and, after a consultation period, a deposit plan, a public local enquiry and a statement of proposed modifications, will be formally adopted. The preparation of district-wide Local Plans is mandatory for all areas and the Government expected to see substantially complete coverage by the end of 1996. With regard to the state of development plans in the North Essex Plan are, approximately one half of them are formally adopted.

There are thirteen Local Plans which cover the North Essex Plan area. There are also two Structure Plans, the Essex and Suffolk Structure Plans. More details of these Plans can be seen in Appendix 6.

A summary of the major development that is presently being constructed/planned within each of the District/Borough Council administrative areas is outlined in Appendix 7. In general, trends appear to show that there is an increased confidence in development and a large increase in enquiries. This would seem to follow with national trends that show that there is a national resurgence of development.

Residential development is again becoming buoyant in parts of the Plan area with considerable building projects in progress after a period of reduced activity. The Essex Structure Plan allocation of dwellings to meet needs anticipated up to 2011 provides for some 84,600 additional dwellings. These will intensify many factors including water supply demand, though this can be self-generated provided the development is located in places served by sewage treatment works located upstream of Public Water Supply Intakes. If not, there will be additional pressure on the water transfer schemes such as the Ely Ouse Scheme and other water resource developments.

The local authorities and the DETR are now seeking the advice of the Environment Agency, particularly on the question of water resources. The specific questions being asked are, how far is the availability (or otherwise) of water resources likely to be a constraint on the amount of housing in the Region and how certain can one be about the need for a major new resource. The

Map 4

Local Authorities

ENVIRONMENT AGENCY

Catchment boundary

Main River

February 1998

fact that these questions are being asked suggests that water resources are likely to be looked on as a legitimate planning issue in the future and that there will be closer integration between water resources and land use planning.

5.2.2 Transport

Road transport is an essential component of our daily lives and yet it poses a significant risk to the environment. The Environment Agency has no formal remit in relation to road transport, although many of the associated issues have a bearing on the Environment Agency's ability to regulate and manage the environment effectively. For example, the contribution of pollutants from exhausts to the atmosphere in the UK affects the way in which the Agency is able to regulate certain sectors of industry. Similarly the building of new roads affects the protection that can be afforded to homes from flooding, may compromise the ability to maintain water quality and will affect the nature conservation value of natural resources. It is clear that road transport places a burden on the environment and the Environment Agency has to take account of this in determining the most appropriate way to protect the environment of England and Wales. The Agency also has an overall aim of contributing to sustainable development, and in doing so is aware of the need to balance the transport requirements of a modern society with the long term health of the environment.

Transport poses many sources of risk to the environment but it is evident that risks posed arise from a limited number of discrete sources, such as:

Raw Materials
These present a risk to the environment as a result of their extraction, transport and usage. Road construction materials (for example, road stone, cement, gravel), car construction materials (such as steel) and petroleum products are all sources of risk to the environment. Road building in the UK accounts for 90 million tonnes per year of the aggregates used (33% of total UK); steel and aluminium used in car manufacturing accounts for 20% and 10% respectively of total world production. Petroleum used in road transport accounts for over 40% of total UK consumption of petroleum products. All of these are set to increase over the next 20 years in proportion to the length of new roads built and the amount of kilometres travelled. Petroleum consumption will increase at a lower rate due to increases in vehicle efficiency, and may decrease in the long-term as alternative vehicle technology develops.

Road Construction and Maintenance
Such activities will inevitably result in some risk to the environment. Physical activities such as movement of earth, removal of vegetation, the creation of cuttings and embankments and the construction of bridges all have an impact on the environment. In addition, the maintenance of road surfaces can pose problems for the quality of water in adjacent watercourses.

Road Run-off
As water runs off hard surfaces such as roads, it takes with it many pollutants including oil and tyre residues. The flush of these substances together with their inherent ability to pollute, poses a significant risk to the environment. The impervious surfaces also pose a risk for the stability of the water cycle itself. As water runs off such surfaces far faster than from areas such as grassland, the hydraulic characteristics of the floodplain are altered, thereby posing a greater flood risk to areas both upstream and downstream.

Accidents and Spillages

Accidents of certain types can result in spillages of substances which pollute the environment. Such substances can range from noxious gases and toxic chemicals to ordinary liquids such as beer or milk. All have the potential to cause environmental damage, and the risk is increasing.

Exhaust Emissions

Road transport is a significant source of a number of air pollutants including oxides of nitrogen (No_x), volatile organic compounds (VOCs), carbon dioxide (CO_2), carbon monoxide and particles with a diameter of less than 10 micrometres (PM_{10}). These pollutants impact on environmental quality in a number of ways. Road transport emissions of No_x account for over 50% of the UK total and, as they occur close to ground, are a major influence on local air quality. Emissions of CO_2 from motor vehicles account for 20% of the national total and, as CO_2 is a greenhouse gas, contribute to climate change. The introduction of catalysts on new cars, and stricter regulations on trucks, has resulted in a downwards trend in No_x emissions since 1990. This is expected to continue until about 2010; thereafter, in the absence of additional controls, current projections suggest that No_x emissions will start to rise again. In contrast, emissions of CO_2 from motor vehicles are projected to rise steadily.

Waste Disposal

These arise from the disposal of tyres, scrap cars, old road surfaces, and spent oil and petroleum. Taking tyre disposal as an example, approximately 30 to 35 million tyres (0.3. to 0.4 million tonnes) are disposed of each year of which around 35% are retreaded and around 45% are recovered for other uses including incineration or energy recovery. The remainder amounts to less than 115,000 tonnes of tyres compared with 250m tonnes of controlled waste in total disposed of annually (less than 0.05%). The special difficulties of tyre disposal suggest that the environmental impact of their disposal may be disproportionate to their waste but nevertheless, in relative terms, the environmental risk associated with the end of life of tyres is rated low. The trend appears to be decreasing as more recycling and reuse schemes are implemented.

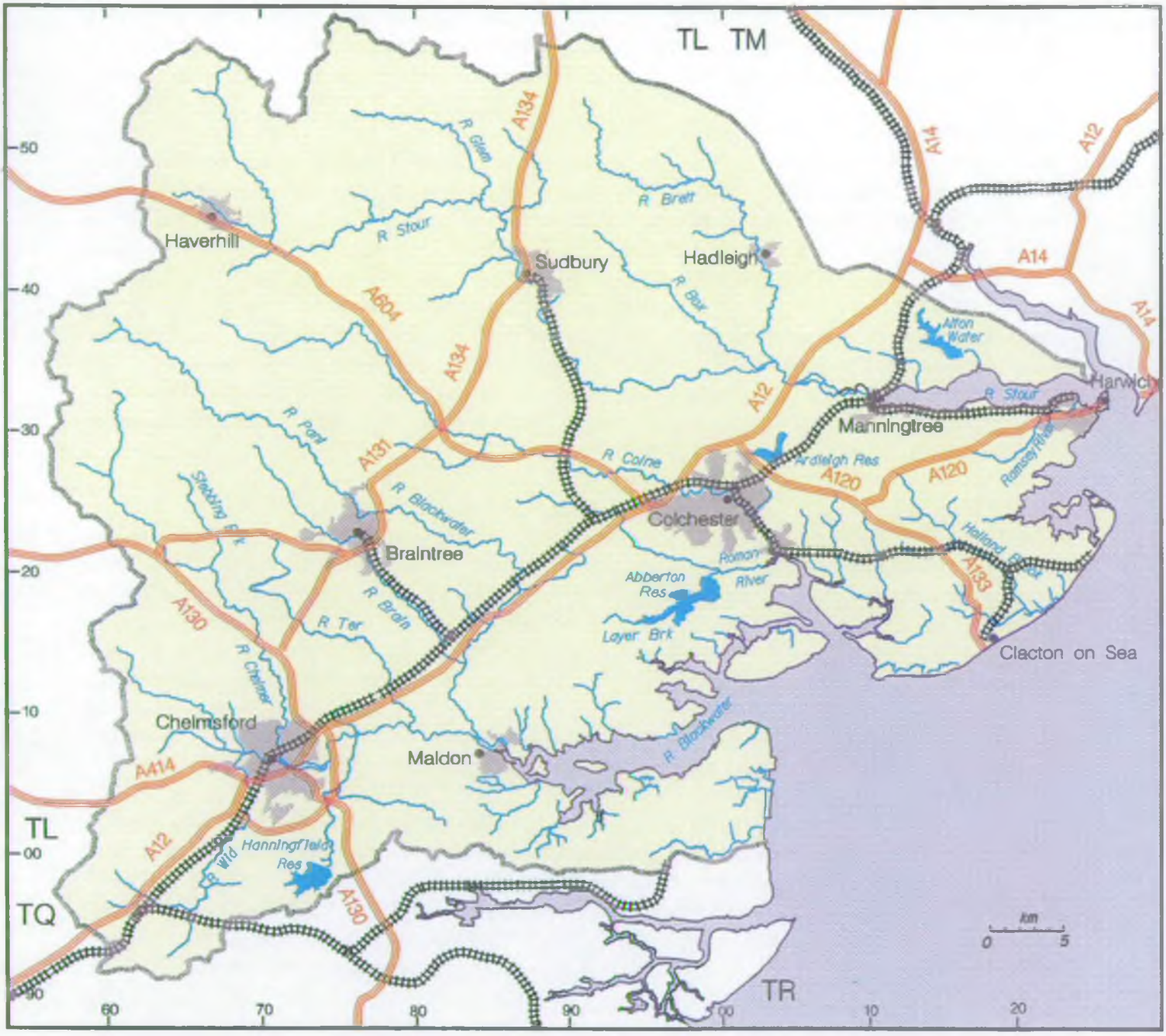
An effective transport system is essential to benefit both the local and national economy. However, continued growth in road transport and its consequent environmental impacts present a major challenge when faced with the concept of sustainable development. Although North Essex is predominantly rural, a significant proportion of its total highway length is 'A' class. The major roads within the Plan area are the A12, A120, A604, A134, A131 and A133. Many of the larger towns are now bypassed. The major A class roads are identified on Map 5.

Transport-related pollution incidents now represent 15% of all recorded water pollution incidents in the Region. They can arise through road traffic accidents, mishandling of goods and at vehicle maintenance and refuelling sites. Such incidents increased by 67% in 1996, compared with the previous year. The A12 and A120 roads are major routes to the east coast ports of Felixstowe and Harwich. Consequently the potential for incidents arising from movements of large volumes of commercial traffic is very high, threatening the quality of the local environment. In particular, drainage from these highways enters sensitive watercourses, including water supply rivers, which require particular protection.

The rail network centres on the major London-Norwich route with stations at Manningtree, Colchester, Kelvedon, Witham and Chelmsford. There are also branch lines to Harwich, Clacton/Frinton/Walton, Braintree and Sudbury. As can be seen on Map 5 the rail network follows similar routes to the primary road network and provides services for both passengers and

Transport and Communication

Map 5



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Urban area
Primary route
Passenger railway

February 1998

to a much lesser degree, freight. There is a significant proportion of freight carriage via road and rail to the ports of Parkeston and Harwich, whilst the former supports a major car/passenger terminal for North Sea crossings to the continent, including the new Stena Sea Cat. Activities at other smaller ports at Mistley, Brightlingsea, Wivenhoe and Colchester, include the import /export of bulk cargoes of grain, soya, fish-meal, ammonia, urea, gypsum, rock and timber. There is therefore considerable warehousing, transport and distribution activity associated with these ports. Pesticide treatment of the timber may be done locally. The shipping movements in themselves also pose some pollution problems, including oil spillages, anti-fouling paint and spillages of cargoes in transit.

5.3 LOCAL INDUSTRY

5.3.1 Agriculture

There is significant scope for agriculture to affect the environment, particularly the water environment, with over 80% of the land in England and Wales utilised for this purpose. Current agricultural practises can have detrimental effects upon the water quality, impact on water resources and affect the wider environment, such as;

- the use of fertilisers influences surface water quality, enriching it with nutrients and promoting its eutrophic state. This can also impact on land drainage by increasing weed growth and on groundwater quality by increasing nitrate levels;
- there is pollution potential to surface and groundwaters from the use of pesticides and the disposal of other farm related effluents;
- the abstraction of water for irrigation affects water levels and supplies;
- maintenance practices undertaken on watercourses, and water levels maintained to ensure land drainage, have a marked effect upon flora and fauna;
- soil erosion can impact on water quality and accumulations can affect river hydraulics;
- disposal of wastes to agricultural land.

Agricultural pollution sources are varied, they include point sources such as those relating to inadequate oil storage facilities, unsatisfactory slurry storage systems and drainage from silage clamps, as well as diffuse pollution deriving from the widespread application of fertilisers and pesticides. The disposal of wastes to land can have benefits where it acts as a soil conditioner and/or fertiliser.

The Ministry of Agriculture, Fisheries and Food classifies land by grade according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. These limitations affect flexibility of cropping, level of yield, the consistency of yield or the cost of obtaining it. Under this system, land is classified into one of five grades (grade 1 being of excellent quality and grade 5 being of very poor quality). The higher grades of agricultural land are described as the best and most versatile agricultural land in Planning Policy Guidance (PPG) Note 7. Such land is recognised in land use planning terms as a national resource for the future, having a special importance.

There are isolated but not extensive areas of forestry in the plan area, located mainly away from watercourses, on pockets of land for which, apart from the cropping of timber also provide cover for game birds.

Much of the Plan area is agricultural in nature, supporting a variety of agricultural activities, with the production of cereals followed by that of root crops and oil seeds in order of importance. There also pockets of intensive glasshouse crop growing and market gardening which require vegetable washing and grading for the supermarket trade.

Fruit growing is localised and includes 'Pick Your Own' areas of soft fruits, extensive orchards and blackcurrant and apple juice manufacture. Strawberries and raspberries are also the basis of a well known, local jam and preserves factory. The extraction of essences from fruit and vegetables is a significant business in Long Melford and Witham. The strong odours and trade effluents arising from these industries can have important implications for air and water quality.

Livestock farming is widespread and includes beef, dairy, pig, intensive poultry and sheep rearing, dominating in different localities. Whilst grant aid is no longer available for the construction of slurry and manure storage facilities, plus their associated irrigation systems, it is likely that problematic sources of this type of pollution have been largely eliminated.

5.3.2 Fisheries - Commercial and Marine

Extensive use has always been made of the exploitable fish stocks which occur within and around Great Britain, and commercial fisheries are one of our most prominent traditional food industries.

The requirements of commercial fisheries are that the biological, chemical and physical characteristics of the fishing areas are maintained and managed in such a way as to allow the exploitation of the commercially viable stocks on a long term and sustainable basis.

Salmon and sea trout do not occur in freshwater anywhere in the area, although occasional records are made from the estuaries and coastal waters. Sea fisheries occur all along the coast, although these primarily exploit marine and estuarine species, rather than the salmon, sea trout, freshwater fish and eels for which the Environment Agency has responsibilities.

Commercial eel fisheries exist around much of the Essex Coast, primarily downstream (seawards) of the demarcation points specified in the *Anglian Region Fisheries Byelaws*. A very limited amount of eel fishing also takes place on inland waters. Offshore, eels are caught primarily by trawling, often by boats operating in pairs. The inshore and inland fisheries make extensive use of fyke nets. Concerns exist over the unregulated capture of species such as dover sole in fyke nets, and over the damage which may be caused to undersized marine fish taken in eel trawl nets. Although these concerns relate primarily to the Thames Estuary, immediately to the south of the area, it is evident that they are valid for the county of Essex as a whole.

5.3.3 Shellfisheries

Coastal waters and estuaries are also used for both crustacean and molluscan shellfisheries. Oysterages differ from other shellfisheries in that they now depend largely on the laying of juvenile stocks for subsequent harvesting, once they have reached a marketable size.

Within this Plan area there are three designated Shellfish Waters for oysters at Pyefleet Channel (River Colne), River Blackwater and Walton Backwaters (see Map 6). These have a long history of commercial fishing but EC legislation requires good water quality to be maintained for them to remain viable. There are also a number of other shellfish harvesting areas in the area.

The layings around West Mersea have in the past been adversely affected by the sewage discharge from the works serving the town but recent capital investment, by Anglian Water Services, has resulted in clear improvement to the hygiene quality of the nearby shellfishery. The current level of treatment, which includes ultra-violet disinfection, has shown that the Class A hygiene criteria can be met. However, the all year round operation of the ultra-violet plant is currently under investigation with Anglian Water Services.

5.4 INDUSTRIAL PROCESSES AND RADIOACTIVE MATERIAL

5.4.1 Industry

Industry can impact upon the environment in many different ways. We aim to work with industry in a regulatory and advisory capacity to ensure that the environment is protected. The development and construction of industrial infrastructure can have a localised impact on both land and water environments. Industrial processes produce waste products that may be disposed of to the land, air or water environments (unless they have an alternative use including recycling). Such wastes that enter the water environment are considered in the 'Effluent Disposal' Section (5.5.2). The disposal of solid wastes is considered in the 'Waste Management' Section (5.5.1). This section introduces the variety of industry within the North Essex Plan area and considers the processes in terms of their effects upon the (emissions to the air) environment.

Although there are many types of industrial activities in the Plan area, the predominant activity is that arising from agriculture. Consisting principally of arable farming, there are associated industries such as confectionary, sausage skin manufacture, silk weaving and dyeing. There are other localised but intensive activities which are described in the Agriculture Section (5.3.1).

Food processing is a major industry in the Plan area, reflecting the mixed agriculture. There are several dairies, abattoirs and meat processing plants for pork and poultry. These create substantial trade effluents plus solid wastes and air emissions. Pet food manufacture, corn milling and processing of cereals are also significant in the Stour valley. Barley production supports malting at Mistley and Witham whilst there is one major independent brewery remaining north of Chelmsford. Vineyards are also becoming more common and recognised as viable commercial ventures.

In addition to the development of residential, commercial and industrial areas, the development of transport and communication networks to serve these centres impose a threat upon the environment in terms of emissions to the atmosphere.

Atmospheric pollution resulting from man's activities, is of local, national and international

Map 6

Shellfish Harvesting Areas

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Shellfish harvesting area

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concern because of its potential threat to the health of the human population, and overall impact upon the global environment. Air pollution may come from a number of sources and may include gaseous and particulate matter. The dispersion and dilution of pollutants depends upon various factors, including the physical characteristic of the release, wind direction and prevailing climatic conditions. Air pollution does not respect administrative or hydrological boundaries.

Air pollutants are considered to be reducing the atmosphere's naturally protective role against harmful radiation, whilst greenhouse gases are believed to be accelerating changes in the climate and potentially exacerbating sea level rise. Acid releases can contribute to the deterioration of historic buildings, the destruction of forests and woodlands and the aggravation of respiratory problems such as asthma and bronchitis.

The main sources of sulphur and nitrogen oxides (the most important gases contributing to acid rain) are emissions from road transport, conventional fossil-fuelled power stations, industry and the burning of fossil fuels for domestic purposes. Direct effects of emissions are usually local resulting reports of poor air quality by the media.

The Rivers Stour, Colne, Roman River, Blackwater and Chelmer are all potable water supply sources, either by direct input to the supply mains after treatment or via storage in reservoirs at Alton, Ardleigh, Abberton and Hanningfield. Their respective river valleys support large numbers of manufacturing, commercial and service industries which are mainly confined to both small and large towns, with no one industrial process dominating. Although there has been a decline in the larger manufacturing industries over the last twenty years, there are still a few significant industrial processes present. Processes within the Plan area regulated by the Environment Agency under the provisions of Part I of the Environmental Protection Act 1990 (IPC) are located primarily at Chelmsford, Harwich and Haverhill. The majority of the processes so regulated are organic and inorganic chemical processes and there is a refinery producing speciality fuels and solvents located at Harwich. A full list of IPC processes can be seen on Map 7. Other industries include electro-plating, anodising, galvanising and extrusion processes using steel, aluminium and plastic. These can create significant trade effluents.

Whilst individual pressures form these industries upon the environment may be small, the cumulative effect is significant. These pressures normally arise from the disposal of trade effluents, either treated on site for direct disposal or via the local sewage treatment works. A mechanism for managing these inputs and impacts exists with our water quality modelling simulations. Occasional pollution incidents into these supply rivers are an additional pressure, which is addressed through pollution prevention campaigns, aimed primarily at industrial estates as well as agricultural sources. Contamination of groundwaters has occurred due to a lack of regulatory control and ignorance. Boreholes have been taken out of use due to localised problems from industrial sources.

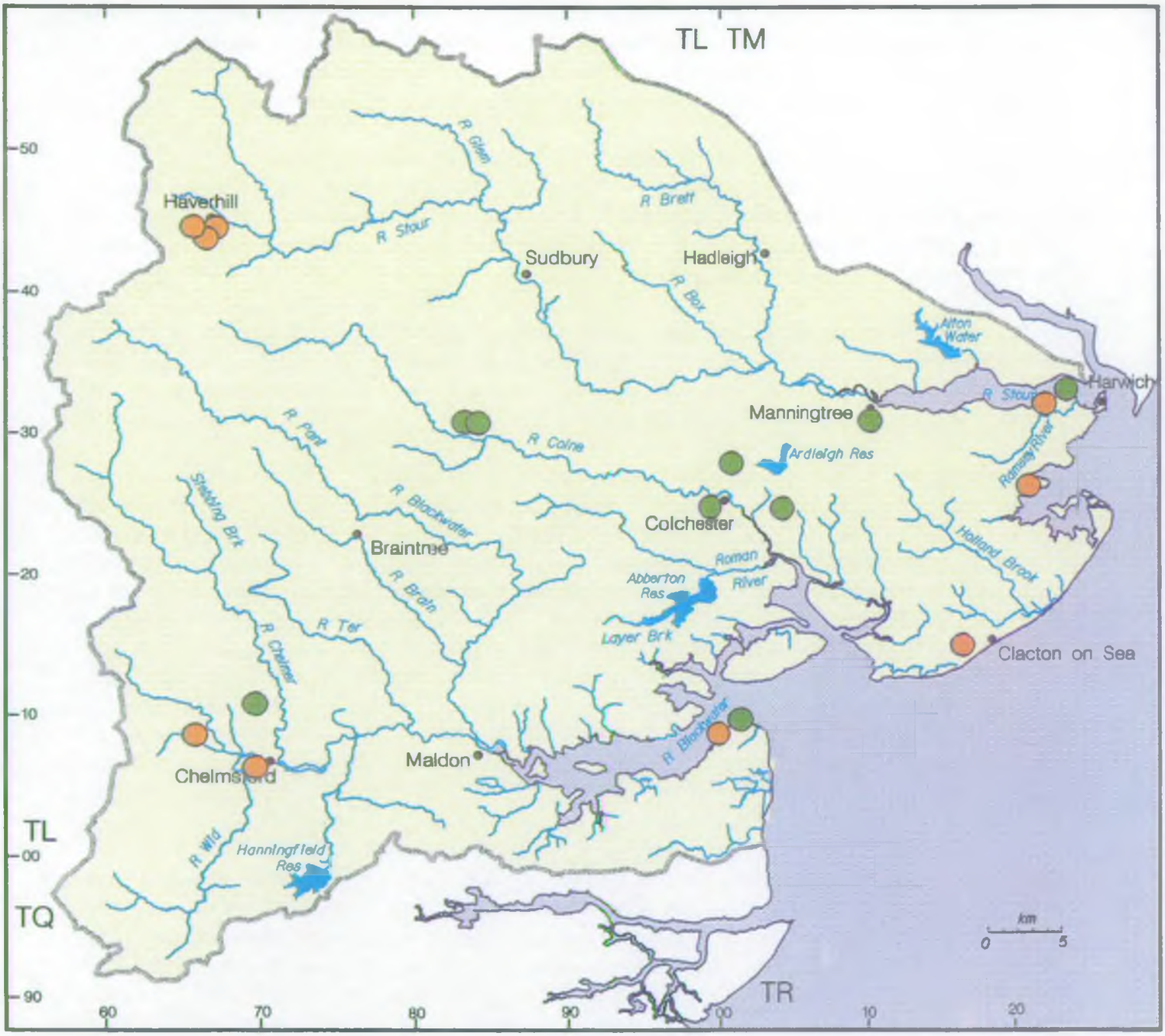
Light Industry

Light industry is present in many of the towns throughout the area. Common examples of firms in this category are light engineering/fabrication, electronics/computing specialists, food processing/packaging, construction/demolition and transport.

Although the Environment Agency undertakes pollution prevention work in cooperation with many companies, it is the impact of oil spillages that is still the most common problem. To this end, we continue our work to improve storage and handling arrangements.

Map 7

Integrated Pollution Control/Radioactive Substances Authorisations



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Site with Radioactive Substances authorisations
Site with IPC authorisations

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Power Generation

The Bradwell Nuclear power station, which commenced operation in 1962, is located within the area of the estuary on the River Blackwater. The station has twin magnox reactors, generating up to 245MW(e) in total. The station is authorised by the Environment Agency under the *Radioactive Substances Act 1993* to dispose of radioactive low level wastes to the atmosphere, the estuary and to Drigg in Cumbria. Higher activity wastes are stored on the site pending station decommissioning and the availability of intermediate level waste disposal facilities. Spent nuclear fuel is removed from the reactors, cooled and decay-stored in fuel storage ponds within a building on the Bradwell site, before being transferred to the Sellafield site in Cumbria for reprocessing. Regulatory responsibility for safety matters and for the storage of radioactive wastes on sites lies with Her Majesty's Nuclear Installations Inspectorate, part of the Health and Safety Executive.

5.4.2 Radioactive Materials

Radioactive substances can be used in many ways that are beneficial to mankind. These include the generation of electricity, medical diagnosis and therapy, scientific research and specialised industrial applications. However, most operations involving the use of radioactive material generate radioactive wastes, which need to be controlled appropriately. These wastes can occur as gases, liquids or solids. Airborne and liquid wastes may be discharged to the environment, after treatment if necessary, while solids are disposed of to appropriate sites or stored until a suitable disposal route becomes available.

Radioactivity can also occur through natural sources. Most radiation exposure to the population is through cosmic rays, gamma rays from the earth, radon and thoron decay products in the air and various radionuclides in foodstuffs. Very little exposure (less than 0.1%) results from the discharge of airborne or liquid radioactive wastes, accounting for only 0.02% of the total annual waste production in the UK, and nearly four fifths of the radioactive waste that is produced contains only a relatively small amount of radioactivity.

Radioactive materials are used for a variety of purposes within the catchment, including power generation (see Section 5.4.1), medical diagnosis and therapy, research and industrial uses.

5.5 WASTE MANAGEMENT AND EFFLUENT DISPOSAL

5.5.1 Waste Management

The generation of waste is an inevitable consequence of many human activities, arising from sources including the home, industry and agriculture. Waste disposal has the potential to harm the environment through contamination of air, land and water in a number of ways:

- the pollution of ground or surface water by leachates escaping from landfill sites;
- the escape of landfill gases such as methane;
- the contamination of land on which waste management and other industrial activities have taken place;
- nuisances such as litter, odours and vermin; and,

- uncontrolled emissions from incineration.

Within the Plan area, by far the greatest proportion of waste is currently sent to landfill. Landfill sites can only accept certain types of wastes, specified by each Waste Management Licence and these categories are explained in Appendix 3. The potential to harm the environment is controlled by the issue of licences and authorisations to carry out waste management activities.

The Government's White Paper on waste, 'Making Waste Work', described a waste hierarchy intended to provide a policy framework within which waste management decisions can be taken. The first priority is to reduce the production of waste to a minimum, and particularly the production of hazardous waste components. At the second level of the hierarchy is the re-use of products so that they do not become waste (the use of milk bottles is a classic example of this). Recovery, including materials recycling, composting and recovery of energy from waste forms the third tier, while disposal is the least attractive waste management option.

n.b. The information on waste in this Section does not specifically relate to the North Essex Plan area, but to political/administrative boundaries, such as those of County Council's.

Waste arisings:

Household Waste

Household waste collected from domestic premises, together with the proportion of it reclaimed via bottle banks, 'can banks' and other similar facilities, represents only a very small proportion of the total waste produced in the County. In 1994/5, for example, it formed less than 10% of the total.

The Borough and District Councils in the Plan area, as Waste Collection Authorities (WCAs), are responsible for collecting household waste. The authorities responsible for the collection of household waste in the area are Babergh, St. Edmundsbury, Basildon, Braintree, Brentwood, Chelmsford, Colchester, Maldon, Tendring and Uttlesford.

Household waste sites (also known as Civic Amenity Sites) are licensed to accept bulky household waste, such as garden waste, old furniture or household appliances. Many of them also provide facilities such as can banks or oil banks, so that particular materials may be separated from the main waste stream. There are currently twelve such sites in the Plan area. These are Shalford, Maldon, Shrub End (Colchester), Witham, Coxtie Green (Brentwood), Mountnessing, Nabbots Farm (Chelmsford), Belsteads Farm (Little Waltham), Great Baddow, Haverhill, Sudbury and Hadleigh. Sites in Suffolk are operated by Suffolk Waste Disposal Company Ltd under contract to Suffolk County Council, while sites in Essex are operated by Exwaste.

Commercial and Industrial Waste

The majority of commercial waste is collected by private waste disposal contractors, although a small percentage is collected by the WCAs along with household waste and road sweepings. All industrial waste is collected by private contractors.

Some 240 million tonnes of commercial and industrial waste is produced in the UK each year

(at present rates). It is difficult at present to provide an accurate estimate of current arisings of this type of waste over the Plan area. However, a nation-wide survey of commercial and industrial waste producers is to be undertaken over four years from April 1998 and this should provide better data.

Special Waste

'Special' waste may loosely be defined as waste which displays one of the hazards (such as corrosivity, toxicity or carcinogenicity) specified in the *Special Waste Regulations 1996*, or which is a 'prescription-only' medicine. A full definition of the term may be found in Appendix 3. The Regulations also prescribe a 'cradle to grave' consignment note procedure to control (at all stages) the movement and disposal of waste which is classified as special.

There are no landfill sites licensed for special waste in the Plan area. There are, however, three transfer stations licensed for special waste. These are Safety Kleen at Brentwood, GBC Clinical at Braintree and an Essex County Council site at Chelmsford. These facilities accept special waste in the area for sorting and bulking prior to dispatch to suitably licensed landfill sites outside of the Plan area. The vast majority of this waste is deposited in two of the hazardous waste facilities of regional significance in South East England (situated at Mucking and Pitsea).

Waste management facilities:

The distribution of licensed waste management facilities currently operating in the Plan area are shown in Maps 8 and 9. The locations of landfill sites in particular are strongly influenced by the geology of the area. These generally exist in former mineral workings now being utilised for waste disposal. Other facilities may be more strongly influenced by population distribution, the location of industry and the road network.

Landfill Sites

Landfill is the disposal method for the vast majority of waste produced in the County and there are fifteen landfill sites in the Plan area. The main sites are Bellhouse (Stanway), Warren Lane (Stanway) and Sandon Hall (Sandon). These are significant sites of over 0.25 million cubic metres.

The other landfill sites in the area are all unlined, and the majority of these are licenced only to accept Category A wastes, *i.e.* inert material such as soil and rubble.

Closed Landfill Sites

There are 153 known former landfill sites within the area, some of which were subject to licensing controls before closure. The majority, however, were landfill sites which were closed before the introduction of controls over waste disposal in 1974. It is quite likely that others exist of which we have no record. Most of these sites cause no problems, but there are some former landfills still generating landfill gas which can cause problems for development. Sites which are known to be generating gas are monitored to ensure that no hazard results.

Transfer Stations

There are currently fourteen transfer stations in the area, licensed to receive a range of materials including household, commercial and approved industrial wastes. These facilities separate certain materials from the main waste stream, some for recycling or re-use and others (inert materials) for disposal in unlined, rather than contained, landfill sites. The separated components are bulked up for movement or disposal, thereby offering transport economies.

Map 8

Open Landfill Sites

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Open landfill site

February 1998

Closed Landfill Sites

Map 9

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Closed landfill site

February 1998

Incineration

There are no municipal waste incinerators in the area. There is a clinical waste incinerator at Ipswich Hospital. Although this is outside of the area, clinical waste and prescription-only medicines are brought to this facility from a wide area for safe disposal.

Scrap Yards

There is one licensed scrap yard within the area, as well as 21 which are registered, or have applied to be registered, as exempt. It is likely that there are also other scrap yards which are currently operating illegally, in that they are unlicensed or have not registered with the Environment Agency as they are required to do. This is an issue which will be addressed as these sites are brought to the Environment Agency's attention. A full list of these scrap yards is illustrated in Map 10.

5.5.2 Effluent Disposal

Effluents are principally treated sewage and industrial discharges although, under particular conditions, discharges of untreated effluent may also occur. In this area the majority of discharges are those arising from small to medium sized population centres. The treatment systems for domestic sewage are well proven and the majority of these fall into traditional categories of percolating filters and aeration units. Industrial treatments, however, invariably have specific units for that particular process, although the majority of industry in this area will not generate effluent in any quantity.

Untreated effluent sources include those discharges from consented emergency and storm water overflows from sewerage systems. Emergency overflow discharges occur due to electrical or mechanical breakdown of pumps which transfer sewage to the sewage treatment works. These overflows are necessary to prevent foul sewage flooding properties when pumps fail. Storm water overflows are constructed on foul drainage systems which receive surface water in addition to sewage. These combined sewerage systems are often found in older parts of towns and cities, but more modern developments have separate foul and surface water systems.

In rural areas many properties are not served by public utility sewage treatment works. In such areas, properties make use of small, private treatment plants and septic tanks. These discharge to land and/or a watercourse and can impact on ground and surface water quality.

Consents for sewage treatment works can consist of two types. Numeric consents are usually applied to larger works and have limits for suspended solids, biochemical oxygen demand and ammonia, commonly known as sanitary determinants. When treatment works are known to receive trade inputs, consideration of the need for standards to control dangerous substances will be required. Descriptive consents (which have no numeric conditions), are usually applied to smaller works and generally consist of statements describing the type of treatment necessary.

Sewerage and Sewage Treatment

In this Plan area most of the large sewage treatment works are operated by Anglian Water Services. All of these discharges are controlled in term of quality and quantity by consents issued by the Environment Agency. Most of the largest sewage treatment works discharge to either the North Sea or to an estuary. Only two, Clacton and Jaywick, are currently subject to minimal treatment but these discharge to the sea through long outfalls. Comprehensive studies, as required by *the Urban Waste Water Treatment Directive*, have recently been undertaken by

Scrap Yards

Map 10

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Scrap yard

February 1998

Anglian Water Services in and around the location of the outfalls to determine whether primary treatment will be adequate to protect the environment. Initial indications show this will not be the case so Anglian Water will be required to construct sewage treatment plants, incorporating secondary treatment, to serve both towns by 2001. The remaining sewage treatment plants that serve the larger towns and discharge to estuaries have consent limits designed to protect the uses of the receiving water.

Treated sewage discharges into the freshwater rivers are all subject to secondary biological treatment with consent conditions that depend upon the dilution available. Therefore, the treated discharges from towns nearer the headwaters of rivers generally have to meet tighter standards than those lower down in order that the river quality objectives are maintained.

The Urban Waste Water Treatment Directive permits the designation of two forms of Sensitive Areas. Sensitive Areas (Eutrophic) [SA(E)] are those where the stretch of water exhibits signs of eutrophication and must be downstream of a sewage treatment works serving a population of greater than 10,000. Phosphorus reduction must be undertaken, to meet a standard of 2mg/l, at those designated works discharging to a SA(E) by the end of 1998. Sensitive Areas (Nitrate) [SA(N)] are those where the stretch of water upstream of a water supply abstraction point (to treatment) exceeds the 50mg/l nitrate standard laid down by the *Surface Water Abstraction Directive* and must also be downstream of a sewage works serving a population of greater than 10,000. Those identified works discharging to a SA(N) must have more stringent treatment than secondary but this has yet to be defined. However, Anglian Water Services are undertaking extensive nitrogen monitoring at those works identified. The table below details those works discharging to Sensitive Areas.

Sensitive Area River	Sensitive Area (Eutrophic) Qualifying discharge	Sensitive Area (Nitrate) Qualifying discharge
River Stour	Haverhill - cand	Haverhill - cand
	Sudbury - SA(e)	Sudbury - cand
Rivers Blackwater and Brain	Braintree - cand	Braintree - SA(n)
	Bocking - SA(e)	Bocking - SA(n)
Rivers Chelmer and Wid	Shenfield - cand	Shenfield - cand
River Colne	Halstead - cand	None - SA(n)

Although many treated sewage effluent discharges achieve a quality significantly better than the Legal Consent standard, development pressures in some towns will have potential impacts on river water quality and therefore on our management strategy. Negotiations with Anglian Water Services will establish priorities for those areas most at risk from such pressures.

Coastal Discharges and Microbial Quality

Within the area there are eight bathing waters identified under the *Bathing Water Directive*. The Environment Agency has the responsibility to ensure that water quality at the waters complies with the criteria laid down by the *Directive*. Anglian Water Services, the sewerage undertakers throughout the area, are required to operate the sewerage system so bathing water quality is protected. Sewage from the local towns is discharged to the sea, close to many of the waters, but

the level of treatment and the length of the outfall varies widely.

Over the next couple of years Anglian Water Services will complete a series of schemes that were designed to ensure bathing water compliance. The schemes have generally relied on elimination of storm overflows or the moving of a discharge location and, in some cases, the installation of secondary treatment. With the exception of West Mersea, disinfection of the sewage is not considered necessary. The position of the outfalls are considered adequate to ensure compliance with the *Directive*. The schemes include:

Name	Details
Harwich/ Dovercourt	This scheme has eliminated all the crude sewage outfalls in and around Harwich and Dovercourt Bay. The sewage from the area now passes to a new works providing secondary treatment and will discharge to the Stour Estuary to the west of Parkeston.
Clacton	A tunnel has been constructed along the sea front and intercepts a number of unsatisfactory storm discharges. These storm flows will principally be discharged to the sea through the current long sea outfall, by the end of the requirements of the *Urban Waste Water Treatment Directive*.
Walton/ Frinton	Investigations are being undertaken to determine what measures would be necessary to achieve Guideline value compliance.
Jaywick/ St. Osyth	It is probable that the sewage arising from St. Osyth will be pumped to Jaywick and discharged through the long sea outfall, Similarly, this sewage works will be upgraded to meet the requirements of the *Urban Waste Water Treatment Directive* by the turn of the century.
Brightlingsea	The sewerage system serving the town has recently been upgraded to minimise the number of storm overflow events.
West Mersea	Ultraviolet disinfection has been installed at the works because of the very close proximity of the discharge to the bathing water to ensure compliance. Anglian Water Services agreed to disinfect the effluent through the winter to determine what beneficial effects it may have upon the shellfishery. This is discussed in Section 5.3.3.

Intermittent Discharges

Associated with most sewerage systems are sewage pumping stations and combined sewer overflows. These can cause the discharge of untreated sewage but they should only occur in the event of plant failure or heavy rainfall when damage to installations or property would result. These often spill to surface water sewers and discharge to rivers remote from the overflow.

Several of the towns in the area are served by sewers that have reached their capacity. Improvements to these systems are being discussed with Anglian Water Services with a view to investment being made over the coming few years.

Many of the industrial estates situated in and around the towns also cause a chronic level of pollution. Small spillages of oils or chemicals are often reported and traced to the surface water

sewerage system serving an industrial estate. The source is rarely found due to the inherent complicated sewerage system and the time delay. Targeted pollution prevention campaigns and joint investigations by the Environment Agency and Anglian Water Services are undertaken periodically.

Industrial and Trade Waste Water Disposal
Several of the rivers within the Plan area receive treated waste water direct from industrial and trade premises. These vary considerably in size but the effluents are all treated to meet river need standards. Historically, most of the effluents discharging to estuaries had particularly lax consent conditions. Over the past few years these have been improved considerably and all now are treated to river needs standards.

Other trade effluents are commonly discharged into Anglian Water Services sewage treatment works and as capacity exists to fully treat these inputs environmental impacts are minimised. Involvement with expanding and developing industry is essential if the environmental impacts of such proposals are to be minimised and controlled in a satisfactory manner.

5.6 WATER MANAGEMENT

5.6.1 Water Resources and River Support

Water is abstracted from rivers and groundwaters for a range of uses by man, including public water supply, agriculture and industry. The Environment Agency regulates these competing demands and the needs of the environment for water through the abstraction licensing system.

All abstraction, except surface water for general agricultural and domestic use of less than 20 m^3/day, requires a licence under the *Water Resources Act 1991*. Licences enable the Environment Agency to control abstractions by setting limits on the amount which may be taken, the purposes for which the water may be used and any necessary conditions to protect the environment and other users. An abstraction licence is only issued by the Environment Agency if there is sufficient water available, the need for the water is justified, all rights of existing users are protected and the water environment (*e.g.* rivers, springs and wetlands) is not unacceptably affected. Abstraction licence inspections are carried out to ensure that licence holders understand and comply with the terms and conditions of their licences.

There is a duty on the Environment Agency to maintain the sustainable balance between the competing needs of humans for water against those of the environment. In carrying out this duty, the Environment Agency estimates the overall water resource availability for each catchment after all the environmental needs have been safeguarded. This fundamental principle ensures that as long as the complement resource availability for abstraction is not exceeded then water resource development is sustainable.

However, the estimates for catchment recharge and for net environmental allocation are complex issues and often difficult to resolve. To overcome this complexity, the Environment Agency has a proven available resource estimation as detailed in Appendix 4. In summary, the water resource availability of a catchment is determined by calculating the effective recharge to the aquifer system and then removing the allocation for environmental and river needs based on the natural 95% flow of the river (see Issue 1a for further explanation of this term). This calculation gives the overall availability for surface and groundwater abstraction within the total catchment.

To assess the impact of a proposed abstraction on the local environment the Environment Agency now requires the applicant to undertake an environmental appraisal whenever there is the likelihood of significant impact. This appraisal will demonstrate the need for the abstraction and justify the quantities required, as well as determining the impact on environmental features and on existing users. In this regard, the Environment Agency has consideration for both the catchment as a whole and local specific issues when determining a licence application.

However, the overall resources within the area are fully committed to any additional abstraction. Therefore, the current policy is not to authorise additional abstraction for groundwater or summer surface water within the Plan area. There are exceptions for non-commercial activities less than 20 m^3/day as well as winter surface water licences for offstream storage (except for streams discharging over inter-tidal mudflats in designated SPA's).

The hydrogeology in the Plan area is influenced by the relatively impermeable Eocene deposits of London Clay and the Lower London Tertiaries (including the Woolwich and Reading Beds and the Thanet Beds). The effective recharge to the various aquifer systems and the interflow to the rivers is influenced by the surface geology (see Map 11). Map 12 illustrates that to the west of the London Clay the aquifer system is principally Chalk overlain by Sands and Gravels, Boulder Clay and Crag, while to the east of this limit the Chalk becomes confined by the overlying sequence of the unconfined Crag and Superficial deposits and London Clay and Lower London Tertiaries. Superficial deposits is a generic term which, in this Plan area, shall refer to all geological sequences deposited after the Pleistocene epoch (including Sand and Gravel, Boulder Clay and Alluvial deposits) and are in general hydraulic continuity.

The Chalk, Crag and Superficial aquifers are important to the overall Plan area as they provide baseflow to rivers as well as supporting significant abstractions for potable supply, industry and agriculture. Within all the aquifers water is also used for local domestic supplies as well as some small-scale agricultural activities. Chalk water varies from around 20m AOD in the west to near sea level in the east. The movement of water within the Chalk is predominantly in a south-easterly direction and generally in line with its dip. However, the Crag and Superficial aquifers are dependant on the variable surface topography of the London Clay deposits. The variability can give rise to discrete pockets of aquifer as well as to dramatically changing direction of flow.

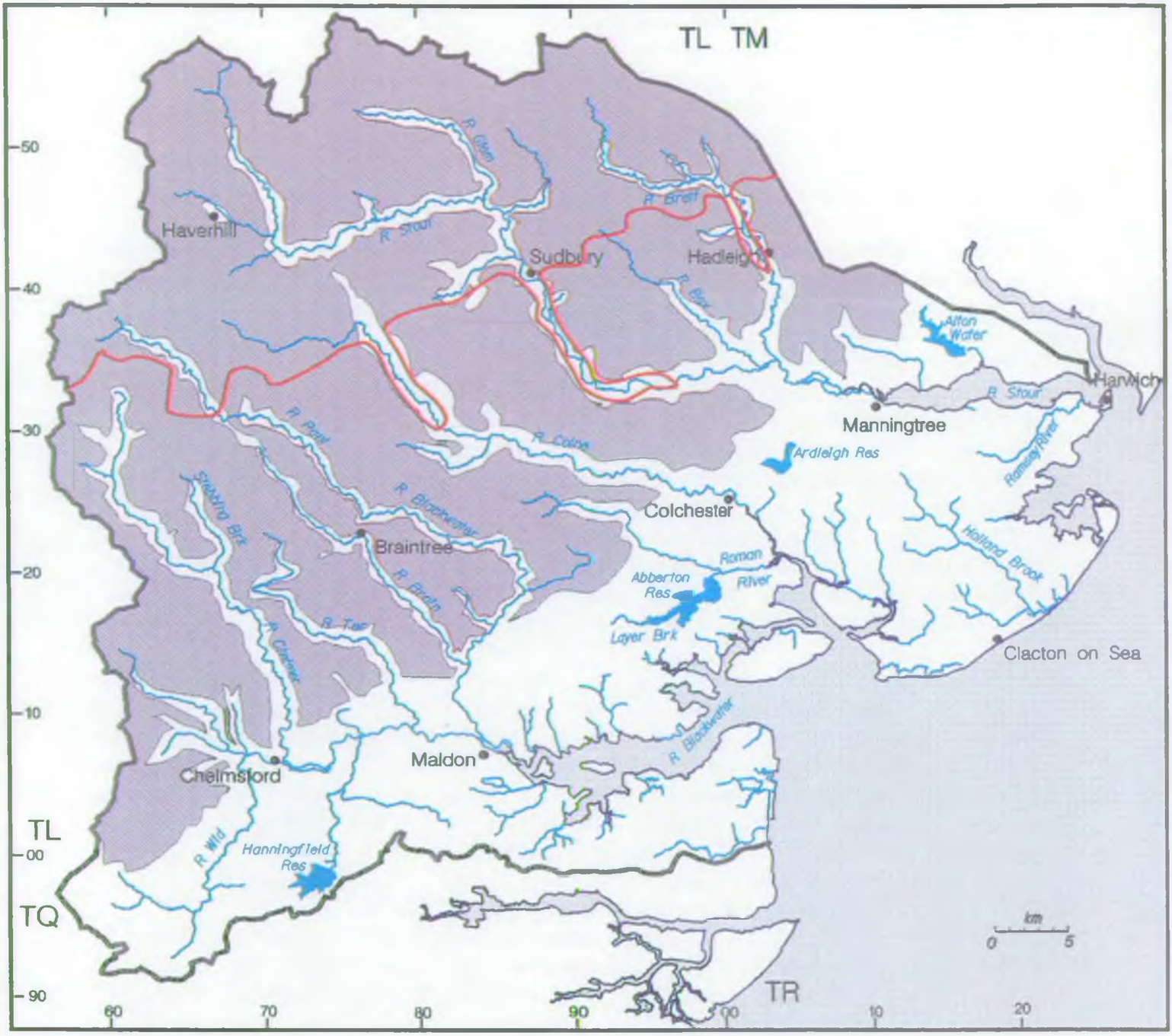
Although the Crag and Superficial deposits are considered to have large storage capacity, the dry weather conditions of 1996/97 have depleted the overall groundwater levels to such an extent that the Environment Agency is increasingly having to investigate many complaints of drought-related well failures. Water quality in both aquifers is predominantly good, although the Chalk water in the east is connate and characterised by high chloride levels while the Crag and Superficial deposits can have high levels of nitrate and iron.

The Plan area contains 24 sub-catchments (see Map 16 for sub-catchment boundaries), each associated with a specific watercourse. A number of these sub-catchments drain into the four main rivers of the Stour, Colne, Blackwater and Chelmer. There are also a number of small, low gradient watercourses which feed estuarine environments.

The use of available water resources within this Plan area fall into four main categories, viz;

Surface Geology

Map 11



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Boulder clay cover

London clay with localised areas of sand/gravels cover

Limit of London clay

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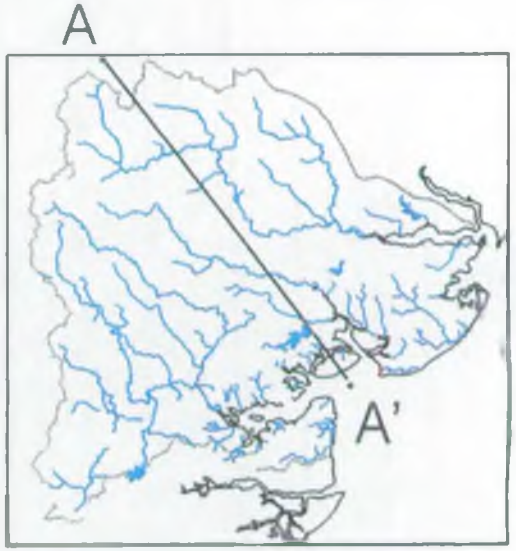
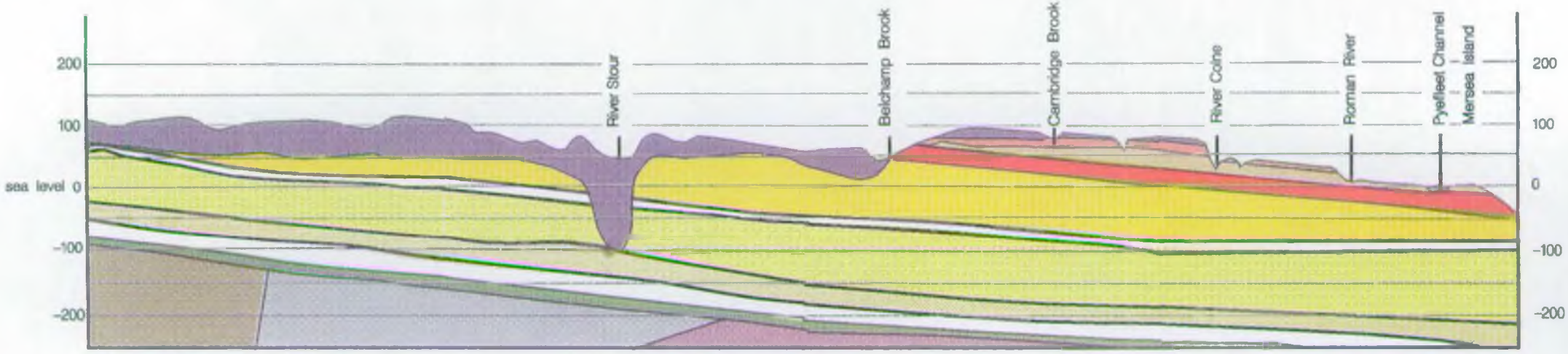
Geological Section

Map 12

- Boulder Clay
- Kesgrave Sands & Gravels
- London Clay
- Upper Chalk
- Middle Chalk
- Lower Chalk
- Lower London Tertiaries
- Pridoli
- Upper Devonian
- Ludlow
- Cambridge Greensand





Section A–A'

1)	Potable Water - Abstraction for Consumption
2)	Agriculture- spray irrigation and general agriculture
3)	Industry, Cooling and Mineral Extraction
4)	River Support and Augmentation.

Abstraction for groundwater uses comes from three distinct aquifer systems, namely Chalk, Crag and Superficial aquifers. Generally the Chalk is separated from the other aquifers by extensive Eocene deposits (London Clay, plus Woolwich and Reading Beds).

Within the Plan area there are over 1600 licences abstracting nearly 750,000 tcma (thousand cubic metres per annum). The following discusses how the authorised abstractions are distributed between the above four categories of use. However, this authorised quantity excludes the allocation for Bradwell Power Station of 750,000 tcma which is beyond the tidal limit of the River Blackwater and is not considered to effect the overall water balance.

Potable Water

Potable water for human use (including drinking and washing) comes from both surface water and groundwater. Potable water abstraction sources range from domestic wells through to large public water supply surface water intakes all of which require a sustainable supply. The three water companies (Essex and Suffolk Water, Anglian Water Services and Tendring Hundred Water) are authorised to abstract nearly 500,000 tcma. The surface water licences for river intakes are located at:-

Abstraction Source	Water Company	Intake
River Stour	Essex and Suffolk Water	Langham
		Stratford St. Mary
		Brantham
River Chelmer	Essex and Suffolk Water	Chelmer
		Langford Mill
River Blackwater	Essex and Suffolk Water	Blackwater at Langford
Sandon Brook	Essex and Suffolk Water	South Hanningfield
River Colne	Tendring Hundred/AWS	East Mill, Colchester
Roman River	Essex and Suffolk Water	Layer-de-la-Haye

The surface water licences for reservoirs are located at:-

Reservoirs	Water Company	Offtake
Alton Water	Anglian Water	Holbrook
Abberton	Essex and Suffolk Water	Layer-De-La-Haye
Hanningfield	Essex and Suffolk Water	West Hanningfield
Ardleigh	Anglian Water/Tendring Hundred	Ardleigh

The authorised groundwater abstractions are located within the Chalk as well as within Superficial deposits. The distribution of groundwater public water supply abstraction is shown on Map 13.

Each reservoir does not have sufficient surface catchment to support the demands imposed on them and as such have to be supported from imported river flow. Alton Water imports water from outside the Plan area. Both Hanningfield and Abberton are supported by rivers within the Plan area which are themselves augmented by the Environment Agency's Ely Ouse Scheme.

The future demand for human consumption is predicted to increase and we have been in consultation with Essex County Council and SERPLAN about the potential implications of population and household projected increases. Despite leakage control and the education of the public to use water wisely, the Essex area is likely to have large residential and industrial expansion from the London conurbation. This projection of increased demand over the existing high water resource allocation is a real pressure on the availability of water from catchments which are already fully committed (for more details on development pressures, please refer to Section 5.2.1).

The number of private potable supplies can be masked from the Environment Agency as their supply is below the deminimus for licensing of 20 m^3/day. However, where a source supplies more than one property then an abstraction licence is required and under such provisions a total of nearly 420 tcma is licensed. However, these are generally small sources located within the Superficial deposits and can be susceptible to changes in groundwater levels, especially during drought related events.

Agricultural Abstraction

This use relates to the abstraction of water from ground and surface sources for agricultural purposes, including both general agriculture (stock watering, chemical spraying of crops) and spray irrigation. All such activities require an abstraction licence except for general agricultural abstractions taken from surface water for less than 20 m^3/day with no commercial gain.

Spray Irrigation

Spray irrigation is widely practised within the area and is undertaken from both surface water as well as from groundwater within all three major aquifers. There is little opportunity for spray irrigation in minor aquifers due to the quantity and reliability of supply required. There are a total of 961 spray irrigation abstraction sites in total of which there are 260 groundwater abstraction sites supplying a total of 3 Ml/d and 701 surface water abstraction sites supplying 13 Ml/d.

Environment Agency And Public Water Supply Abstraction

Map 13

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Surface water abstraction:
- Anglian Water Services
- Essex Water Company

Groundwater abstraction:
- Environment Agency
- Anglian Water Services
- Essex Water Company
- Thames Water Company

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Spray irrigation generally returns a relatively small percentage of the water used back into the water resource system and, as such, is considered as a net loss to the resource. Despite the high concentrated demand in summer months, spray irrigation only accounts for 3% of all licensed abstraction in the Plan area. There are over 960 spray irrigation sites and the distribution of these is illustrated in Map 14.

Future spray irrigation demands is estimated to increase by 50% over the next 25 years. At present there are no available resources for additional abstraction quantities except for the storage of naturally high winter flows into reservoirs for subsequent use in summer for spray irrigation. However, there is a competing demand in estuarine Special Protection Areas (SPAs) where winter residual flow is important for wintering wildfowl.

The Environment Agency encourages the use of winter storage for summer use where appropriate. Although we have no control on the eventual use or the actual siting of the off-stream storages, procedures are being sought between ourselves, local authorities and conservation bodies to encourage environmentally sustainable habitats and recreational use .

General Agriculture

There are over 620 general agricultural abstraction sites in the Plan area (see Map 15) and although totalling nearly 1500 tcma they individually tend to involve small quantities.

Industrial, Cooling and Mineral Extraction

There are nearly 80 abstractions sites in the area (see Map 16) supplying around 75,000 tcma for a variety of industrial and cooling activities in addition to licensed sand and gravel washing, requiring 1000 tcma. Dewatering for mineral extraction is exempted from licensing and is not included in the resource allocation figures. Within the Superficial deposits, where most extraction activities occur, there is no allowance made within the water resource balances for an activity which could have a significant impact on relatively small and localised groundwater aquifers. The Environment Agency is in the process of discussions with quarrying groups to help redress this problem.

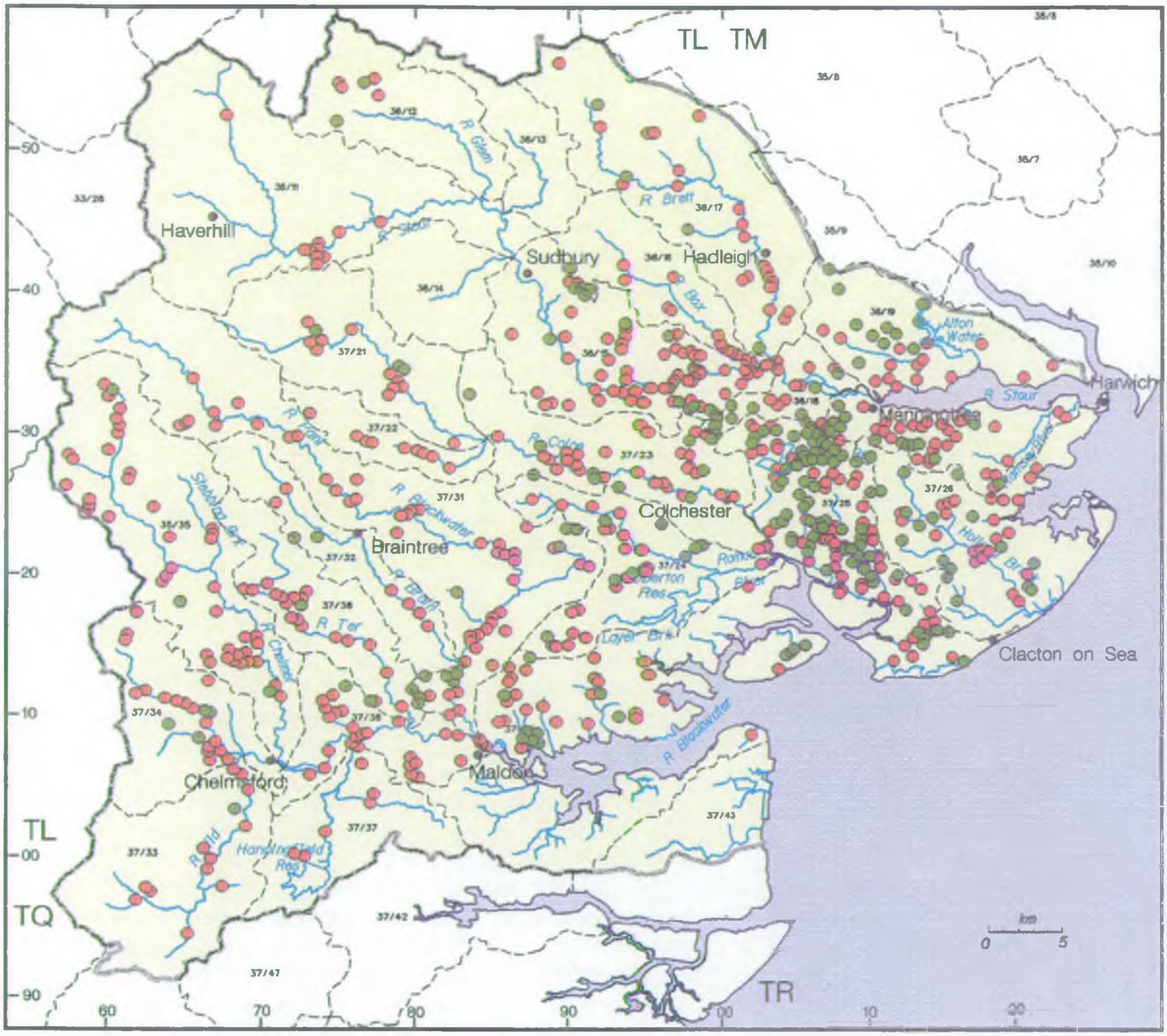
River Support and Augmentation

It has long been recognised that the demand for water in Essex far exceeds the naturally available resources. To meet the needs of humans for water and at the same time protect the needs of the environment, the Environment Agency has one transfer scheme and one augmentation scheme which strategically manages, augments and distributes water.

The Environment Agency's Ely Ouse Scheme transfers water from the Blackdyke intake on the Cut-off Channel, Norfolk, and is discharged at Kirtling Green into the R Stour via the Kennett pumping station. The Ely Ouse Scheme flow is supplemented by the Environment Agency's Stour Augmentation Groundwater Scheme (SAGS), which is located near the upper reaches of R Stour. Figure 2 schematically shows both schemes and the way in which water is managed within the Plan area.

Location Of Spray Irrigation Abstractions

Map 14



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Surface water licence
Groundwater licence
Sub–catchment boundary

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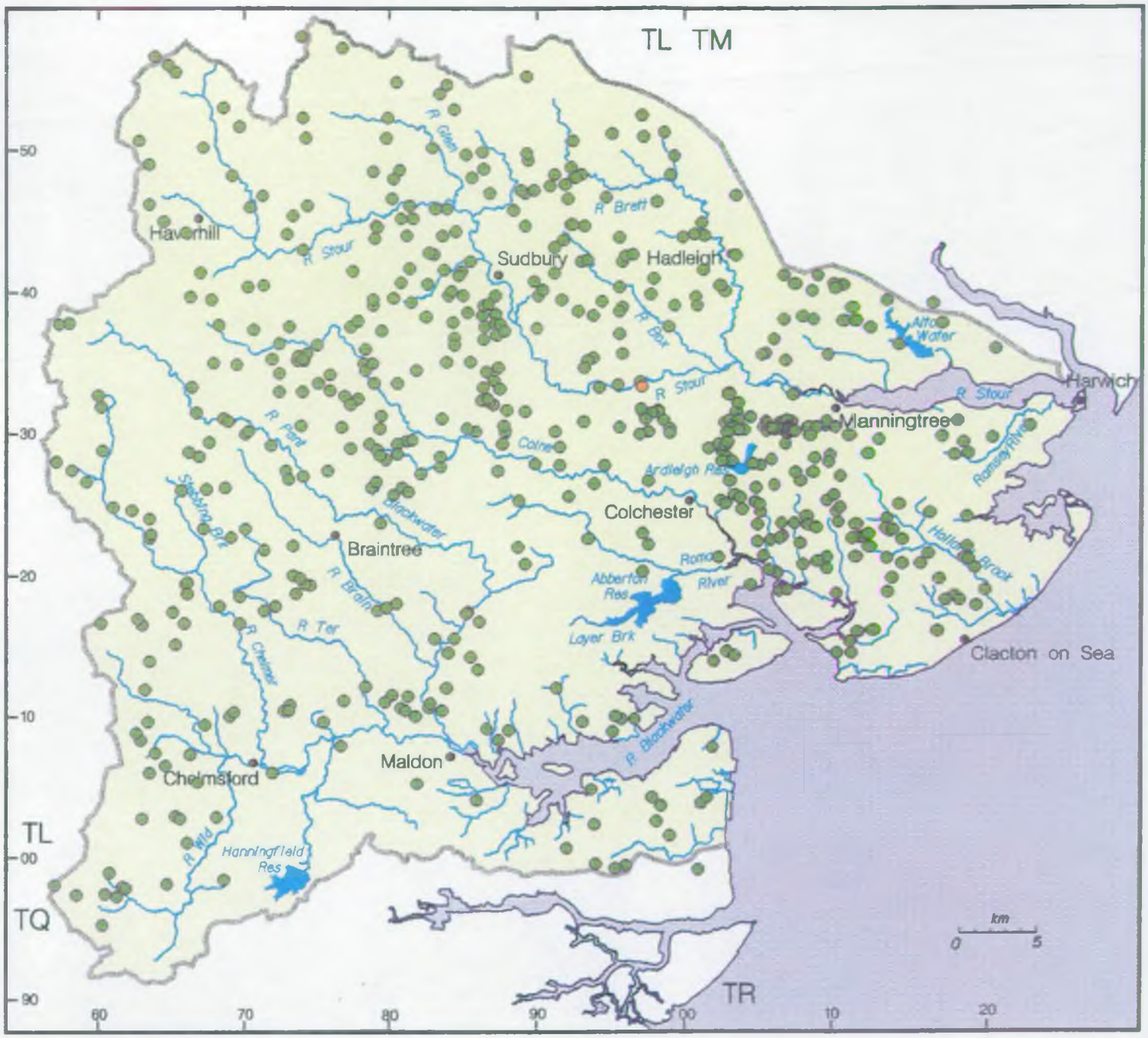
Map 15

General Agricultural Abstractions (Excluding Spray Irrigation)



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Groundwater abstraction
Surface water abstraction

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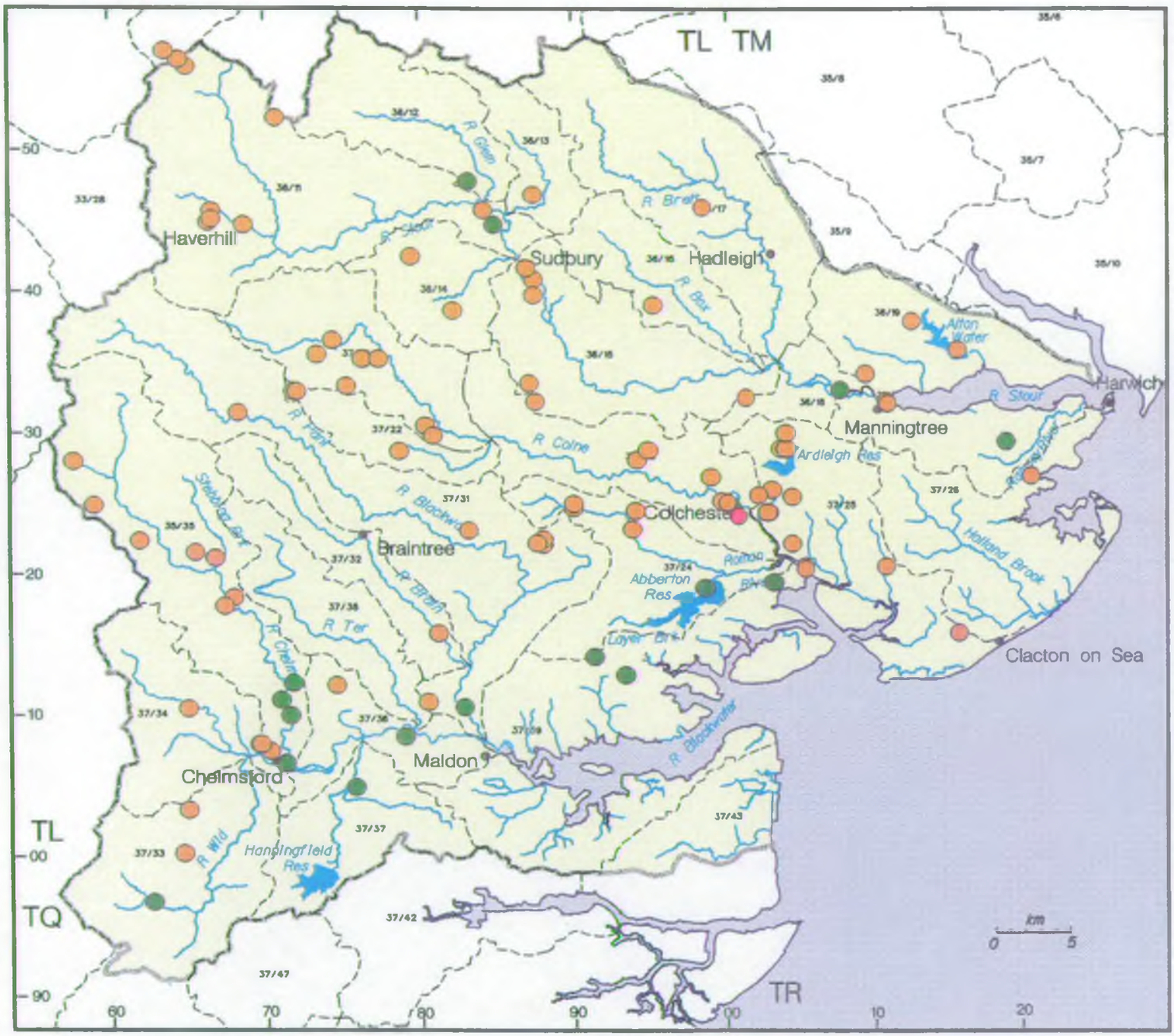
Industrial And Cooling Abstractions

Map 16



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Surface water abstraction point
Groundwater abstraction point
Tidal water
Sub-catchment boundary

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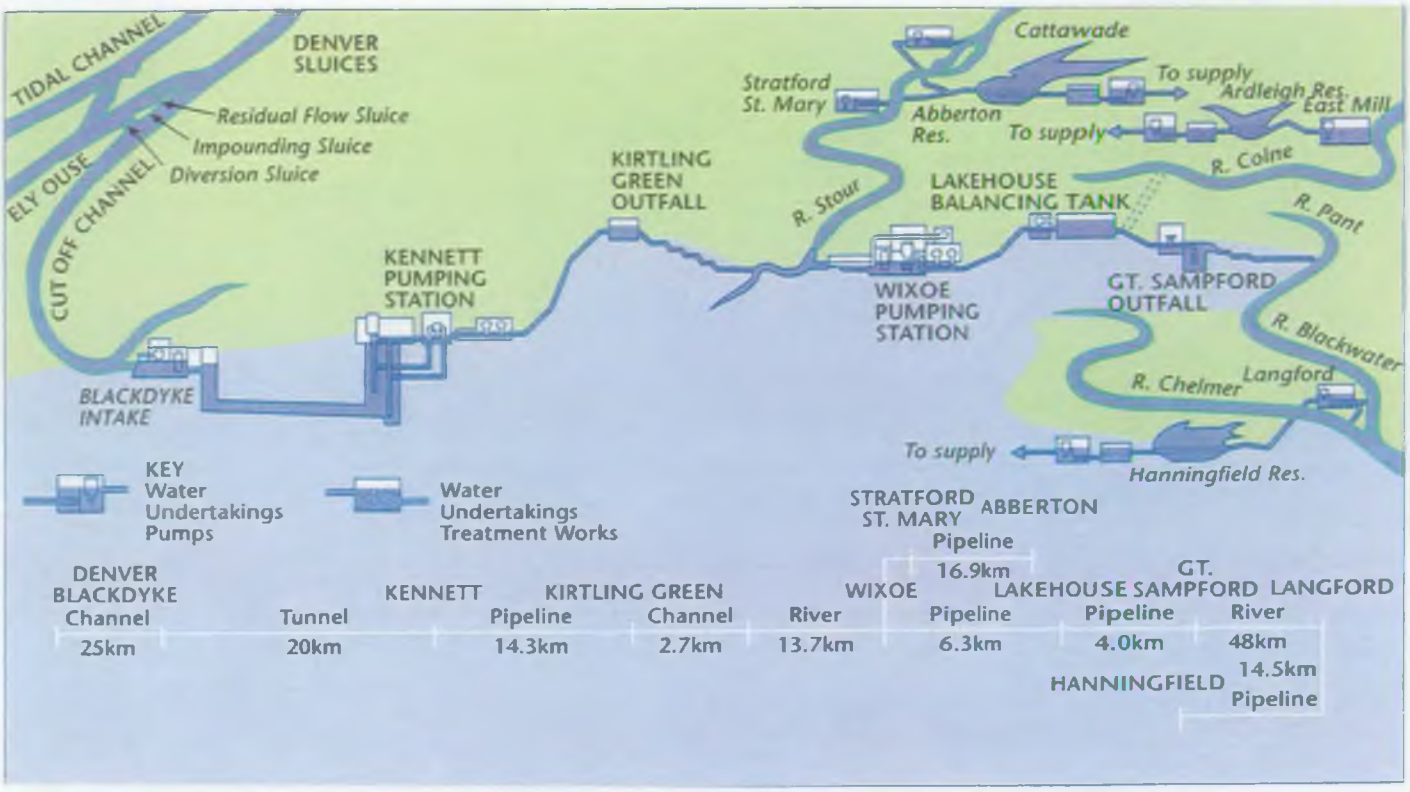


Figure 2: Ely Ouse to Essex Water Transfer Scheme.

The water supplied by these schemes is used for both supporting river flow as well as augmenting surface water licences, especially intakes for Abberton and Hanningfield. The river support element of the scheme ensures that the environmental and river needs are maintained during drought and summer periods as well as ensuring the operation of the large surface water intakes. The operation of such schemes must also allow for a component which is not available for use due to groundwater recirculation or losses to the sea. The proportion of river support, river augmentation and net losses have not been quantified following the operation of the schemes.

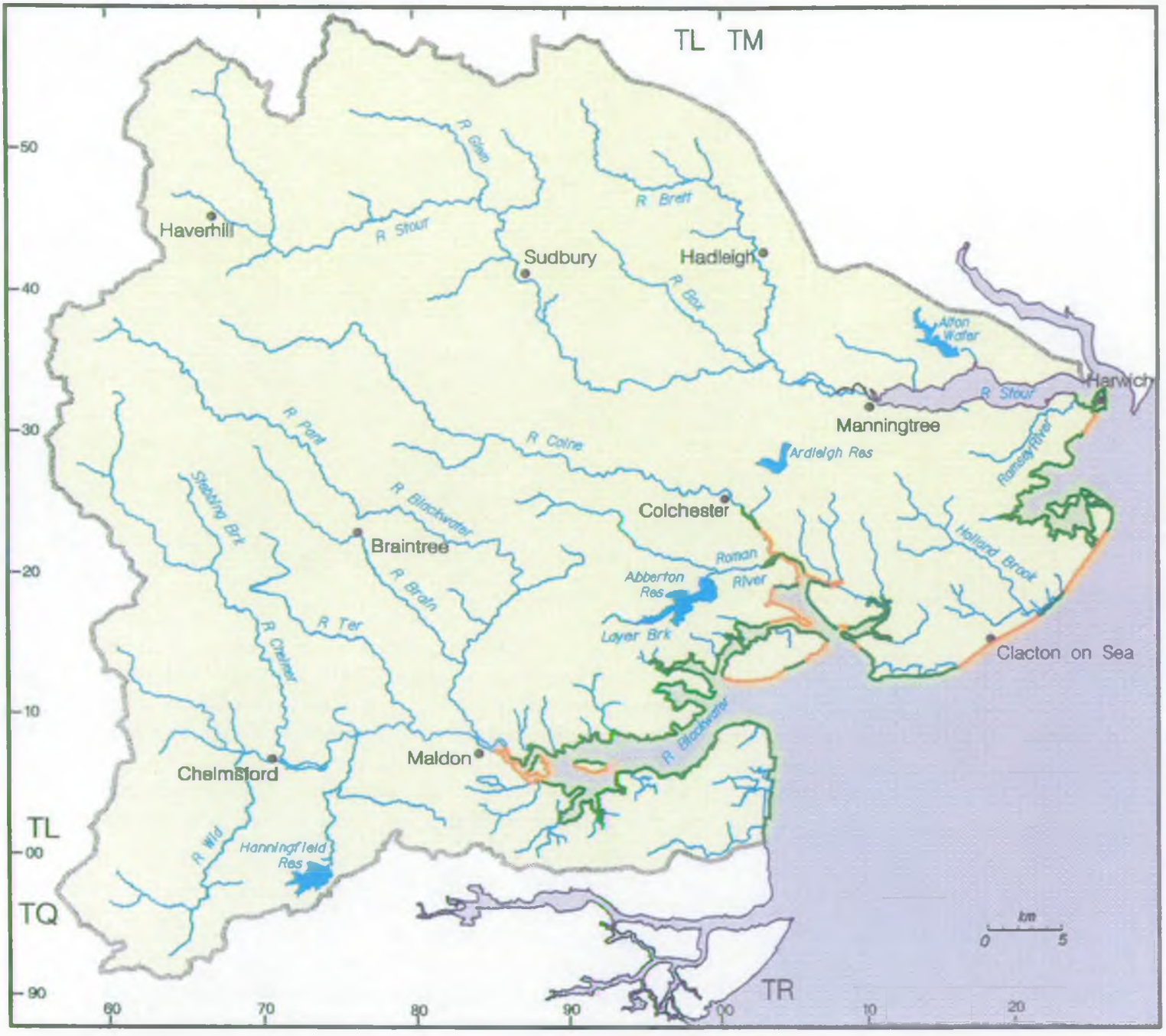
5.6.1 Flood Defence and Coastal Protection

Flood Defence deals with the provision and maintenance of effective defences tp protect people and property against the risk of flooding from rivers and the sea. Normally flooding is a result of extreme climatic conditions, such as very heavy rainfall or tidal surges. Flood events are described in terms of the frequency at which, statistically, a certain flood flow or level can be expected (*e.g.* a 1 in 50 year event. These risks are not a measure of actual events. A similar approach is used to measure the effectiveness of flood defences (*e.g.* a 1 in 50 standard defence) would provide protection from the consequences of a 1 in 50 year flow or level. Different types of frontage need different standards of protection. Areas such as Harwich where lives and property are at risk can justify very high standards of protection and expenditure levels, whereas individual parcels of low grade agricultural land threatened by fluvial inundation may only justify low or negligible standards of protection.

Much of the land bordering the coastal waters of Eastern England is low lying and, consequently, is protected by various types of sea defence (see Map 17). These defences have been

Sea Defences Responsibility

Map 17



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
Environment Agency maintained
Non–Environment Agency maintained

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constructed, improved and maintained by the Environment Agency and its predecessors over many years.

Tidal surges (often accompanied by strong winds which generate heavy wave action) originating in the North Sea can give extremely high water levels, particularly at times of Spring tides.

The natural river systems of Eastern England have been altered over the centuries to provide power, navigation, improved agricultural yield and flood protection. Some have, by necessity, been embanked, the combined effect being to create artificial environments which can provide a relatively restricted diversity of flora and fauna.

The maintenance of the existing systems is essential to protect life and desirable to protect property. The maintenance of river systems for these purposes can be a source of conflict because of its possible impact upon the associated flora & fauna.

Loss of life and property as a result of tidal flooding is not a new phenomenon. The Roman Army annals noted a flood involving loss of life in AD9. The eleventh to fifteenth centuries were exceptionally stormy. It was, however, the 'Great Tide' of 31 January to the 1 February 1953 that had the greatest impact on the coastline and inhabitants of north Essex. Loss of life and property was considerable. Remedial measures taken were both rapid and costly requiring mobilisation on a national scale. These remedial measures were effective to the extent that no serious tidal flooding has taken place since; the risk remains though, as does the need for continual maintenance and improvement.

Fluvial flooding has affected property, communications and infrastructure within the relatively narrow confines of the Plan area river valleys. Serious urban flooding in 1947 affected towns such as Halstead and Colchester, the latter to a major extent. The town is now protected by flood embankments and control structures. A major summer flood in September 1968 caused serious problems in the Stour Valley. Haverhill suffered badly leading to the construction of a flood storage reservoir upstream of the town. Other lesser schemes were undertaken to protect downstream towns and villages. The high amenity value of the Stour Valley puts added pressure on designers of improvement schemes. Major flood alleviation works protect Chelmsford which, previous to this work, had a long history of flooding.

Coastal Defences

The Plan area coastline is composed of soft materials, mostly low lying. Some cliffs are present, notably at Walton on the Naze, where erosion is a major problem. Some coastal towns (Clacton on Sea and Walton on the Naze) are built on high ground, benefitting from coast protection works funded by district councils. Groynes and beach re-charge schemes have been employed on open sea reaches in an effort to reduce damaging waves both on high ground frontages and low-lying land zones maintained by the Environment Agency.

Clay walls form the most common type of protection to the low-lying marshland along the tidal estuaries. Nearly all these walls now have an armoured face to reduce the effect of wave action. Vulnerable towns such as Maldon, Manningtree and Harwich have high grade concrete and steel sheet-pile defences. Colchester is protected by a movable tide barrier, located at Wivenhoe, two miles downstream from the town.

A large proportion of the Plan area coast is protected for nature conservation under European and

International legislation. There is a need to balance these requirements with the flood defence needs. The long-term nature conservation interest of this area is dependent upon the management of coastal defences. Whilst some defences protect important habitat (*i.e.* Old Hall Tollesbury, Tollesbury Wick and Holland Marshes) other defences are preventing the natural development of saltmarsh landward resulting in 'coastal squeeze' and loss of habitat as sea level rises.

Fluvial Defences

Fluvial defences are limited in the Plan area. Those that exist are predominately urban. Colchester has an extensive system of embankments, Sudbury, Cornard and Bures have embankments combined with improved channels and Stratford St. Mary has a small flood embankment.

The Plan area has four main river systems, the Rivers' Stour, Colne, Chelmer and Blackwater. All have flood plains under agricultural use and numerous water mills, none now functioning commercially (although a few can still operate and others are being restored). Augmentation of flow can take place to these systems via the Ely Ouse Scheme.

River Stour

The River Stour rises at Weston Green at an altitude of 103 metres AOD and flows 108 km to join the North Sea through the ports of Harwich and Felixstowe. The principal tributaries joining the main river at various points are the Rivers Glem, Box and Brett. The Stour is the main receiving course for augmented flows from the Ely Ouse Scheme in periods of dry weather. Flows can be further transferred via the Wixoe Pumping Station from the Stour to the River Pant/Blackwater system and to the River Colne. The remaining flow is abstracted by Essex and Suffolk Water Company into the supply at Langham and to Abberton Reservoir via pumping stations at Stratford St Mary and Brantham.

There is a public right of navigation on the river from Sudbury downstream to Cattawade. The lower end of the river valley, known as Dedham Vale, is a scheduled Area of Outstanding Natural Beauty (AONB).

River Colne

The river rises at a level of 91m AOD and runs 51.5km to the tidal discharge point at East Mill, Colchester. The river has numerous maintained tributaries totalling 78.3km in length. Few properties have a serious flood risk since the construction of a major flood relief scheme in Colchester. The river has several picturesque mills. The Mill rights for most of these are held by the Environment Agency. Much of the summer flow is abstracted at East Mill by Anglian Water Services and Tendring Hundred Water for Ardleigh Reservoir.

River Blackwater *(known as River Pant upstream of Kingsbridge, Bocking)*

The river rises at a level of 107 m AOD and runs 108.5km to the tidal discharge point at Beeleigh Falls near Maldon, a discharge location it shares with the River Chelmer. The river has a major tributary in the River Brain (19km) and 29.7km of lesser maintained tributaries. As with the River Colne a good number of Mills remain. The flow is augmented during times of drought by Ely Ouse Scheme flows. The water is abstracted by Essex and Suffolk Water for transfer to Hanningfield Reservoir.

River Chelmer *(including Chelmer and Blackwater Navigation)*

The River Chelmer runs 72.6km to the tidal discharge point at Beeleigh Falls near Maldon. Major tributaries are the River Can (19km long), the River Wid (25.4km long) and the River Ter (31.7km long). Lesser maintained tributaries total 85km. The river supported a number of large and interesting watermills, some of which remain. The history of these, and other Essex Mills, can be ascertained by reading 'Some Essex Water Mills', by Hervey Benham (see References). The river incorporates a navigation between the sea at Maldon and Chelmsford. It was completed in 1797 and has eleven locks. It carried considerable commercial traffic in its heyday but today it is used for recreational boating only. As with the River Blackwater, water is abstracted for transfer to Hanningfield Reservoir.

Maintenance Programme

The Environment Agency does not own watercourses (except in a few locations where the Environment Agency or its predecessors have purchased land for structure, construction or flood defence improvements). The ultimate responsibility for the upkeep of a watercourse rests with the person who owns the land on the side of the river (also known as the riparian owner). We have permissive powers, on Main River, to undertake works and exercise our powers in this respect according to available resources and priorities. Regular maintenance is essential if the river system and sea defences are to operate properly at times of high water levels. Such maintenance works include vegetation control, repairs to earth embankments and other floodwalls, obstruction and blockage removal and limited dredging. Maintenance works help preserve the integrity of the coastal defences and maintain the flood discharge capacity of the Main Rivers, thereby significantly reducing the risk of flooding.

An essential element of the annual maintenance works, is the requirement to design and implement these in a sensitive and environmentally acceptable way. Whilst carrying out flood defence works and in liaison with our environmental functions, opportunities are sought to incorporate environmental enhancement features wherever possible, in relation to the extent and expenditure of the flood defence maintenance scheme. Under the legislation three principal aspects have to be considered, namely to take into account the impact of proposals on natural features, to have regard for the protection of features of historic interest and to further the conservation and enhancement of flora, fauna and other natural features .

Minimum recommended maintenance frequencies are desirable but are not mandatory. The revenue maintenance programme is funded principally by a levy on Essex and Suffolk County Councils and supported by general drainage charge contributions within the Essex Local Flood Defence Committees' area.

The North Essex Plan rivers are generally of a natural channel section, (with the exception of embanked sections upstream of mills and lengths improved for flood protection reasons) and require little in the way of maintenance, other than annual weedcutting, minor de-silting and the removal of obstructions.

Maintenance of the coastal defences consists mainly of maintaining the integrity of the seaward face protection systems. Sluices, barriers and access gates are regularly serviced and repaired as required. Grass on the landward embankment slopes is cut annually to promote a dense, erosion resistant, turf. In addition to general maintenance work, the Environment Agency has discretionary powers to build new flood defences if flooding is a serious problem in a particular area. All schemes must be technically, economically and environmentally sound and sustainable. Subject to the above criteria being met, schemes may then be funded on a priority basis with

currently up to 55% grant aid from the Ministry of Agriculture, Fisheries and Food, with the balance once again funded by a levy on Essex County Council.

To identify the future needs of the catchment for improved and replacement flood defences, a Long Term Plan has been produced, for the Essex Local Flood Defence Committee. Projects have been identified within the area and prioritised for the years 1998 - 2008. These represent the Committee's capital expenditure needs over the next ten years. This is a strategic document which is used for consultation with both MAFF and Local Authorities to gain Grant Earning Ceiling Allocations and as a basis of discussions with Essex County Council regarding precept funding for flood defence.

Recent Capital works expenditure within the Plan area includes the following:

- Provision of high standard defences to Parkeston Quay where none formerly existed. These defences incorporate concrete parapet and steel sheet pile walls with movable tide gates. Considerable beach recharge works have recently completed the protection of the Parkeston compartment.

- The construction of the River Colne tidal barrier at Wivenhoe has, by the provision of this movable defence, provided protection to Colchester, Rowhedge and Wivenhoe.

- New defences and reconstruction of existing seawalls are presently being undertaken at Brightlingsea.

Shoreline Management Plan (SMP)
A Shoreline Management Plan is a document which sets out a strategy for coastal defence for a specified tidal frontage taking account of natural coastal processes and human (and other) environmental influences and needs.

Recent research has suggested that the coastline of England and Wales can be divided into eleven major sediment cells. A sediment cell is defined as a length of coastline which is relatively self-contained as far as the movement of sand and shingle is concerned and where interruption to such movement would not have a significant effect on adjacent sediment cells.

SMPs provide the vehicle for the long-term sustainable protection of our coastlines. The objectives of SMPs are to improve our understanding of coastal processes, to work in partnership with all interests and organisations and to prepare an agreed framework for the long-term planning of coastal defences.

The north Essex coast falls into Sediment Cell 3, from the Wash to the Thames. Although this cell forms a discreet unit it has been divided into sub-cells to provide a more practical basis for the initial production of a Shoreline Management Plan. The north Essex coast falls into Sub-cell 3d (Manningtree to Mardyke) of the Essex SMP and is divided into nine natural management units.

Land Drainage
For watercourses which are not designated as Main River, local authorities have powers under the *Land Drainage Act 1991*, to maintain or improve existing works or construct new works.

These powers are permissive and do not relieve riparian owners of their duties and responsibilities. In general water must be accepted from an upstream neighbour and passed on, together with drainage from the property, to the neighbour downstream. The ultimate responsibility for maintenance of the watercourse, including the banks, rests with the riparian owner. This could include clearing obstructions, repairing the banks, protecting vegetation and trees and removing rubbish.

Any works which may affect the flow in a watercourse require the consent of the Environment Agency under either Section 109 of the *Water Resources Act 1991* or Section 23 of the *Land Drainage Act 1991*. The Environment Agency operate Byelaws which additionally require the issuing of consents for works which may affect the effectiveness and operation of its assets. Such approval is required for works on or adjacent to seawalls, flood embankments and Main Rivers. By exercising these powers the Environment Agency seek to ensure that standards of flood defence and drainage are not compromised, and in determining all river works which need its approval, the Environment Agency must also consider the environmental effects of any proposed works. The Environment Agency has permissive powers to enter and to carry out works in pursuit of their flood defence role as resources allow. However, the ultimate responsibility for repair and maintenance of river systems rests with landowners. The Environment Agency have prepared a booklet, the *Riverside Owners Guide*, which gives advice to people living near rivers and streams, and is available from our Area offices.

Flood Risk Areas

The relevant authority for controlling development in the floodplain is not the Environment Agency but the local planning authorities through the Town and Country Planning process. Local planning authorities and the Environment Agency are required by the Department of Environment, Transport and the Regions (DETR) in Circular 30/92, on Development and Flood Risk, to liaise closely on flooding and surface water run-off matters. The aim is to ensure that flood risks that might arise from a development are recognised and made an integral part of the decision-making process undertaken by local planning authorities. Flooding and drainage issues are also to be taken fully into account during the preparation of land use development plans. In this respect the Environment Agency has responsibility to prepare surveys under Section 105 of the *Water Resources Act 1991* to define the nature and extent of flood risks (see Issue 5a, Option 2).

Flood Warning

The Storm Tide Warning Service is run by the Meteorological Office at Bracknell and monitors and predicts tidal surge conditions that may affect the east coast of England. This gives sufficient advanced warnings of areas likely to be affected by tidal flooding, in order that effective action can be taken. When appropriate, flood warnings are issued by the Environment Agency to the public, the police, emergency services and the media, and messages are put on FLOODCALL, our flood enquiry telephone service (0645 88 11 88).

In order to ensure that timely warnings are issued to the right people, the Environment Agency operate a system of Flood Warning Standards of Service. By defining lengths of river, or reaches, with common land use interests, those areas with a high population concentration can be treated as priority. It is our aim to provide a two hour warning of commencement of flooding wherever practicable.

During flood flows, mobile patrols keep structures and sluices clear of debris, whilst reporting

on the flooding situation to the Agency's Area Emergency Incident Room.

5.7 CONSERVATION AND RECREATION

5.7.1 Landscape and Archaeology

The historic landscape and archaeological assets of the environment include features such as hedges, walls, ditches and hay meadows, and archaeological features including megalithic monuments, castles, churches, deserted villages, great halls and bridges. Some sites, protected or managed for their historic interest, are also valuable for wildlife because they form important habitats.

Change of land use and development (including farming practices and flood defence works) may result in ground disturbance and alter water table levels. Such change exerts a constant pressure on our landscape and archaeological heritage. Rivers, lakes, wetlands and alluvium-covered areas can be important in terms of archaeology because of the types of site preserved and the possibility of anaerobic conditions permitting the preservation of organic materials. Archaeological remains in these environments are possibly the least well documented because, until disturbed, remains preserved in these areas are among the best protected in the country. Water levels may be critical to preserving remains, as an increase may result in erosion and a decrease may lead to the destruction of previously water-logged deposits.

The river valleys of the Stour, Colne, Blackwater and Chelmer have a wealth of archaeological interest. The light soils which are easily worked for agriculture, coupled with the rivers as an obvious source of food has led to continuous occupation of the area since Neolithic times. Much of the evidence for these prehistorical sites is derived from aerial photographs which reveal fields, enclosures and trackways of early settlements as differences appearing in the growth of ripening crops (crop marks). Rising sea levels since the Iron Age has meant that many archaeological features have remained encapsulated in the estuarine mud.

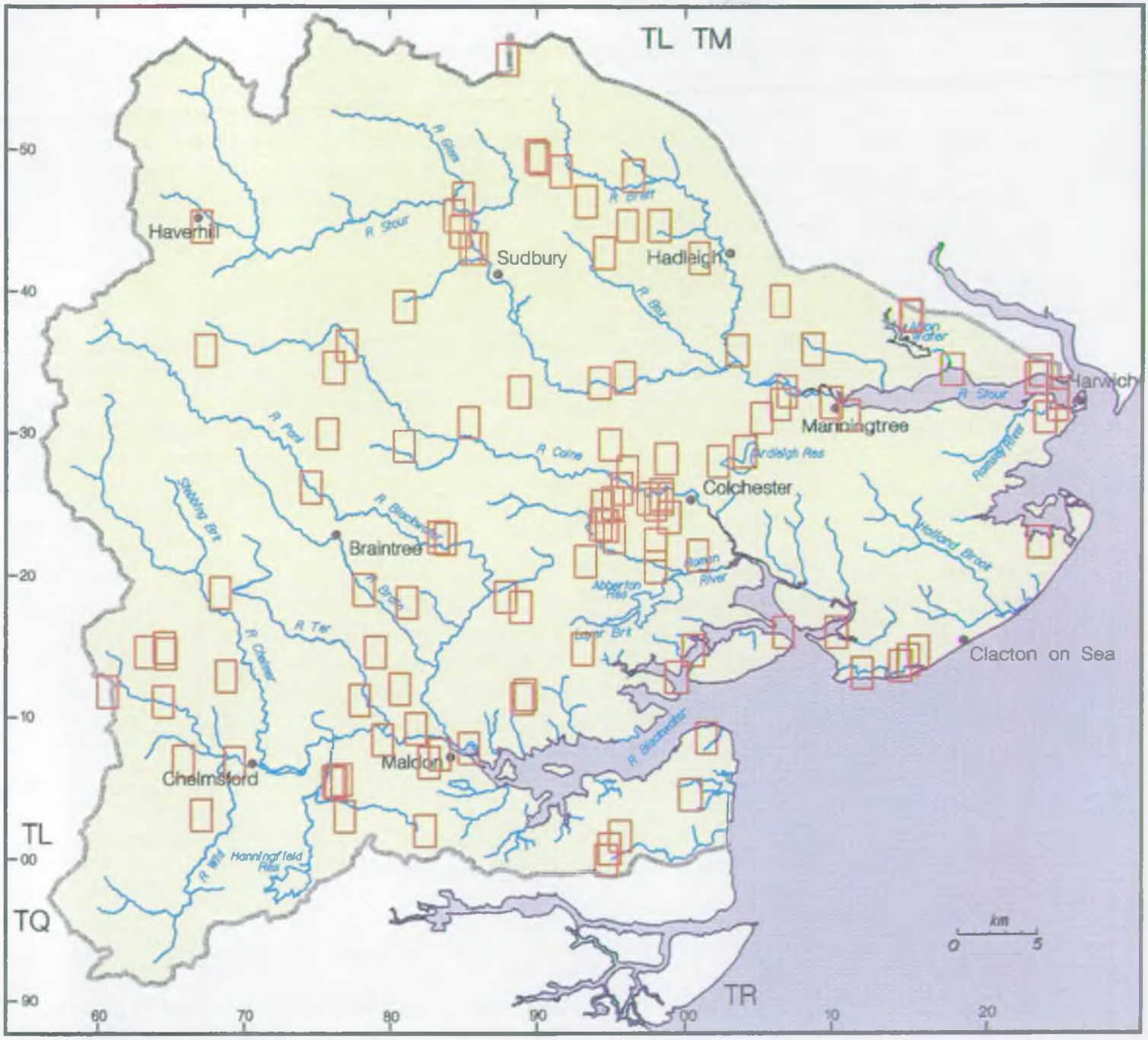
Throughout the Iron Age a flourishing local industry was that of salt extraction. Traces of this industry can be seen along the fringes of the Blackwater and Walton Backwaters where there are mounds of waste material from the extraction process, known locally as the 'Red Hills' because of the bright red colour the soil has taken from the partially fired and heated clay in the broken vessels. Most of these areas have been adversely affected in the last two thousand years through coastal erosion, ploughing and incorporation into early seawalls.

The whole area is renowned for its wealth of historic buildings and archaeological sites. The Essex County Sites and Monuments Record (excluding for the moment any Suffolk records) cover many sites of interest and contain evidence of over 9,000 sites and this does not include the many, as yet, unidentified archaeological sites. Current thinking is that the Monuments Record represents less than 10% of actual sites (Suffolk County Council, Archaeological section). There is much public interest in our historic heritage and some sites (*e.g.* Norman Keep at Castle Hedingham, Roman structures in Colchester and Pleshey Castle) attract many visitors.

The County Sites and Monument Record includes a number of sites which are identified as being of national importance and which are designated as Scheduled Ancient Monuments (SAMs). There are 145 SAMs in the Plan Area (see Map 18). The number of these sites may increase over

Archaeology

Map 18



ENVIRONMENT AGENCY

Catchment boundary

Main River

Coastline

Sceduled Ancient Monument

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the next few years as a result of English Heritage's Monument Protection Programme.

Within this area lies the Dedham Vale Area of Outstanding Natural Beauty (AONB), part of both the Suffolk River Valleys and Essex Coast Environmentally Sensitive Areas (see Map 19) and two River Valley Projects. Both the Stour and the Colne have River Valley projects, funded by the local authorities and the Countryside Commission, associated with them. Their aims are to maintain and enhance the aesthetic landscape, nature conservation, recreational and educational aspects of the river valley, many of which are compatible with the Environment Agency's conservation and recreation duties.

5.7.2 Angling

Angling is said to be the most popular recreational activity, in terms of participating numbers, within Britain. It is undertaken both for relaxation, and occasionally as a competitive sport, in all of its three principal disciplines, namely coarse, game and sea angling. Coarse and game angling is practised on freshwater rivers, lakes and reservoirs, whilst sea angling takes place on estuaries, from beaches and in coastal waters. Freshwater venues may be privately owned, commercial, syndicated or association waters, many of which are managed voluntarily by both owner and tenant angling clubs.

Freshwater

Organised coarse fishing takes place on all four of the major freshwater rivers in the area (Stour, Colne, Pant/Blackwater and Chelmer). Less intensive use is made of some of their major tributaries (most notably the Brett, Brain, Can and Wid) and of the small coastal catchments (Ramsey River and Holland Brook). The majority of these fisheries are controlled and managed by angling clubs, although a few private, syndicated and local authority-managed waters are also present. A good variety of coarse fish species typical of rivers are regularly taken, including occasional individuals of specimen size.

Only very limited facilities exist for river trout fishing. Private syndicates have been established on short sections of just two rivers, where they operate 'put and take' fisheries for both brown and rainbow trout.

A very large number of still waters are utilised for coarse and/or trout fishing, ranging in scale from small farm and village ponds of less than 0.25 hectares right up to the major reservoir fisheries at Hanningfield, Abberton, Ardleigh and Alton Water, which are hundreds of hectares in size. Whilst many of these lakes and ponds are managed by angling clubs, there are an increasing number of commercially operated venues available to anglers purchasing a day ticket. A comparatively small number of waters are under local authority control, whilst others are used by syndicates or private owners.

Still waters offer a wide variety of opportunity, ranging from general angling for typical lake fish such as tench, roach, rudd and crucian carp, through 'specimen only' common carp venues, to 'put and take' rainbow and brown trout fisheries. They also offer a great diversity of challenge and difficulty, according to their size, depth, location and individual character. In recent years there has been an increasing interest in fishing for exotic species, particularly wels catfish, which are now present at a small number of tightly controlled venues. Grass carp have been introduced at certain fisheries as a means of weed control, whilst there is a developing interest in the potential of barbel and chub as stillwater angling targets.

Environmentally Sensitive Areas

Map 19

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Suffolk River Valleys ESA
Essex Coast ESA

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Approximately 100 freshwater angling clubs are believed to be active in the area. Memberships can range over two orders of magnitude, from tens to thousands per club. Smaller clubs may have an interest in just one lake or stretch of river, whilst the larger clubs, particularly those with open memberships, can have extensive interests in both rivers and a range of still waters. In some cases, clubs can own their waters outright, although rental or leasing agreements remain the most common practice.

Saltwater

The existence of a public right to fish in tidal waters means that most saltwater angling takes place on an informal basis. Saltwater angling can and does take place from the shore in almost any location where access is possible. The extensive saltings and mudflats that occur along the coasts and estuaries can inhibit access, and may lead to concentrations of activity at or around high tide.

A diverse range of fish species are captured by anglers fishing around the coast. Flatfish such as plaice, dab, flounder and sole are regularly caught by beach anglers. Cod and whiting are commonly caught species in the autumn and winter, whereas bass tend to be captured in the summer and autumn. The frontage between Walton on the Naze and Colne Point is probably the most popular area for beach fishing, partly because of its accessibility. There is good boat fishing for tope, smooth hound, cod, bass and thorn back ray, with several commercial sea angling boats based at Harwich, Walton, Clacton, Brightlingsea, Mersea and Bradwell.

Digging of baits for saltwater fishing along the foreshore is a controversial activity which is potentially damaging, particularly if undertaken mechanically and/or on a commercial scale. Bait digging within coastal SSSI/NNR/SAC/SPA can threaten their conservation value by reducing the food resource available to other wildlife and creating disturbance to waders and wildfowl. In the Dengie Flats National Nature Reserve (NNR), bait digging is licenced exclusively by English Nature to the Dengie Bait Diggers Association, which is empowered to issue a maximum of 50 permits to its members. In some locations, bait digging is controlled by local authority byelaws.

5.7.3 Fisheries - Freshwater

Fish populations are affected both by the quality and the quantity of water, and by the physical suitability and structure of the aquatic ecosystem. The presence of a thriving fish stock is therefore a good indicator of a satisfactory water environment.

Freshwater fisheries uses include -

Game Fisheries	Those supporting breeding population of salmonid fish.
Coarse Fisheries	Those supporting breeding populations of coarse fish.
Maintained Fisheries	Those supporting non-breeding populations of fish maintained solely for recreational exploitation (represented mainly by 'put and take' rainbow trout fisheries).
Fish Farms	Those sites supporting the artificial propagation and growing on of fish under controlled conditions for commercial and/or management purposes, or providing holding or transit facilities in connection with the live fish trade.

Coarse fish species are dominant throughout. The most numerous and widespread riverine species are roach, dace, chub, gudgeon, bream, pike, eels and perch. Lesser streams may only support smaller species, such as minnow, bullhead, stone loach and sticklebacks, although some of these populations are important in conservation terms. Barbel, zander and spined loach have been recorded from the River Stour catchment. Common carp, tench, rudd, and crucian carp are commonly encountered, but are better represented in still water locations. Exotic and ornamental species can be found occasionally, most usually as the result of irresponsible and unauthorised introductions.

Salmonid species are not widely distributed anywhere in south east England, and the Plan area is no exception to this generality. Brown trout occur in small numbers only in the headwaters of the Rivers' Stour, Pant, Chelmer, Box, Glem and Ter. Although of secondary importance to coarse species in resource terms, the presence and persistence of these stocks is regarded as an important environmental indicator. Salmon and sea trout do not occur.

Reservoirs, lakes and ponds supporting fish stocks occur everywhere. There are far too many of them to identify or characterise individually. In contrast to the rivers, few precise data exist on these stocks, although it is abundantly clear that they represent an important and very large scale resource. Maintained 'put and take' rainbow trout fisheries are included in this category.

Fish farming is only undertaken on a large scale at Hanningfield Reservoir, where rainbow trout are reared in floating cages. These fish are supplied to a number of 'put and take' fisheries both in the immediate vicinity and on a region wide scale, as well as supporting Hanningfield's own substantial trout angling facilities. Some of the fish are also supplied direct to the table trade. A small number of rainbow trout are grown at other locations in the area, to support the 'put and take' angling market. Remaining fish farming businesses are primarily concerned with the restocking of enclosed coarse fisheries, using surplus stocks obtained from other lakes and ponds.

5.7.4 The Natural Environment

The Environment Agency, through both its regulatory and operational activities, has a significant impact on the natural environment. This is particularly so where wetlands, rivers and coastal habitats are involved. Whilst implementing our flood defence, water resource and pollution prevention functions the *Environment Act 1995* places a duty upon the Environment Agency to conserve and enhance natural beauty, flora and fauna whilst promoting recreation. These duties are particularly relevant in areas of high value for wildlife or landscape and archaeology which are recognised and formally protected through various designations. East Anglia is particularly rich in wildlife with over one third of the key species and important habitats identified in the 'UK Biodiversity Action Plan' found here. However over the past few decades, dramatic declines in habitat and species have occurred, making remains even more precious.

The coastal zone of the area is recognised as being of considerable national and international importance. The value for nature conservation lies in the intricate mosaic of wildlife habitats, from coastal habitats to grazing marsh, reedbeds and woodland. Many of these habitats support rare and threatened plants and animals, in some cases of national and international importance. Approximately 542 km^2 of coast has been put forward as a candidate Special Areas of Conservation (cSAC - see Map 20) in recognition of it's international importance. The Essex Estuaries cSAC includes the Colne Estuary, the Blackwater Estuary, some of the Crouch Estuary and Foulness and areas of open coast, including Dengie and Southend Marshes. In addition to internationally important sites there are also numerous Sites of Special Scientific Interest (*e.g.* section of the River Ter) and County Wildlife Sites within the area (see Map 21).

Coast

The habitats of the coast consist primarily of intertidal mudflats and saltmarshes. In some places there are small areas of reedbed and extensive areas of grazing marshes behind the seawalls. The coast is recognised as an outstanding area for wildlife and natural features. The diversity of habitats, the associated plant communities and the breeding and wintering bird populations are of international importance. In recognition of this nearly all of the coastline has been designated as an SSSI. Many sites have been declared as Ramsar sites under an international convention and/or as candidate Special Areas of Conservation and/or Special Protection Areas (SPAs) under European legislation.

The area is particularly valued for a number of rare species some of which are specifically protected under international law (for instance river and brook lamprey, otter, and numerous species of wader, all listed in the *Habitats Directive 94/43/EEC* as requiring special measures of protection). In addition a high concentration of nationally rare and threatened species are present in the catchment, for instance the plants hogs fennel, dittander and river water dropwort. Red Data Book species of bird include avocet, marsh harrier, redshank and little tern, all of which are strongly influenced by our operational activities.

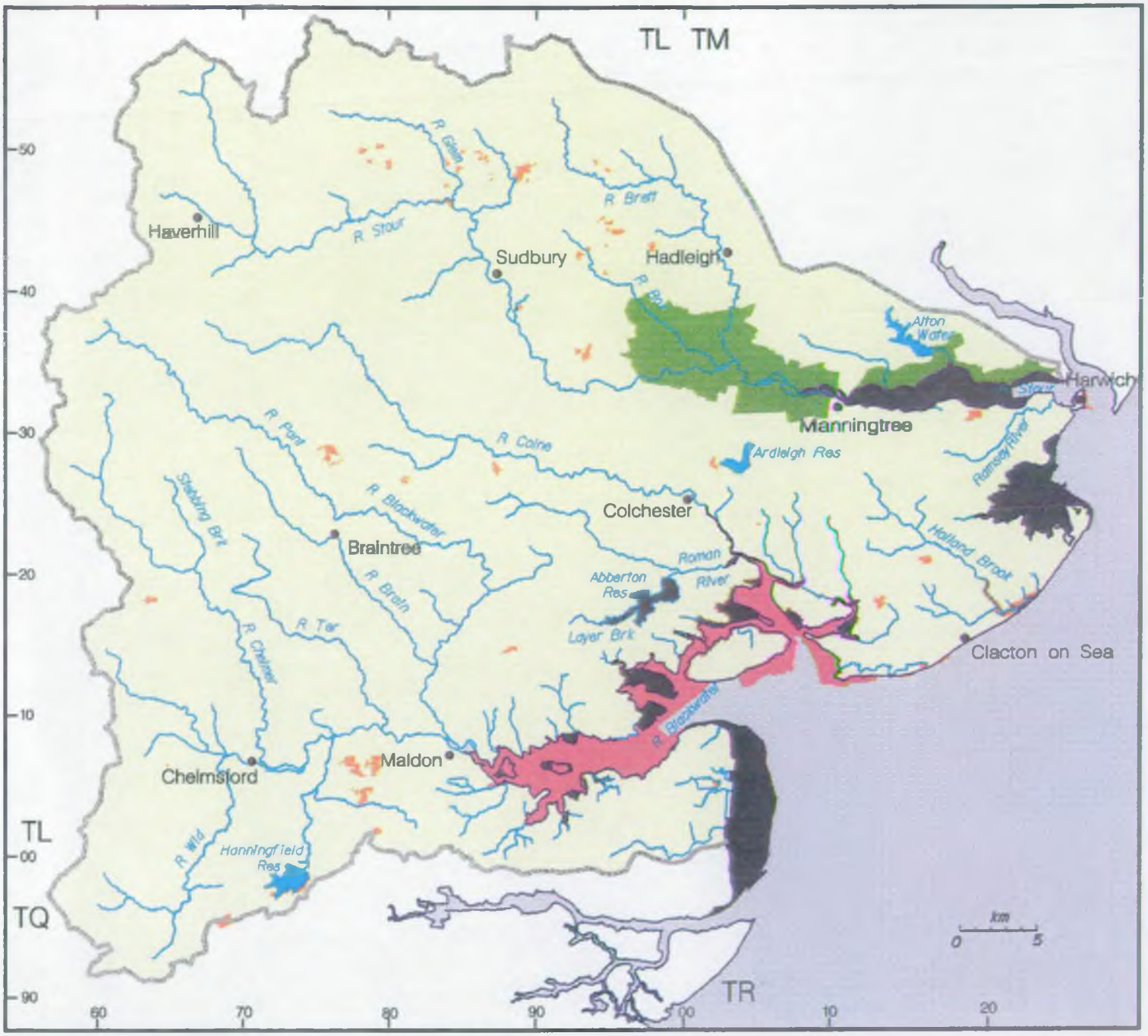
The Essex estuaries are of particular note and all have been designated as SPAs, primarily for their importance for over-wintering waders and wildfowl.

Freshwater Catchment

The River Stour forms the county boundary between Suffolk and Essex and the lower reaches are famous for its association with the painter John Constable. This area is also designated an Area of Outstanding Natural Beauty (AONB). The catchment is predominantly agricultural and

Conservation – Ecology

Map 20



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

SSSI
SPA & SSSI
SAC & SSSI
AONB

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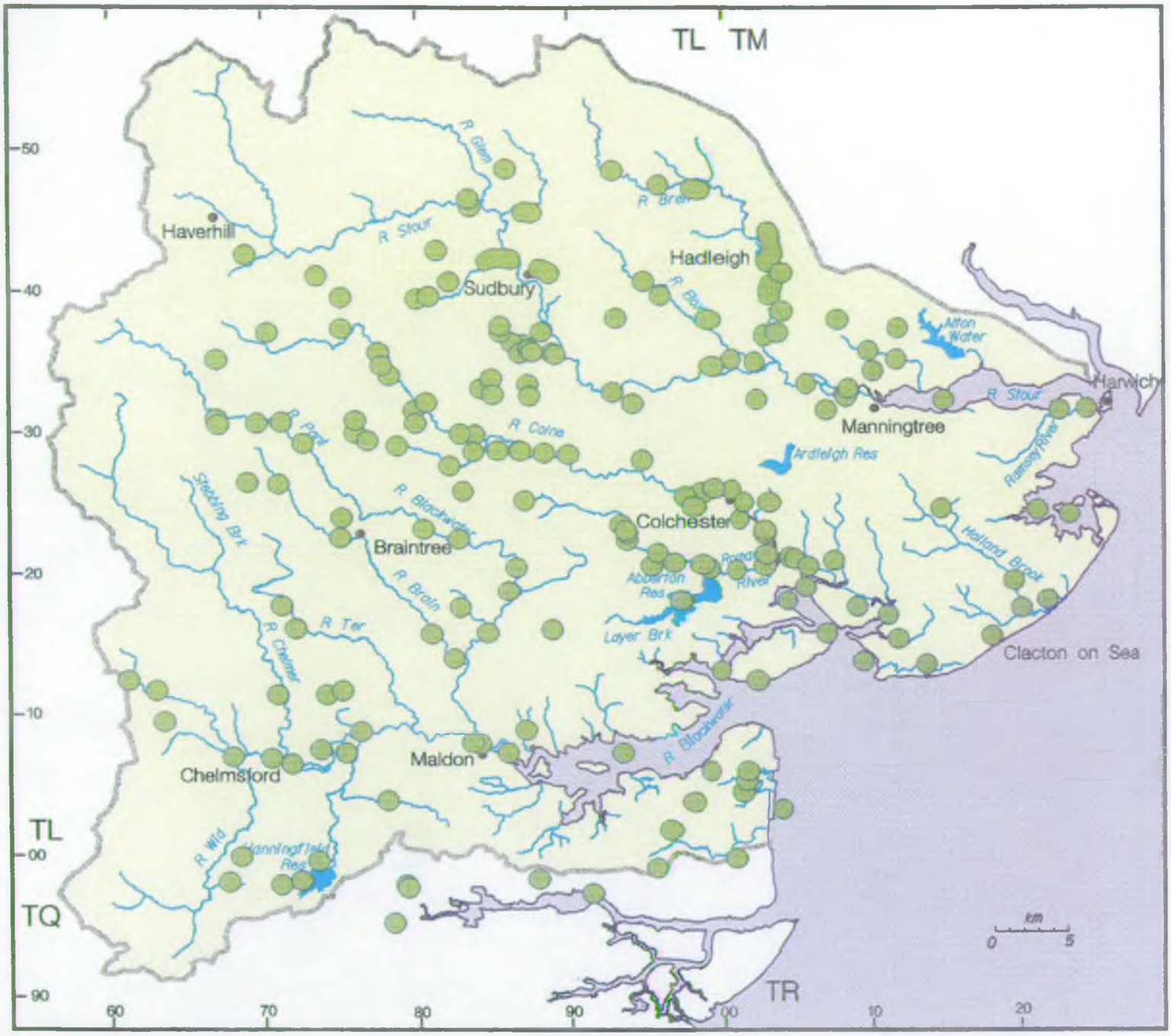
Map 21

County Wildlife Sites



ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline
County Wildlife Site

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the river itself is navigable, in sections, downstream from Sudbury. There is much botanical interest in the catchment with four nationally scarce species and 18 county scarcities (*e.g.* water soldier and small pondweed). Within the area many stretches of river are County Wildlife Sites and towards the estuary there are areas of reedbed and grazing marsh. Holland Brook has a relatively small catchment area and drains between Clacton On Sea and Frinton On Sea. Near the coast areas of grazing marsh support numerous bird species and the area is a Country Park.

The Colne

The River Colne rises near Steeple Bumpstead and ultimately flows out in to the sea north east of Mersea Island. The valley is picturesque as the river flows down through Sible Hedingham, Earls Colne and into the tidal stretches at Lexden and Wivenhoe. The botanical interest includes three county rarities and two nationally scarce species (Dittander and Golden Samphire).

The Blackwater

The Blackwater catchment includes the Rivers Pant, Brain and Pods Brook which flow into the Blackwater estuary, with the River Chelmer joining at Maldon. The catchment is predominantly agricultural with the rivers flowing through the larger urban areas of Braintree and Witham. Detailed macrophtye surveys are being carried out this year and next year within this area to ascertain the extent of rare species. Otter surveys have been carried out on the Stour, Colne and Blackwater with evidence of them being present on all three.

The Chelmer

The Chelmer catchment includes the Rivers' Can, Wid and Ter. One stretch of the River Ter is designated as an SSSI and the river supports a nationally scarce macrophtye species (Marsh Sowthistle). The Chelmer and Blackwater Navigation flows through Chelmsford and is a popular stretch for recreational activities.

5.7.5 Recreation

The Estuaries and the river valleys of the Plan area provide excellent opportunities for both informal and formal recreation. Many of these draw upon the natural beauty of the area and are broadly compatible with the various landscape and wildlife designations within the area.

The Eastern Council for Sport and Recreation has produced a very comprehensive regional strategy report for Water Recreation which covers the waters of this Plan area (Essex and part of Suffolk - Zone 3). The Environment Agency has been actively involved in the production of both these reports and has a seat on the Zone 3 Committee. The Environment Agency seeks to contribute towards the development of public amenity in a way that complements its statutory duties and responsibilities. The area covered in this report contains several recreationally important coastal estuaries (Blackwater, Colne, Stour), inland rivers (Chelmer, Colne, Stour) and enclosed waters (Abberton, Ardleigh, Hanningford).

The Essex and East Suffolk countryside provides ample opportunity for walking, cycling and riding. Much of this is based on the existing network of rights of way. The abundance of footpaths within the area as a whole is such that Essex County Council have produced a 'Directory of Walks and Rides' which gives details of the numerous choices available and where to obtain further information about each walk. Two long distance walks are promoted in the 'Directory of Walks and Rides', one being the 'Essex Way'. This is an 81 mile walk from

Harwich to Epping, many miles of which are along the river banks in this area. The other is the Maldon Millennium Way which is a 22 mile circular walk focusing on Maldon around the mouth of the Chelmer and commemorates the Viking incursion and the Battle of Maldon in 991AD. At present the Suffolk Coast Path ends at Felixstowe but it is hoped that future resources will allow this long distance path to be extended to link in with the Essex Way and Stour Valley Path. 'Ways through Essex' is an Essex County Council project set up to coordinate and promote rights of way through the countryside.

The sea walls of Essex are some of the most popular walks in the area. The Blackwater Trail is a twelve mile coastal walk along the seawall. There is a continuous walk of 19 miles from Salcott to Heybridge and a walk of 43 miles (with four short deviations inland from the seawall) from Maldon to North Fambridge. Essex does, however, lack a continuous coastal footpath.

Wildlife observation is a popular activity that the area provides a wealth of opportunity to pursue. The Stour, Blackwater and Colne Estuaries are notified as an SSSI, Ramsar and SPA. They regularly support international and nationally important bird populations.

The estuaries of the Stour, Colne and Blackwater provide opportunities for both sail and motor-powered craft. The area has many launches, moorings, berths, sailing and cruising clubs. Dinghy sailing is popular in all the estuaries, but is concentrated at Harwich, Manningtree, Bradwell, above Osea Island, Mayland, West Mersea, Brightlingsea and Wivenhoe. Water skiing takes place on the Colne estuary off Brightlingsea and the Blackwater estuary below Osea Island. Water ski facilities exist at Gosfield lake, the Lido at St. Osyth and at Bradwell on Sea Lake. Jet skiing takes place on the Blackwater and at the Lido, St. Osyth. In general, the Rivers Colne, Blackwater and Chelmer are unsuitable for sailing or power craft upstream of their tidal limits as they soon become too narrow and varied in depth to support water sport use. However there are some stretches that are suitable for boats and canoes, with the permission of the riparian owners, although generally their main recreational value is for angling, rambling and nature study.

The River Chelmer, both through and below Chelmsford, and the River Can in Chelmsford are popular with canoeists. The upper reaches of the Chelmer, Can and Wid provide good canoeing. However the rivers are privately owned and not statutory navigations. There are canoe slalom courses on the River Chelmer in Chelmsford and on the River Colne in Colchester. The river has been diverted through the former outdoor swimming pool at Colchester, which is now the base for Colchester Canoe Club.

The Stour Valley and Dedham Vale have been a tourist destination since the later part of the nineteenth century. Specific reasons for the level of tourist interest in the area is the awareness that it is primarily 'Constable Country' and the attractions that this promotes such as Flatford Mill (Visitors Centre) which is owned by John Constable's family. The area's status as an AONB and the number of historic buildings of interest, helps to attract tourists who enjoy recreational pastimes such as walking, painting and photography.

The River Colne flows through a historical corner of Essex with many interesting towns including Castle Hedingham, Halstead and Colchester. Colchester commands the head of the Colne Estuary and the river has attracted the development of walks and restaurants situated on its banks. The River Colne itself is of a more restricted width than the Stour and its recreational use is limited to angling, except with Colchester where rowing may be possible. There are

certain impounded stretches which provide opportunities for manually-propelled boating and canoeing, as well as sub-aqua sports.

The estuaries and rivers in the area are covered by a number of Countryside Projects. The River Stour Trust and the Dedham Vale and Stour Valley Project (Suffolk County Council) covers the whole of the Stour Valley. The Dedham Vale and Stour Valley Project area extends up to Clare. The Essex Coast is especially noted for its waders and wildfowl due to the wealth of suitable inter-tidal mud and salt marshes, much of which are managed by wildfowling clubs.

Popular coastal and estuarial sailing opportunities exist in this area, with several major marinas catering for numerous berths. Along with these berths there are numerous swinging-moorings in the channels and creeks of the areas estuaries. Harwich has a port and is very popular for sailing. There have been several proposals to develop marina facilities at Harwich, but only the Bathside scheme remains a firm proposal. The Colne estuary has many established moorings, most of which are centred around Brightlingsea. There are further moorings and mud berths further up the river towards Wivenhoe. Brightlingsea also has a wharf.

The Blackwater is used by a large numbers of boats with various small launching facilities and moorings. Bradwell Creek and Bradwell Marina provide moorings and berths as does the Tollesbury Fleet and Tollesbury Marina. Walton town also has a very important yachting and sailing centre, the sheltered moorings in the Backwaters providing a haven for many sailing craft.

The conflicting interests of water recreation, commercial activity and nature conservation in this area is quite pronounced at the mouth of the Stour. There has been significant recent development of the docks at Harwich.

There is a significant leisure and tourist industry within the Plan area, which is largely seasonal but does continue throughout the year. Conventional seaside resorts compete with historical, scenic and other attractions. Large numbers of visitors can impact upon the area by placing additional burdens upon the infrastructures such as water supply, sewage disposal and energy supplies as well as the sheer weight of numbers in sensitive areas. Many tourists pass through the area travelling to and from the port of Parkeston.

Section 6

State Of The Environment

This section provides information on the current state of the area and assesses this against targets and identified shortfalls. Many of these shortfalls can be addressed through the North Essex LEAP and have been linked to the Issues in Section 3.0.

6.0 State of the Environment

The Environment Agency is committed to reporting on the State of the Environment (SoE) and has a duty to form an opinion of the state of pollution of the environment under the *Environment Act 1995*. State of the Environment reporting will look at pressures placed on different environmental media, individually and as a whole, and should help to identify and assess trends which should assist in establishing overall priorities.

The Environment Agency is using this approach to provide data to local authorities with whom it will work closely and to inform others about environmental matters. The Environment Agency will assist with this by supplying data where appropriate. The purpose of this Section is to describe and explain the current environmental conditions in the Plan area through a given set of indicators. The environment is a very broad subject and therefore we have been selective in this Section. Eighteen indicators have been chosen, as those which cover what the Environment Agency perceive to be the most important environmental Issues in the Plan area.

Where possible, information has been compared with recognised standards or indicators and with previous years to see whether conditions are getting better or worse. We regularly monitor many environmental parameters as part of our routine business to identify the status of the environment and it is in this context that statutory or mandatory targets are described. These, if met, should help to ensure that we continue to protect and enhance the environment.

The wide range of challenges identified in this Section have contributed greatly to the formation of Issues in the 'Issues and Options' section (3.0). Much of the information discussed in this Section is publicly available and, where possible, we have highlighted its availability under each indicator.

6.1 The Quality of Rivers

The Environment Agency is responsible for water quality monitoring and has a specific duty to carry it out under the *Water Resources Act 1991*. The principal objectives of carrying out monitoring are to obtain information on the general status of water quality and to look at any changes that have occurred over time. Monitoring is also carried out to assess compliance with statutory standards arising from National or European legislation and to answer specific questions arising, *i.e.* evidence for negotiation with dischargers, investigational research and pollution incidents.

In this Plan area much of the monitoring is carried out for the purposes of our General Quality Assessment (GQA) scheme (see Appendix 1) and to assess compliance with the River Ecosystem (RE) classification scheme. Classified rivers are sampled on a routine basis and to each sample point, a stretch of river is assigned which that sample point will characterise. Data from each sample point is then used to assess the river quality in that stretch. Sampling is also carried out at 34 points for the purposes of assessing compliance with *EC Directives* and these are shown in Map 22. Baseline monitoring from which data for the GQA and RE classification schemes is used consists of the following parameters; pH, turbidity, conductivity, Biochemical Oxygen Demand (BOD), ammonia, Total Oxidised Nitrogen (TON), chloride and total reactive phosphorus (orthophosphorous), sampled monthly. At sites where an *EC Directive* applies, monitoring will be carried out according to the requirements of that *Directive*. The parameters monitored are varied but details can be obtained in Appendix 1.

Targets are used for planning the management of river quality and helping to sustain the use of rivers for recreation, fisheries, wildlife and to protect the interests of abstractors. They are also used as a basis for setting consents to discharge effluent into rivers and guide decisions on the Environment Agency's other actions to control and prevent pollution.

Water quality targets can be divided into those that are statutory and non statutory. Statutory standards in this Plan area are set by the following *EC Directives*; the *EC Surface Water Abstraction Directive (75/440/EEC)*, the *EC Freshwater Fish Directive (78/659/EEC)*, the *EC Bathing Water Directive (76/160/EEC)*, the *Shellfish Waters Directive (79/923/EEC)* and the *EC Dangerous Substances Directive (79/464/EEC)*.

The Department of the Environment, Transport and the Regions (DETR) has published proposals for a statutory scheme of Water Quality objectives but until these are formally established by Legal Notice served by the Secretary of State, they will be applied on a non-statutory basis. The DETR proposals include a range of River Quality Objectives RQOs reflecting a range of different river uses. Standards defining one component, the River Ecosystem scheme, were introduced by the *Surface Waters (River Ecosystem) (Classification) Regulations 1994.* These address the chemical quality requirements of different types of aquatic ecosystems with the standards reflecting differing degrees of pollution by organic matter and other common pollutants which can influence the natural biotic community. A more detailed explanation can be found in Appendix 1.

Within the Plan area water quality is generally fair with very few problems encountered that can be attributed to discharges. Compliance with RE targets for the three year period up to December 1996 are shown in Map 23. The majority of RE non-compliance in the area is solely due to Dissolved Oxygen concentrations not achieving the assigned target. This is addressed in Issue

Map 22

Water Quality – EC Directive Sampling Points

ENVIRONMENT AGENCY

- Catchment boundary
- Main River
- Coastline
- Surface waters directive
- Freshwater fish directive
- Shellfish waters directive
- Bathing waters directive
- Salmonid fish directive
- Cyprinid fish directive

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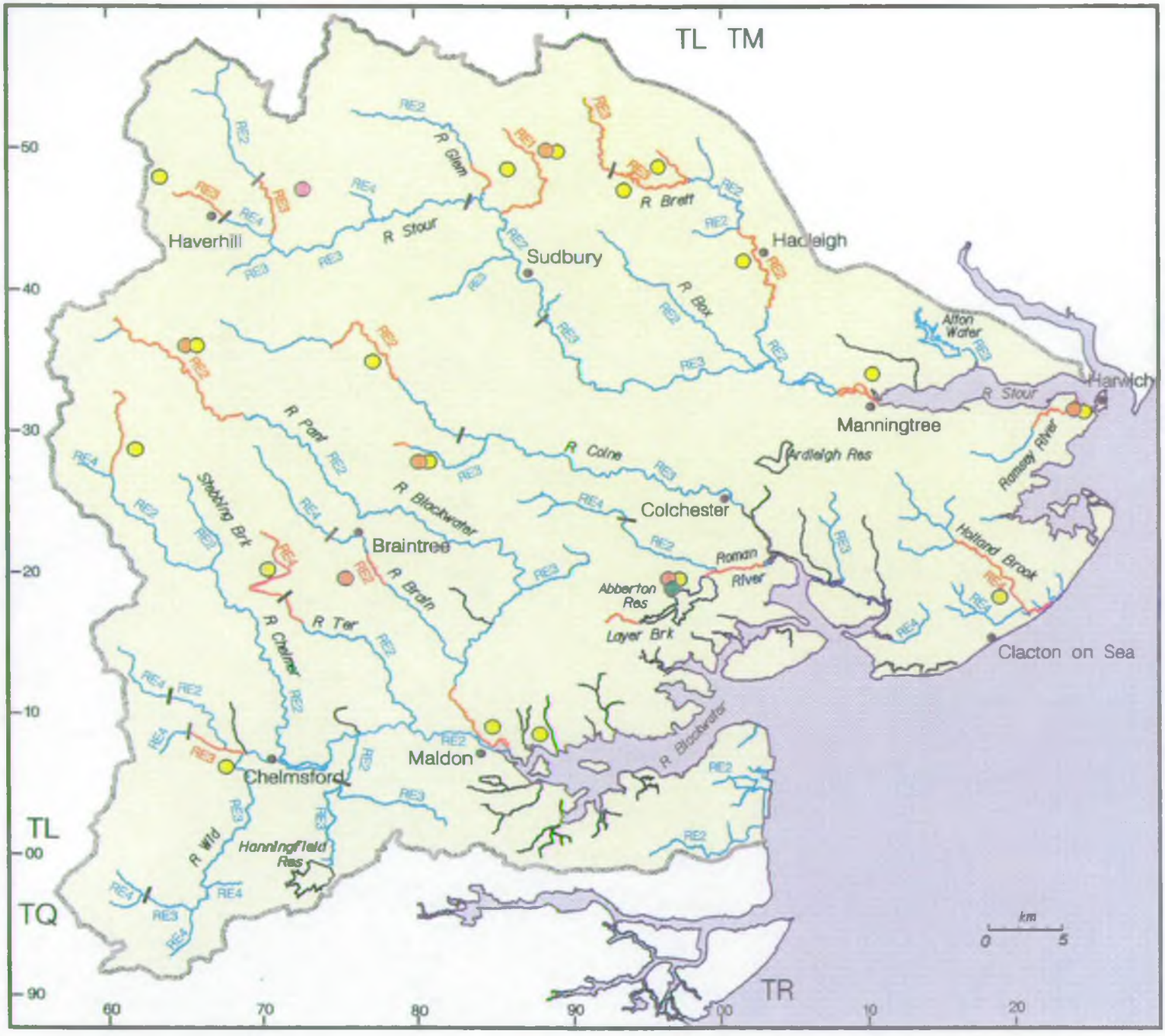
Water Quality – Compliance Against River Ecosystem Targets

Map 23



ENVIRONMENT AGENCY

Compliant
Fails
Main River with no target class

Reason for failure:
- Dissolved oxygen
- Ammonia
- BOD
- Unionised ammonia

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4b of the 'Issues and Options' section. Analysis of long term trends show dissolved oxygen levels to have been in these ranges for the past 15 years and that there has been no deterioration in concentrations.

Compliance with *EC Directives* are given in Table 6 below. There have been sporadic failures at a number of sites but regular failures at others. Dissolved Oxygen failures are addressed via Issues 4a and 4b, whilst the metals failures in the estuarine and coastal waters are addressed in Issue 7b and the nitrate failures at the water intakes in Issue 4c. The cause for occasional exceedences of the *Surface Water Directive* for phenols and hydrocarbons have not been ascertained but are not considered significant.

Table 6: *Directive* Failures from 1992 to 1996

SITE NAME	*DIRECTIVE*	YEAR				
		1992	1993	1994	1995	1996
Alton Water, draw off tower	*Surface Water Directive*			FAIL (phenols)		
Abberton Reservoir, draw off tower	*Surface Water Directive*			FAIL (phenols hydrocarbons)		
Ardleigh Reservoir, draw off tower	*Surface Water Directive*			FAIL (phenols)	FAIL (hydrocarbons)	
River Blackwater, Langford	*Freshwater Fish Directive*	FAIL (DO)				FAIL (pH)
River Blackwater, Langford	*Surface Water Directive*	FAIL (DO)	FAIL (nitrate)	FAIL (nitrate phenols)	FAIL (nitrate)	FAIL (nitrate)
River Box, Thorrington	*Freshwater Fish Directive*	FAIL (DO)				
River Chelmer, Langford	*Freshwater Fish Directive*				FAIL (DO)	
River Chelmer, Langford	*Surface Water Directive*	FAIL (DO)	FAIL (nitrate)	FAIL (nitrate phenols)	FAIL (nitrate)	FAIL (nitrate)
River Colne, East Mills	*Freshwater Fish Directive*	FAIL (DO)				
Roman River, Essex Water Intake	*Freshwater Fish Directive*				FAIL (total ammonia)	
River Stour, Cattawade	*Freshwater Fish Directive*	FAIL (pH)				FAIL (pH)
River Stour, Stratford St Mary	*Surface Water Directive*			FAIL (nitrate phenols)	FAIL (nitrate)	FAIL (nitrate)
River Stour, Langham	*Freshwater Fish Directive*	FAIL (pH)				FAIL (pH)
River Stour, Langham	*Surface Water Directive*		FAIL (nitrate)	FAIL (nitrate)	FAIL (nitrate)	FAIL (nitrate hydrocarbons)

SITE NAME	DIRECTIVE	YEAR				
		1992	1993	1994	1995	1996
West Mersea, off Fairhaven Ave.	*Bathing Water Directive*		FAIL (E. Coli)	FAIL (E. Coli)		
River Blackwater, Marconi Sailing Club	*Shellfish Waters Directive*	FAIL (DO Cu Zn)	FAIL (Zn)	FAIL (Zn)		
River Blackwater, Herons Point	*Dangerous Substances Directive List II*	FAIL (Cu)	FAIL (Cu)			
River Blackwater, Fullbridge	*Dangerous Substances Directive List II*	FAIL (Cu)	FAIL (Cu)			
Hamford Water, The Twizzle	*Dangerous Substances Directive List II*		FAIL (Cu)	FAIL (Cu)		
Hamford Water, The Twizzle	*Shellfish Waters Directive*	FAIL (pH Zn Cu)	FAIL (Cu Zn)	FAIL (DO Cu Zn)	FAIL (Cu)	
Pyefleet Channel at North Farm Hard	*Shellfish Waters Directive*	FAIL (Cu Zn)	FAIL (Cu Zn)	FAIL (Zn)	FAIL (DO)	
River Colne, Rowhedge Ferry	*Dangerous Substances Directive List II*		FAIL (Cu)			
River Stour, Baltic Wharf, Mistley	*Dangerous Substances Directive List II*		FAIL (Cu)			
Hanningfield Reservoir, draw off tower	*Surface Water Directive*					FAIL (hydrocarbons)
d/s Tiptree Water Treatment Works	*Dangerous Substances Directive List II*					FAIL (Fe)
Sea adjacent to Holland Sluice	*Dangerous Substances Directive List II*					FAIL (Cu)

Trends in river quality are best examined by using the Environment Agency's General Quality Assessment scheme, which is explained in more detail in Appendix 1. The results of the 1996 survey are shown in Maps 24 and 25. In summary 246.6km or 26% river stretches showed an improvement in quality compared to the 1990 GQA survey and 84.5km or 13.5% deteriorated. This gives a net improvement between 1990, the base year, and 1996 of 26%. The reasons for the net improvements are probably due to a combination of pollution prevention initiatives, increased investment in effluent treatment and increased river flows since the drought of 1989-1992.

It is interesting to note that there is an overall deterioration in quality when the results of 1995 are compared with those of 1996. This is most likely due to the prolonged dry spell being experienced over the last couple of years.

Under current legislation the Environment Agency must maintain a set of Public Registers. Information is held in a combination of paper and computer files which may be inspected at our

Map 24

General Quality Assessment (GQA) Classification – Chemistry

ENVIRONMENT AGENCY

CHEMICAL RIVER QUALITY SURVEY 1996

According to the General Quality Assessment (GQA) and Classification of Estuaries Working Party (CEWP) Schemes

- Catchment boundary
- Main River
- Coastline

River and Canal Quality	Estuary Quality
Grade A	Class A
Grade B	Class B (none)
Grade C	Class C
Grade D	
Grade E	
Grade F (none)	
Not sampled	

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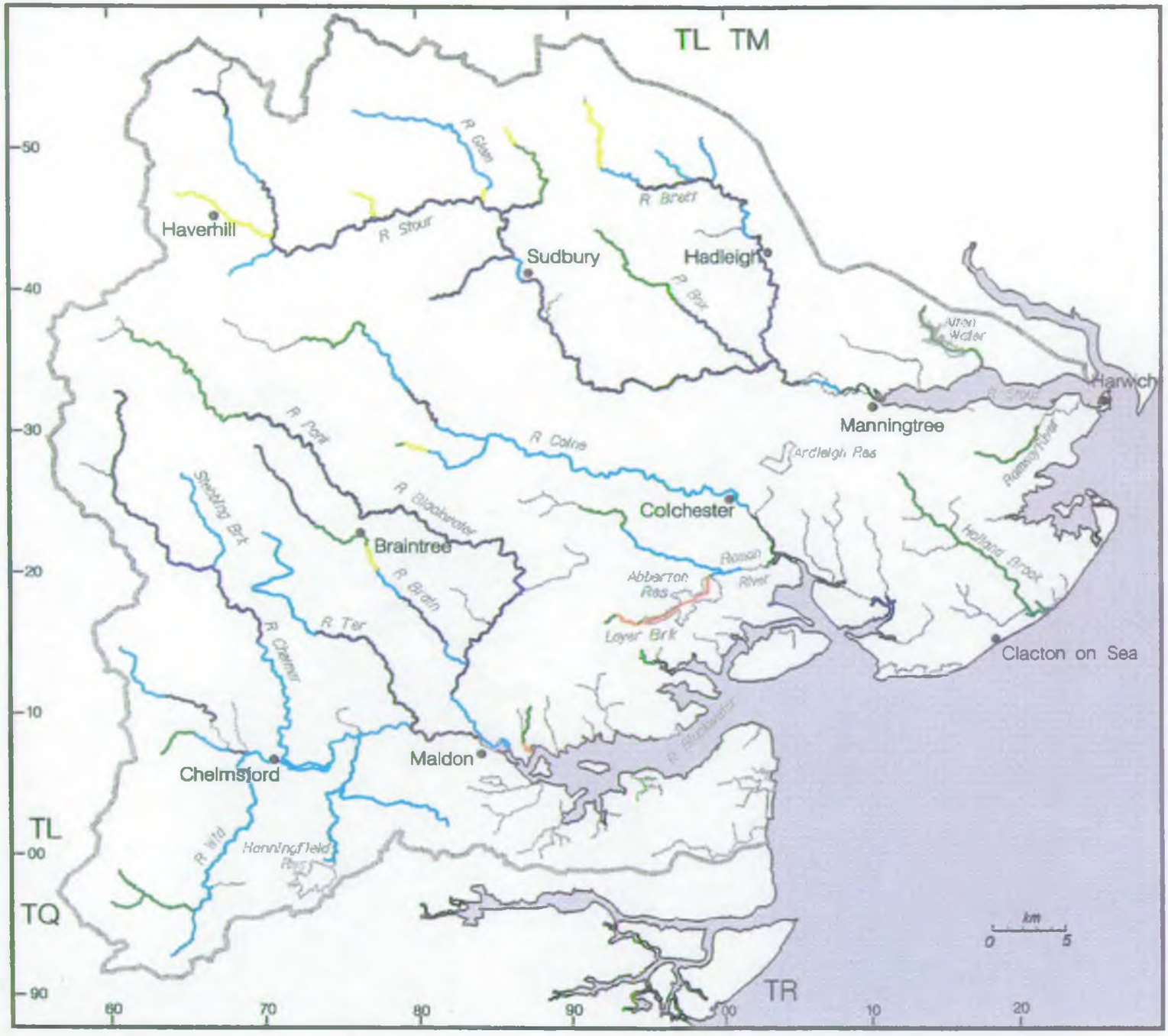
Map 25

General Quality Assessment (GQA) Classification – Biology



ENVIRONMENT AGENCY

Catchment boundary
Main River (not classified)
Coastline

BIOLOGICAL RIVER QUALITY SURVEY 1996
According to the
General Quality Assessment (GQA) Scheme

River and Canal Quality

Grade a
Grade b
Grade c
Grade d
Grade e
Grade f (none)
not sampled

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Regional Head Office in Peterborough. Quality monitoring data is held on the Water Quality and Pollution Control Register.

6.2 Pollution Incidents

Under Section 85 of the *Water Resources Act 1991*, it is an offence to cause or knowingly permit any poisonous, noxious or polluting matter or any solid waste matter to enter controlled waters. Pollution incidents are categorised by source, type and reason for the occurrence as well as severity of impact upon the environment.

A constant pressure on the aquatic environment is that of the number and severity of pollution incidents. Such incidents have been recorded for many years, but the basis for deciding what is recorded and what is not has varied considerably in the past. Since the creation of the National Rivers Authority (NRA) in 1989, attempts have been made to standardise procedures across England and Wales. The Environment Agency is now responsible for dealing with, and reporting on, aquatic pollution incidents.

All pollution reports are recorded on a database by investigating officers. The Environment Agency is *dependant* upon the general public to notify actual and suspected pollution incidents. The provision of a freephone number assists in the reporting of incidents by the public. Additional information is frequently forthcoming from other emergency services and local councils, as well as from Environment Agency staff engaged in their routine work, such as pollution prevention campaigns.

It is our aim under our standards of service, to attend all reported incidents within two hours during office hours and within four hours at other times. Staff are available 24 hours a day to investigate pollution reports. Many reported incidents are relatively minor and require little investigation. The more serious incidents frequently result in the Environment Agency prosecuting offenders where it is deemed to be appropriate within its policy and procedures. Under the 'Polluter Pays Principle' as covered in Section 161 of the *Water Resources Act 1991*, the Environment Agency recharges identified polluters where total costs exceed £50 or the time involved in investigating and clean up is in excess of one hour. Where a prosecution is bought, the courts are empowered to allocate other costs against offenders.

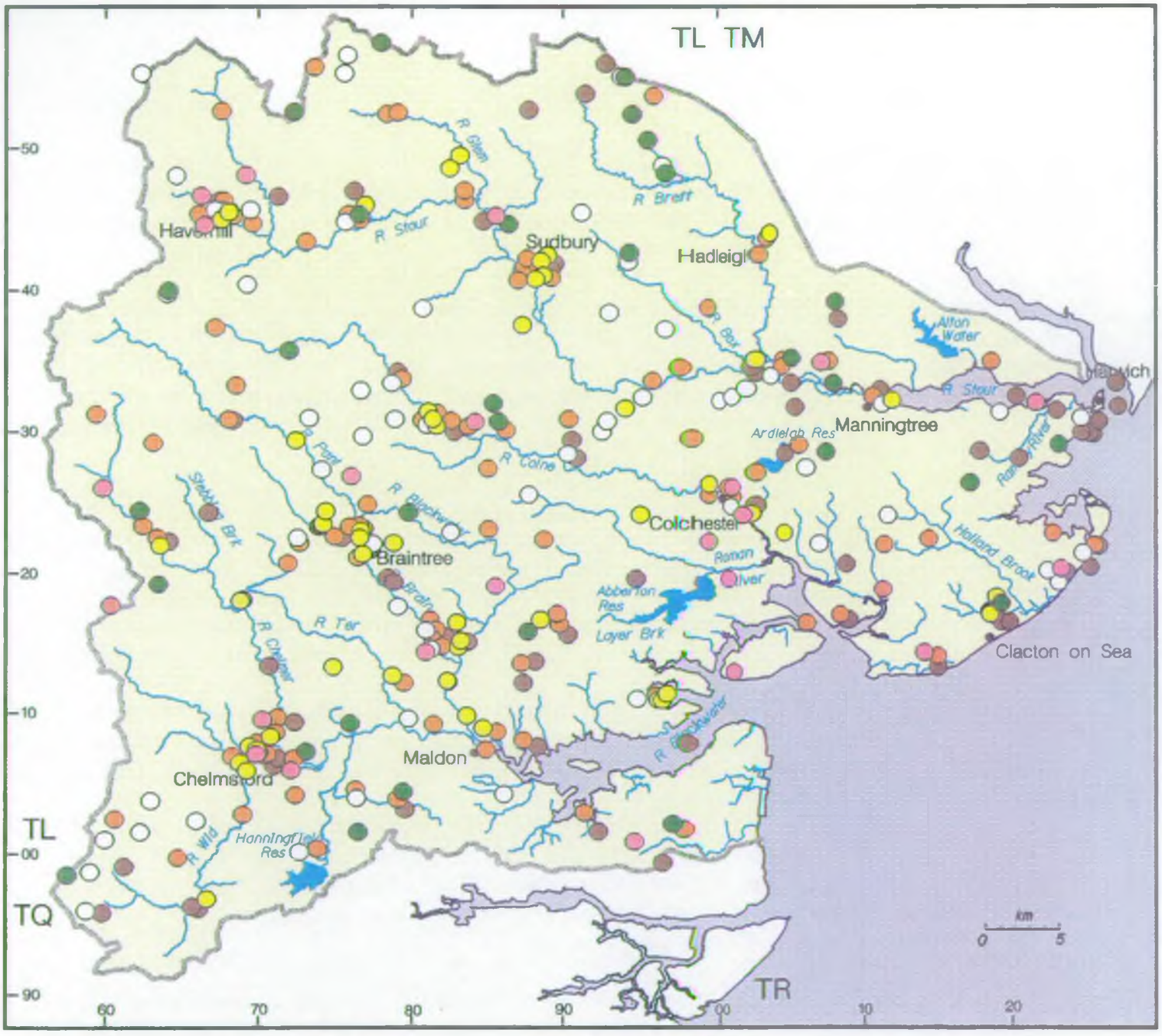
An annual summary of pollution incidents shows that pollution incidents are widely sourced within the Plan area. Whilst no one industry appears to have dominated the figures over the last three years, the numbers of incidents per source have been remarkably consistent year on year, although total numbers have steadily declined. Map 26 shows the distribution of pollution incidents during 1996/97.

The seriousness of an incident is determined by its actual and potential impact upon the environment, with the degree of public/media interest and concern also being taken into account. In 1996 there were five major incidents, two involving large fish kills from natural causes, one actual industrial, one potential chemical discharge and one agricultural liquid fertiliser spillage. There were 43 other significant incidents involving industrial, agricultural and sewerage sources.

The total number of reported pollution incidents in inland waters has risen more or less continuously, even in recent years. This is considered to be partly due to an increased public

Map 26

Pollution Incident Sources October 96 – September 97



ENVIRONMENT AGENCY

- Catchment boundary
- Main River
- Coastline

- Anglian Water Services discharges
- Private Sewage
- Transport
- Industry
- Agriculture
- Others

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awareness of water quality issues. A freephone number (0800 80 70 60) has been available since 1994 to enable the public to report pollution incidents and the line is manned 24 hours a day. Many of the incidents are relatively minor and some cannot subsequently be substantiated by direct investigation. Since 1990, therefore, the number of substantiated pollution incidents have been separately recorded. In 1996 there were over 32,000 reports of water pollution nationally, of which over 20,000 were subsequently substantiated.

Although agriculture is the major activity in the area, pollution incidents from agricultural sources are increasingly less frequent. We believe that this is due in part to nationally promoted pollution prevention campaigns, the *Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991* plus the *Code of Good Agricultural Practice*, which have identified and controlled the careless disposal of agriculturally derived effluents to watercourses. Industrial pollution sources continue to be of concern (see Issue 7c) and the pollution incident figures bear this out. We believe that the non-enactment of regulations to cover industrial sites similar to those for agriculture, is a contributory factor. It is hoped that this will be partly addressed when draft regulations relating to works notices under section 161A of the *Water Resource Act 1991* are enacted after full consultation.

Finally, the Environment Agency has, for some time, been concerned about oil being one of the most common pollutants of controlled waters. These concerns led to the instigation of a national 'Oil Care Campaign' to increase the awareness of the problems arising from the handling of oil. The bunding of oil storage tanks is becoming more acceptable, but this is nevertheless going to have little or no impact on the issue of oil pollution of coastal waters. To that end a Memorandum of Understanding (MoU) was signed with the Environment Agency, the Harwich Haven Authority (HHA) and District Councils with a view to providing protection for the coastal area controlled by HHA. A similar agreement for other areas at risk, such as the Colne and Blackwater estuaries, would be welcomed by all with an interest in protecting the environment.

Details of the nature and location of pollution incidents may be made available to the public on request. In particular, it is our policy to keep those who have reported incidents informed as to the findings and subsequent actions made by the Environment Agency.

6.3 The Quality of Estuaries and Coastal Waters

A General Quality Assessment (GQA) scheme is being developed for estuaries, but in the meantime the Environment Agency continues to use the Coastal and Estuarine Working Party (CEWP) classification system. Under the CEWP scheme stretches of estuaries are allocated points depending on their biological, aesthetic and chemical quality. There are four classes ranging from A to D which classify each stretch of the estuary as good, fair, poor and bad respectively. The classification is detailed in Appendix 1. All the estuaries in the area are surveyed on a routine basis to determine the chemical and bacteriological status of those waters. In addition where particular problems exist, or need to be quantified, studies are undertaken as required. Biological assessments are undertaken according to a five year rolling programme of monitoring.

The CEWP classification is used in the decision-making process to allocate resources to ensure improvements to the water quality of estuaries. The Environment Agency works with the water companies and industry to improve discharges which have a significant and adverse impact upon

estuarial quality. Modelling of the estuaries is used to demonstrate the scale of the impact of major discharges and to determine consent standards appropriate to river needs requirements.

Further to the CEWP scheme, statutory targets exist under the *EC Dangerous Substances Directive (76/464/EEC)*. The statutory objectives for dangerous substances apply to all water stretches and are aimed at protecting aquatic life, although monitoring is only carried out in the river downstream of points likely to, or known to, discharge these substances. Monitoring for dangerous substances is carried out in Hamford Water due to the nature of the industrial discharge entering this estuary.

The majority of estuaries in the area are classified as Class A, although the upper sections of the Blackwater and Stour are Class B. Quality is poorest in the upper part of the Colne estuary (Class C). However improvements which are in hand at Colchester Sewage Treatment Works should result in improved estuarine quality once this is complete. Exceedences of limits of List II metals as determined under the *Dangerous Substances Directive* and the *Shellfish Waters Directive* have been a cause of concern (see Issue 7b). A recent collaborative project with CEFAS has shown that copper and zinc exceedences result more from commercial or recreational boating activities than loadings from estuarine discharges. Further work is being planned to address whether these exceedences constitute a threat to marine life.

The biological surveys provide a basis for an evaluation of the biological status of the estuary and are related to what type of animal community would be expected in a given salinity/sedimentation regime. It is a cause for concern when statistical analysis shows there to be a clear departure from this expectation. In 1992 the Upper Colne showed a clear departure from that expected in a clean estuary and it is probably linked to organic enrichment arising from the effluent from Colchester Sewage Treatment Works. A biological survey is planned for this year to assess the current situation.

Under current legislation the Environment Agency must maintain a set of Public Registers. Information is held in a combination of paper and computer files which may be inspected at our Regional Head Office in Peterborough. Quality monitoring data is held on the Water Quality and Pollution Control Register. The biological data is held at the Area Office (Ipswich), either in paper reports or as computer files, and is available upon request.

6.4 Bathing Water Quality

The Environment Agency has specific duties in relation to bathing waters. The quality of bathing waters in England and Wales is monitored against standards laid down in the bathing water regulations (SI 1991/1597), which give effect to the *EC Bathing Water Directive 76/160/EEC* which imposes statutory objectives on bathing waters. Waters covered by its provisions are identified by the DETR.

Monitoring is carried out by the Environment Agency and reported to the DETR, who assess compliance on a calendar year basis. The bathing season in England and Wales is taken to be from 15 May to the 30 September; bathing water sampling begins two weeks before the start of the season and continues throughout the season. A number of parameters are monitored including the main microbiological indicators. These parameters are sampled/assessed in all 20 samples throughout the year apart from pH, dissolved oxygen, salmonella and enteroviruses (only sampled when bathing water has failed *Directive* in the previous year), each of which are sampled twice in the season.

The weekly samples are analysed for total coliform bacteria, and for faecal coliform bacteria (the latter being indicative of the presence of traces of human sewage). The imperative standards which should not be exceeded, are 10,000 total coliforms per 100 millilitres (ml) of water and 2,000 faecal coliforms per 100 ml of water. In order for a bathing water to comply with the *EC Directive*, 95% of the samples (*i.e.* at least 19 out of the 20 taken) must meet these standards, plus other criteria.

Identified bathing waters exist at West Mersea, Brightlingsea, Jaywick, Clacton (*2), Holland, Frinton, Walton and Dovercourt. In 1996, all these waters satisfied the imperative coliform standards, with Brightlingsea, Holland and Clacton (Edith Road) satisfying the more stringent guideline criteria.

There have been sporadic failures at certain identified waters prior to 1996 (see Issue 4i) and as a result there are investment programmes in place to ensure imperative compliance at Clacton/ Jaywick, and Dovercourt. The Clacton/Jaywick improvements are centred around eliminating all the sewer overflows which run along the seafront whilst sewage from Dovercourt will be diverted to the recently constructed waste water treatment works at Parkeston.

Many non-identified bathing waters exist in the Plan area as for example at Harwich and Wrabness. Microbiological sampling by the Environment Agency has shown that Wrabness easily passes the imperative coliform criteria of the *Directive*. However, the water at Harwich (Wellington Road) has already exceeded the limits on two occasions during the 1997 sampling season. The Environment Agency is committed to a policy of no deterioration in respect of the quality of these amenity waters, and there has been a considerable amount of effort to ensure that the commissioning of the new Parkeston outfall will result in an overall improvement to the Dovercourt/River Stour area.

Information on the quality of bathing waters is available from the public register. Many seaside resorts also display this information at popular public access points.

6.5 The Quality of Groundwater

Environment Agency policy on the protection of groundwater is explained in the 'Policy and Practice for the Protection of Groundwater' (PPPG) published in 1992. The main objectives of the Policy are to ensure that all risks to groundwater are dealt with in a common framework and to provide a basis for decisions affecting groundwater resources. This will enable the management and protection of groundwater in a sustainable manner.

About a third of public water supply in England and Wales is obtained from groundwater and in the Anglian Region the proportion is 50%. Groundwater can be particularly vulnerable to pollution and the clean up of such an occurance is extremely difficult, if not impossible, to achieve. Under Section 85 of the *Water Resources Act 1991* it is an offence to pollute groundwater and the *EC Groundwater Directive (80/68/EEC)* also prohibits the direct or indirect discharge into groundwater of List I substances and limits discharges of List II substances. A recent publication by the Environment Agency, 'Groundwater Pollution', details the extent and character of groundwater pollution from point sources in England and Wales.

The PPPG sets out the approach to this subject. Groundwater protection is achieved through the evaluation of vulnerability and risk. The vulnerability of groundwater to pollution is a function of the presence and nature of the overlying soils and drift, the geology and depth to the water table. These physical characteristics define the vulnerability of all underground waters and, for the Plan area, are mapped on Sheets 39 and 40 of the Groundwater Vulnerability Map series. This includes the definition of protection zones around key boreholes, the classification of aquifers depending on their vulnerability and a list of specific contaminative activities requiring high standards of control. Certain controls are available to the Environment Agency and local authorities who can play a major role in influencing the locations of development which may pose a potential risk to groundwater.

The Policy also describes the groundwater source protection zones which have been defined for large public water supplies and industrial abstractions associated with food production. These are intended to guide planning and development around each abstraction source in order to minimise future risks of groundwater contamination.

Background groundwater quality is monitored as part of the Environment Agency's national clean groundwater monitoring network. Three categories of sampling points exist. The primary network comprises of major public water supply sources with a national coverage of 1 per 250 km^2. The secondary network consists of large licenced or private groundwater sources and a tertiary network is made up of minor abstractions or springs chosen to cover local groundwater issues or minor aquifer quality. The majority of monitoring points relate to the Chalk aquifer because of its importance for water supply.

The frequency of monitoring is dependent on aquifer flow characteristics but is generally one or two times per year. Routine monitoring (currently undertaken) is based on a ferruginous groundwater suite which includes the determination of the following chemical characteristics: electrical conductivity, pH, Total Organic Carbon, calcium, magnesium, potassium, sodium, chloride, sulphate, nitrate, alkalinity, phosphate, iron and fluoride. It is intended to develop the network further in future and to expand the range of chemical characteristics determined.

There are currently no statutory water quality objectives for groundwater because it is naturally

variable and dependent on natural hydrochemistry. The current network has been set up to characterise groundwater chemistry and to monitor trends. The area covered by this Plan includes 24 points which monitor the Chalk aquifer. The network has been sampled since before 1980.

Under current legislation the Environment Agency must maintain a set of Public Registers. This information is held in combination of paper and computer files which may be inspected at our Regional Head Office in Peterborough. Miscellaneous historical groundwater data and results of groundwater monitoring around landfill sites is held at the Area Office (Ipswich).

6.6 Derelict and Contaminated Land

The Environment Agency has specific duties under the *Environment Act 1995* with respect to contaminated land. This is defined as any land which appears to a local authority to be in such a condition - because of the substances it contains - that water pollution of significant harm is being, or is likely to be, caused. This interpretation is subject to guidance issued by the Secretary of State. Some sites may become designated as 'special sites', and these will eventually become the responsibility of the Environment Agency, but none have been designated to date.

The process of identifying contaminated land in a standard way across England and Wales has yet to commence. It is not now likely that regulations to enact the contaminated land provisions in the *Environment Act 1995* will be brought in before April 1999. Therefore any contaminated land work that is currently on-going is in anticipation of those regulations. Once the regulations come into place, the Environment Agency has a duty to prepare and publish a report on the state of contaminated land from time to time, or if specifically requested to do so by the Secretary of State.

Periodic surveys have, however, been made of *derelict* land. The two, of course, are not the same. Derelict land is considered to be land which has become so damaged by industrial or other developments that it is incapable of beneficial use without treatment. Such land includes closed and disused waste tips, worked out mineral excavations which are not subject to enforceable planning conditions or other arrangements providing for restoration, abandoned military or service installations, abandoned industrial installations and areas of land which are affected by actual surface collapse resulting from disused underground mining operations. There are different sources of grant available to enable derelict land to be brought back into beneficial use. These include the Land Reclamation Programme, which is administered by English Partnerships and, under the *Local Government and Housing Act 1989*, local authorities may apply to the DETR for supplementary credit approvals in respect of Capital expenditure on contaminated land.

The Environment Agency will also collate information relating to contaminated land and produce reports on the State of the Environment in this respect. We will also organise a national research program for contaminated land, act as a centre of expertise and provide expert advice to local authorities on site-specific issues. It is envisaged that the Environment Agency will be able to offer a supportive and advisory role to local authorities.

6.7 Waste Management

Section 42 of the *Environmental Protection Act 1990* requires the Environment Agency to supervise licensed waste management activities. The Environment Agency regulate waste management facilities which are developed and operated so as to prevent pollution of the environment, harm to human health, and serious detriment to the local amenity. Local authorities also have a role to play in the protection of human health and the local amenity with regard to statutory nuisances, such as noise or smell.

The monitoring of waste management facilities is a statutory duty, the guidance for which is set out by the DETRs 'Waste Management Paper Number Four'. Monitoring frequency is established by this guidance, and site visits are dependant on the category and risk potential of each facility. For instance, the licence conditions for landfill sites accepting non-inert wastes require the site operator to monitor for landfill gas, leachate levels, and the quality of groundwater and surface water. Other environmental indicators might include air quality, noise, dust, smell and litter, depending on the characteristics of each site. Licence conditions are also established for other types of waste management facilities, depending on the risk that each operation poses. The monitoring carried out by the site operators is audited by the Environment Agency, in addition to the site inspections Environment Agency Officers frequently carry out.

There are no area wide targets for waste management facilities. Targets are site specific and established as part of the licence conditions. The licence conditions for landfill sites set trigger levels for groundwater quality, regular exceedance of which require remediation initiatives. Leachate indicators that are monitored in groundwater include ammonium, chloride, sodium, potassium, conductivity, dissolved oxygen, chemical oxygen demand, total organic carbon, and pH. Minimum standards have been established by the Waste Management Paper No. 4 for the 'open' and 'closed' phases of site operation. Surface water conditions may also form part of a waste management licence, but these may also require a Consent to discharge under the *Water Resources Act 1991*, if a discharge is involved. Landfill gas is monitored for three main parameters, methane, carbon dioxide, and oxygen where, once again, minimum standards have been established.

6.8 Air Quality

The quality of air can be diminished by a number of different factors influencing a number of different chemical parameters. The type of pollutants that affect air quality include; ozone, sulphur dioxide, nitrogen oxide(s), carbon monoxide, carbon dioxide, benzene, lead, particulates (PM_{10}), and 1,3 Butadiene. *The Environment Act 1995* has laid the foundations for a nationwide system of local air quality management, in which local authorities are obliged to review and assess the quality of air in their areas and to take action where air quality standards or objectives are breached or at risk of being breached.

In addition to the sources of air pollution regulated by the Environment Agency other sources exist including processes regulated by local authorities, domestic sources, road transport, railways, civil aircraft, shipping and agriculture. It must be emphasised that the vast majority of air pollutants arise from diffuse sources, predominantly from traffic.

Authorisations issued by the Environment Agency for IPC processes include, where appropriate,

conditions which require the Operator to carry out monitoring of releases from authorised processes. Monitoring may be implemented as 'spot' sampling or continuous monitoring integrated into the process. Such monitoring is subject to auditing during inspections by Environment Agency staff. Additionally, check monitoring may be carried out independently by the Environment Agency or its contractors. Where considered appropriate, Operators are also required to carry out ambient air monitoring as part of their IPC authorisation conditions. Monitoring results are placed on public registers.

Nationally, the DETR has Urban, Rural and Hydrocarbon automatic air pollution monitoring networks and a series of monitoring stations for measuring acid deposition and sulphur dioxide levels at rural locations. Within the Plan area, acid deposition has been monitored at Flatford Mill since 1986, and sulphur dioxide at Little Horkesley since 1963.

The *Environment Act 1995* extends responsibilities of local authorities to establish action target standards for air pollutants so as to improve the environment. This may involve more extensive measures involving parties other than those regulated as operators of Part B processes. The Environment Agency in its regulation of Part A processes, will be required to participate in the setting and achievement of such local standards.

Eventually it is intended that these targets will be set at two main levels of air quality. One will be a guideline figure to represent the level at which the pollution has been rendered harmless to health or the environment, or at which it is unlikely that any significant further benefit could be obtained by expending further reasonable cost on abatement, because of background sources or other factors. The other, a level higher than the guideline figure, will be a trigger level which distinguishes when air quality is so poor that an immediate response would be justified to prevent serious damage.

The Government intends to introduce in due course mandatory duties on local authorities to assess local air quality and, where it is shown to be necessary according to nationally agreed criteria, prepare Local Air Quality Management Plans for operation in defined areas where targets are unlikely to be met. The 'alert' threshold for any pollutant or combination of pollutants would define the level at which there is a potential risk of immediate serious damage. If the level were reached or approached in a particular area, it should therefore trigger a mandatory obligation on the relevant pollution control authorities, including the Environment Agency, to take remedial action.

Air quality within the UK has been improving in recent years and these improvements are set to continue over the next decade. The new systems for dealing with industrial pollution introduced by the *Environmental Protection Act 1990*, new vehicle standards and other measures aimed at mitigating the environmental effects of traffic are addressing the reduction of emissions. The UK confidently expects to meet its existing international commitments for reductions in emissions of NO_x, SO_2 and Volatile Organic Compounds (VOCs).

There remain, however, important challenges and uncertainties. For example, the recurrence of ozone episodes, particularly in summertime, and the recent publication of research into the effect on mortality of the wintertime smog episode of December 1991 have again raised public concern about air quality.

There are national, regional and local networks which often utilise differing methodologies of

analysis. Comparisons between national and local data which has been assimilated using different criteria can not easily be achieved. In addition, bordering local networks which use different methodology for the same parameter are difficult and often unreliable to compare. It is complicated to establish trends when the data are assimilated in this way

6.9 Radioactivity

The greatest source of radiation exposure to the public in England and Wales is that which arises from natural background. Background radiation is not the only source of radiation to which the population is routinely exposed. Medical and occupational exposures both add to the average dose rates, as does residual fallout from the atmosphere testing of nuclear weapons. Collectively these anthropogenic exposures add about another 0.3 milli-Sieverts per year to the average annual exposure to the general public of 2.2 milli-Sieverts. Radioactive discharges from nuclear sites account for only about 0.0004 milli-Sieverts per year to the average member of the public. Discharges of radioactive wastes to the environment are very carefully controlled.

The Environment Agency is the organisation currently charged with regulating use of radioactive materials and disposal of radioactive wastes under the provisions of the *Radioactive Substances Act 1993*, which consolidated and superseded the *Radioactive Substances Act 1960*. In summary, the usage/disposal of radioactivity is grouped by the *Radioactive Substances Act 1993* into four main areas and registrations/authorisations are issued by the Environment Agency in respect of these activities:

Section 7	Registration of users of radioactive materials and premises where radioactive materials may be kept and used.
Section 10	Extension of the registration provisions of section 7 to mobile radioactive apparatus and the release of radioactive materials into the environment for the purposes of environmental studies. It should be noted that the responsibility for regulating the transport of radioactive materials and / or wastes rests with the Department of Transport.
Section 13	Authorisation of the disposal of radioactive wastes to air, water (including sewers), landfill, or specified repositories.
Section 14	Authorisation of the accumulation of radioactive wastes prior to disposal.

The Environment Agency also ensures that all applications to keep and use radioactive materials are justified and that the amounts of radioactive materials used, and hence the quantities of wastes generated, are commensurate with the proposed uses of the radioactive materials. Some users of radioactive materials are exempt from the requirements for registration/authorisation under the *Radioactive Substances Act 1993* by Exemption Orders made under the *Act* by the Secretary of State. Operations carried on under Exemption Orders generally involve small quantities of radioactivity in common usage (*e.g.* smoke detectors). Many Exemption Orders contain limits and conditions, and operators are liable to compliance inspections by Environment Agency staff.

The International Commission for Radiological Protection make recommendations on the system of radiological protection, including dose limits. The principles underpinning the

Government's policy on radiological protection take account of these recommendations and on the advice of the National Radiological Protection Board. The limit for exposure of the public from all manmade sources of radioactivity (other than medical exposure) is 1 milli-Sievert per year which, although very much less than the background rate, is considered to reflect a low level of acceptable additional risk for members of the public. Because man can be exposed simultaneously to both internal and external radiation, the dose received is assessed by adding together both internal and external radiation exposures.

Limits on the quantity and type of radioactivity which may be discharged are set by the Environment Agency in authorisations. In the case of authorisation for nuclear licensed sites, *e.g.* nuclear power stations, Quarterly Notification Levels (QNL) may also be set on specific radionuclides or groups of radionuclides, at values close to routine discharge levels to provide a further performance indicator. Nuclear site authorisations additionally impose an overriding requirement on operators to use best practicable means to limit discharges of radioactive waste.

On a national scale the Radioactive Incident Monitoring Network (RIMNET) constantly takes recordings of gamma dose rates. There are approximately 90 RIMNET monitoring stations throughout the country, of which approximately ten are in the Anglian Region. If one RIMNET station has a high reading *twice* or adjacent stations have high readings then an alert will be initiated at the DETR. The RIMNET network was installed after the Chernobyl accident in 1986 to monitor the scale of any international radioactive release upon the UK in addition to compiling background radiation levels.

Site specific monitoring is carried out for all nuclear installations by the site operator, MAFF and the Environment Agency. Radiation levels are tested throughout each site. In particular the perimeter fence monitoring points are seen as especially important. In addition, depending upon the characteristics of each station, sampling is routinely monitored at beaches, on fish, shellfish and aerial deposits and for agriculture (sampling of both herbage and milk levels). Samples are predominantly taken by the station operators and MAFF. The station reports all data to the Environment Agency on a regular basis, depending upon the monitoring schedule.

The Environment Agency does not routinely carry out monitoring for non-nuclear sites with RAS authorisations, for example industrial, research or medical use of radioactive materials. The Environment Agency has the power to request the monitoring of the usage/disposal of waste from other operators. However, the majority of authorisations use radioactive materials in small quantities with relatively short half-lives which provides a low dose risk to the public. Therefore monitoring to scrutinise the majority of these disposal pathways is not seen as necessary by the Environment Agency. Operators are liable to compliance inspections by Environment Agency staff.

Monitoring results for nuclear installations is available through public registers.

6.10 Pesticides in the Aquatic Environment

Due to the potential for pesticides to pollute the aquatic environment, Environmental Quality Standards (EQSs) for the protection of aquatic life have been derived for a number of pesticides. Statutory EQSs have been set by the EC for eight pesticides which have been designated as List I under the *Dangerous Substances Directive (76/464/EEC)*. The DETR is responsible for

deriving EQSs for List II substances and other substances identified as being of international priority. A number of pesticides fall within these categories. In addition, the Environment Agency derives EQSs for substances of operational concern, including those compounds that are frequently consented for discharge or are detected in the environment. This includes a number of pesticides.

Under the *EC Dangerous Substance Directive (76/464/EEC)* the Environment Agency has to monitor water downstream of all known discharges of List I and List II substances. The former are also monitored at 'national network' sites in order to provide 'background' levels. All of the List I substances have individual statutory EQSs, for both fresh and saline waters, which are expressed as annual averages.

Sites at which water is abstracted for public supply have been identified for the purposes of the *EC Directive on Surface Water for Abstraction (75/440/EEC)* and have to be monitored for specific pesticides. This is also the case for waters designated under the *EC Directive on Shellfish Waters (79/923/EEC)*. In addition the Government has set standards for DDT. Exceedences of statutory EQSs are reported annually to the DETR. In addition to the requirements of the directive, the Government agreed to at least halve the input loads of 36 priority hazardous substances (Annex 1A) discharged to the North Sea by 1995.

Pesticide monitoring is carried out by the Environment Agency at a number of sites within the Plan area, more usually at surface water sites. Analysis is also carried out by Anglian Water Services, Essex and Suffolk Water and Tendring Hundred Water Services at their boreholes used for public water supply. Data from these monitoring sites are passed to the Drinking Water Inspectorate and the Environment Agency where they are held on the Anglian Region Pesticide Database. Local authority monitoring of private wells and boreholes used for potable supply is undertaken as part of the *EC Drinking Water Directive* and will include pesticide analysis. It is their duty to liaise with users of such sources to ensure wholesomeness of supplies.

Research is ongoing as to the potential of pesticides to pollute the aquatic environment and as a result, a large number of environmental quality standards exist. Environmental Quality Standards (EQSs) are derived such that the levels set will ensure that aquatic life is protected. Of those set, eight relate to individuals and groups of List I Pesticides, under the *EC Dangerous Substances Directive.* The DETR has also proposed values for a further 14 pesticides. Further statutory limits are imposed in the *EC Directive on Surface Water Abstraction (75/440/EEC)* and the *EC Directive on Shellfish Waters (79/923/EEC).*

There have been a number of EQS failures for pesticides in the North Essex area since 1991. These are listed below:

Year	Location	Reason for Failure
1991	River Colne, East Mills	Chlorfenvinphos
	Salary Brook	DDT
1992	River Colne, East Mills	Lindane
1993	River Stour, Langham	Diazinon
1994	Layer Brook, Abberton	Isoproturon

Year	Location	Reason for Failure
1995	Salary Brook	2-4-d
1996	Layer Brook, Abberton	Diazinon
	River Stour, Langham	Ioxynil

National research shows that diffuse pesticide influences on many rivers are an important issue and investigational work will continue in this area. Information within the Plan area is required. Trends for most pesticides in the environment show a gradual rise over several decades. Recent research shows pesticide runoff from agricultural land to be a significant problem.

The current surface water quality monitoring network does not give comprehensive coverage of the Plan area, as sampling for pesticides is driven according to those reasons given in the section above.

Much information in respect of groundwater is passed to the Environment Agency under reciprocal arrangements with water companies and local authorities. Geographical coverage therefore is not comprehensive and our understanding of pesticide contamination of aquifers continues to be developed.

Under current legislation the Environment Agency must maintain a set of Public Registers. Information is held in a combination of paper and computer files which may be inspected at the Regional office. Quality monitoring data is held on the Water Quality and Pollution Control Register. Further information can be obtained from 'Pesticides in the Aquatic Environment' (1994) published by the former National Rivers Authority (NRA).

6.11 Algal Blooms

Algae are a very diverse group of organisms ranging from the microscopic to visible filamentous mats, including seaweeds. They are natural inhabitants of many inland waters, estuaries and the sea. However, increased algal growth in rivers, lakes and estuaries can often give rise to a number of problems, for example the production of toxins and the depletion of vital dissolved oxygen levels.

Populations of blue-green algae, so called because of their colour, can under suitable conditions, in still freshwaters, grow to extremely high densities and form visible scums on the water surface. Some of these algae are known to produce chemicals which are toxic to mammals, including man.

Blooms of suspended microscopic algae can also occur in rivers and often colour the water brown or green. Such blooms usually occur during the spring and summer period. Later in the season mats of filamentous algae can develop which are often seen attached to the river bed or submerged macrophytes within the river channel. These blooms of algae can impact upon the dissolved oxygen levels within the river causing a wide fluctuation between very elevated levels during the day to reduced levels at night. Under certain conditions, particularly during periods of prolific algae growth, the reduced night time levels can result in, for example, fish mortality.

The factors leading to such blooms of algae are many and complex. However, it is known that excessive growth of algae is promoted by high levels of the nutrients nitrogen and phosphorus, the principal sources of which are from sewage treatment works and agriculture. Such enrichment is commonplace within Anglian Region and is termed eutrophication.

Algal populations are not routinely monitored by the Environment Agency. However, samples for blue-green algae are collected on a 'reactive' basis in response to reports of suspected blooms in water bodies. Where water samples are found to contain populations of potentially toxic algae at, or above, specific concentrations, letters are sent by the Environment Agency to the owner, to the relevant local authority Environmental Health Officer, MAFF and to the local Medical Officer of Environmental Health. An information leaflet is also available offering guidance on what to do and contains important messages from the Department of Health and from the Ministry of Agriculture.

On some watercourses *chlorophyll a* concentrations are determined to provide an indication of the levels of algae. This additional work is carried out by the Environment Agency on controlled waters which are either candidate or designated Sensitive Areas (Eutrophic) under the *Urban Waste Water Treatment Directive* (UWWTD). Within the Plan area the Rivers Stour, Colne, Blackwater/Pant, Brain, Chelmer and Wid and Abberton Reservoir are candidate Sensitive Areas (Eutrophic) and Hanningfield Reservoir and Ardleigh Reservoir are designated Sensitive Areas (Eutrophic).

The Urban Waste Water Treatment Directive 91/71/EEC sets out specific requirements for the minimum standards of treatment for sewage at works falling within its remit and has been implemented through *The Urban Waste Water Treatment (England and Wales) Regulations 1994*. These standards are derived to prevent the environment from being adversely affected, and depend on:

- the size of the discharge;
- the nature of receiving water (river, estuary or coastal); and,
- the sensitivity of the receiving water.

For works serving a population equivalent greater than 10,000, additional stringent treatment (including phosphorus reduction) can be required if they discharge to 'Sensitive Areas'. Such areas include waters which have been shown to be suffering from an undesirable disturbance to the balance of organisms as a result of nutrient enrichment. The DETR have defined in some detail the definition of a 'Sensitive Area'.

Within the area a total of 19 confirmed reports of blue-green algal blooms within lakes and ponds were received over the period 1993 to 1997 indicating that they are only a minor problem. Nationally, the Environment Agency is carrying out research to learn more about the causes and effects of blue-green algal blooms and is seeking to devise means of reducing their occurrence and alleviating the impact on water bodies.

Chlorophyll results generally show increasing populations of algae at the lower ends of the rivers compared to the headwaters, as would be expected due to slower flows. In the period since 1990, populations were lowest in 1994, corresponding to a year of relatively high rainfall. Annual mean concentrations of chlorophyll in the lower reaches of the Rivers Brain and Wid were generally low (<10µg/l) and below the criteria for designation as sensitive areas (eutrophic) under

UWWTD. This is due to the fact these are smaller rivers which are tributaries of other rivers and so have relatively fast flows in their lower reaches. The annual means were higher in the Colne and Chelmer (7-25µg/l), in the Blackwater (8-67µg/l) and highest in the Stour (18-108µg/l) in the period since 1990. The UWWTD criteria of annual mean >25µg/l or annual maximum >100µg/l were exceeded in the lower reaches of these rivers in most years. These results partly reflect the slow flows achieved in the lower reaches of these larger rivers, especially due to impoundment by mills, weirs and water supply structures. The degree of eutrophication also governs the potential for algal growth under these conditions. All these rivers are eutrophicated, indicated by mean annual total phosphorus concentrations of up to 1mg/l in the larger rivers and several mg/l in the Wid and Brain.

Hanningfield and Abberton Reservoirs, for which data has been available since 1994, had mean annual chlorophyll concentrations of 7-13µg/l. Data for Ardleigh Reservoir is available over a longer time period and showed higher values of 25-63µg/l since 1990. The UWWTD criteria were exceeded on all but one occasion.

Chlorophyll a data is available on the Public Register, which under current legislation the Environment Agency must maintain. Information is held in a combination of paper and computer files which may be inspected at our Regional office. Quality monitoring data is held on the Water Quality and Pollution Control Register. Additional advisory leaflets are available upon request from the Environment Agency.

6.12 Freshwater Invertebrates

The monitoring of freshwater invertebrates using the biological GQA system compliments the results of the chemical GQA surveys as a water quality monitoring technique. The chemical GQA may achieve a good grade in spite of pollutants not included in the chemical GQA or intermittent pollution not detected by the occasional samples taken for chemical analysis. The biological class of a section of river is based on the species diversity and tolerance of the invertebrate life found within a sample. If the river is polluted, even only for a few minutes, then some or all of these may die. Recovery may take several months. This means that biology provides information about pollution that may have been missed by the chemical sampling.

Invertebrates are sampled from 124 sites within the area to provide a biological indication of water quality. A methodology has been devised to assess this data from a conservation perspective by looking at species rarity and community richness. This information compliments the results of the River Corridor Surveys and River Habitat Surveys.

Invertebrates are regularly monitored at sampling points along the length of rivers which are monitored for GQA. One sampling point is placed in each stretch of river identified by chemical GQA monitoring. Samples are taken from these monitoring points twice in each year, in spring and autumn. The data from both seasons are pooled to give information on water quality and conservation status.

For GQA assessment, invertebrate species are linked together into 85 groups (taxa) which vary in their sensitivity to pollution. A score is assigned to each group with the most sensitive animals scoring 10 and the most tolerant 1. The sum of these scores for all taxa present gives the Biological Monitoring Working Party (BMWP) score, from which the Average Score Per Taxon

(ASPT) is calculated. Thus higher values of these scores indicate better water quality. The River Invertebrate Prediction and Classification System (RIVPACS) is used to interpret this data. It uses physical details about the sampling site, *e.g.* water depth and distance from source to predict the invertebrates which would be expected to be present in undisturbed, unpolluted conditions. From this it generates the expected BMWP score, ASPT and Number of Taxa. By comparing the ratio of the observed to expected values, a series of grades of quality are defined. There are six grades (the same number as for chemical GQA), ranging from a (very good) to f (bad). Lower case letters are used to distinguish from chemical GQA grades. The use of this system to set water quality targets is currently under development (for more information please refer to Appendix 1).

In order to assess the conservation value of a monitoring site, invertebrates are identified to species. Each species has a conservation score which increases from 1 for very common species to 10 for Red Data Book 1 endangered species. The Average Conservation Score for all the species in a sample is used, along with information about the BMWP score and the highest conservation score, to calculate a Community Conservation Index (CCI). High CCI values can result from the presence of very rare species or very diverse communities. Values over 20 probably indicate very high conservation interest.

The results of the 1995 biological GQA survey are shown in Appendix 1. A large proportion of river length (71%) falls in the top two grades indicating good or very good quality. Rivers which have very good water quality (grade a) over considerable parts of their length include the Glem, Box, Brett, Pant, Chelmer and Can. The lowest recorded quality, grade e (poor) occurred on only one stretch. This is the Salary Brook north tributary. No bad quality (grade f) was recorded.

A conservation score of over 20, indicating high conservation interest, was recorded at one site (River Brain, White Notely Ford) due to the presence of a rich community including several uncommon species. A further 48 (39%) sites scored between ten and twenty, indicating some conservation interest.

The majority of river stretches showed an improvement in quality compared to the 1990 GQA survey. Overall 52% improved with 27% of stretches improving significantly (>75% probability of improvement in grade). Several stretches improved by two grades, e.g. Holland Brook improved from grade e to c and two stretches of the River Can improved from grade c to a. The overall improvement is probably due to a combination of pollution prevention initiatives, increased investment in effluent treatment and increased river flows since the drought of 1989-1992. A downgrade in quality occurred in only six stretches and was significant for only one (River Stour, at Bakers Mill). Non-significant downgrades (or upgrades) may be due to normal variation in the data but possible reasons for these changes will be investigated further.

Due to the recent introduction of the Community Conservation Index, no trends are yet available.

Collection of invertebrate samples for GQA is only carried out by trained and experienced staff. The sorting of samples in the lab and identification of animals is subject to internal and external Quality Control checks. All data is held on computer databases and is available on request either from the Ipswich office for small data sets or from the Regional Headquarters in Peterborough for larger requests.

6.13 Fisheries - Freshwater

The overall objective of the Environment Agency is to maintain, improve and develop coarse fish and brown trout populations appropriate to the fluvial fisheries within the area. Due regard should also be given to the maintenance of the smaller species of fish in minor watercourses, and of all species of fish in reservoirs, lakes and ponds.

The Environment Agency has a specific duty to assess the state of, and safeguard, freshwater fisheries and the waters which they inhabit. The *EC Freshwater Fish Directive 78/659/EEC* sets water quality objectives for designated stretches of water, to enable fish to live continuously or breed in favourable conditions. Two categories of water are identified; those suitable for salmonid fish (salmon and trout), and those suitable for cyprinid fish (*e.g.* carp, tench, barbel, rudd, roach, pike). The former category is characterised by fast flowing rivers which have a high oxygen content and a low level of nutrients, whereas the latter waters are slower flowing, commonly nutrient rich, have a lower oxygen content and frequently pass through intensively managed agricultural land.

Fish population surveys are undertaken on all major rivers in the area according to a regular rolling programme. Extensive data on the fish stocks are available, and these are used to derive a fisheries classification scheme based on the biomass (grams per metre squared [gm^{-2}] of water surface area) of the stocks present. The classification comprises of four biomass classes (see Map 27).

A new river fishery classification scheme is currently being introduced, that considers a variety of both biological and physical parameters. This new scheme, which takes account of river type and species richness, as well as population measures of density and biomass, should in future provide a more meaningful assessment of the status of our rivers and their fish populations.

The Environment Agency has more recently started a programme of monitoring upper reaches and minor streams to determine the full distribution of rarer species of fish, and to identify the importance of these fish populations within the area as a whole.

The *EC Freshwater Fisheries Directive 78/659/EEC* provides a list of water quality determinands to be measured, together with associated requirements of analytical methods and minimum sampling frequencies. This work is incorporated into the water quality monitoring programme.

Fish stock biomass targets are founded on the assumption that all waters included in the rolling fisheries survey programme are capable of supporting at least 5 gm^{-2} of fish where physical conditions may be limiting and at least 10 gm^{-2} where no such limits exist. Thereafter, scope exists for setting increased targets where experience has shown that greater stock levels have been sustained over a minimum of a seven year period, as represented by three consecutive surveys. The target classes thus provide both a minimum acceptable standard and a means of ensuring that higher and regularly achieved standards are not allowed to erode unnoticed, through lack of an appropriate benchmark. Map 28 illustrates the targets for the Plan area.

A number of rarer fish species, some of which are found in the Plan area, are listed in the *EC Habitats Directive 92/43/EEC* as requiring special measures of protection. To identify the distribution and habitats of these species within the north Essex rivers, and to ensure their

Fisheries – Biomass Classes

Map 27

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

	coarse	trout
Class A	———	·····
Class B	———	·····
Class C	———	·····
Class D	———	·····

(1995–97 survey cycle)

February 1998

Freshwater Fisheries – Target Classifications

Map 28

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

Biomass targets classifications

Class A
Class B
Class C

(Derived from 1984–1997 data)

February 1998

protection during all Environment Agency activities, is a specific target for fisheries work.

The *EC Freshwater Fish Directive 78/659/EEC* sets various standards in relation to salmonid and cyprinid fish, including imperative values for dissolved oxygen, pH, non-ionised ammonia, total ammonium, total residual chlorine, zinc and, where thermal discharges occur, temperature. Guideline values are also set for various other chemical parameters. Monitoring for compliance is carried out on a monthly basis.

The area has a diverse range of fisheries with varying fish communities and species. In total 373.5km of water are included in the current rolling programme of river fisheries surveys, of which 310.2km meet or exceed their biomass target class. The majority of the classified water supports coarse fish populations only, but brown trout occur in 20% of the monitored river length.

Nine reaches do not currently meet their biomass target class, namely parts of the Rivers Stour (2 reaches), Glem, Colne and Blackwater (2 reaches), together with the whole of the Ramsey River, Asheldham Brook and Holbrook (see Map 3). Natural recruitment processes, water quality and flow constraints, the impact of drought, the quality of the habitat, the Ely Ouse Scheme and the operational regime of these rivers are all possible contributory factors, most of which require some further investigation. The target class A set for the lower Ramsey River (based on the long term presence of introduced carp stocks which do not breed and which are now dying out) may be overly ambitious in relation to the physical habitat and flows, and this possibility needs to be examined carefully.

Various reaches of the Rivers Glem, Box, Pant, Ter and Brain, together with Sandon Brook, have been identified as supporting significant populations of fish species listed in the *EC Habitats Directive 94/43/EEC*. The network of County Wildlife Sites, which provides some local protection to important habitats, is currently being extended and is likely to include these reaches.

The value of fish stocks identified by the new programme of monitoring upper reaches and minor streams will be fully considered during 1998, when the coverage of 'first time' surveys is completed.

Some small sections of the Rivers Blackwater, Chelmer, Stour, Box, Colne and Roman have shown failures against *EC Freshwater Fish Directive 78/659/EEC* standards over the last five years (to 31/12/96). Most of these failures are believed to relate to the presence of dense algal populations, which can cause high pH and/or low dissolved oxygen conditions. Such conditions may impact on fish populations, and their occurrence needs to be kept under ongoing review in relation to the status of the fish stocks themselves.

The majority of rivers in the area have reasonable to very good fish stocks, which have met or exceeded their target classes in most, if not all, surveys since 1984. Many of these rivers have achieved target class promotions to A or B, based on the presence of consistently good fish stocks during this period. The percentage of river length failing to meet target class has remained fairly stable since the system was introduced in 1995. However, the distribution of lengths falling into each individual biomass class has shown some decline in overall quality in recent years, following a long period of improvement up until 1993. The reasons for this are under investigation. Climatic factors may be responsible, since the changes are detectable on similar timescales over a wide geographical area.

Although figures which specifically relate to North Essex are not available, it is probable that the large and ongoing increase (>100% between 1990 and 1996) in applications for consents to introduce and/or remove fish noted for Eastern Area as a whole is fully reflected within the Plan area. This is believed to be due to increasing demand for stocks to supplement or establish lake, reservoir and pond fisheries, which has been reflected particularly in greater coarse fish trading activity.

Fisheries survey data are held in a combination of paper files and computer databases, and in reports describing (or summarising) the results obtained from each river included in the programme. The latter are available from the Area Office at Ipswich, upon request. Supporting data can be made available in a variety of formats, also available upon request.

The availability of water quality compliance data in relation to the *EC Freshwater Fish Directive 78/659/EEC* is given elsewhere.

6.14 Fisheries - Commercial and Marine

The excusal of eel fishing from licence duties downstream of the Byelaw demarcation points, the geographical flexibility of eel netting licences for inland waters, the low level of eel fishing activity, and the lack of any requirement for catch returns of eels from all waters, serve to limit the Environment Agency's regulatory role for eel fisheries to a minimal level in this Plan area.

A Net Limitation Order (NLO) for the East Coast Salmonid Fishery, proposed by the Environment Agency as part of its policy of phasing out migratory salmonid fisheries exploiting mixed stocks, was confirmed by MAFF following a public enquiry in May 1995. The NLO came into effect on 1 January 1996, from which date licences could only be issued to fishermen who had held them in 1995.

Monitoring of eel stocks levels in the freshwater rivers is an integral part of the fisheries survey programme, and is reported through that avenue. There is no monitoring scheme for eel stocks in tidal waters.

Holders of salmonid net licences are required to make catch returns to the Environment Agency at the end of each season. These returns represent the only means of monitoring the status of the stocks themselves. The returns received confirm that a commercial fishery for salmonids does not currently exist within the area.

The Environment Agency will seek to maintain good stocks of eels in all freshwater catchments, whether subject to commercial exploitation or not.

Under the terms of the NLO, no new licences will be issued as existing licensees leave the fishery. This will progressively reduce the number of licences and ultimately eliminate the fishery throughout the NLO area. The combination of the NLO and the Byelaw prohibition on fishing for salmon and sea trout with any instrument other than a rod and line in all waters south of Walton on the Naze pier, will prevent any commercial salmon and sea trout fishery from arising in the area at any future time. These measures are designed to protect stocks migrating through to other areas, including the River Thames.

Eel stocks in freshwater rivers are quite variable, with some catchments supporting more than others. The upper reaches of some rivers support noticeably smaller eel stocks than the lower reaches, a fact which may relate partly to river control structures obstructing migration. However, no specific shortfalls which need to be addressed have been identified to date.

The mixed status of any salmon and sea trout which may occur off the coast means that stock evaluation is very difficult, and is determined primarily by factors operating in other geographical areas.

Whilst eel stocks may have increased or decreased within individual catchments in the plan area, no specific trends which could affect eel stocks overall have been identified.

The recent recovery of fish stocks of all types within the Thames Estuary, and the reestablishment of a salmon run in the Thames itself, may lead to an increased frequency of occurrence of salmonid fish in Essex coastal waters. Should this prove to be the case, it may be necessary to give more attention to enforcement of the existing legislative controls.

The availability of data on eel stocks in freshwater rivers is the same as that described for fisheries survey data in Section 6.13.

A new nationally applicable byelaw requiring catch returns to be made in respect of licenced eel fishing is under consideration, and if approved, will provide coordinated data on commercial eel catches for the first time. Under existing circumstances, the byelaw would not encompass coastal eel fisheries because of their excusal from the licencing requirement.

Although of little relevance to the Plan area, catch statistics for migratory salmonid fish throughout England and Wales are collated and published annually by the Environment Agency. Copies of the reports are available from the National Head Office (Bristol).

6.15 Shellfisheries

The *EC Shellfish Waters Directive (79/923/EEC)* aims to protect layings by imposition of statutory water quality objectives for designated areas. In the Plan area the Blackwater estuary, Pyefleet Channel and Hamford Water are designated under this *Directive*. Compliance is good with the exception of zinc at Hamford Water. These exceedences have been attributed to leaching from sacrificial anodes from boats. The *EC Shellfish Hygiene Directive (91/492/EEC)* is administered by the local authorities and lays down health conditions for the production and placing on the market of live bivalve molluscs, principally the bacteriological quality. The Environment Agency has a responsibility to help maintain current class for layings under this *Directive* and investigate and control pollution inputs as appropriate.

The *EC Shellfish Waters Directive* requires the designated waters to be routinely monitored for a large range of determinands. The sampling frequency depends upon the parameter but ranges from monthly to twice yearly.

Environmental Quality Standards and minimum sampling frequencies have been established for shellfish waters under the *EC Shellfish Waters Directive (79/923/EEC).*

There are numerous commercial shellfisheries within the Plan area and the following list summarises the species harvested together with their current hygiene classification.

Production Area	Bed Name	Species	Class
Walton Backwaters	Twizzle, Kirby Creek Mill Lane	Pacific Native	B
Colne	Peewit Island, Colne Buoys Pyefleet Spit, The Wreck Harbour	Pacific and mussels	B
	Brightlingsea Harbour	Mussels	C
	Colne Point	Mussels	C
West Mersea	Tollebury, Salcott, Little Ditch, Freeground Strood Channel, the Nothe	Native/Pacific	B
Blackwater	Goldhanger	Pacific	A
	Thirslet Creek	Mussels	B
	Bench Head, Batchelor Spit and St. Peters Flats	Native	A
	Buxey Sands	Cockles	A
	The Nass	Native	B

The recent upgrading of the West Mersea STW to ensure compliance of West Mersea beach under the *EC Bathing Waters Directive* has also yielded noticeable improvements to the nearby shellfisheries. Negotiations are continuing with Anglian Water in an attempt to maintain the tertiary (ultraviolet) treatment of effluent outside of the bathing water season.

Under current legislation the Environment Agency must maintain a set of Public Registers. Information is held in a combination of paper and computer files which may be inspected at our Regional office. Quality monitoring data is held on the Water Quality and Pollution Control Register. Data on classification under the *EC Shellfish Hygiene Directive (91/492/EEC)* can be obtained from local authorities (for local authorities in this area please refer to Map 4).

6.16 Conservation

This Plan area is recognised as an outstanding part of the country for wildlife. As a result numerous surveys conducted by different organisations have been completed to identify the status of habitats and species.

The Environment Agency has a duty under the *Environment Act 1995* to have regard to the desirability of conserving natural beauty, flora and fauna with respect to all of its pollution control and waste management functions, and to further the conservation and enhancement of natural beauty, flora and fauna with regard to all its other activities. In order to play its role in achieving the objective of sustainable development, it has been requested to pay particular attention to its conservation duties.

Conserving biodiversity is a measure of sustainable development. Nature conservation is concerned with safeguarding for future generations our heritage of plants, wildlife, geological and physiographic features. At the United Nations Conference on the Environment and Development held at Rio de Janeiro in 1992, the UK Government signed up to the 'Convention on Biological Diversity' aimed at conserving the biodiversity of global species. As a consequence of this the Government produced a report in 1993 called 'The UK Biodiversity Action Plan' with a commitment to produce national targets and action plans for key species and habitats. Some of these were launched in December 1995 and are relevant to this Plan and the work of the Environment Agency. We are committed to contributing to Biodiversity Action Plans at a local level. Biodiversity Action Plans are currently being prepared for target species and habitats in Essex and Suffolk. A number of these species and habitats are related to the aquatic and coastal environment which is of particular concern to the Environment Agency in Essex.

In order to characterise Main River in terms of its conservation value the Environment Agency uses a classification system using River Corridor Survey (RCS) data. This data forms the Rivers Environmental Database (REDS) and provides information to assess the ecological quality of the rivers in a catchment, area and regional context. The RCS survey catalogues the botanical species in the river, on the banks and within the adjacent ten metre corridor as well as some ornithological data. Surveys have been completed for every 500 metre section of Main River in the Anglian Region (see Map 29). Information on fisheries, freshwater invertebrates and other species specific surveys (*e.g.* otter, water voles, crayfish, breeding waders) are used in conjunction with REDS to identify the most important stretches as riverine County Wildlife Sites.

A national River Habitats Survey (RHS) methodology is currently being used to complement the RCS which classifies the environmental condition of rivers with regard to physical features such as riffles, pools, wet shelves, cliffs and other habitat features. Both the RCS and RHS are aimed at identifying degraded, as well as important stretches, of river in order to protect valuable features/wildlife and identify opportunities to rehabilitate and enhance degraded habitats.

The species of plant living within a river can also give an indication of water quality, particularly with regards to nutrient enrichment. A national methodology has been devised, called Mean Trophic Ranking, to identify changes in plant communities that can be attributed to the nutrient status of the water. This analysis will be completed for all rivers in the Eastern Area using RCS data, allowing for a comparative assessment of nutrient enrichment.

Invertebrates are monitored twice a year to provide a biological indication of water quality. A methodology has been devised to assess this data from a conservation perspective looking at species rarity and community. This analysis feeds into the process for identifying County Wildlife Site river stretches.

Environmental Assessments are required for water abstraction licenses that could impact upon wetlands as well as for capital Flood Defence schemes undertaken by the Environment Agency. Ecological and, for abstraction licences, hydrological monitoring, is often an integral part of many projects/licences to ensure that the natural environment is not damaged. In addition to the above, monitoring of the conservation resource has and will be carried out in partnership with many organisations (for instance breeding wader and wildfowl of grazing marsh, saltmarsh and shingle surveys in 1997) providing essential data to ensure Environment Agency activities protect and where possible enhance the natural environment.

Conservation – River Corridor Survey Classification

Map 29

ENVIRONMENT AGENCY

Catchment boundary

Main River

Conserve

Enhance

Restore

February 1998

All the estuaries in this area, except the Stour, have been designated as Special Protection Areas because of their international importance for over-wintering wildfowl. The Environment Agency and English Nature are of the opinion that a number of important species tend to concentrate around the small streams which flow over intertidal mudflats. To address this issue a research project has been set up to ascertain the importance of the freshwater flow over these intertidal areas. The results of which will help determine that abstraction licences do not adversely effect these sites.

With regard to the ecological quality of rivers the baseline target is one of no deterioration which can be measured against past River Corridor Survey data and species-specific surveys. In addition we have a long term target to increase the length of river that qualifies as County wildlife Site to 20% of river length by 2010. Analysis of the REDS focuses our long term activities to conserve the most important sections, enhance those that are of moderate ecological quality and restore those that appear to be of little importance. Opportunities for protection and enhancement are sought through our routine regulation of all Environment Agency water related functions including Water Quality, Water Resources and Flood Defence activities. A Project reviewing the liaison procedures between the Flood Defence and Conservation functions has recently proposed a number of measures that are currently being implemented which will improve the delivery of ecological enhancements to all rivers during river and coastal maintenance works.

Many more precise targets will be drawn up over the next few years in partnership with other organisations through the production of a Local Biodiversity Action Plan for Essex. Threatened species (*e.g.* otter) will be covered by these targets as well as important habitats (*e.g.* reedbeds and saltmarsh). In addition to these Action Plans, and as a general principle for all wetlands and coastal habitats influenced by the Environment Agency, a target of sustainable management of biodiversity is the underlying objective with positive enhancements sought where appropriate.

It is expected that the Environment Agency will have the primary influence over many Biodiversity targets, particularly through the implementation of the Shoreline Management Plans and our influence on coastal and estuarine habitats, water resources and river management.

Until the Biodiversity Action Plans for species and habitats are completed long term targets for this area will include a number of specific targets aimed at rare/threatened and indicator species characteristic to the catchment and/or significantly influenced by the Environment Agency operations or activities.

Interim targets are as follows:

Species

- Otters breeding in every catchment by 2010;
- Expansion of the breeding redshank and snipe populations within the river valleys from 1988 levels, attributable to Environment Agency activities;
- 20% increase in the distribution of river water dropwort by 2010;
- Aquatic/emergent plant species diversity to be greater than 25 species per 500 sections in 10% of river sections;
- 25% increase in the distribution of crayfish by 2010 from 1996 levels.

Habitats

- No nett loss of vegetated shingle (for areas managed/influenced by the Environment

Agency;
- No nett loss of the total area of saltmarsh from 1993 levels;
- No nett loss or deterioration of brackish lagoons from 1997 levels;
- 20% of river length to qualify as County Wildlife Site by 2010.

Many data sets can be used to identify the status of the area covered by the North Essex Plan

Rivers
Most of the rivers in the area are of relatively poor ecological quality. Rare species of note include invertebrates, lamprey, bullhead, otter, water vole, river water dropwort, flowering rush and Hogs fennel.

Estuaries and Coastal Habitats
The majority of the coastline within the Plan area is recognised as being of the highest ecological status. All the estuaries have been designated as SPAs or candidate SACs whilst the majority of the open coast is SSSI. Many of these areas not covered by these international and national designations are County Wildlife Sites (see Map 21)

Ecological information accurately identifying trends is hard to come by, but with the present programme of surveys (both internal and external) trends will become more identifiable in the near future.

Of the few historical data sets available it is clear that, of the species identified in the targets above, the otter is experiencing a comeback and is expanding its range. On the other hand redshank and snipe are known to have declined significantly in the river valleys, but the former could be increasing as the influence of the Environmentally Sensitive Area (ESA) Scheme encourages the return of more traditionally managed wet grassland.

Most coastal habitats are experiencing a decline primarily due to sea level rise and coastal erosion. Saltmarshes, for instance , are estimated to be eroding in Essex by approximately 2% per year. A future emphasis on more suitable sea defence options and the protection afforded to many coastal habitats within the SAC/SPAs provides many opportunities to address these trends.

6.17 Water Resources

The Environment Agency has the responsibility of managing water resources in a sustainable and effective manner to achieve the proper balance between the needs of the environment and those of abstractors and other water users. The Environment Agency operates the abstraction licensing system to achieve this (as detailed in Section 5.6.1). In summary, water resources are managed through the abstraction licensing procedures to ensure that:

- the applicant has a real need for the proposed abstraction of water;
- there are sufficient available resources within the catchment for the proposed abstraction;
- the proposed abstraction will not significantly derogate existing water users; and,
- the proposed abstraction will not significantly effect water features, including wetlands.

There a few minor exceptions to the requirement for all abstractions to be formally appraised

through the established licensing procedures. These exceptions, principally dewatering of mineral extraction, can be controlled through conservation notices.

The Environment Agency sets an overall framework for water resources planning and development, through National and Regional water resource strategies. The document 'Water Resources in the Anglian Region' published by the National Rivers Authority in 1994 reviews the resource-demand balance in the Region for the following thirty years. This remains the main statement on water resources in the Anglian Region at present. However, changes are now developing as work is progressed by the Environment Agency, water companies and others on a national review of water resources and demands.

The Regional and National water resources strategies will be revised and updated during 1999 to take account of changes to resource assessments, yields and demand forecasts as well as to ensure full compatibility with the new duties and policies of the Environment Agency.

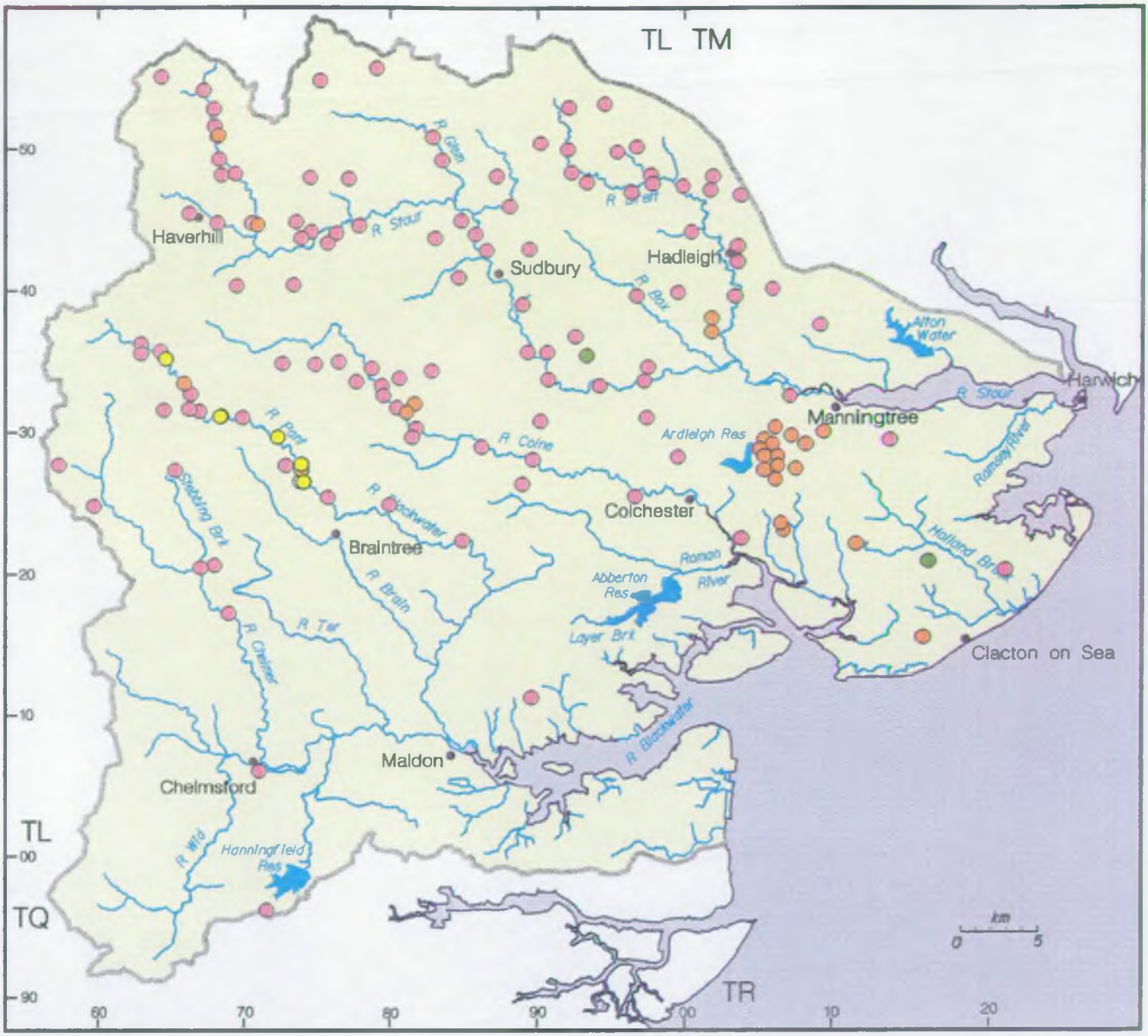
There is still uncertainty as to whether climatic change in the long term will result in an increase or decrease in water resources within the UK. It is thought that water demand will increase above current levels with seasonal and regional distortions to climatic conditions. The DETR's Climatic Change Impacts Review Group (CCIRG) has identified the climatic change implications to be considered by the Environment Agency. There is agreement that the winters are likely to be wetter and stormier and the summer's warmer and drier, especially in south. The Environment Agency will consider the implication of climate change in the formulation of policy and in the delivery of its duties.

The Environment Agency has duties under the *Water Resources Act 1991* to conserve, redistribute, augment and ensure the proper use of water resources. These duties must be achieved within its wider duties under the *Environment Act 1995* to contribute to sustainable development and to conserve and enhance the environment.

To enable it to carry out its duties, the Environment Agency maintains a network of recording stations where hydrometric information such as rainfall, river flows and levels, and groundwater levels are collected (see Map 30). This information provides the basis for water resource assessments and management (for example in licence determination and controls) as well as wider application in the Environment Agency's other functions such as flood defence and water quality. Table 7 highlights the numbers of and types of hydrometric sites within the area and Map 31 highlights surface water monitoring sites.

Groundwater Level Monitoring Points

Map 30



ENVIRONMENT AGENCY

- Catchment boundary
- Main River
- Coastline

- Chalk
- Glacial
- Lower London Tertiaries
- SSSI Wetland

February 1998

Hydrometry – Surface Water

ENVIRONMENT AGENCY

Catchment boundary
Main River
Coastline

River gauging station
Current metering site
Tide level monitoring site
Rainfall monitoring site

February 1998

Type of Monitoring Location	Number Sites in Plan Area
Rainfall measuring sites	12 on telemetry and 52 storage
River gauging stations	31
River level sites	2
Current meter sites	26
Tidal gauges	2
Groundwater level sites	142
Wetland monitoring sites	3

Table 7: number and types of hydrometric sites.

The Environment Agency processes hydrometric data to assist both short-term strategic operational management (particularly for public water supply abstraction, spray irrigation during the summer abstraction season and drought events) as well as determining the long term resource availability. In regards to long-term resource availability, the continued monitoring programme refines the estimate of water allocation which is required for environmental needs as well as the quantity available for abstraction. The Environment Agency periodically undertakes a formal review of all inputs and outputs within each sub-catchment of the overall water resource budget. The hydrometric data which are gathered by the Environment Agency are available to the public.

It is considered that there are problems with the hydrometric coverage within the area. However, these problems are being addressed through several Regional initiatives. Due to the complexity of the hydrological process, the Environment Agency is also undertaking several initiatives to understand the resource allocation required for environmental needs. A typical example of this type of initiative is the 'Hydrological Monitoring of Wetlands' project. This project has resulted in the installation of hydrological monitoring in 52 of the most sensitive wetlands in the Anglian Region followed by ten years of monitoring groundwater and surface water levels. These sites were chosen in consultation with English Nature.

For public water supply the Environment Agency accepts the reference levels of service used by OFWAT, which are:

- a hosepipe ban not more than once in every 10 years;
- voluntary savings of water on average not more than once in 20 years; and,
- the risk of rota cuts or use of standpipes on average not more than once in 100 years.

Water companies may aim to provide higher standards than these.

However, public water supply demands are forecast to rise within the area. To meet the increase in demand a number of options are being considered for the potential future to ensure timely development if needed. These are:

Re-use of Effluents
With increasingly high standards of treatment it is possible to redirect effluents for further use, whether via discharge to rivers or elsewhere. Many river flows already depend on the local return of well treated effluents to maintain low flows and the Agency is keen to see this principle maintained and extended by Anglian Water Services in its consideration of any changes to sewage treatment works. Essex & Suffolk Water are currently applying to relocate the discharge of Chelmsford effluents to give a substantial boost to the yield of Hanningfield reservoir.

Where new developments are located upstream of major reservoir intakes the reservoir yields can benefit from the return of effluents.

Aquifer Storage and Recovery
This involves storing surplus treated water which may be available during periods of low demands in the aquifer for later abstraction during peak periods or when other resources are scarce. It requires the right geological conditions and a suitable source of good quality water. Essex and Suffolk Water and Anglian Water Services are currently investigating potential sites in their area.

Feltwell Reservoir
Feltwell Reservoir (not within the Plan area) is a long term option that would store additional water for transfer to Essex through the Ely Ouse Scheme, as well as having the potential to meet other demands in the Anglian Region. Although investigations are progressing, considerably more work is needed to assess the viability of the proposal, in terms of water availability, environmental impacts and rigorous scrutiny of future demand forecasts. Promotion of such a reservoir will be a lengthy, contentious and potentially high risk process.

Other Reservoir Enhancements
Ardleigh Reservoir crest has recently been raised slightly, to ensure the existing yield is secure, but further increases are unlikely. Essex and Suffolk Water are investigating the raising of Abberton Reservoir, but this will involve many of the same issues regarding environmental impacts as needed for the potential Feltwell development.

Other Options
The water companies are also re-assessing a number of other options that have previously been judged uneconomic or not feasible, such as desalination which is still potentially expensive, and has environmental drawbacks. The Environment Agency remains concerned about these drawbacks, including the high power consumption and disposal of the concentrated waste. It would also be difficult to find suitable locations on the environmentally sensitive coast of Essex.

Spray irrigation is a key input to agriculture in a dry region such as East Anglia. Within the Plan area this is a small component of total demand for water, but the peak use in dry summers is nevertheless significant. Some farmers have licences supported by the Ely Ouse Scheme. The Environment Agency promotes the efficient use of irrigation water and encourages farmers to store winter water in farm reservoirs, where this is appropriate.

The pressures on agriculture in recent years, both from droughts and from the increasingly specific requirements of the supermarket chains, have led to considerable growth in winter storage reservoir construction as farmers seek to ensure reliable supplies of irrigation water.

Although our licensing policy indicates that winter water is available in most catchments, there will still be limits on the total water availability and in some small headwater catchments this point has already been reached. There are also pressures on some small coastal streams of the Essex estuaries where winter storage licences are not currently being granted. As outlined earlier this is to allow the importance of freshwater flows for coastal creeks and mudflats to be assessed in the context of the needs of over-wintering water birds in the SSSI, cSAC and SPA sites.

In the regional strategy we predicted that future demand for irrigation water would rise by 1.7% per year until 2001 and 1% per year thereafter. It is too early to say whether these trends are being followed. These predictions excluded the potential effects of climate change and more recent work indicates that climate change effects could almost double potential demand for irrigation water in the Anglian Region.

Winter storage will inevitably be the main option for new resources for agriculture in the short-term. At the same time the need for efficient use of existing licensed resources applies equally to agriculture and the Environment Agency has continued to liaise successfully with MAFF, the National Farmers Union and other farming organisations to promote efficient irrigation practices, winter storage and active management of scarce resources during droughts.

Modern agriculture is subject to a wide variety of external pressures, but under climate change we believe it will be important for serious consideration to be given to appropriate crop varieties and farming regimes if agriculture in the Region is to be truly sustainable in the long-term.

Unfortunately, there are no additional resources within the area to meet the increase demand in public water supply or agricultural use. However, to achieve these increased targets, given the constraint on resources, the Environment Agency will need to estimate the actual requirements for water level and flow needed for all components of the water environment. The development of river flow objectives from the current in-river needs project as well as the wetland monitoring project should be an essential part of this process.

There are 24 surface water sub-catchments within the Plan area (see Map 16). All catchments are fully committed and no further applications for water abstractions will be considered except for winter surface water.

There are no additional groundwater resources available and no further summer surface water available within the Plan area as they are fully committed. Some additional surface water may be available during the winter periods when flows are generally higher. Abstractors are encouraged to store water in reservoirs for subsequent use in the following summer. These abstractions would also have to undergo analysis to ascertain the impact on the local environment. The abstraction of water for winter storage may not be allowed in certain areas where the flows pass over mudflats of high conservation value.

Over the last ten years river flows and groundwater levels have tended to be lower reflecting the drought of 1989-1993 and the subsequent drought which started in 1995 and looks set to continue. During this period rainfall has been below the annual average for five out of the past

eight years.

Rivers within the Plan area which typically rely on baseflow from groundwater are relatively low for a comparative time of year due. These low levels are principally due to the low rainfall recharge as a result of the continued drought conditions. However, over long time periods drought events are relatively rare even though they may seem a common occurrence at the present time.

Figure 3 illustrates the Chalk and Superficial aquifer water levels within the Plan area and highlights that they are currently at an all time low.

6.18 Flood Defence

Flood Defence powers and responsibilities are set out in the *Land Drainage Act 1991*, and the *Water Resources Act 1991*. In addition, the Environment Agency's sea defence byelaws set out operational powers to preserve the integrity of these defences.

The powers relating to flood defence are permissive. Works are carried out under the auspices of the relevant Local Flood Defence Committee (LFDC), who are responsible for raising and approving the annual flood defence budget and expenditure. The Long Term Plan (LTP) identifies the future needs of the catchment for improving and replacing flood defences, involving capital expenditure.

Both the revenue maintenance and capital programmes are developed within the framework of the following management documents: Shoreline Management Plans (SMPs), Anglian Region Flood Defence Target Standards and Flood Defence Maintenance Frequencies. Although SMPs do not have legal status, the preferred options from each Plan influence the promotion of capital projects and the production of future Long Term Plans. There are seven sub-cells to the Anglian Region coastline with a Shoreline Management Plan being prepared. The Anglian Region Flood Defence Standards and Flood Defence Maintenance Frequencies set out target standards for defending against fluvial and tidal flooding.

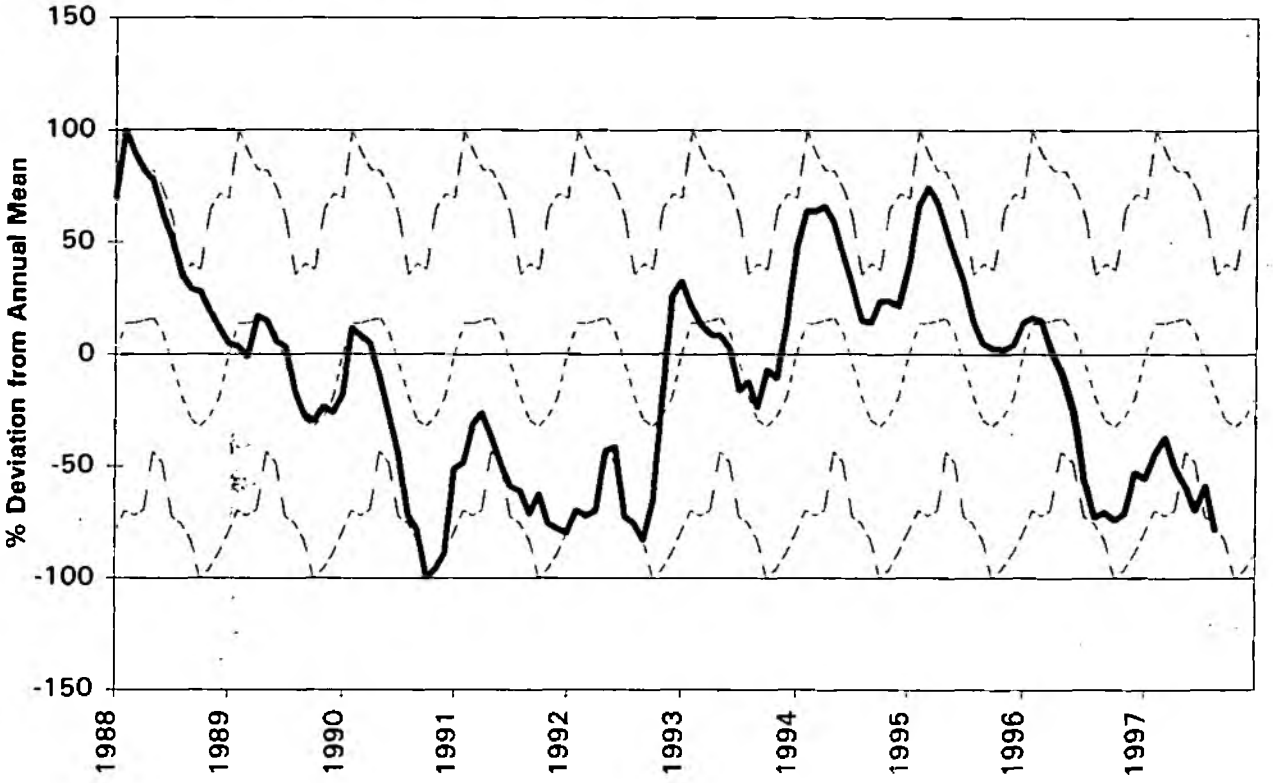
Sea level rise will have a major influence on important coastal habitats. The Shoreline Management Plan identifies the options and recommendations for coastal management. Under the *Habitats Directive* there is a requirement to assure that compensatory measures are taken to preserve the overall coherence of SAC/SPAs in the country. It was not the intention of the SMP to address the issue of replacement habitats to compensate for those lost due to sea level rise and the developing sea defence strategy. However the Environment Agency clearly has a role to play in the identification and creation of compensatory habitat if this is deemed to be appropriate under the legislation and as the result of Flood Defence works.

The Anglian Region is developing a Standards of Service exercise for flood defences. This involves the determination of flood defences and the risk associated with those defences in protecting from floods (*i.e.* 1 in a 100 year risk or a 1 in a 25 year risk of flooding). These risks are determined on previous flood information, tidal levels and fluvial flows.

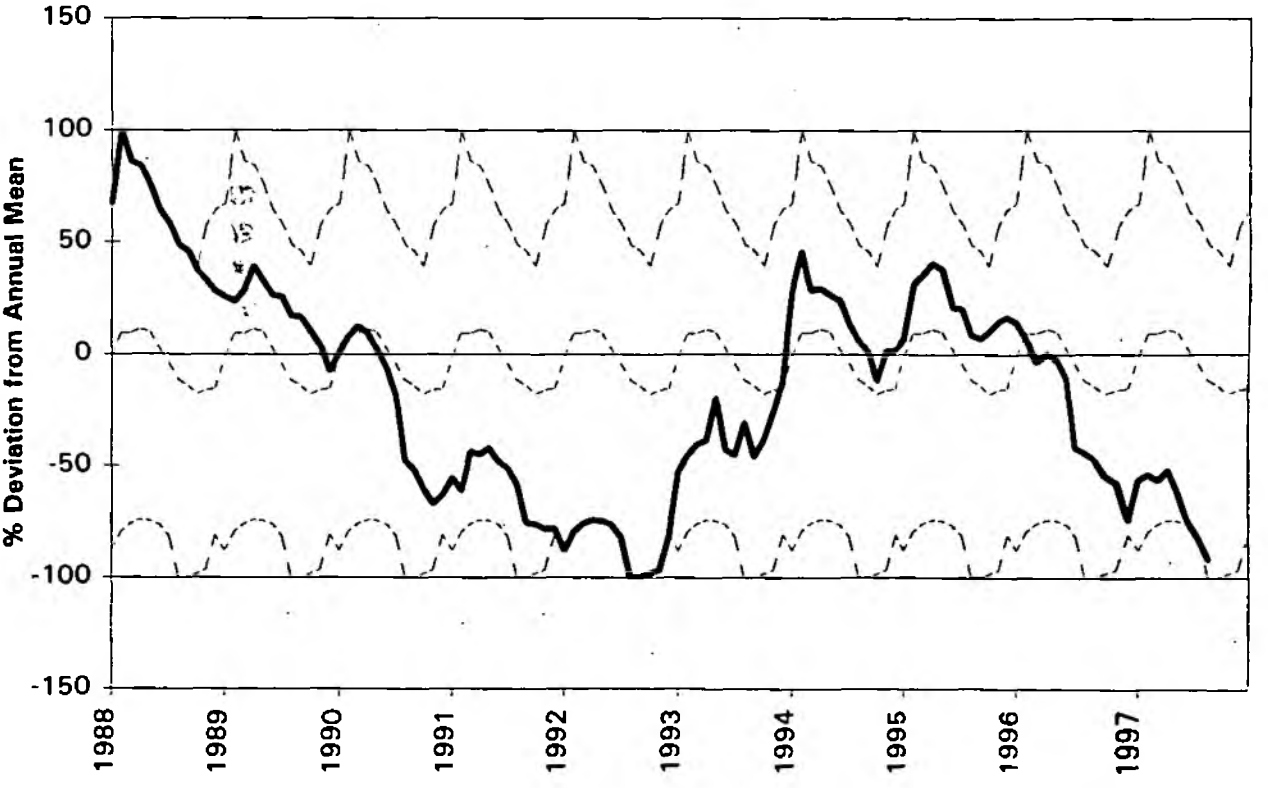
The hydrometric network has an important role to play in the warning of imminent fluvial or tidal flooding. Since September 1996 the Environment Agency has inherited the responsibility from

Figure 3: **Essex Chalk and Essex Gravels**

Essex Chalk



Essex Gravels



the police to disseminate flood warning information to the public. The hydrometric network is used extensively to provide the necessary information to disseminate warnings of flood risk to the public. In terms of flood warning the Environment Agency aims to disseminate information as quickly, as accurately and as comprehensively as possible.

The monitoring of tidal levels in the long term will allow the Environment Agency to make a judgement as to the scale and extent of sea level rise through global warming, if such a phenomenon exists. To retain the same flood defence standards in the event of sea level rise, seawalls and other coastal defences will have to be raised and improved to ensure that present standards are maintained where this is economically, technically and environmentally feasible and sustainable.

The National Flood Defence Target Standards sets out minimum target standards of flood protection expressed as a flood return period. These standards have been adopted by the Regional Flood Defence Committee.

The open coastline and estuaries are a dynamic feature. Sea level rise is proven to be a fact in the Plan area by analysis of the continuous records obtained from the Holland on Sea tide gauge. Fifty years of records show a rise over the period of, on average, 4mm per year. This rise is not a steady one; over a period of 4 years average levels can actually fall. The force waves can generate increases with water depth therefore the defences must withstand more damaging effect as time passes if foreshore levels remain constant. The net effect of sea level rise and land tilt is taken as 7mm per year for the design of new schemes.

The current state of the Plan area defences is good with no major failures since 1953 (one of the longer trouble free runs). The continuation of this good situation requires several things:

- Continued investment in maintenance;
- A willingness to employ new methods of protection (open stone asphalt outperforms concrete blockwork and is cheaper). Beach and foreshore recharge reduces or removes wave effect and benefits the environment;
- A change in emphasis on rural seawall policy. Funding for major improvement (*i.e.* raising) of such defences is unlikely in the future. Therefore other options may have to be explored. Armouring crest and back faces of seawalls will permit overtopping without structural failure. Crest paths thus treated can become a much improved amenity path; Tollesbury Wick seawall has been treated in this way. Back faces can be partially armoured with re-used concrete blocks no longer adequate for sea face duty where severe back face erosion is likely to present problems. As a secondary benefit this would help the Environment Agency's recycling aims.
- Seawalls may be set back on a retired line promoting new areas of salting and providing a new, more sustainable defence. Some sites have been treated thus experimentally at Tollesbury, Northey Island and Bradwell. Opportunities for further work on this basis within the Plan area continue to be investigated.

Risk levels are assessed for vulnerable properties in fluvial flood-susceptible areas. These are prepared using all available data. The problem with such risk assessments is the variability of

weedgrowth. A given flow will generate very different levels between January when no weed growth is present and September when weeds are at their thickest.

Tidal risk on any undefended low land can be assessed simply enough by return periods for given levels. However, where a tidal defence is fissured or in a poor structural state, assessment of risk is less easy. A defence high enough to provide protection from, say, a 1 in 20 year tidal event would not do so if the structure of the defence was in a sufficiently poor state to permit wave damage. This damage could allow the wall to become unstable and full or partial failure resulting at a much lower tide level than the 1 in 20 year event. Hence the need for continued maintenance. One block lost from a seawall face can rapidly become 500 lost blocks if swift remedial work is not forthcoming.

Section 7

Appendices

Appendices, Glossary and Abbreviations

Length (km) of River in General Quality Assessment Classification 1993-1995

The GQA scheme is used to make periodic assessments of the quality of rivers in order to report trends over time across England and Wales. The scheme provides a snapshot of the current quality of rivers and is a means of assessing and reporting upon the general state of controlled waters in a manner which is nationally consistent and independent of the uses to which the waters may be put.

The GQA scheme consists of a number of water quality assessments, each providing a separate window through which water quality is viewed. In this report the chemistry and biology windows are considered.

The Table below details the parameters and limits used in the chemical scheme.

Water Quality	Grade	Dissolved Oxygen	Biochemical Oxygen Demand (ATU[1])	Ammonia
		(% saturation) 10 percentile	(mg/l) 90 percentile	(mg N/l) 90 percentile
Good	A	80	2.5	0.25
	B	70	4	0.6
Fair	C	60	6	1.3
	D	50	8	2.5
Poor	E	20	15	9.0
Bad	F[2]	-	-	-

[1] as suppressed by adding allyl thio-urea
[2] quality which does not meet the requirements of Grade E in respect of one or more determinants

Chemical Classification

Class	Quality	Stour Catchment	Colne Catchment	Blackwater Catchment	Chelmer Catchment	Total
A	Good	2	0	0	35.5	37.5
B		45.8	54	49.5	73	222.30
C	Fair	104.5	11.2	22.5	49	187.20
D		55.5	22.9	9	22.5	109.90
E	Poor	19	28	4	5.5	56.50
F	Bad	0	0	0	0	0.00
Total		**226.80**	**116.10**	**85.00**	**185.50**	**613.40**

Biological Classification

Class	Quality	Stour Catchment	Colae Catchment	Blackwater Catchment	Chelmer Catchment	Total
a	Excellent	107.8	4.5	55.5	49.9	217.70
b	Good	56.5	48.5	10	117.6	232.60
c	Fair	25	41.6	18.5	21.5	106.60
d	Moderate	29	6	2	0	37.00
e	Poor	5	13	0	2	20.00
f	Bad	0	0	0	0	0.00
Total		**223.30**	**113.60**	**86.00**	**191.00**	**613.90**

River Ecosystem Classification
Water Quality Criteria

Class	Dissolved Oxygen % saturation 10 percentile	BOD (ATU) mg/l 90 percentile	Total Ammonia mg N/l 90 percentile	Un-ionised Ammonia mg N/l 95 percentile	pH lower limit as 5 percentile; upper limit as 95 percentile	Hardness mg/l Ca CO^3	Dissolved Copper ug/l 95 percentile	Total Zinc ug/l 95 percentile
RE1	80	2.5	0.25	0.021	6.0-9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE2	70	4.0	0.6	0.021	6.0-9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	30 200 300 500
RE3	60	6.0	1.3	0.021	6.0-9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE4	50	8.0	2.5	-	6.0-9.0	≤10 >10 and ≤50 >50 and ≤100 >100	5 22 40 112	300 700 1000 2000
RE5	20	15.0	9.0	-	-	-	-	-

Compliance With Targets

Compliance is assessed using recognised parametric statistical methods. From the preceding three years data, percentiles and confidence limits are calculated. Confidence limits are the limits within which the 'real' quality is assumed to lie. Use of confidence limits allows us to state, with a known degree of confidence, that a failure to achieve the relevant standards has occurred. The level of confidence chosen for assessment of compliance with RE targets is 95%. Failure against a target can be defined as either marginal or significant and below is a summary of what this means.

Marginal Failure: We are 50% to 95% confident that the river stretch has failed its class.
Significant Failure: We are 95% confident that the river stretch has failed its class.

For a more detailed explanation please refer to the document *Water Quality Objectives: Procedures Used by the National Rivers Authority for the Purpose of the Surface Waters (River Ecosytem) (Classification) Regulations 1994.*

Freshwater Fish Directive 78/659/EEC
Mandatory Standards from Directive
Sampling Frequency - Monthly (Weekly for Thermal Discharges)

Parameter	Salmonoid Imperative Standard	Cyprinid Imperative Standard	Notes
Dissolved Oxygen (mg/l O_2)	≤ 9 ≤ 6	≤ 7 ≤ 4	50% of samples must meet this standard. Absolute minimum.
pH[1]	6 - 9	6 - 9 (O)	Derogation allowed in naturally acidic areas.
Non-ionised ammonia (mg/l NH_3)	≤ 0.025	≤ 0.025	Calculated from temperature, total ammonia and pH.
Total ammonium[2] (mg/l NH_4)	≤ 1	≤ 1	Relaxed standard of 3 mg/l can be applied where there is good evidence of healthy fish populations.
Total zinc (mg/l Zn) Water Hardness (mg/l $CaCO_3$) ≤ 10 > 10 and ≤ 50 > 50 and ≤ 100 > 100	 ≤ 0.03 ≤ 0.2 ≤ 0.3 ≤ 0.5	 ≤ 0.3 ≤ 0.7 ≤ 1.0 ≤ 2.0	Derogation allowed in areas of high mineralisation, natural enrichment or abandoned mines.
Temperature at thermal discharge (°C)	≤ 1.5 ≤ 21.5 (O) ≤ 10 (O)	≤ 3 ≤ 28 (O) ≤ 10 (O)	Temperature change. Maximum absolute limit. Maximum during breeding periods if cold water needed for reproductions for certain species of fish.
Total residual chlorine (mg/l HOCl)	≤ 0.005	≤ 0.005	A suitable test is not yet available for this parameter.

COMPLIANCE: 11 out 12 samples must meet standards for pH, non-ionised ammonia, total ammonium, and total zinc. Where sampling frequency less than 12, all samples must meet the standard.

[1] Artificial pH variations with respect to the unaffected values shall not exceed ±0.5 of a pH unit within the limits falling between 6.0 and 9.0 provided that these variations do not increase the harmfulness of other substances present in the water.

[2] In particular geographical or climatic conditions and particularly in cases of low water temperature and of reduced nitrification or where the competent authority can prove that there are no harmful consequences for the balanced development of the fish population. Member States may fix valued higher than 1 mg/l.

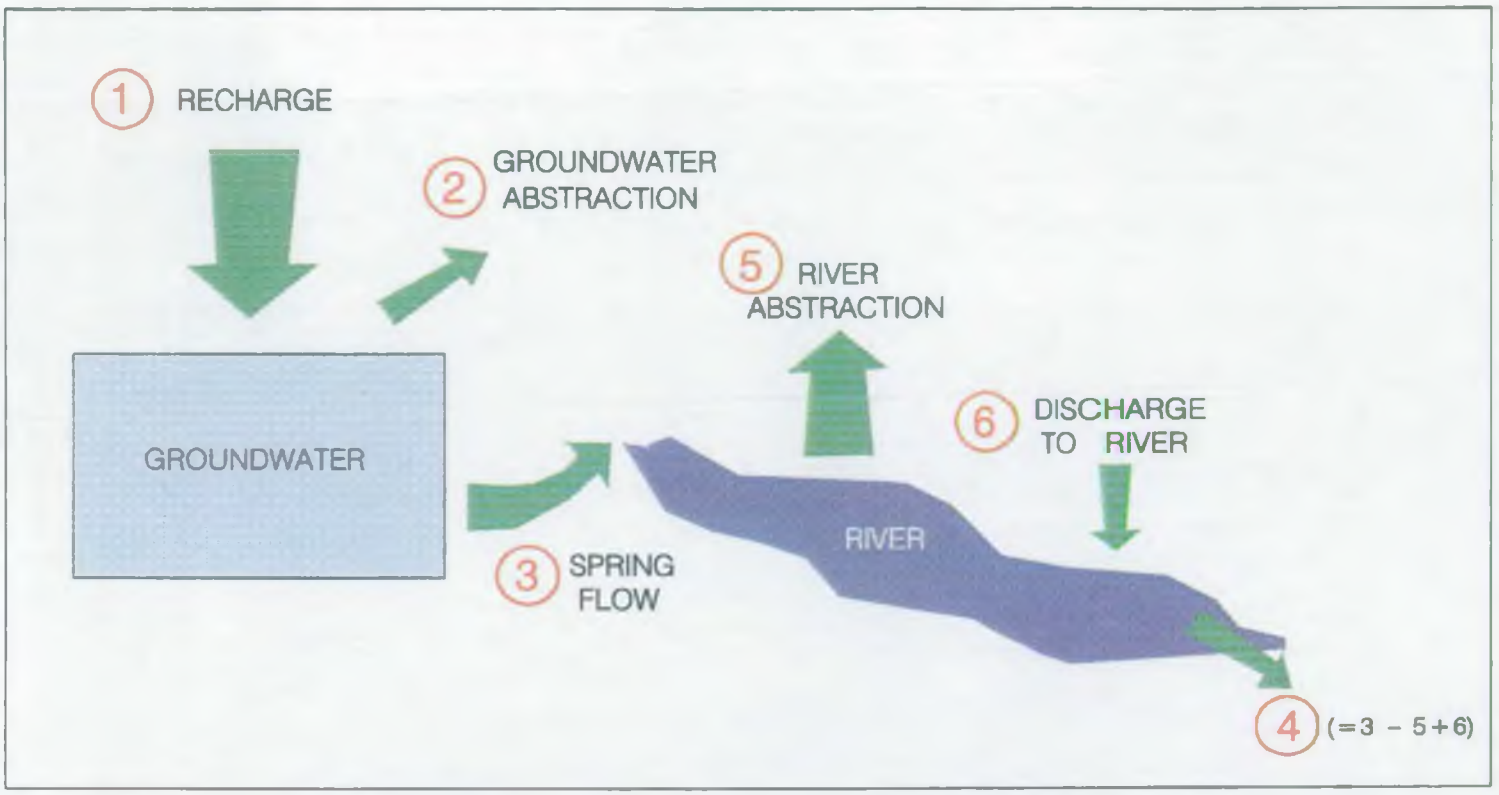
(O) Derogations possible in accordance with Article 11.

Waste Categories

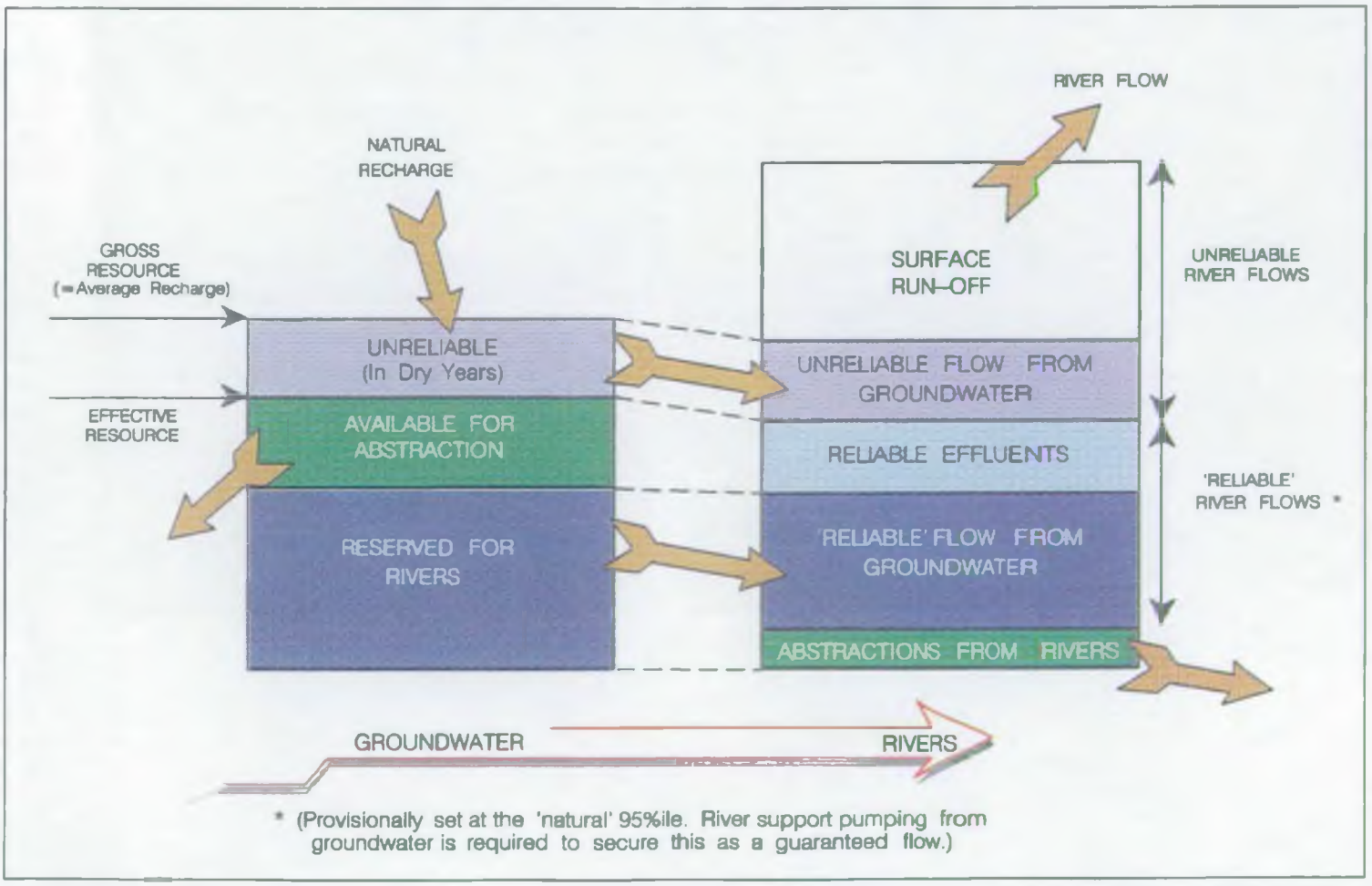
Category Number	Type of Waste
1	Solid wastes which either do not degrade or degrade very slowly, consisting of materials from the following list: subsoil, topsoil, clay, chalk, hardcore, brickwork and mortar, stone, concrete, sand, silica (excluding finely powdered waste), excavated road material (road planings), glass, pottery, china, enamels, ceramics, mica and abrasives.
2	Solid wastes which may degrade and cause pollution if allowed to enter ground or surface waters, consisting of materials from the following list: ash and clinker, boiler scale, paper, cardboard and fibreboard, plastics, plasterboard, leather, floor sweepings, natural and man-made fibres, shot blasting residues, silicate slag, ferrous metals, non-hazardous non-ferrous metals, tar, pitch and bitumen wastes in solidified form, carbon, kieselguhr, diatomaceous earth, calcium carbonate, calcium sulphate, calcium chloride, magnesium carbonate, cement, trees, bushes, weeds and grass, wood and wood products, waste food or materials that include food or vegetable matter, rubber, household waste and empty containers.
3	Waste specified in (a) to (h) below which does not constitute Special Waste within the meaning of the Control of Pollution (Special Waste) Regulations 1980, or requires special procedures in its disposal due to the nature and physical characteristics of the material. a) inorganic acids (hydrochloric acid, sulphuric acid, nitric acid, phosphoric acid) b) organic acids and related compounds (aliphatic acids, aromatic acids, acid anhydrides, acid chlorides) c) alkalis (hydroxides of sodium, potassium or calcium, oxides of sodium, potassium or calcium, carbonates of sodium or potassium, proprietary alkaline cleaners) d) non-toxic metal compounds (iron, titanium, chromium) e) non-toxic organic compounds (dyestuff wastes) f) polymeric materials precursors (resins and unfinished polymeric materials, latex, latex and rubber solutions and suspensions, synthetic adhesive wastes, ion exchange resins) g) miscellaneous (commercial or industrial waste: paint, varnish, lacquer, synthetic adhesive wastes, incinerator ashes, lighting lamps and tubes, transformers with oil cooling systems, car batteries, sewage sludge, car fragmentiser waste, non-prescription pharmaceutical products, contaminated soils, bonded asbestos, empty pressurised gas containers. h) Waste containing materials itemised under Category 4 but which, due to the concentration of those materials, is not a 'Special Waste' under the Control of Pollution (Special Waste) Regulations 1980.
4	Special waste, as defined in the Control of Pollution (Special Waste) Regulations 1980, by virtue of any of the following: antimony and antimony compounds, arsenic and arsenic compounds, barium and barium compounds, boron and boron compounds, cadmium and cadmium compounds, copper compounds, chromium compounds, lead and lead compounds, mercury and mercury compounds, nickel and nickel compounds, phosphorous and phosphorous compounds, selenium and selenium compounds, silver compounds, tellurium and tellurium compounds, thallium and thallium compounds, vanadium and vanadium compounds, zinc compounds, acids, alkalis, biocides and phytopharmaceutical substances, laboratory chemicals, pharmaceutical and veterinary compounds, tarry materials from refining and tar residues for distilling, heterocyclic organic compounds containing oxygen, nitrogen or sulphur, hydrocarbons and their oxygen, nitrogen and sulphur compounds, inorganic cyanides, inorganic halogen containing compounds, inorganic sulphur containing compounds, organic halogen compounds, any medicinal product available only on prescription and asbestos fibres.

Category Number	Type of Waste
5	Clinical waste as defined in the Controlled Waste Regulations 1992 as detailed below: Group A a) All human tissue, including blood, animal carcasses and tissue from veterinary centres, hospitals or laboratories and all related swabs and dressings b) waste materials, where the assessment indicates a risk to staff handling them, for example, from infectious diseases c) soiled surgical dressings, swabs and other soiled waste from treatment areas Group B Discarded syringe needles, cartridges, broken glass and any other contaminated disposable sharp instruments or items. Group C Microbiological cultures and potentially infected waste from pathology departments (laboratory and post-mortem rooms) and other clinical or research laboratories. Group D Certain pharmaceutical products and chemical wastes. Group E Items used to dispose of urine, faeces and other bodily secretions assessed as not falling within Group A. This includes used disposable bed pans or bed pan liners, incontinence pads, stomach bags and urine containers.

Groundwater Balance Methodology



The Allocation of Groundwater to Rivers



* (Provisionally set at the 'natural' 95%ile. River support pumping from groundwater is required to secure this as a guaranteed flow.)

Process in Determining Abstraction Licence Applications

A: Section 32/3 Consent To Drill and Test A Borehole

WHAT	HOW	BY WHO
PRELIMINARY ENQUIRY	Informal. Environment Agency may comment in writing in some cases	Applicant or representative
APPLICATION FORM NOTES SENT		Environment Agency
APPLICATION MADE		Applicant or representative
PRELIMINARY ASSESSMENT	Study resource availability, environmental considerations, consider need/timing for EAP/ environmental report	Environment Agency
SURVEY INSTRUCTION ISSUED	Specify survey area and need for extended environmental report where applicable	Environment Agency
SURVEY	Report on prescribed form all water features within given radius Environmental report provided as necessary	Applicant provides, Environment Agency checks, assesses
CONSENT ISSUED	Specification of borehole construction, pump tests and measurements, other special conditions	Environment Agency
TEST PUMPING CARRIED OUT	Collect and return groundwater data, river flow data, geological data	Applicant, Environment Agency checks
DATA ANALYSED	Depends on qualification and experience of consent holder Review need for environmental report with full licence application	Applicant or Environment Agency Environment Agency

B: Abstraction Licence Application Procedures

WHAT	HOW	BY WHO
ADVERTISE PROPOSALS (when appropriate)	In local newspaper (to be agreed with the Environment Agency) and in the London Gazette.	Applicant
SUBMIT FORMAL APPLICATION FOR ABSTRACTION LICENCE	Submission of appropriate application forms to Environment Agency	Applicant
CONSULTATION	Within Environment Agency English Nature Conservation bodies (When appropriate)	Applicant/Environment Agency
ENVIRONMENTAL APPRAISAL	Assess the effects of the application on water features and protected rights	Applicant
AUDIT OF ENVIRONMENTAL APPRAISAL	Environment Agency reviews the results of the environmental appraisal	Environment Agency
DETERMINATION	Determine application in the light of the technical assessment, public and internal consultation. Recommend refusal or issue of licence, possibly with licence conditions *.	Environment Agency
NOTIFICATION	To licence applicant To consultees on the Authorities decision	Environment Agency

Note: The order and extent to which each of these activities are carried out may vary from application to application. Re-consultation may also take place at any stage during the licence application process.

* Where appropriate, the licence applicant may be required to carry out remedial works to protect licensed abstractions and water features, before a licence can be granted.

Water Level Management Plans (WLMPs)

Water Level Management Plans provide a means by which the water level requirements for a range of activities in a particular area, including agriculture, flood defence and conservation, can be balanced and integrated. The highest priority has been given to internationally important sites such as those SSSI's which qualify as Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites. Water Level Management Plans being prepared for the North Essex Plan area are detailed below.

SSSI	PLAN	PRIORITY	DATE COMPLETED
Blackwater Estuary	Old Hall Marshes	HIGH	12.04.96
	Tollesbury Wick Marshes	HIGH	12.04.96
	Ramsey Marsh	HIGH	31.03.98
	Steeple Marsh	HIGH	31.03.98
	Osea Road	HIGH	30.11.97
	Lauriston Farm	HIGH	30.11.97
Cattawade Marshes	1 Plan	MEDIUM	31.07.98
Colne Estuary	Howlands Marsh	HIGH	21.04.96
	Brightlingsea Marsh	HIGH	30.11.97
	Lang M and Fing Wick	HIGH	21.04.96
	Cudmore Grove	HIGH	01.03.97
Holland Haven	1 Plan	MEDIUM	30.09.98
Hamford Water	Bramble Island	HIGH	01.03.97
	Old Moze Hall	HIGH	01.03.97
	New Moze Hall	HIGH	31.12.97
	Walton Hall Marsh	HIGH	31.12.97
	Horsey Island	HIGH	01.03.97
Roman River	1 Plan	MEDIUM	30.11.98
Upper Colne Marshes	1 Plan	MEDIUM	31.07.98

All of the above Plans have been prepared by the Environment Agency - Anglian Region (Eastern Area) in consultation with other interested parties. The Environment Agency, as operating authority, are responsible for preparing these Plans and further Plans in the future. The Plans will be reviewed on a regular basis and updated or revised if the objectives are unable to be met, or if circumstances change.

Status of Statutory Development Plans

Local Authority	Plan Status	Date
Essex County Council	Pre-Deposit Consultation	Mar 1997
Suffolk County Council	Additional Post-Deposit Amendments	Apr 1997
St. Edmundsbury Borough Council	Further Modifications	Feb 1998
Babergh District Council	Alteration No. 1	Jun 1995
East Cambridgeshire District Council	Deposit Draft	Sept 1997
South Cambridgeshire District Council	Consultation Draft	Aug 1997
Tendring District Council	Proposed Further Modifications	Jan 1998
Colchester Borough Council	Consultation Draft	Oct 1996
Braintree District Council	Adopted Local Plan	Feb 1995
Uttlesford District Council	Adopted Local Plan	Apr 1995
Epping Forest District Council	Notice of Intention to Adopt	Dec 1997
Chelmsford Borough Council	Further Proposed Modifications to Deposit Plan	Oct 1996
Maldon District Council	Adopted Local Plan	Aug 1996
Brentwood District Council	Second Alteration - Deposit Copy	Nov 1997
Basildon District Council	Further Modification	Dec 1997

Major Developments Within North Essex

District/ Borough Council	Town/Village	Name/Place of Development	Type of Development		
			Residential	Industrial	Commercial
Braintree	Black Notley	Black Notley Hospital	✓		
Braintree	Bradwell	Bradwell		✓	
Braintree	Braintree	Kings Park Village	✓ (1000)		
Braintree	Braintree	London Road			✓
Braintree	Braintree	Marks Farm, Coggeshall Road			✓
Braintree	Braintree	Old Lake and Elliott site		✓	
Braintree	Braintree	Rose Hill, Railway Street			✓
Braintree	Braintree	Bus Park, Braintree Town Centre			✓
Braintree	Braintree	Galleys Roundabout			✓
Braintree	Braintree	Suter/Norcross site, Chapel Hill			✓
Braintree	Braintree	Sainsbury Store Town Centre			✓
Braintree	Castle Hedingham	Colne Valley Railway		✓	
Braintree	Coggeshall	A120 Colne Road Junction		✓	
Braintree	Great Yeldham	High Street	✓		
Braintree	Witham	Maltings Lane	✓ (800)		✓
Braintree	Witham	Eastways Industrial Site			✓
Braintree	Witham	Lynfield Motors Site			✓
Chelmsford	Chelmsford	White Hart Lane	✓ (400)		
Chelmsford	Chelmsford	Hornes Farm	✓ (550)		
Chelmsford	Chelmsford	East of High Street Service Road			✓
Chelmsford	Chelmsford	Essex Millennium Centre			✓
Chelmsford	Chelmsford	Ex-RHP site New Street	University Campus and Buildings		
Chelmsford	Runwell	Runwell Hospital Site	✓ (400)		
Colchester	Colchester	Northern Approaches	Housing, Hospital Extension, Business Park		
Colchester	Stanway	Western Approach	✓		
Maldon	Beaumont Wick	A414 Wycke Hill	✓ (400+)		

District/ Borough Council	Town/Village	Name/Place of Development	Type of Development		
			Resid-ential	Indus-trial	Comm-ercial
Maldon	Maldon	Ex-Coal Yard Site, Fullbridge			✓
Tendring	Great Bromley	Boudge Hall Village	✓ (1500)		
Tendring	Great Bromley	The Three Greens	✓ (10,000)		
Tendring	Parkeston	Stena Port Facilities		✓	
Tendring	Thorpe-le-Soken	Thorpe Hall	Retirement Village and Golf Course		

Lengths (km) of River in Each Biomass Class - by Catchment
(Data for 3 years ending 31 December 1997)

a) Coarse Fisheries

Catchment	Class A	Class B	Class C	Class D	Total
Stour	4.7	99.1	11.2	0	**115.0**
Colne	25.2	0	12.3	0	**37.5**
Blackwater	6.7	42.6	0	0	**49.3**
Chelmer	49.4	12.6	4.4	0	**66.4**
Other	0	17.2	4.1	10.0	**31.3**
Total	**86.0**	**171.5**	**32.0**	**10.0**	**299.5**

b) Trout Fisheries

Catchment	Class A	Class B	Class C	Class D	Total
Stour	4.0	11.3	0	10.0	**25.3**
Colne	0	0	0	0	**0**
Blackwater	22.8	0	0	0	**22.8**
Chelmer	21.3	0	4.6	0	**25.9**
Other	0	0	0	0	**0**
Total	**48.1**	**11.3**	**4.6**	**10.0**	**74.0**

c) All Fisheries (coarse & trout combined)

Catchment	Class A	Class B	Class C	Class D	Total
Stour	8.7	110.4	11.2	10.0	**140.3**
Colne	25.2	0	12.3	0	**37.5**
Blackwater	29.5	42.6	0	0	**72.1**
Chelmer	70.7	12.6	9.0	0	**92.3**
Other	0	17.2	4.1	10.0	**31.3**
Total	**134.1**	**182.8**	**36.6**	**20.0**	**373.5**

Essex Fisheries District -EC Freshwater Fisheries Designations

River Name	Upstream Limit	Downstream Limit	Coarse Length (km)	Salmonid Length (km)
Stour	Clare (Mill)	Cattawade (Barrage)	66.2	
Glem	Hartest Tributary	River Stour		4.0
Box	Polstead (Mill)	River Stour		6.7
Brett	Chelsworth (Bridge)	River Stour	20.5	
Colne	Nunnery Bridge	Halstead (Langley Mill)	9.3	
Colne	Earls Colne (Mill)	East Mills	20.1	
Roman	Stanway (Bridge)	Abberton (ESWCo Dam)	9.0	
Pant	Great Sampford (Outfall)	Wethersfield (Mill)		15.4
Pant / Blackwater	Wethersfield (Mill)	Langford (Beeleigh)	45.7	
Chelmer	Churchend (FGS)	Heybridge Basin	48.9	
Can	Wid Confluence	Chelmer Confluence	2.8	
Ter	Great Leighs (Cole Hill Br.)	Chelmer Confluence	13.4	
Total Lengths			235.9	26.1

Total Length Designated: **262.0km**

Notes: points in parenthesis were selected for ease of measurement reference and are not cited in the designations.

List of Organisations Consulted

Anglian Water Services Ltd
Angling Consultative
Association of Drainage Authorities
Association
Atmospheric Research and Information Babergh District Council
Basildon District Council
Birdlife International
Blackwater Project Group
Braintree District Council
Brentwood District Council
British Non-Ferrous Metals Association
British Cycling Federation
British Organic Farmers/Growers' British Canoe Union
British Waterways
British Ecological Society
British Trust for Conservation Volunteers
Business in the Environment
Cement Manufacturers Association
Centre for Environmental Initiatives
Centre
Centre for Accessible Environments
Chelmer & Blackwater Navigation Ltd
Chelmsford Borough Council
Chemical Industries Association
Climatic Research Unit (UEA)
Colchester Borough Council
Colne Estuary Project
Committee of Heads of Environmental Common Ground
Common Ground
Confederation of British Industry
Contractors
Council for Environmental Education
Council for the Protection of Rural England
Country Landowners Association
Countryside Commission
Crouch Harbour Authority
Dedham Vale & Stour Valley Project
DETR
East Cambridgeshire District Council
Education
English Heritage
English Tourist Board
English Nature
Environment Council
Environmental Services Association
Epping Forest District Council
Essex Wildlife Trust
Essex County Council
Essex and Suffolk Water Company
Essex Angling Consultative Association
Exchem Organics
Exwaste Limited
Farming and Wildlife Advisory Group
Flood Hazard Research Centre
FRCA
Friends of the Earth
Harwich Haven Authority
Inland Waterways Association
Inspector of Ancient Monuments
Kent & Essex Sea Fisheries Committee
Linking Environment and Farming
Long Distance Walkers Association
Magnox Electric Plc
Maldon District Council
Ministry of Defence
National Association of Environmental National Association of Waste Disposal National Council on Inland Transport
National Association of Fisheries and National Federation of Anglers
National Association of Boat Owners
National Rural Enterprise Centre
National Monuments Record Centre
National Farmers Union
Otter Trust
Pesticides Trust
River Stour Trust
River Colne Countryside Project
Roman River Valley Countryside Project
Royal Town Planning Institute
Royal Yachting Association
Royal Society for the Protection of Birds
Salmon and Trout Association
Sciences
Shell UK Ltd
Shellfish Association of Great Britain
South Cambridgeshire District Council
Southend-On-Sea Borough Council
Sports Council Eastern Region
St. Edmundsbury Borough Council
Stour and Orwell Estuaries Group
Suffolk County Council
Suffolk Wildlife Trust
Tendring District Council
The Ramblers Association
Thurrock District Council
Tidy Britain Group
Tilbury Power Station
Town and Country Planning Association
Transco
Transport 2000
United Kingdom Irrigation Association
Uttlesford District Council

The Role of the Environment Agency

What We Do

The Environment Agency's work is divided into seven main functions:

Flood Defence: Flood Defence has the role of protecting people and the developed environment from flooding by providing effective defences and protection of floodplains. Safeguarding life is its highest priority and to meet this aim it provides a flood forecasting and warning service. Flood defence also has an aim to protect and enhance the natural environment by promoting projects that are sustainable and work with nature.

Water Resources: This function comprises the conservation, redistribution and augmentation of surface and groundwater supplies. It includes the powers to encourage water conservation and to promote Transfer Schemes and to balance the needs of water users and the environment by issuing licences for users to abstract from rivers and boreholes.

Pollution Control: The *Integrated Pollution Control (IPC)* section regulates the most polluting, or technologically complex, industrial and other processes in air, on land and in water. *Water quality* and pollution control prevents and controls pollution and monitors the quality of rivers, estuaries and coastal waters. *Radioactive Substances* regulate the disposal of radioactive material, including that from licenced nuclear sites, and regulate the accumulation, keeping and use of radioactive materials, except from licenced nuclear sites. *Waste Regulation* set consistent standards for waste management practice to regulate the treatment, storage, movement and disposal of controlled waste. The Environment Agency also has a requirement to register and monitor those who produce waste imposing obligations to re-use, recover or recycle products and materials. Reporting on the extent of contaminated land and contributing to its management is also a matter of our concern, but will be primarily undertaken by local authorities. Abandoned mine operators are also required to work with the Environment Agency so that steps can be taken to prevent minewater pollution in the future.

Fisheries: The Environment agency is responsible for maintaining, improving and developing fisheries. This is carried out by licensing, regulation and enforcement schemes which cover salmon, sea trout, non-migratory trout, coarse and eel fisheries. The Environment Agency also carries out improvements to fisheries by improving the habitat, fish stocks and providing advice to fisheries owners.

Navigation: The navigation function is responsible for managing and improving our 800km of inland waterways, the non-tidal Thames, the Harbour of Rye and Dee Estuary. Its aim is to make these resources widely available to the public for water or land based recreational use.

Recreation: The Environment agency must also take account of recreation and access. Over 1000 sites in our control are managed for recreational use. We also have a general duty to promote recreational use of water and land

have a general duty to promote recreational use of water and land throughout England and Wales.

Conservation: In fulfilling all its functions the Environment Agency is required to contribute to the conservation of nature, landscape and archaeological heritage. We have a *regard* to conserving and enhancing flora, fauna, geological or physiographical features when carrying out our pollution control functions, and a duty to *further* conservation when carrying out our other functions. We also have a duty generally to promote the conservation of flora and fauna dependent on the aquatic environment.

What We Do Not Do

The Environment Agency does not cover all aspects of environmental legislation and service to the general public. Local authorities deal with all noise problems, household and commercial waste collections, air pollution arising from vehicles, household areas, small businesses and small industries and litter.

Planning permission is the responsibility of the local authorities who will contact the Environment Agency *as a Statutory Consultee* when necessary. The local authorities also deal with contaminated land issues in liaison with the Environment Agency.

Environmental health issues should also be directed to local authorities. Sewage treatment is carried out by Anglian Water services and the supply of potable water is the responsibility of the local water companies.

Further Information

Further information on the work of the Environment Agency can be found in a series of Agency strategy documents covering water quality, water resources, flood defence, fisheries, conservation, navigation, recreation and research and development. These documents are available from the Corporate Planning Section at our National Head Office in Bristol. Fact files on rivers and functions and other leaflets may also be obtained from the Area Office (call 0645 333 111).

We maintain several public registers which can be inspected at our Regional Head Office in Peterborough. Information is usually provided free of charge, but for large and complex requests we may charge for staff time and materials. There are also standard charges for some specific searches. Further details about our public registers and the types of information we hold are available in our leaflet *A Guide to Information Available to the Public*. Copies are available from the Public Relations department in Peterborough or the Eastern Area office.

At present, offices may have information relevant only to their local area. It is therefore advisable that you call before you visit to ensure that the information you want is available. Some environmental details and information about our public registers are available on the Internet on **http://www.environment-agency.gov.uk**.

GLOSSARY

Abstraction	The removal of water from any source, either permanently or temporarily.
Abstraction Licence	A statutory document issued by the NRA to permit removal of water from a source of supply. It can limit the quantity of water taken daily etc.
Algae	Microscopic (sometimes larger) plants, which may be floating or attached. Algae occur in still and flowing water.
Algal blooms	Rapid growth of phytoplankton in marine and freshwaters which may colour the water and may accumulate on the surface as a green scum. Decomposing dead cells consume large quantities of oxygen in the water which may result in the waters becoming anaerobic. Some blooms (such as certain species of blue-green algae) may produce poisons.
AMP	An acronym for the Asset Management Plans produced by the Water Companies for the Office of Water Services (OFWAT). It sets out the water industry investment programme for a given period.
AOD (Above Ordnance Datum)	Land levels are measured relative to the average sea level at Newlyn in Cornwall. This average level is referred to as 'Ordnance Datum'. Contours on Ordnance Survey maps of the UK show heights in metres above Ordnance Datum.
Aquatic	Pertaining to the water environment.
Aquifer	A water bearing-stratum situated below ground level. The water contained in aquifers is known as groundwater.
Augmentation	The addition of water by artificial input. (Usually to "top up" low flows in summer by either groundwater pumping or via reservoir release.)
Base Flow	The proportion of river flow that is provided by groundwater discharge from an aquifer.
Biochemical Oxygen (BOD)	A standard test which measures over 5 days the amount of oxygen taken up by aerobic bacteria to oxidise organic (and some inorganic) matter.
Bio-diversity	Diversity of biological life, the number of species present.
Biomass	Total quantity or weight of organisms in a given area or volume - e.g. fish biomass is measured as grammes per square metre (gm^{-2}).
Borehole	Well sunk into a water bearing rock.
Boulder Clay	Residue deposited by glaciers as they retracted at the end of the ice ages. It consists of a mixture of rock fragments, clay, sand and gravels.
Breach	A failure of a flood defence.
Buffer Zone	Strip of land 10-100m wide, alongside rivers which is removed from intensive agricultural use and managed to provide appropriate habitat types.
Catchment	The total area from which a single river system collects surface run-off.
Chalk	A calcium-rich rock formed from deposition of the shells of marine creatures. Groundwater is found within the fissures of the rock.
Coarse Fish	Freshwater fish other than salmon and trout.
Coastal and Estuarine Working Party Classification	A historical summary of the quality of estuarine waters based on points awarded for biological, aesthetic and water quality. Will be overtaken by coastal/estuarine GQA.

Consent (Discharge)	A statutory document issued by the NRA. It can authorise entry and indicate any limits and conditions on the discharge of an effluent to a Controlled Water. A land drainage consent is an approval for specified structural works in areas under NRA control.
Controlled Waste	Industrial, household and commercial waste, as defined in UK legislation. Controlled waste specifically excludes mine and quarry waste, wastes from premises used for agriculture, some sewage sludge and radioactive waste.
Controlled Waters	All rivers, canals, lakes, groundwaters, estuaries and coastal waters to three nautical miles from the shore, including the bed and channel which may for the time being be dry.
Cyprinid fish	Coarse fish eg.Roach, Dace and Bream.
Dangerous Substances	Substances defined by the European Commission as in need of special control. This is because they are toxic, accumulate and concentrate in plants and animals, or do not easily break down into less dangerous substances. They are classified as List I or List II.
Derogation	A legal term that describes a diminution of the water rights of existing water users due to a new abstraction.
De-watering	Removal of groundwater to reduce flow rate or diminish pressure.
Diffuse Pollution	Pollution without a single point source eg. acid rain, pesticides, urban run-off etc.
Diffuse Source	Pollution from non-point sources.
Discharge consent	See consent.
Dissolved Oxygen (DO)	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 the water. It is used to classify waters.
Drought Order	Drought Orders are made by the Secretary of State upon application by the NRA or a water undertaker (Water Company), under powers conferred by Act of Parliament, to meet deficiencies in the supply of water due to exceptional shortages of rain.
EC Directive	A type of legislation issued by the European Union which is binding on Member States in terms of the results to be achieved but which leaves to Member States the choice of methods.
Ecology	The study of relationships between an organism and its environment.
Ecosystem	A functioning, interacting system composed of one or more living organisms and their effective environment, in biological, chemical and physical sense.
Effective Rainfall	Total rainfall minus direct evaporation and the water used by plants for transpiration. This is equivalent to the total resource of a catchment.
Effluent	Liquid waste from Industry, agriculture or sewage treatment plants.
Emergent Vegetation	Plants with roots in the river bed but which emerge from the water. Examples include reeds, iris and bulrush.
Environmental Quality Standard (EQS)	The concentration of a substance which must not be exceeded if a specific use of the aquatic environment is to be maintained.
Environmentally Sensitive Area (ESA)	An area where traditional farming methods may be supported by grant aid from the Ministry of Agriculture, Fisheries and Food (MAFF) to support distinctive landscape, wildlife habitats or historic features.
Evapotranspiration	Water lost by evaporation and water taken up and lost by plants.

Flood Defences	Anything natural or artificial that protects against flooding, to a designed return period.
Flood Plain	This includes all land adjacent to a watercourse over which water flows or would flow but for flood defences in times of flood.
Fluvial	Relating to the freshwater river.
Gauging Station	A site where the flow of a river is measured.
General Quality Assessment (GQA)	A scheme replacing the NWC Classification system. It provides a means of assessing and reporting environmental water quality in a nationally consistent and objective way. The chemical grades for rivers introduced in 1994 uses BOD, Ammonia and Dissolved Oxygen limits for water quality between A (Good) and F (Bad). Other grades for estuarine and coastal waters are being developed and aesthetic components will be measured and graded by a system under trial now.
Geomorphology	Scientific study of land forms and of the processes that formed them.
Groundwater	Water which saturates a porous soil or rock substratum (or aquifer). Water held in storage below ground level.
Groundwater Protection	NRA policy whicb controls activities having the potential to **Policypollute** ground water resources.
Habitat	The customary and characteristic dwelling place of a species or community.
Heritage Coast	The finest example of a coastal and adjacent inland area as designated, through cooperation between the Countryside Commission and local authorities, for it's protection and enhancement of enjoyment by the public.
Hydrogeology	Branch of geology concerned with water within the Earth's crust.
Hydrology	The study of water on and below the earths surface.
Hydrometric	The measurement of water.
In river needs	The totality of requirements for the water environment and effluent dilution before abstraction is taken into account.
Integrated Pollution Control	A system of pollution control, administered by the Environment Agency, that applies to the most potentially polluting or technologically complex industrial and other processes in UK. IPC deals with releases of all media (air, land and water) and uses the principles of BATNEEC and BPEO.
IPC Authorisation	An authorisation issued by the Environment Agency prescribed by the Environmental Protection Act 1990 covering certain operation of processes .
Landfill	Site used for waste disposal into/onto land.
Main River	The watercourse shown on the statutory 'Main River maps' held by NRA and MAFF. The NRA has permissive powers to carry out works of maintenance and improvement on these rivers.
Managed Retreat	The deliberate abandoning of an existing tidal defence in order to obtain economic and ecological advantage. A new defence may be constructed landward of the old line.
National Nature Reserve	An area of national importance for nature conservation.
Nitrate Vulnerable Zone (NVZ)	An area where nitrate concentrations in sources of public drinking water exceed, or are at risk of exceeding the limit of 50 mg/l laid down in the 1991 EC Nitrate Directive, and where compulsary, un-compensated agricultural measures will be introduced from 1996 as a means of reducing those levels.

Nutrient	Substance providing nourishment for plants and animals eg nitrogen, phosphorus.
OFWAT	Office of Water Industry's Financial Regulator of Water Service Companies .
Percolation	The descent of water through soil pores and rock crevices.
Pesticides	Substances used to kill pests, weeds, insects, fungi, rodents etc.
Porosity	The volume of water which can be held within a rock or soil, expressed as the ratio of the volume of the voids to the total volume of the material.
Potable Water	Water of a suitable quality for drinking.
Primary Treatment	Physical treatment of effluent by screening and settlement.
Public Water Supply	The supply of water by companies appointed as Water Undertakers by the Secretary of State for the Environment under the Water Industry Act 1991.
Put and Take	A water stocked regularly with fish already of takeable size and prized food value which will not reproduce (typically rainbow and / or brown trout), with the intent and expectation that a high proportion will be removed immediately by anglers, usually for culinary purposes.
Putrescible Waste	Solid waste which will produce leachate when chemically and or biologically degraded.
Ramsar	Wetland site of International Importance that is designated under the Ramsar* convention (*a town in Iran where the international convention originally agreed in 1975 to stem the progressive encroachment on, and loss of, wetland).
River Flow Objectives (RFO)	A series of flows which aim to reflect the varying in river needs and the seasonality of flow patterns.
River Habitat Survey (RHS)	An inventory survey of physical features of the river and adjacent habitat.
River Quality Objectives (RQO)	The level of water quality that a river should achieve, in order to be suitable for its agreed use. Is being replaced by Water Quality Objectives (WQO's).
Rivers Environmental Database (REDs)	Comprehensive database based on 500m stretch survey of statutory main river. It maps the physical and environmental information and provides a basic conservation resource.
Saline Intrusion	Salt water is heavier than freshwater and will therefore tend to sink to the bottom of a water column. Once salt water has entered a watercourse it is difficult to remove other than by flushing with high flows during floods. It can have profound effects on the ecology of a river.
Saltings	Meadowland or marsh that is periodically flooded by seawater.
Saltmarsh	Expanses of herbaceous plants in the supratidal zone.
Scheduled Ancient Monument (SAM)	The key sites nationally for archaeology, designated by the Secretary of State for National Heritage, through English Heritage.
Sea Defences	Anything natural or artificial that prevents ingress of land by the sea.
Sea Level	As defined by Newlyn. Ground levels are measured as above Ordnance Datum Newlyn (AODN).
Secondary Treatment	Biological degradation of effluent which has already received Primary Treatment. the process may also involve some chemical and physical treatment.
Site of Special Scientific	A site given a statutory designation by English Nature or the

Interest (SSSI)	Countryside Council for Wales because it is particularly important, on account of its nature conservation value.
Soil Moisture Deficit	The drying out of soil, occurring when the loss of water by evapotranspiration is greater than rainfall.
Special Protection Area (SPA)	Statutory protected habitats for wild birds under EC Regulations.
Spray Irrigation	The watering of crops by spraying. Can have a high impact on water resources.
Surface Water	Water collecting on and running off the surface of the ground.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Trade Effluent	Effluent derived from a commercial process/premises.
Underground Strata	A term used to signify geology under the surface soil layer. If groundwater exists, or if water is being discharged to the ground, the geology underneath the soil layer is known in the various Acts of Parliament as 'underground strata'.
Water Table	Top surface of the saturated zone within the aquifer.
Wetland	An area of low lying land where the water table is at or near the surface for most of the time, leading to characteristic habitats.
Winter Storage Reservoir	Reservoirs built by farmers to store water during the winter months when it is "plentiful" for re-use during the summer.

ABBREVIATIONS

AMP	Asset Management Plan
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AWS	Anglian Water Services
BOD	Biochemical Oxygen Demand
CEFAS	Centre for Environment Fisheries and Aquaculture Science
CWS	County Wildlife Site
DETR	Department of the Environment, Transport and the Regions
EA	Environmental Assessment
EC	European Community (European Union)
EQS	Environmental Quality Standards
ESA	Environmentally Sensitive Area
FRCA	Farming and Rural Conservation Agency
GQA	General Quality Assessment
HNDA	High Natural Dispersion Areas
IPC	Integrated Pollution Control
LEAP	Local Environment Agency Plan
LFDC	Local Flood Defence Committee (Essex Committee for this Plan area)
LTP	Long Term Plan
Ml/year	Mega litres per year
MAFF	Ministry of Agriculture, Fisheries and Food
MRF	Minimum Residual Flow
NFU	National Farmers Union
NNR	National Nature Reserve
NRA	National Rivers Authority
NVZ	Nitrate Vulnerable Zone
OFWAT	Office of Water Services
PWS	Public Water Supply
R&D	Research and Development
RCS	River Corridor Survey
RE	River Ecosystem, RE1, RE2, *etc.*
REDs	River Environmental Database
RFO	River Flow Objective
RHS	River Habitat Survey
RNC	River Needs Consent
RQO	River Quality Objective
RIVPACS	River Invertebrate Prediction and Classification System.
SAC	Special Areas of Conservation
SAGS	Stour Augmentation Groundwater Scheme
SAM	Scheduled Ancient Monument
SMP	Shoreline Management Plan
SMR	Sites and Monuments Record
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
TCM	Thousand Cubic Metres per Annum
UWWTD	Urban Waste Water Treatment Directive
VOCs	Volatile Organic Compounds
WLMP	Water Level Management Plan

References and Environment Agency Publications

Local Authority Statutory Development Plans

Structure Plans

Essex County Council, *Pre-Deposit Consultation Structure Plan*, March 1997

Suffolk County Council, *Additional Post-Deposit Amendments Structure Plan*, April 1997

Local Plans

St. Edmundsbury Borough Council, *Further Modifications*, January 1998

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Brentwood District Council, *Deposit Copy, 2nd Alteration*, November 1997

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Local Authority Strategy and Other Documents

Essex County Council (1992) The Essex Environment

Suffolk Local Planning Authorities (1997) Suffolk's Environment...Towards Sustainable Development

Suffolk County Council (1993) Suffolk Countryside Strategy

Stour and Orwell Estuaries Group (1996) Stour and Orwell Estuaries Management Plan

The Blackwater Project (1996) The Blackwater Estuary Management Plan

Essex County Council (1995) Directory of Walks and Rides

Environment Agency (and NRA) Publications

Environment Agency (1996) *Riverside Owners' Guide*

Environment Agency (1997) *Integrated pollution control and Radioactive Substances in the Anglian Region*

Environment Agency (1996) *Action for Wildlife in East Anglia*

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NOTES

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